In Pursuit of Prosperity

Education in North Carolina as the United States Becomes a Wealthy Nation

LARRY K. MONTEITH

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PROLOGUE

The author is not a historian nor an economist, so the content of this book is mostly factual fragments of analysis from the research of others. The themes of this book are derived from curiosity about the development of an economy in a new country that included innovations for improving production in agriculture and manufacturing, which resulted in the creation of institutions for “practical” education and opportunities for employment. The word “practical” in education was chosen to compare the objectives with those in traditional classical education and to emphasize the value of education in occupations created by the innovations, discoveries, and improvements that were important to expanding and increasing the wealth of the country.

The title embodies four characteristics of the book. First, most of the content is based on the author’s curiosity, seeking significant and historical examples of pursuits of prosperities. Second, the continuity is the sequence of difficulties encountered in the State of North Carolina while in other states there were opportunities for people to gain prosperity. Third, the vague concept of prosperity was chosen to broadly include those measures occurring across the centuries, such as property ownership, domestic manufacturing, trades, and employment in occupations that provided more than the daily necessities for men and women who may have lived in poverty. Fourth, the four centuries permitted the curiosity to extend into the origins of customs, prosperity, and conflicts within England that were duplicated to some extent in the United States.

The brief description of the development of England and then Great Britain as a wealthy nation illuminates the fact that plantations, labor, sugar, tobacco, landed gentry, voting rights, class conflicts, indentured servants, slavery, factories, cotton, and trade unions were part of building another great nation of wealth with constitutions as guardians of the freedom to establish culture, society, and governance that eventually emerged in North Carolina, with a great deal of experience on arrival as English settlers.

The first draft of curiosities was written with the theme of practical education in the United States creating opportunities for pursuits of prosperity. However, the theme of this later version combines the motivation of innovations with the application of practical education that were prominent in the establishment of the existing culture, society, and economy of mostly subsistence living. The pursuits

of prosperity include discoveries and improvements in transportation, agriculture, manufacturing, and a variety of domestic necessities that increased productivity with various occupations for wage earners.

In this work, the development of the cultures, societies, and economies in the new colonies of America begins before the establishment of states and their identity from governance, trade, innovations, improvements, investments, labor, occupations, and education to increase and spread the wealth. Although pursuits of prosperity in the states increased the wealth of this new country, local innovations and education defined the culture, society, and economy for each state.

The search for innovations, education, and prosperity has depended on the assistance of dozens or more librarians at institutes and colleges throughout the country. Special thanks for the attention from Honora Eskridge, David Zwicky, and Greg Tourino at the North Carolina State University Libraries who helped me clarify my questions and always responded thoughtfully. In addition, guidance from Professor Emeritus John Riddle of the History Department at the NC State University greatly improved the continuity for the search for prosperity. With his evaluation and suggestions, in a sense the effort was transformed from mostly an atlas to the themes of innovation and education. However, the support from Nancy Monteith provided the encouragement to undertake the search after ten years of our retirement and to continue over the last seven years.

Part I

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Great Britain and the Establishment of the Colonies of North America

Early England Economy

Before the sixteenth century, England was altogether an agricultural economy with domestic manufacturing articles organized solely to provide for the internal consumption of necessary goods; but eventually raw wool for spinning and knitting was exported to benefit the king and noblemen. Except for a few towns established by occupiers during and after wars, by traders at ports, by fortifications against invasions, or by attractions to an abbey or a monastery, the country was divided into manors, villages, or districts in which one person known as the lord “possessed certain important and valuable rights over all the other inhabitants” granted by the current king.¹

Although “three-fifths or two thirds of the whole” owned by the lord was cultivated for his immediate benefit, all the land of each manor was cultivated with the joint labor of slaves and commoners under the supervision of the bailiff who managed the manor for the lord.² In addition, there were men and women in the community capable in all necessary occupations and crafts such as carpentry, blacksmithing, weaving, and sewing; however, almost everyone was engaged in cultivation.

For lords with a grant from the king that included jurisdiction of criminal enforcement, the punishment by hanging for grave crimes could be administered “at the places where they had sinned.”³ The fundamental characteristics of each manorial enterprise were “its self-sufficiency, its social independence.”⁴

Even though the manors were essentially isolated communities, any agricultural production beyond requirements for their own consumption was transported to markets in the evolving towns where the sale by the bailiff of the manor resulted in money for the lord. In addition, other commerce occurred from the year-to-year

routines of trading or purchasing from other manors supplies required for agricultural production, such as salt for preserving meat, iron for making and repairing ploughs, and millstone for grinding corn.⁵

With a charter some of these manors developed into towns with valuable rights and privileges that eventually included governance, taxation, and income to the lord or king.⁶ As the commerce expanded, the economic activities in these towns were organized by merchants who established a guild “for more or less religious and charitable purposes”⁷ with a bond by oath and “a guild-feast, held once a month in the common hall.”⁸

The merchants who were members of their guild were privileged with a monopoly of the local trading in the town that also excluded outsiders. After serving a year in the guild, a member was declared a free man; that permitted him to participate in the governance of the town.⁹ By the thirteenth century some of these towns had become centers of “specialized industries, regulated and organized by the craft-guilds”¹⁰ that included cloth, blankets, linen, cord, bakeries, fine bread, knives, needles, razors, gloves, leather, marble, tin, and iron.¹¹

Subsequently, the king classified some of these products as staples, which permitted the merchants in the staple towns to trade with other towns and at other foreign ports. In addition, country market towns were established that opened one or two days a week for trade with special officers appointed “to prevent frauds and adulteration of goods” and “to keep prices at a ‘natural level,’ and to regulate the cost of manufactured articles.”¹²

Once a year Great Fairs were held in different parts of England, which added to the expansion of internal commerce and to the wealth of the merchant class as well as the king, who had provided the privilege for his portion of the wealth that was created. In addition to the development of the merchant class engaging in commerce, in the larger towns, manufacturing crafts were establishing guilds, which “tried to secure good work on the part of its members, and attempted to suppress the production of wares by irresponsible persons who were not members of the craft.”¹³

In doing so, a system was established whereby each master of a craft trained apprentices, most of whom were eventually admitted to the guild. In the sixteenth century there were combinations and associations of workmen who were employed with regulations regarding the maximum number of apprentices for each master or journeyman. With payments from the apprentices’ parents, a town-magistrate determined the age before bonding; the hours of labor in summer, winter, and Easter; and their wages.¹⁴

Development of Trade

With navigation for wealth during the sixteenth century, kings and queens in European states supported ocean voyages southward to Africa and westward toward the continent of the Americas to claim islands and territories. Subsequently, the search for precious metals and harvests of rare products eventually depended on the labor of slaves throughout the Americas with British settlements of plantations in the West Indies. However, a triangle of trade involving slaves began with exports of cloth, iron works, and guns from London, Liverpool, and Bristol to Western Africa where the exports were exchanged for African women, men, and children. Subsequently, the slaves were transported and then sold at markets in the West Indies. With the money from the slave market, sugar, coffee, and tobacco purchased from plantations were transported to Great Britain and then sold at the markets in the larger towns.¹⁵

In addition to occupying a growing number of islands and inland settlements on the North and South American continents, the growing prosperity from crops of sugar, tobacco, rice, indigo, and cotton depended on increasing the number of African slaves laboring on the plantations. Over three centuries, more than nine million Africans were forcibly transported across the Atlantic Ocean with forty-one percent of the slaves transported to Brazil, forty-seven percent to colonies in the Caribbean, seven percent to American colonies and states combined, and five percent to other countries. Although a large number of slaves were required to produce tobacco and cotton in the American colonies and states, sixty to seventy percent of the imported slaves produced sugar in the European colonies.¹⁶

In addition to prosperity from productions of slaves on plantations in the West Indies, in the trade among countries and colonies during the reigns of kings and queens from Henry VIII in the sixteenth century through George III in the nineteenth century, monarchs relied on the mercantile system to “enrich the country by achieving an advantageous balance of trade”¹⁷ with their wealth measured in the accumulation of silver and gold. However, a great deal was spent to wage wars against France, Spain, and the Netherlands, which included building ships for establishing a large navy for invading Ireland and Scotland, which required conscripting men and training an army. In simple terms as written by Adam Smith, mercantilism was driven by “two great engines” of “the encouragement of exportation, and the discouragement of importation” for certain commodities; “yet with regard to some other particular commodities it seems to follow an opposite plan.”¹⁸

With bounties encouraging and duties discouraging gaining advantages in the balance of trade; generally, importations of raw materials for domestic manufactures were more likely to be encouraged and exportations more likely to be discouraged “in order to give our own workmen an advantage, and to enable them

to undersell those of other nations in all foreign markets.”¹⁹ Although ordinances existed in England to gain advantages for the Crown in balance of trade with other countries before the seventeenth century when English lords were chartered to create companies and plantations, the primary objectives of trade for the initial settlements established in North America were exportations of raw materials of natural products and harvested crops with advantages for wealth to the investors and duties for wealth of their majesty.

Among the Puritans and proprietors who were chartered by the king to establish settlements in the seventeenth century, the first pursuit of prosperity that survived on the North American continent under the flag of England occurred during colonization for wealth. This depended on voyages to faraway continents and islands with the primary purpose of searching “for minerals and for a route to the southwest, and to secure for trade the materials which were native and peculiar to those regions.”²⁰

In 1606 King James I issued a charter “to make Habitation, Plantation, and to deduce a Colony of sundry of our People into that Part of America, commonly called Virginia.” The king made it clear that one-fifth of the gold to be found in Virginia belonged to him.²¹

With the king claiming only part ownership, a group of noblemen took the responsibility for organizing the Virginia Company of London in which they invested funds to provide for the cost of the voyages. Over the first decade of establishing the settlement, which had been located along the Chesapeake Bay, the company retained more than a dozen ships loaded with supplies and more than a thousand passengers in total who ultimately were “subjected to the ordinances of a commercial corporation, of which they could not be members; to the dominion of a domestic council... and finally, to the arbitrary legislation of the sovereign.”²²

Most of the settlers were not prepared for the challenges of establishing a community that required their labor for survival in the provision of food and shelter while warring with natives and also searching for minerals and a passage to the westward seas. Even though gold mining did not occur nor was a route to Asia traveled, and the first products exported to England were timbers, there were additional investors who were confident in the financial success of the Virginia Company, which had become a private company that ultimately depended on cultivating, curing, and exporting tobacco as the hope for wealth.²³

Fortunately, John Rolfe, who subsequently joined the settlement and married Pocahontas after his wife died, began to experiment with growing varieties of tobacco from other climates that resulted in producing leaf that rivaled the quality of the tobacco that had been imported to England from Spain.²⁴ With seven thousand tobacco shops already in London alone by 1614, the established market responded favorably to the tobacco imported from America.²⁵ This encouraged the

rapid expansion of planting tobacco throughout the settlement occupied by the Virginia Company. While trade from and to colonies was under the control of the motherland, all the settlers were growing tobacco, which resulted in sixty thousand pounds in weight exported to England in 1622 with production doubling over the next two decades.²⁶

During the first half of the seventeenth century, while under the authority of proprietorships of lords of England, the settlements in North America were developing their own governance and pursuing various productions for trade to support their progress; however, some instructions were intermittently received from different committees and commissions in England that were in charge as advisors to His Majesty, including the most prominent Privy Council.²⁷

With additional settlements developing in North America, the population increased by about forty thousand.²⁸ Consequently as much as a million pounds of tobacco was exported from Virginia and Maryland in seven ships built in Massachusetts to carry "fish, pipestaves, masts, skins, beef, and pork" for trade in foreign ports by 1648.²⁹ Subsequently Parliament appointed a Council of Trade with instructions to review all components of domestic and foreign trade that included the plantations.³⁰ Also, the council was asked to consider how these plantations could be controlled and made more useful for the Commonwealth of England by multiplying, improving, and supplying commodities for whatever was important for the needs of the country.³¹

Over the last half of the seventeenth century, the development of trade in the North American colonies received more attention after Parliament decided to gain more advantages in trade for England. Attempts to regulate trade resulted in a series of Navigation Ordinances enacted by Parliament from 1651 to 1669, with the first one requiring carry for imports and exports of goods and commodities at the ports of English Plantations to be either on ships owned by English persons or on ships with the same of the master and three-fourths of the crew. To regulate some trade with the colonies, certain goods and commodities produced for exportation by the plantations were enumerated and restricted for shipment to ports belonging to His Majesty with tariffs included for advantages to England.³²

Those goods enumerated by an act of Parliament included sugar, tobacco, cotton-wool, indigoes, ginger, fustic, or other woods for dyeing from the growth, production, or manufacture on English plantations in America that were in demand in England.³³ In the Navigation Act of 1663 another regulation controlling trade by requiring foreign goods to be routed through the ports of England on their way to American plantations resulted in additional levies, greater advantages for His Majesty, and higher costs for colonials.³⁴

Parliament expected the routing of foreign goods through the ports of England to establish staple centers of commodities and goods for the "Kingdome," somewhat

like the staple towns created centuries earlier within England, in which His Majesties' subjects on the plantations would maintain "a greater correspondence and kindness" as a source for producing raw materials to be imported into the ports of England and in turn consumers of "English Woolen and other Manufactures and commodities" exported to the plantations.³⁵

During these last decades of the seventeenth century, the number of colonies grew from seven to twelve, with the population increasing fivefold and forty percent of the North American colonials living in either Virginia or Massachusetts.³⁶ In these twelve American colonies, production of raw materials and agriculture for trade varied from northern to southern climates, soils, and forests. In northern colonies, the prominent products for trade were timber, lumber, grains, fish, pork, beef, and tar. Agriculture dominated the southern colonies with the prominent crops of tobacco, rice, and indigo grown on plantations.

Although the exports from the southern colonies were more than five times greater in value than those of the northern colonies, the imports to northern colonies were about equal in total value to that of the southern colonies.³⁷ Most of the imports were from English domestic manufactures that produced woolen, linen, silk, brass, iron, pewter, and leather goods.³⁸

With trade by the colonials increasing, eight of the original charters authorizing the founding of companies or settlements were revoked. With the establishment of royal colonies, constitutional governance was reviewed by Privy Council of Lords reporting to the English monarch, and the governor was appointed by the monarch. To provide more oversight of trade, the Navigation Act by Parliament in 1696 required governors to enforce trade regulations and establishment of courts with a single judge deciding the outcome of trials. In general these navigation acts were established to regulate foreign trade; however, when woolen goods by domestic productions in North American colonies were considered competition to the number-one industry of manufactured products and the pride of England trade, the Woolen Act of Parliament in 1699 restricted, except for production in England, all trade of wool and woolen goods to the origin in which the sheep were born, yarn spun, and goods produced.³⁹

As the unrest grew and the number of acres of the cash crop of tobacco cultivated increased the pound weight exported into England during the seventeenth century, another opportunity for importing a cash crop from the colonies into England was developing with domestic manufacturers of cloth consuming as much as one million weight pounds of cotton that had been grown in the East and West Indies. Importing cotton as a competitor to wool for weaving cloth occurred even though the largest part of the economy depended on trading woolen goods manufactured within the cottage industries in England that consumed the annual production of raw wool. Even with the dominance of domestic manufactured woolen goods, the

bales of cotton imported from the colonies to the domestic manufacturers were increasing, which inspired a few men in the first half of the eighteenth century to experiment with ways to improve productivity in spinning yarn and weaving cloth.⁴⁰

Innovations and Wealth

Even with innovations that ultimately ignited the Industrial Revolution in England in their infancy, the labor engaged in domestic manufacturing, which included home production, continued to spin yarn and weave cloth as they were taught by their ancestors. The families who manufactured in their homes were usually self-sufficient with enough land to garden and to house livestock for agricultural efforts necessary to feed themselves. The society and economy remained relatively stable for most of the people engaged in domestic textile manufacturing during the first half of the eighteenth century, while both raw wool and cotton were imported for the purpose of increasing textiles manufacturing.⁴¹

Although there was a continuing preference for woolen goods, fashions of “Indian printed calicoes” styled from cotton cloth were sold in London, which violated an act of Parliament that was intended to protect the market for the manufacturers of woolen goods.⁴² Even with cotton consumption increasing almost fourfold by mid-century, the export of manufactured woolen products grew twenty times that of cotton goods.⁴³

By the end of the eighteenth century, the market for cotton goods was growing faster than for woolen goods with more than fifty-six million pounds of cotton imported into England, which was one-half the consumption of wool obtained from domestic and importing sources. With the demand for manufactured cotton goods continuing to grow throughout the first four decades of the nineteenth century, the consumption of imported cotton increased tenfold in England and grew to double that of the consumption of wool.⁴⁴

This rapid growth in manufactured cotton goods was enabled by a dozen or more inventions and innovations with the development of machines replacing hands that ultimately and dramatically increased the productivity of domestic yarn spinning and cloth weaving. One of the earliest innovations was developed by John Kay, who received the patent “A New Engine or Machine for Opening and Dressing Wool” in 1733 that included the “fly shuttle” to be used with a wider loom, which permitted one person to weave wider cloth in shorter time.⁴⁵

The essence of the invention was a widened loom with a mechanism attached which was designed so that one person instead of two could operate the loom by propelling the shuttle back and forth across the warp or longitudinal threads with the yank of a cord. The mechanism became known as the fly shuttle; however, there

was vicious opposition to using the mechanism by those domestic workers “who feared that they would lose their employment.”⁴⁶ To avoid anger and persecution, Kay left England to reside in Paris.

Another significant step in the production of cotton goods was described in a “Patent for Spinning by Rollers” filed in 1738 by Lewis Paul which was actually the invention of John Wyatt. Processing raw cotton into yarn involved cleaning, aligning, drawing, and twisting the fibers before winding the yarn on a bobbin. The essence of the Paul innovation was a mechanism for drawing the fibers after carding with brushes or combs which had loosely aligned the fibers into the form of a rope or wick also referred to as *sliver*. The drawing mechanism described in the patent consisted of a pair of cylindrical surfaces rotating at one speed and positioned so that the loose rolls of fiber from carding would pass between the rolling surfaces and then be drawn into smaller cross-sections and further aligned by a second pair of cylindrical surfaces rotating at a higher speed through which the fibers passed before being drawn and twisted into yarn. By varying the difference in the speeds between the input and output rollers, the patent claimed that the thread could be “any degree of fineness which may be required.”⁴⁷

During the decade of the 1760s James Hargreaves invented a machine that greatly improved the productivity for a spinner of yarn, which he constructed, operated, and sold to other spinners of yarn. This innovation resulted in the development of a continuous process of production which could be operated by one person while simultaneously spinning on multiple spindles of yarn, although drawing the “loose thread, about the thickness of a candle wick” and twisting the cotton into yarn for each spindle was a unique arrangement.⁴⁸

Hargreaves’ greater contribution was the development of a machine to produce thread from roving (slightly twisted strands of cotton fibers) with hands directing and powering the machine by turning a wheel which was connected by a band or rope to an elongated horizontal cylinder attached to a frame with a number of continuous bands along the cylinder connecting through the wharves (pulley at the end of a spindle) on the spindles mounted on the same frame, with rotational power provided to each spindle from a band around the cylinder connected to the wheel rotated by the worker.⁴⁹

With a mechanism on rollers atop the frame and connections of loose fine thread through a clamp for drawing (stretching and aligning) and twisting onto each vertical spindle, the machine known as the Spinning Jenny began the era where the inventions of labor-saving machinery were introduced in the factory production of cotton goods. While these inventions were developed for domestic manufacturers who actually refused to adopt mechanical assistance, these mechanisms were the foundations for the machines developed in the second half of the eighteenth

century that increased productivity in the manufacturing of cotton goods by replacing skilled labor.

From 1770 to 1803, there were five inventions or innovations that accelerated the manufacturing of cotton cloth in England and consequently the production of cotton throughout the colonies. In 1770 Sir Richard Arkwright patented and developed the water-powered spinning frame that produced cotton yarn strong enough to weave one hundred percent cotton cloth. In 1776, Samuel Crompton introduced the mule-spinning machine that incorporated the principles of the jenny and a spinning water-powered frame that occurred before the steam engine designed by James Watt was introduced into a factory of cotton spinners in 1785, with the power loom patented in 1785 and followed by the invention of the cotton gin by Eli Whitney in 1793.⁵⁰

From the time of the Arkwright patent of water power to the steam-engine-driven spinners, the imports of cotton to England grew from more than four million in 1771 to eighteen million weight pounds in 1785 and tripled to fifty-six million by 1802.⁵¹ With each invention increasing the productivity and then combining them into factories of laborers, the rate of consumption of baled cotton resulted in the expansion in the number of acres planted and in the number of the laborers to plant, pick, gin, bale, and export cotton.

Control and Unrest

British Parliament passed the Sugar Act in 1764 with expectations that “new provisions and regulations should be established for improving the revenue of this kingdom, and for extending and securing the navigation and commerce between Great Britain and your Majesty’s dominion in America.”⁵² Raising new income depended on increasing duties on non-British goods such as indigo, coffee, wines, silks, and other products manufactured in Persia, China, and East India and imported to the colonies.

After manufacturing for trade in the colonies had been discouraged and trading had been controlled for more than a century by laws enforced by representatives of Parliament, unrest in the colonies began to grow in intensity and purpose in 1765 with the Stamp Act that required colonists to pay a duty for a stamp on all paper, parchment, and pamphlets of all sorts available in the colonies, and with the Quartering Act that required colonial officials on necessary occasions “to quarter and billet the officers and soldiers in His Majesty’s service.”⁵³

During the debate of the House of Burgesses of the colony of Virginia in 1765, Patrick Henry described the authority vested in Parliament to tax the colony as “a Manifest Tendency to Destroy American Freedom”; therefore, any other than the

General Assembly of Virginia who “have the Right or Authority to lay or impose any Tax whatever on the Inhabitants thereof, shall be deemed, an enemy to this His Majesty’s colony.” Henry was not proposing a revolution; however, he opposed the Stamp Act as a tax law specific to the American colonies with his resolve “That the General Assembly of this Colony, together with His Majesty or his substitutes, have in their Representative Capacity, the only exclusive Right and Power to lay Taxes and Imposts upon the Inhabitants of this Colony.”⁵⁴

Although the Stamp Act was rescinded in 1766, the Declaration Act made it clear that Parliament could make laws that were binding in the colonies. Further agitation of the relationship between the colonies and Great Britain was stirred in 1767 when Parliament passed the Townshend Act that included raising revenue from taxes on paper, glass, lead, and tea imported from Great Britain into the colonies.⁵⁵

Even with the message of “no taxation without representation” originating in Boston, well known and supported among the colonies, Parliament invoked punishment in May 1774 for the actions of the colonists in the Boston Tea Party that occurred in December of 1773 by passing a more comprehensive Quartering Act that applied to all colonies and three more acts including the punishment of Boston by closing the port in Boston until payment was made for destroyed tea, altering the existing system of governance and rearranging the administration of justice in Massachusetts. The public referred to the action by the Parliament as the “Intolerable (Coercive) Acts” with great resentment toward cancelling the charter by which Massachusetts was governed and subsequent appointment of a British general as governor that provoked growing concerns about the relationship between the American colonies and Great Britain.

On October 7, a Provincial Congress of Massachusetts met in Salem without the governor and chose John Hancock as the president. With many citizens in other colonies agreeing that the acts by Parliament violated the rights of the citizens of Massachusetts, the colonies were ready to unite in purpose with their representatives meeting September 5, 1774 in Philadelphia. The fifty-six delegates in attendance representing eleven colonies at the first Continental Congress at Philadelphia on October 14, 1774 resolved that “the inhabitants of the English colonies in North America, by the immutable laws of nature, the principles of the English constitution, and the several charters or compacts” were guaranteed rights that included life, liberty, and property; entitlement to the common law of England; peaceable assembly to consider grievances and petition to the king; keeping a standing army in times of peace and a “free and exclusive power of legislation in their provincial legislatures, where their right of representation can alone be preserved, in all cases of taxation and internal polity, subject only to the negative of their sovereign.”⁵⁶

The delegates of the twelve colonies of New Hampshire, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania, Delaware, Maryland,

Virginia, North Carolina, and South Carolina avowed, in the Articles of Association adopted at their meeting on October 20, 1774, their allegiance to His Majesty and “affection and regard for our fellow subjects in Great Britain and elsewhere”; however, the members of the First Congress also agreed “that the present unhappy situation of our affairs is occasioned by a ruinous system of colony administration, adopted by the British ministry about the year 1763, evidently calculated for enslaving these colonies.” Seeking correction for the injustices, the delegates were “of opinion, that a non-importation, non-consumption, and non-exportation agreement, faithfully adhered to, will prove the most speedy, effectual, and peaceful measure.” The articles also included a plan for implementing, adjusting, and monitoring as the situation may “encourage frugality, economy, and industry, and promote agriculture, arts and the manufactures of this country, especially that of wool.”⁷

No doubt the members of Congress expected that the document they adopted on October 20, 1774 for circulation to “Inhabitants of The Several Anglo-American Colonies,” which included the plan for restricting trade, would convince a majority of the inhabitants of the importance of challenging the injustice invoked by the British ministry. However, the first Continental Congress did not have authority to require action on behalf of any of the colonies; therefore, the restrictions of cargo were the responsibility of the colonies and the officials at the large harbors in Boston, New York, Philadelphia, Norfolk, Charleston, and smaller ports.

With encouragement, the members of Congress reminded all the colonists about the shared history of claiming their rights and privileges as citizens in each of the colonies as they were chartered as a member of the British Empire. Recalling all the grievances since the Stamp Act and the recent nullification of the charter of Massachusetts, the Continental Congress asserted that the acts by British ministry had violated the constitutional rights of British citizens and restricted their freedom in the American colonies.

Recommending non-exports and imports with Great Britain as an effort to restore equality, Congress mindfully stated that: “We deeply deplore the urgent necessity that presses us to an immediate interruption of commerce, that may prove injurious to them. We trust they will acquit us of any unkind intentions toward them, by reflecting that we are driven by the hands of violence into unexperienced and unexpected public convulsions, and that we are contending for freedom, so often contended by our ancestors.”⁸

In addition to the message from the Congress to the inhabitants of the American colonies that included the reasons, the plans, and the plea for the actions to seek correction of injustices from the British ministry, John Jay prepared a letter that was approved by the Congress on October 21, 1774 and addressed “To the People of Great Britain” with the message that: “The cause of America is now the object of universal attention; it has at length become very serious. This unhappy country

has not only been oppressed, but abused and misrepresented; and the duty we owe to ourselves and posterity, to your interest, and the general welfare of the British Empire, leads us to address you on this very important subject.”⁵⁹

The recent era of concerns was described as “hardy attempts to take our property from us, to deprive us of the valuable right of trial by jury, to seize our persons and carry us for trial to Great Britain, to blockade our ports, to destroy our charters, and change our forms of government, would occasion, and had already occasioned, great discontent in the colonies.”⁶⁰ John Jay was born in New York in 1745, educated by tutors before attending Kings College (now Columbia University) and graduating in 1764, an assistant to the members in their writing at the first Continental Convention, a delegate from New York at the meeting of the Second Continental Congress, elected as secretary of Foreign Affairs in 1784, and appointed by the president as the chief justice of the new Supreme Court.

In their address to the people of Great Britain, members of Congress asserted that before the injustices of their freedom as British citizens, the people in the colonies “were happy in being instrumental to your prosperity and grandeur” even though the colonies had been restrained in their trading in “every way that could conduce to your emolument.”⁶¹ In addition, Great Britain had “named the ports and nations to which alone our merchandise should be carried; and with whom alone we should trade.”⁶² The objective of the letter was depending on the virtue of the English people in the appeal for justice that permits “us to be as free as yourselves.”⁶³

However, “if you are determined that your ministers shall wantonly sport with the rights of mankind; if neither the voice of justice, the dictates of the law, the principles of the constitution, or the suggestions of humanity can restrain your hands from shedding human blood in such an impious cause, we must then tell you that we will never submit to be hewers of wood or drawers of water for any ministry or nation in the world.”⁶⁴

In a petition addressed to the “Most Gracious Sovereign,” King George VIII, from “your majesty’s faithful subjects,”⁶⁵ the delegates representing twelve colonies agreed on October 26, 1774 to “lay our grievances before the throne,”⁶⁶ which included fifteen statements that described their dissensions about the acts of Parliament over the last five decades that resulted in altering colonial governments, levying taxes in trade, reorganizing the court system, and collecting taxes with the standing armies without consent from the colonists or discussion in the colonial assemblies. The seven-year war with France and other European nations ended in 1763 with Great Britain in debt and just one year before the Sugar Tax that was to improve the wealth.

With Parliament asserting control of government, trade, and taxes for the benefit of Great Britain, the members of the Congress emphasized that “we present this petition only to obtain redress of grievances and relief from fears and jealousies

occasioned by the system of statutes and regulations, adopted since the close of the late war, for the raising a revenue in America.⁶⁷ Without a response from King George and with General Thomas Gage in charge, members of the Massachusetts militia in villages of Concord and Lexington began gathering and storing arms and ammunition in case the petition for redress and peace was rejected, with the possibility of invasion by the British soldiers requiring their defense of the people.

While the discourse about trade and taxes was threatening the bond between the American colonies and the Mother Country, societies were organizing to support manufactures in a factory with the first established in 1751 in Boston for “Encouraging Industry and for Employing the Poor,”⁶⁸ with another in New York for “The Promotion of Arts, Agriculture, and Economy” in 1764 proposing similar objectives that included employment of the poor as the labor to operate the spinning wheels and looms in the manufacturing of woven textiles.⁶⁹ In 1775, a society similar to those in Boston and New York was organized by the name of “The United Company of Philadelphia for Promoting American Manufacturers.”⁷⁰

The business plan indicated that the company would operate for just four years on investments of stock at a par value of ten pounds with dividends paid to investors from sales of manufactured woolens, cottons, and linens. In fact, by 1777 the par value of the stock had increased by eighty-two percent before the British army arrived and occupied Philadelphia in September of 1777 when manufacturing ceased and then did not reopen after the army evacuated in June 1778.⁷¹

Economy and Labor

When production of manufactured goods was increasing in England, the means of transportation to markets was also expanding. In 1755, James Brindley, a self-instructed engineer, was hired by Francis Egerton, Third Duke of Bridgewater (Lord Bridgewater), to plan, design, and construct a forty-one-mile canal that connected coal mines on the estate of the duke to the city of Manchester when completed in 1761. Additional cotton mills arose over the decades after the canal was extended to Runcorn and by way of the Mersey River connected to the port at Liverpool.⁷²

Before the beginning of the nineteenth century, more than a dozen other rivers, waterways, and backwater areas near deep-water ports were dredged, widened, and joined with some of the other forty canals that were privately constructed by individuals or associations. By 1830 there were four thousand miles of navigable waterways and canals that provided a network for commerce within England as well as access to ports for exporting and importing from the interior to the eastern, western, and southern shores of the country.⁷³

By the 1830s there were almost one hundred thousand powered looms in the textile mill towns of England with ninety percent of the looms producing cotton cloth⁷⁴ and more than two hundred thousand people employed in these cotton industries.⁷⁵ The value of the exported cotton goods of nineteen million English pounds was more than three times the combined value of the exports of iron, steel, woolen goods and yarn, silk, apparel, machinery, and coal.⁷⁶ As the market for cotton goods grew, cotton producers around the world attempted to meet the demand for ginned cotton with growth depending on climate, fertility, and labor.

At the end of the seventeenth century, raw wool had been the source of wealth for England, resulting from the trade with a value of two million pounds from the shorn wool of the twelve million sheep. Before the mid-eighteenth century, the number of sheep had increased by forty percent, the value of the shorn wool by fifty percent, and manufactured cloth added another eight million dollars. Two decades later, the value of raw wool had increased by fifty percent while the value of manufactured wool increased nearly two-thirds in value.⁷⁷

Even with the increasing demand for woolen goods for export, as early as 1760 the economic revolution in England began with noblemen consolidating three hundred thousand acres of the small open range farms, which they had previously rented for subsistence farming, into larger enclosed farms for the purpose of improving the practice of farming and increasing agricultural productivity. When the small farms of forty to one hundred acres were enlarged to one hundred to five hundred acres and crop rotation was introduced, the subsequent soil fertility increased the harvested crop by one-fourth in production for the market. In addition, with fewer farm units, there were fewer families involved in the harvest that increased the profits to the owners.⁷⁸

With the growth in the manufacturing of woolen cloth, the increase in labor was regulated by the number of looms a weaver owned; however, the real wages paid by the masters ignored the higher rate fixed, resulting in temporary combines of labor against the masters. However, the Act of 1756 prohibited the employees in the woolen manufactures from combining against the master and empowered a justice to fix the wages. Without response from a justice who fixed the rates and the difficulty of living on the wages determined by the masters, the workers ignored the act and revolted with a strike until masters agreed with them.⁷⁹

The economic structure of domestic manufacturing of woolen goods was interconnected financially with losses due to market decline or bankruptcies spread among the "whole body of the manufacturers,"⁸⁰ and workmen shared in a solution if a master needed to fulfill an order or was just shorthanded. The introduction of factories in the nineteenth century to manufacture woolen cloth established an entirely different economic structure and relationship between the employer and the employee. Capital was invested to build factories, operate at a profit, and hire

employees that included women and children who had not served an apprenticeship. In contrast with domestic manufacturing, there were different economic and societal problems when a downturn in markets resulted in hundreds of workers unemployed at one time in the cities as compared to workers spread across smaller communities.⁸¹

The introduction of machinery and factory production in the late eighteenth century in England began a series of interruptions, combinations of labor and strikes by workers concerning wages and working conditions. Contributing to conflict among the employees, the control of the master to journeyman to apprentice structure in the trades was challenged, in addition to uncertainty in hiring, wages and discharges of common laborers to reduce costs of production. However, in 1802 the journeymen sought relief from Parliament and ceased combinations with hope for fair consideration.

Consequently, a committee of Parliament reviewed the plea and responded with a report that included: "Everything is made subservient to the interest of the masters, and exclusively too; for the diminution of expense, considerable as it is, the manufacture arising out of their multiplication of apprentices at reduced wages, and the introduction of machinery, do not appear to have produced any reduction whatever in the price of the fabric to the consumer."⁸² Therefore, Parliament was not prepared to interfere with the evolving relationship between capital and labor or with the development of the industries that hired them.

The response did not settle the circumstances in the silk industry, so another Parliament committee was appointed in 1814 to consider the whole question of labor in the era of factories for manufacturing. To the surprise of many and dismay of most, the statute that regulated all the industrial trades for almost a century was repealed. The seven-year apprenticeship and the number of workers for each journeyman were replaced, since "the persons most competent to form regulations with respect to the trade were the master manufacturers."⁸³

The rearrangement of the labor in the factories resulted in hardship for men and women who were suddenly unemployed or reduced in wages.⁸⁴ Some workmen petitioned for restitution of ancient regulations, secret societies organized, labor combined (united) even though unlawful, with a two hundred pound fine, trade unions were founded to contest manufacturers, and public outrages expressed the frustration of the people who created the wealth of the nation.⁸⁵

The prohibition of the combination of labor only encouraged the workers to continue their efforts with greater zeal of unified purposes. In 1824, another committee of Parliament reviewed the evidence concerning combinations of workmen and concluded that the law prohibiting the combining of labor should be repealed. The law was important in three separate conclusions regarding the relationship between labor and management. First, the "laws relative to combinations of workmen and to

the fixing of the wages of labour,” were repealed with the second a declaration that “certain combinations of workmen should be exempted from punishment,” and the third decision “that the attempt to deter workmen from work should be punished in a summary manner.”⁸⁶ Furthermore, those employees who were members of a combination to obtain advancement of wages, working hours, and a severance decision that “refuse to enter into work or employment, or to regulate the mode of carrying on any manufacture, trade, or business, or the management thereof, should not therefore be subject or liable to any indictment or prosecution for conspiracy, or to any other criminal information or punishment whatever under statute law.”⁸⁷

The interests of the manufacturers were included with the portion of the statute providing that

if any person, by violence to the person or property, by threat or by intimidation, should wilfully [*sic*] or maliciously force another to depart from his hiring or work before the end of the time or term for which he is hired, or return his work before the same should be finished, or damnify, spoil, or destroy any machinery or prevent any person not being hired from accepting any work or employment; or if any person wilfully [*sic*] or maliciously use or employ violence towards the person or property, threats or intimidation towards another on account of his not complying with, or conforming to, any rules, orders, resolutions, or regulations made to obtain an advance in wages, or to lessen or alter the hours of working, or to decrease the quantity of work, or to regulate the mode of any manufacture, trade, or business, or the management thereof; or if any person by violence, etc., should wilfully [*sic*] or maliciously force any master or mistress, manufacturer, his or her foreman or agent, to make any alterations in their mode of regulating, managing, conducting, or carrying on their manufacture, trade, or business: Every person so offending, or causing, procuring, aiding, abetting, or assisting in such offense, being convicted thereof in manner hereinafter mentioned, should be imprisoned only, or imprisoned and kept to hard labour, for any time not exceeding two calendar months.⁸

With a victory for the laboring men, women, and children, combining workers began to spread their activities to political matters for improvements of interest to the lower class of Great Britain.

With the enormous growth in the economy during the last half of the eighteenth and the first half of the nineteenth centuries, some of the wealth of Great Britain was being distributed among common people who were becoming members of a middle class as many members of this lower class became owners, managers, and superintendents of manufacturing in the factories, in charge of transportation on railroads and in canals and merchants managing exporting, importing, and marketing the

production of cotton and woolen goods. After redistribution of wealth among the population during a century of plenty, the Parliament of Great Britain confronted the accusations of voting fraud, the undemocratic distribution of representation in the House of Commons, and elitist requirements for voting rights.

With debates about tradition, equity, and responsibility, the Reform Bill was enacted in 1832; however, the lower class of laborers were concerned about the portion that entitled persons “in the Occupation of such lands or Tenements...of the clear yearly Value of not less than Ten Pounds” to vote in an election of the knights who served in the House of Commons from their shire.⁸⁹ With voting rights for the new middle class of manufacturers and farmers, the lower class of laborers were concerned that the people who hired the lower class would use their political advantage to elect members to serve in the House of Commons who would unfairly represent the interests of the manufacturers in the relationships between capital and labor. Subsequently, the lower class of laborers organized and then developed a charter that outlined their purpose and the primary objective in their effort to obtain their voting rights.

Although the organization was not successful in gaining their political advantage, the movement became known as Chartism and awakened the public to the social and moral costs that can arise when capital is at risk to create value. Born in Scotland in 1795, Thomas Carlyle attended the University of Edinburgh, was recognized as a learned expounder of literature and philosophy, and was as a cohort of John Stuart Mill and Charles Dickens before the prolific writer expressed concerns about the lack of recognition such “that the condition and disposition of the Working Classes is a rather ominous matter at present: that something ought to be said, something ought to be done, in regard to it.”⁹⁰ Carlyle wrestled with questions about the necessities that “constitutes the well-being of a man” and the wages for “laying up money” beyond subsistence.⁹¹

The moral failure of a society was for a person “to live miserable we know not why; to work sore and yet gain nothing; to be heart-worn, weary, yet isolated, unrelated, girt-in with a cold universal Laissez-faire: it is to die slowly all our life long, imprisoned in a deaf, dead, Infinite Injustice, as in the accursed iron belly of a Phalaris’ Bull!”⁹² Action by the government did not seem promising; however, proceeding “deliberately to ‘organise labour’,”⁹³ enacting the “right Education Bill”⁹⁴ and “true liberty of a man.... To learn, or be taught, what work he actually was able for; and then by permission, persuasion, and even compulsion, to set about doing the same!”⁹⁵

Karl Marx was born in Germany in 1818 and moved to London, England in 1849. After an analysis, Marx concluded that the charter of Chartism had demanded “complete and undisguised ascendancy of the bourgeoisie, the open, official

subjection of society at large under the laws of modern bourgeois production, and under the rule of those men who are the directors of that production.”⁹⁶

The *Communist Manifesto* was published in 1848, one year before Marx moved to London, where he lived until his death in 1883. The manifesto was published at a time when labor unions were organizing for wages and working conditions; however, the message included much more, with ten steps to eliminate class distinctions by government rental replacing property ownership; by graduated and heavily progressive taxes; by eliminating the rights of inheritance; by confiscating property from all emigrants and rebels; by centralizing banks with monopoly on credit lending; by state-owned and operated communications and transportation; by a common plan by the State for industrial production, reclaiming wasteland and improvements of soil; by equality for all labor with expansion in the number of industrial workers, especially agriculture; by the combination of agriculture and manufacturing industries with more equable distribution of the population, and by free education and abolition of labor for children. Marx directed the manifesto to the lower-class laboring people in the developing countries as a replacement for the wage-labor system supporting the capitalistic economic system that encouraged lowering the cost of production, including lowering the cost of labor in favor of profits. Marx considered the market-driven competition of capitalism as productive forces that created an “epidemic of over-production” in the factory system and “appears as if a famine, a universal war of devastation had cut off the supply of every means of subsistence.”⁹⁷

The factory workers who replaced the domestic trades over the previous century were an “appendage of the machine” requiring few skills and “monotonous” to operate.⁹⁸ In the great factories, there was an army of workers with the laboring privates “under the command of a perfect hierarchy of officers and sergeants.”⁹⁹ Marx expected the working people to become the proletariat class; however, the transformation would be difficult, with the factory system of production depending on the manufacturing machinery that “obliterates all distinctions of labor and nearly everywhere reduces wages to the same low level.”¹⁰⁰

In addition, the fluctuations in the consumer markets for the production of cotton goods and the increasing productivity from improved machinery led Marx to conclude that the uncertainty of employment and reduction in wages would result in “collisions between individual workmen and individual bourgeois” with the conflict escalating as trade unions were organized.¹⁰¹ Marx envisioned that continuous collisions would unite the working class in a struggle against the ruling class, which would begin a “dissolution” that would result in some of the bourgeois joining the ideological united proletariat of the working people.¹⁰²

At the thirty-first meeting of the British Association for the Advancement of Science held in Manchester from September 4–11, 1861, Edwin Chadwick—who was

born in Longsight near Manchester and dedicated in analyzing and writing during his career in public service, which included improvements in public health, law for employment of children, administering the Poor Law, and in developing sanitation in the cities—was invited to share some of the content of a paper that he was preparing at the request of the British Association at Oxford. The progress of Manchester and Salford during the two previous decades was apparent to most citizens of Midland England; however, increasing population in manufacturing towns, trading of cotton imports, exporting manufactured goods, and wages of the operatives were of great interest to an audience including capitalists who were involved in the creation of wealth and progress for the nation.

Chadwick reported that the population had increased almost fifty percent, the consumption of raw cotton had increased fourfold, the yards of cloth increased fivefold with the length of the 1860 production long enough to wrap around the world more than one hundred times, the cotton goods increased 160 percent, and the deposits in saving banks had increased 265 percent with nearly fifty thousand depositors.¹⁰³ Chadwick analyzed the behavior of the men and women at work in addition to completing his assignment to “collect information in the manufacturing districts on the employment of children in factories and as to the expediency and means of curtailing their labor.”¹⁰⁴ The recommendations for answers to the assignment were to shorten the hours and prevent employment unless the child attended school with proof from a teacher.

After observing the adults at work, Chadwick challenged the common thought of gloomy views described by Karl Marx due to monotonous work in the subdivision of labor and by Adam Smith from very few operations—frequently one or two with his conclusions that instead of “confining the mind to the process” the activity will “liberate it, instead of depressing the mind, give room for its expansion, and open it to the reception of agreeable impressions.”¹⁰⁵ With a sense of optimism, Chadwick had previously presented to the Philanthropic Congress at Brussels in 1856 his opinions that:

As a general rule, we must anticipate that all labour which consists of repetition of motion by hand will be executed by machinery.... Thus, amongst the economical results displayed of the improvements in processes and machinery are these, that, where labour is saved, or rendered more productive thereby, capital is increased: and the increased investment of capital increases the demand for labour, and thence increases what I call the absorbent power of the labour market, to re-absorb the displaced labour. And to meet these changes sound education is advantageous, as increasing the aptitudes of labourers to learn new employments.¹⁰⁶

As for his expectation for the future from the past: “All the large advances in the use of machinery had, as a general rule, been accompanied by an average increase of wages, as well as by a reduction in the price of production.”¹⁰⁷

The Pursuit of Prosperity in the American Colonies

When the people boarded the ships in December of 1606 at the port in England, they could not pack for the trip and carry all of their clothing, bedding, furnishings, and equipment required to establish a new life in America. No doubt that each person made choices of their absolute essentials for survival on their arrival to Virginia in April of 1607 that may have included a mixture of arms and ammunition, farming and forestry equipment, articles of clothing, and seeds for gardening or tools for an artisan. Their futures were uncertain unless their efforts were combined to create a plan that would produce the needs of the community. The later landings for most of the early settlements in North America were near deep-water ports that were open to the Atlantic Ocean and then along the banks of rivers and around bays or sounds of navigable waterways.¹⁰⁸

Those early settlements were challenged with building shelters, clearing land, providing food, surviving bad weather, confronting Native Americans, and producing from natural products for export. To establish subsistence in the construction of those communities, a variety of tradesmen were recruited to be among the early settlers. However, there were other factors influencing the development of subsistence and prosperity, such as geography, climate, and the existence of useful natural products that varied in each of the three regions of northern, middle, and southern settlements. Courage, innovation, and commitment were required to develop and sustain those American communities.

Without precedents for guidance, they were literally building the colonies from the ground up, relying on their own initiative and then encouraged to improve their existence from experiences. Later, immigrants of various origins, ethnicity, and religious denominations entered through the middle colonies to settle along the frontiers that in time became an early gateway for their pursuit of prosperity in America. Among those immigrants, Quakers in Pennsylvania had arrived from a number of countries to share the freedom of their religion. Many of those immigrants from Great Britain and Europe were of various languages and denominations and established settlements in the inland regions of North Carolina.

For more than two hundred thirty-seven years, the purposes and achievements in pursuits of prosperity for all the states within the geography of the United States of America were anything but united as a single country, even with the eventual adoptions of a constitution by all the states. The Province of Pennsylvania was a

land grant that settled a large debt of King Charles II to William Penn's father. The southern colonies were owned by lords with plantations of England providing products for trade. All colonies shared ultimate loyalty to the Crown; however, there were three relationships of charter, proprietary, and royal colonies. The charter was a contract between the colony and the Crown. The proprietary were governed by the lord to whom the Crown granted the land. The royal were governed by those who were appointed by the Crown.

Although independent from one another, the early charters and constitutions were similar and usually included a governor to administer, a council to advise the governor, an assembly to enact legislation, and judges to rule on laws. Even with variances in the adoptions and interpretations of local laws among the settlements, English Common Law prevailed throughout the American colonies.¹⁰⁹

During the development of each colony, the settlers were engaged to varying degrees with challenges of establishing effective governance, more than subsistence, transportation for trade, agreements with Native Americans, and religious tolerance. Although lords proprietors established the structure and functions of the government of settlements such as in Carolina, the moral standards in communities were often influenced by religions of some of the early settlers, with Puritans locating in northern colonies, Quakers in middle colonies, and Anglicans in southern colonies.¹¹⁰

In 1610, a few more than three hundred whites settled in Virginia. With the population growing on average a little less than two-and-one-half percent per year, the total population of Virginia colony increased to fifty-eight thousand by 1700, which included almost thirty percent of blacks who were mostly enslaved. The combined population throughout the thirteen colonies grew to a quarter of million that year. Ten percent of the total population were blacks, with almost ninety percent located in the colonies of Virginia, Maryland, South Carolina, and New York. There were about four hundred black people living in North Carolina.¹¹¹

The populations in 1700 within each of the colonies varied from the least in Delaware, with twenty-five hundred persons, to the eighth largest population of ten thousand persons in North Carolina, the largest in Virginia of fifty-eight thousand, with the second largest in Massachusetts of about fifty-five thousand residents. The total population of the southern region of Virginia, Maryland, North Carolina, and South Carolina was the largest; but the sum of the totals for the New England colonies of New Hampshire, Vermont, Massachusetts, Rhode Island, and Connecticut was within about ten percent of those in the southern region. The sum of the totals of the populations in the middle colonies of New York, New Jersey, Pennsylvania, and Delaware was about one-half of that in the southern region.¹¹²

By 1700 the value of exports was nearly four hundred thousand pounds sterling, with ten percent of the total value exported from New England, four percent from

each of New York and the Carolinas, and one percent from Pennsylvania. Most of the remaining value from the colonies of Virginia and Maryland was nearly eighty percent of the total value of the exports. The resulting distribution and concentration of prosperity north to south depended to a large extent on the labor of slaves.¹¹³

One measure of relative prosperity was the division among the colonies of the total value of imports from England with four pounds sterling per white person in Virginia, about the average of one-and one-half each in New York and the Carolinas, and below average in New England and Pennsylvania. However, this measure of prosperity among the colonies does not include values of internal production and commerce from their own domestic manufactures.¹¹⁴

Between the years of 1714 to 1717, the prominent imports from the colonies of New York, Pennsylvania, Virginia, Maryland and the Carolinas included tobacco, pitch and tar, logwood, rice, skins and furs, turpentine, brown sugar, oil, and whale fins, with two-thirds of the value from tobacco. The principal imports to the colonies from Great Britain listed by value included domestic manufactured products of woolen cloth and goods, wrought iron and nails, wrought leather and saddles, linens and sail cloth, cordage, pewter, lead and shot, wrought brass, and copper and gun powder with one-half the value from woolens. Other foreign imports to the colonies were mostly of linens and calicoes, and about one-half the value from Great Britain.¹¹⁵

After decades of developing trade to foreign ports, a review in 1721 concluded that the “dominion or Government of several Colonies is absolutely alienated from the Crown.”¹¹⁶ In fact they “frequently refused obedience to such orders” from the Crown and “made laws of their own” while breaking the existing laws of trade and navigation.¹¹⁷ Also, some colonies were giving “shelter to pirates and outlaws and refuse to the contribute to the defence [*sic*] of the Neighbouring [*sic*] Colonies... even in cases of the greatest emergency.”¹¹⁸ In addition to condemning the lawlessness of colonial governments, the lords commissioners proposed corrections with proprietary and charter placed “under your Majesty’s immediate government” as royal colonies.¹¹⁹

To further advantage the Crown from trade, the lords commissioners recommended that the colonies should be encouraged in “raising Naval Stores of all kinds” as well as “iron, flax, hemp, & all sorts of timber... whereby the trade and navigation... be highly advanced & the plantations diverted from the thoughts of setting up manufactures of their own, interfering with those of Great Britain.”¹²⁰ Subsequently, the Crown arranged the transfer of North Carolina from the lords proprietors to become a royal colony with exporting naval stores as a high priority.

By 1770 the value of exports from the colonies was nearly three-and-one-half million pounds sterling with about half of the total value shipped to Great Britain, about one-fourth to the West Indies, one-fifth to southern Europe, and the rest to

Ireland and Africa. With six of fifty-seven in the order of value for tobacco, bread and flour, fish, rice, indigo, and wheat accounting for about seventy percent of the total value of all the articles, tobacco alone accounted for more than one-fourth of the total. In addition to the exported articles of agriculture and natural products, there were three thousand manufactured pairs of shoes exported to the West Indies.¹²¹

Development of Another American Colony

Three decades after the settlement in Virginia, King Charles II granted to eight lords of England the opportunity for a settlement on land in North America to be governed according to the requirements of "A Declaration and Proposals of the Lord Proprietor of Carolina (1663)." Before the people traveled three thousand miles from England to Barbados and then to North America to establish the settlement near the Cape Fear River, all the settlers elected thirteen persons for the lords proprietors to select the governor from this elected group. Arriving in 1664 and building along the Cape Fear River, the settlement of Charles Town in Clarendon County was adopted as the population grew to as many as eight hundred people.¹²²

To attract freemen to leave England, land grants of one hundred acres were offered to each settler plus fifty more for each manservant and thirty for each woman servant; however there was an obligation to pay quitrent, a land tax, of one-half cent per acre.¹²³ With little support from England and conflicts with the indigenous population, in 1677 the first settlement was abandoned after the proprietors established another Charles Town in 1670 that became the capital of the Carolina colony. In addition, the lords proprietors adopted "The Fundamental Constitution of Carolina" in 1669 for the government of the second Charles Town, replacing the "Declaration and Proposals of the Lord Proprietor of Carolina."¹²⁴

Throughout the period from the grant to the Carolina propriety of eight Englishmen in 1663 until acquired by the Crown in 1729, the settlements within the geography that eventually became North Carolina experienced periods of unstable and chaotic events during the establishment and administering of the government. As communities continued to evolve away from the port of Charleston in the south and along the border of Virginia in the north, the form and function of the propriety government, obligations for the land grants, and sparse separation of communities resulted in independence and self-subsistence as attributes of these earliest settlers in the Province of Carolina. To govern, a feudal form of government was intended by the lords proprietors of the Province Carolina with noblemen and gentlemen representing the interests of commoners and tenants.

As set forth in the constitution, a governor, selected in conjunction with the parliament and commissioned by the proprietors, appointed a ten-member council, and with the parliament formed the legislative body. The authority of the governor included the appointment of judicial and administrative officers, the veto of any legislation, the right to summons and dissolve the assembly, and to command military affairs. The members of parliament (assembly) of Carolina included proprietors or their deputies, titled gentlemen, and freehold who owned more than five hundred acres and were elected by men who owned more than fifty acres in each precinct.¹²⁵ The legislative authority of the assembly was limited by the requirement that “No act or order of parliament shall be of any force, unless it be ratified in open parliament, during the same session,” by the eldest proprietor or his deputy and by “three more of the lords proprietors or their deputies; and then not to continue longer in force but until the next biennial parliament.”¹²⁶ The assembly began as a unicameral body with the governor presiding, but emerged, without formal enactment, into a bicameral council that conducted affairs of government in a manner similar to the Parliament in England.

If the Fundamental Constitution of Carolina had been fully implemented, a total of two-fifths of the land in the counties of the province would have been set aside for the eight proprietors and the nobility of the manors where societies of class distinctions would have evolved with the other “three fifths, amongst the people; so that in setting out and planting the lands, the balance of the government may be preserved.”¹²⁷ For the barons and the lords their “manor shall consist of not less than three thousand acres, and not above twelve thousand acres.”¹²⁸ Limited acreage for some settlers, requirement to pay a tax on the land, and incentives to own servants did not result in either a plantation economy or a society of nobility, but in time the relatively few successful plantation owners “began to think of themselves as true aristocrats and to be accepted as such by those of them.”¹²⁹ With the evolving society, culture, and economy depending mostly on common men acquiring and tilling the land and without nobility, the form, function, and effectiveness of governance were more republican than the constitution described and more aristocratic than the common people desired.

With the division of the Province of Carolina in 1710, with controversies developing between the colonists and the governor and with unrest among the settlers about taxation, political liberty, and commerce, the colony of North Carolina established in 1712 became one of the most rebellious and unruly regions in the American colonies.¹³⁰ In addition, the absentee ownership and the requirement that any “act or order” of the parliament be approved by the proprietors, resulted in concerns about property rights and discouraged people from settling in northern Carolina. Those who did were involved in Indian wars, controversies resulting from inept and sometimes unscrupulous governors, conflicts concerning equitable

representation in the elected assembly, confrontations regarding unpopular trade laws, tariffs levied that discouraged shipments to other colonies while favoring shipments to England, attempts to require government officials' allegiance to the Church of England, and piracy along the coast.¹³¹

In 1721 the Board of Trade of Great Britain reported that North Carolina was "great tracts of good land... but the situation renders it for ever incapable of being a place of considerable Trade by reason of a great sound near sixty miles over, that lyes [*sic*] between this coast and the sea, barr'd by a vast chain of sand banks so very shallow and shifting that sloops drawing only five foot water run great risks of crossing them."¹³² Therefore, the commerce of the colony was carried in "very small sloops chiefly from New England, who bring them clothing and iron ware in exchange for their pork and corn."¹³³ Additional trade with New England and Britain was the exports of pitch and tar. An estimated sixteen hundred persons paid their poll tax with about one-third of them black persons.¹³⁴

In "North Carolina Through Four Centuries," William S. Powell concludes that the propriety governors "failed to preserve order, promote the welfare of the people, or defend the colony against Indians, pirates or other enemies."¹³⁵ However, colonial assemblies or governors were not completely independent from the rule of England with the establishment of laws, resolution of boundary disputes, charters for schools, taxing commerce, and other actions by the assemblies reviewed by the Board for Trade and Plantations before recommendations to the Privy Council that acted on behalf of the Crown.¹³⁶

The lords commissioners of the board also concluded that "The Government of this Province, having for many years been a very disorderly one, this becomes a place of refuge for all the vagabonds, whom either debt, or breach of the Laws have driven from the other Colonies on the Continent; and pirates have too frequently found entertainment amongst them. There is no great prospect, that these mischiefs should be redressed, unless your Majesty should be pleased to resume this, as well as the Southern province in to your immediate Government; in which case, North Carolina might, in our opinion, be restored again to Virginia & put under the care of your Majesty's Governor of the Colony."¹³⁷ With continuous turmoil within the Carolinas from 1650 to 1729, boundary disputes with Virginia, and unrealized economic expectations, the proprietors under some pressure sold the charter to the Crown (George II).

Prior to 1729 while responding to opportunities provided by the proprietors of the Charter of North Carolina, most of the settlers along the border with Virginia and in the coastal plains of North Carolina, entered from earlier English settlements in Virginia or directly from England. The combined population grew to around thirty thousand whites and six thousand blacks in 1730.¹³⁸ In 1700, the majority of the population was in the five counties of Currituck, Pasquotank, Chowan, Bath,

and Perquimans.¹³⁹ With the establishment of North Carolina as a crown colony in 1729, governance became more acceptable and supported by more colonists. Even though the final authority was transferred to the Crown, the form and details of governing did not change.

Able law enforcement, effectiveness of governors appointed by the king and their efficiency in administering the laws and regulations of the colony led to a period of stability and expansion. Immigration grew rapidly that developed the agriculture economy resulting in communities that began to establish cultural and societal attributes. With expansion along the coast and southward to South Carolina, the number grew to fifteen counties by 1740. With a rapid increase westward in population during the remainder of the eighteenth century, sectional disputes concerning taxation and representation resulted in disturbances concerning governance.

After 1672, settlers who were loyal to the Church of England were joined by Quakers, Methodists, and Baptists mostly from England, Moravians mostly from eastern Saxony, Presbyterians mostly from Ulster and Scotland, and Lutherans mostly from Germany who located with others east of the Blue Ridge Mountains, west of the earlier English settlers and in the bottom land along the Piedmont rivers and streams.¹⁴⁰ From Pennsylvania through Virginia and North Carolina into northwestern South Carolina and northern Georgia, "In the last sixteen years of the colonial era, southbound traffic along the Great Philadelphia Wagon Road was numbered in tens of thousands; it was the most heavily traveled road in all America... This was primarily a movement of humble folk, of families hopefully seeking a cheaper, better, and freer life than they had hitherto known."¹⁴¹

The growing number of settlers from 1746 to 1753 resulted in seven new counties: Johnston, Granville, Anson, Orange, and Rowan that extended into the backcountry of the colony.¹⁴² By the mid 1700s, the Highlander Scots, numbering as many as ten thousand, entered through Brunswick and Wilmington and settled along the upper Cape Fear River, resulting in the establishment of Cumberland County in 1754.¹⁴³ During the decades prior to the War of Independence, the population in the colony of North Carolina increased from fifty-one thousand in the thirteen counties in 1740¹⁴⁴ to two hundred sixty-five thousand inhabitants in thirty-five counties.¹⁴⁵

Except for the small towns of Bath, New Bern, Edenton, and Beaufort with a few hundred families residing in each, the vast majority of the population was scattered across the colony in isolated communities connected by ethnic, religious, social, and cultural customs of their ancestry. W. J. Cash in *The Mind of the South* characterizes the settlers and the circumstances in these communities with his view that:

In the vast backcountry of the seaboard states, there lived unchanged the pioneer breed—the unsuccessful and the restless from the older regions; the

homespun Scotch-Irish, dogged out of Pennsylvania and Maryland by poverty and the love of freedom; pious Moravian brothers, as poor as they were pious; stolid Lutheran peasants from northern Germany; rugged, throat-slitting Highlanders, lusting for elbow room and still singing hotly of Bonnie Prince Charlie; all that generally unpretentious and often hard bitten crew which, from about 1740, had been slowly filling up the region. Houses, almost without exception, were cabins of logs. Farms were clearings, on which was grown enough corn to meet the grower's needs, and perhaps a little tobacco which once a year was 'rolled' down to a landing on a navigable stream. Roads and trade hardly yet existed. Life had but ceased to be a business of Indian fighting. It was still largely a matter of coon-hunting, of "painter" tales and hard drinking.¹⁴⁶

In different times, places, and circumstances, most of the immigrants and their ancestors had separately experienced repeated conflicts with invaders, loss of religious freedom, taxation without representation, and laws enacted by a governing body of the privileged. In general, they shared the desire to be free and self-sufficient, and a sense of skepticism about any form of government.

Germans (often isolated by language), Moravians (often bound by culture), Quakers, (often allied by faith), and other sparsely populated ethnic and religious groups developed and improved agricultural practices, built schools, developed communities, shared cultural events, and contributed to the evolving society of North Carolina. However, enhanced by their number and their breadth of geographical reach, many of the settlers who confronted the evolving political circumstances in colonial North Carolina were of Scottish ancestry. The Scot-Irish and Highlanders once shared geography; but their experiences before arriving in America and their actions as colonists were very different.

From 1730 to 1775, Highlander Scots entered the colony from Scotland, with the majority arriving after they were defeated by the English in 1740 at the Battle of Culloden. Subsequently, the British Parliament confiscated land, restricted religious leaders, and enacted uniform but unpopular laws throughout Scotland.¹⁴⁷ Attracted by opportunities and distressed by circumstances that adversely affected their life and livelihood in Scotland, they immigrated to North Carolina. Ironically, many of these Highlanders remained loyal to the Crown during the period of unrest leading up to the Declaration of Independence. Some have suggested that a sense of past loyalty to the House of Hanover, uncertainty about the outcome of any war against England, and maintaining preferential treatment by the colonial governor in matters of commerce contributed to the decision of those who remained loyalists.¹⁴⁸

The Ulster Scots, often termed Scotch Irish, immigrated into North Carolina primarily from Pennsylvania, Maryland, and Virginia. They came to the colonies from the Ulster plantations in Northern Ireland. Before Ulster and while in the Scotland Lowlands, they withstood invasions by well-equipped and supplied armies without being conquered for more than one thousand years. From the Romans in 122 AD to the victory by Robert the Bruce over Edward II in 1314, these Scots remained essentially independent clans with leaders who earned their position through valor and survival. During the period (1603–1625), when Scotland and England shared a king known as James VI in Scotland and James I in England, Scots and English were induced to immigrate to Ireland (Northern Ireland) and establish the Plantation of Ulster on land previously occupied by Irish farmers. Men of rank were granted large acreage, but most Scots were tenant farmers and by choice, lived in a cluster of dwellings and shared the surrounding land.¹⁴⁹

In 1641 the native Irish of Ulster rebelled against the Scots and the English residents to reclaim their land and to establish their own governance. Enlisting an army, embarking from England and landing in Ireland in 1650, Cromwell was compelled to quell the rebellion by devastating, brutalizing, and reclaiming Ireland for the king of England, bringing to an end an eleven-year war. It is estimated that there were fifteen thousand casualties during the conflicts prior to 1650 and that six hundred sixteen thousand, mostly Irish, out of a population of one million four hundred forty-eight thousand perished under the assault by Cromwell.¹⁵⁰ Although peace was restored and generations of Scots had established a new motherland by birth, by 1717, unsettling religious doctrine, concerns about renewal of tenant leases, continuing drought, and availability of attractive land in the colonies convinced many Scot-Irish to leave their recently established homeland in search of another.¹⁵¹

It has been estimated that by 1790 as many as two hundred fifty thousand Scot-Irish had immigrated to the colonies.¹⁵² These Scot-Irish have been characterized as “self-reliant, industrious, unemotional, opinionated, and often considered to be bigoted, reserved, and cold, but they were loyal to friends and family. They made ideal settlers of the backcountry. They cleared land, built barns and houses (often in that order), and soon afterward established churches and schools.... Their religion encouraged them to read and interpret the Bible, and it was largely for this reason that they supported education. They were highly literate—even many women could read and write, which was uncommon at that time.”¹⁵³ In *The History of Education in North Carolina* Charles Lee Smith concludes that, “From the arrival of these immigrants dates the impulse for the establishment of schools throughout the State.”¹⁵⁴

For decades, this developing culture in the west competed with the established society in the east to reshape the government and to achieve prosperity for more North Carolinians. However, as Thomas Sowell describes in *Race and Culture*, there would be challenges ahead: “Minorities living in linguistic or cultural islands,

like the... Ulster Scots in Appalachia, may maintain the level of cultural development with which they began their isolated existence but seldom keep pace with the further advance of their home country, or with the progress of compatriots living elsewhere as immigrants in touch with a wider world.¹⁵⁵ In fact, as the Ulster Scots were adjusting to their new homeland in America, their original homeland of Scotland was experiencing a transformation in society, culture, and economy due to advances in agriculture, science, and technology. By 1860, the centers of commerce in Scotland were producing iron, manufacturing textiles, and building ships with connections by roads, canals, and railroads to ports for exporting to markets around the world. In addition, the foundations for applied science that accelerated the Industrial Revolution were established from the knowledge derived by experiments in thermodynamics and electricity by Lord Kelvin and the brilliance of the theoretical principles in electricity and magnetic fields by James Clerk Maxwell during the nineteenth century.

Identity of Colonial North Carolina

The contrasting attributes of the older and the newer settlements in North Carolina geographically dispersed with tending cultures unified in purpose and developing in relative isolation, contributed to the disagreements about the role, form, and representation in government. The agricultural economy attending the society in the east depended on slave labor and acreages of land with most of the larger farms and plantations developed by the early Englishmen near or along the waterways of the east coast. Access from eastern counties along the Roanoke, Neuse, and Cape Fear Rivers and their tributaries by barge or narrowboats to a deep-water port, then to markets in other colonies and England, enabled planters to engage in commerce and to operate self-sustaining communities with income from exporting mostly agricultural and natural products.

Copying the established Virginians, the plantation society of northeastern North Carolina was built upon class distinction of plantation owners, planters, small farmers (yeomen), and indentured servants. Status was derived from wealth that depended on the number of slaves, the acres of land, and the value of exports. In the plantation community the blacksmiths, carpenters, spinners, gardeners, farmers, cattlemen, cannerys, and some supervisors were slaves with skills and knowledge to produce articles for commerce as well as livelihood. Tobacco was the principal money crop and required considerable slave labor to create prosperity for the owners. While some of the plantation communities were as large as twenty-five thousand acres and two hundred slaves, less than five percent of the freeholders were considered planters, and most of them owned less than five hundred acres and fewer than twenty slaves.¹⁵⁶ However, the larger plantation owners in the east produced

most of the commerce, controlled most of the wealth, and were the most influential politically.

In contrast, farming in the back country, mainly for subsistence, due in part to poor and few wagon roads, depended less on slaves and provided less income to the settlers. The main paths available for exporting were north to the Tidewater of Virginia or south to Charles Town, South Carolina. Consequently, there was little travel and communication east to west in North Carolina. Western communities were sparsely populated and connected by culture, religion, and bartering. Some of the most prominent members of each county were the independent blacksmiths, carpenters, wheelwrights, coopers, bricklayers, and grist mill operators who often bartered with their services. Cultural, social, and educational opportunities, for most settlers, resulted from their religious activities with the minister providing the rudiments of education for their children.

Although the free white population in the back country was more than one-third of that in the east, only fifteen out of eighty-one assembly members represented the western counties. Since representation in the legislature was by county and not by population, the east dominated by dividing existing counties in the east and delaying the establishment of new western counties. Those in the west resented the gerrymandering and complained about unfair legislative decisions, such as a poll tax to build the Tryon Palace for the governor. With the tax levied as an equal amount on the poor and the privileged, westerners, with limited opportunities for income, considered the tax to be a burden on the backcountry farmers.¹⁵⁷ Essentially defined by commerce in 1760, the backcountry began where transportation was no longer practical along the rivers and canals and extended beyond the western most counties of Anson and Rowan into the unclaimed land of the state.

Angered with the governance by local officials, who were appointed and controlled by the central government, settlers in the western counties, around Orange and Mecklenburg, "formed themselves into an association for regulating grievances and abuse of power"¹⁵⁸ and challenged the governor and the legislature to address their concerns about ineffectiveness, corruption, and unfair taxation. Responses were viewed as unsatisfactory, and in 1771, citizens, mainly from the west, decided to take matters into their own hands. They formed an organization, known as the Regulators, and vowed not to pay taxes until a system of honest and fair local governance with accountability was established. Even though the governor subsequently took some corrective action, it did not satisfy the Regulators. When attempts to reach agreement through another direct plea to the legislature failed, a mob of Regulators in Hillsborough dispelled a Superior Court judge, conducted a mock court in defiance, thrashed a public official, and vandalized his home.¹⁵⁹

Responding to an expected attack by the Regulators, colonial Governor William Tryon gave orders for raising two thousand five hundred fifty volunteers from

the twenty-nine counties;¹⁶⁰ however, the colonels formed a militia of one thousand four hundred fifty-two men, mostly from the east, with fourteen assemblymen as officers, and marched to Hillsborough to confront two thousand men from the west, many from the back country. While the engagement, known as the Battle of Alamance, lasted only a short time, men were killed and wounded on each side. Some from the west were arrested and a few eventually hanged.

In defiance, some Regulators migrated to other colonies or the western frontier as a response to this unique confrontation between comparable numbers of citizens within one of the original colonies.¹⁶¹ While the eastern militia prevailed and the rebels were forced to accept the authority, the western settlers continued to challenge inequities of colonial governance and eventually, those underrepresented settlers participated in the state Constitution Convention of 1835 that established a more democratic form of government in North Carolina.

Prior to 1765, the tariffs and taxes on exports and imports levied in the colonies were usually recommended by the governor and enacted by the assemblies. Breaking with this tradition, the Parliament of England established the Stamp Act to collect taxes on all material printed in the colonies with the stated purpose of paying for the costs of administration and protection provided by the Crown. The colonists challenged the action as a duplication of the internal taxes authorized by the assemblies in each state to provide their own security and as a tax levied without representation by the colonies in the Parliament. Although the Stamp Act was repealed in 1766, the Parliament passed a declaration that the colonies were bound by English laws. This statement of absolute control without representation was viewed by many colonials as an effort by the Parliament to restrain the growing commerce within the colonies and to further benefit by protecting the manufacturing economy of England from competition.

In 1771, while representing colonial Pennsylvania and after visiting industrial centers in England, Benjamin Franklin shared his perspective with a friend in Massachusetts about creating silk, clothing, and metal industries in the colonies that could reduce the dependency on imports from England. Franklin doubted that the clothing industry in England could meet the growing demands in the colonies and suggested that "Necessity therefore, as well as prudence, will soon induce us to seek resources in our own industry."¹⁶² At that time Franklin remained loyal to the British Empire and advocated and received encouragement that "America ought not to be restrained in manufacturing."¹⁶³

Economy and Labor of Colonial North Carolina

From the proprietors until 1776, the expectation, by most of the colonists and by most of the English, that the colonies should export products from their soil to

England and in return import products manufactured in England, prolonged the dominance of an agrarian economy and delayed manufacturing for trade in the colonies. As a consequence, the colonial economy in North Carolina depended mostly on agricultural crops of corn, rice, tobacco, lumber, and staves and naval stores of tar, pitch, and turpentine harvested from pine trees.¹⁶⁴ From 1750 until the Revolutionary War the bushels of corn exported doubled, however the demand for the improved quality of the tobacco leaves and naval stores was sixty percent of the exports. Those yeomen and plantation owners with access to markets realized opportunities to acquire more than subsistence income. In pursuit of greater prosperity, some landowners increased exports of agricultural and forest products by acquiring more land and more slaves. With increasing population, increasing commerce, and a labor-intensive economy, the number of slaves in the colony grew from one thousand in 1717 to thirty-nine thousand in 1767.¹⁶⁵

The dependence on slavery for the labor in pursuit of prosperity started with the purchase of twenty Africans who were classified as indentured servants at Jamestown in 1620. A century of growth in importing indentured servants and slave laborers began for the sole purpose of cultivating and curing the tobacco crops on the growing number of larger farms and plantations in southern colonies of North America. At Jamestown, some white indentured servants were also imported and became qualified to own land after serving their master for four or five years; however, after 1650 imported Africans were purchased as slaves for life. After the Company of London that established the settlement was dissolved in 1624 and royal governance was in charge, there were still six thousand indentured servants in 1671 hoping to receive an opportunity to own land while the two thousand slaves in the Crown colony of Virginia were not eligible.¹⁶⁶

With North Carolina, Maryland, and Virginia chartered before the turn of the century, by 1709 these crown colonies exported a total weight of nearly thirty million pounds of tobacco.¹⁶⁷ By mid-century, the value of the total exports to Great Britain from the colonies of Virginia, Maryland, and North Carolina combined was four times the value of the combined total exports from the New England, New York, and Pennsylvania colonies.¹⁶⁸ From 1774 until the Declaration of Independence, the exports of tobacco from the colonies averaged about forty million weight pounds a year.

Increasingly the white indentured servants laboring in the tobacco fields were replaced on large farms and plantations by a growing number of African men, women, and children who were held as slaves in bondage for a lifetime. In the First Census of 1790 the number of slaves was eighteen percent of the total population of the sixteen states with eighty-seven percent of the slaves located in the tobacco producing states of Virginia, Maryland, North Carolina, and South Carolina, almost half of those in Virginia. Excluding those in Delaware, only six percent of the total number

of slaves in the United States were reported as residents of the nine northern states with seventy-five percent of those in New York and New Jersey combined.¹⁶⁹

The irregularity of institutionalizing slavery among southern colonies and within North Carolina is cited by historian John Hope Franklin as reflections of the “social, economic and political” conditions in a particular area.¹⁷⁰ By the first Census in 1790, about one in four in the population of North Carolina was a black person, and fewer than five percent of the black people were free of slavery.¹⁷¹ With fewer and smaller plantations, with unrelenting opposition to slavery by many Quakers and with most Scot-Irish yeoman unenthusiastic about slavery, there were fewer slaves per capita in North Carolina than in the other southern colonies of Virginia, South Carolina, and Georgia.

Nevertheless, as a colony and until the Civil War, the Legislature of North Carolina perpetuated and aggressively enforced slavery by periodically enacting laws that impeded any efforts to free slaves by the Society of Friends, by the North Carolina Manumission Society, by the American Colonization society, by free black persons, by owners, and by probaton of estates.¹⁷² Even so, Franklin describes a number of circumstances where slaves were virtually free of chattel conditions, with some taught to read and write, some free to travel, and some who bought free time from their owners.¹⁷³ Eventually, the legislature, with a majority from the culture of the privileged, who depended on the institution of slavery for their prosperity and were concerned about an uncontrollable rebellion by the slaves, responded by “incessant” and “vehement” opposition to freedom for any slaves under any terms.¹⁷⁴ The dominant economic, cultural, societal, and political leaders of North Carolina were not prepared to abandon a life of privilege that depended on their rights of ownership and of absolute supremacy over black people by law.

As slaves provided the labor for prosperity among plantation owners in colonial North Carolina, the textile industries in England were achieving increased productivity by replacing manual labor with water and later with steam power in the mills. As early as 1760, the Industrial Revolution in England was transforming the economy, urbanizing the society, and creating a new working class in England. However, many people in North Carolina did not consider manufacturing as a necessary industry since most colonists either met their personal needs using skills learned from ancestors or importing from abroad.

The agrarian culture preferred by most of the colonists was passionately described by Thomas Jefferson as “Those who labour in the earth are the chosen people of God, if ever he had a chosen people, whose breasts he has made his peculiar deposit for substantial and genuine virtue...While we have land to labour then, let us never wish to see our citizens occupied at a work-bench, or twirling a distaff. Carpenters, masons, smiths, are wanting in husbandry; but for the general operation of manufacture, let our workshops remain in Europe... The loss by the transportation

of commodities across the Atlantic will be made up in happiness and permanence of government. The mobs of great cities add just as much to the support of pure government, as sores do to the strength of the human body."¹⁷⁵ Even though most colonists were poor by monetary measures, the vast majority preferred an agrarian society and a culture of self-sufficiency, liberty, and faith. Given the chance, few in North Carolina would have opted for a mill town anywhere.

Even though the second Industrial Revolution in New England did not prosper for decades after the Revolutionary War ended, the entry of cargo and immigrants into the United States at deep water ports encouraged centers of commerce that became more urbanized, created more employment, emphasized more training, supported more education, and built more infrastructure than occurred throughout the vast country they served. Of the twenty-four largest towns in the United States in 1790, eighteen were north of Baltimore. The population ranged from thirty-three thousand in New York City to twenty-five hundred in Hudson City, NY. The total combined population of the five deep-port communities of New York, Philadelphia, Boston, Charles Town, and Baltimore was larger than the combined population of all the other nineteen largest towns, with many of these towns near and connected by commerce to the five ports.¹⁷⁶

However, there was not a town in North Carolina among the fifty largest in the nation until 1820 when New Bern became forty-eighth with three thousand six hundred sixty-three, Fayetteville fifty-first with three thousand five hundred thirty-two, Raleigh fifty-ninth with two thousand six hundred seventy-four, and Wilmington sixtieth with two thousand six hundred thirty-three residents.¹⁷⁷ While the centers of commerce were developing in the northern colonies, the southern colonies remained more dispersed, more agrarian, with fewer schools and roads, and were culturally unprepared and socially antithetical toward pursuing the opportunities to increase productivity and to expand prosperity using emerging mechanical work rather than human labor.

The pursuits of prosperity in the American colonies were primarily by owners of large acreage who exported natural products from forests and mines and harvests from farms and plantations mostly to Great Britain. Even though production of woolen yarn and cloth with spinning wheels and looms and various iron products with forge equipment in blacksmith shops was common in each colony, trade of domestic products among the colonies or export to foreign countries had been discouraged by the Crown to maintain a monopoly for England in the production by groups of domestic manufactures of paper, ironware, nails, glassware, pottery, woolen goods, hats, firearms, ammunition, and dozens of specialties by artisans to be exported to the colonies.

Education in Colonial North Carolina

During the proprietary period “there were but few schools and these were ill-attended.”¹⁷⁸ However, “throughout the colonial period it was the custom of gentlemen of means living in the country to maintain tutors for their children.”¹⁷⁹ Prior to the American Revolution, except for private tutoring, nearly all education for the youth in North Carolina was provided by a church, a missionary, or a minister. “The earliest account that we have of teachers in North Carolina is the report of Dr. John Blair, who came as a missionary to the colony in 1704,” and “About 1705 Mr. Charles Griffin came from some part of the West Indies to Pasquotank and opened a school which was patronized by all classes.”¹⁸⁰ However, most of “The early governors of the province had little desire to promote popular education, and as a rule it was the people, and not the Government, who promoted it to the extent it was carried.”¹⁸¹ In 1745, the General Assembly empowered the commissioners of the town of Edenton to build a schoolhouse, but most organized efforts survived only a few years due in part to a sparse population, small communities, wilderness roads, shortage of funds, and lack of qualified teachers.

In 1736, Governor Gabriel Johnston unknowingly spoke to all legislatures for the next two centuries on behalf of more than a million yet to be born in this state who would never learn to read or write:

In all civilized Societys [*sic*] of men, it has always been looked upon as a matter of the greatest consequence to their Peace and happiness, to polish the minds of young Persons with some degree of learning, and early to instill into them the Principles of virtue and religion, and that the Legislature has never yet taken the least care to erect one school which deserves the name, in this wide extended country, must in the judgment of all thinking men, be reckoned one of our greatest misfortunes. To what purpose, Gentlemen, is all your toil and labour, all your pains and endeavors for the advantage and enriching your families and posterity, if within ourselves you cannot afford them such an education as may qualify them to be useful to their country and to enjoy what you leave them with decency.¹⁸²

Over the next two centuries, there were hundreds, maybe thousands, of requests to the legislature to give more attention to the need to educate the youth for the prosperity of all North Carolinians. Yet, for at least one hundred years they simply avoided the issue by resisting any attempt to raise taxes for supporting education. Unfortunately, this was usually a popular decision with those eligible to vote.

Just prior to the Revolutionary War there were attempts, with some success, to provide continuing public, private, or church funding for a few schools. In 1760, the classical schools of Tate’s Academy in Wilmington and Crowfield Academy in

Mecklenburg were established by Presbyterians. A school for girls was founded in 1766 by the Moravians in the village of Salem that became Salem College a century later. At about the same time, Dr. David Caldwell, a Presbyterian minister and a graduate of Princeton, began a classical school near Greensboro where his “log cabin served for North Carolina as an academy, a college and a theological seminary” for four decades.¹⁸³ “Five of his scholars became Governors of different States, many more members of Congress... and a much greater number became lawyers, judges, physicians, and ministers of the gospel.”¹⁸⁴

In 1766, the Colonial Assembly incorporated the first academy by “an act for establishing a school-house in the town of Newbern.”¹⁸⁵ The incorporation required that “no person shall be admitted to be master of the said school but who is of the Established Church of England.”¹⁸⁶ Provisions for funding required a “duty of one penny per gallon on all rum, or other spirituous liquors imported into the river Neuse... by the importers...towards raising a fund for the education of ten poor children... and... towards giving a salary of twenty pounds per year to the master... towards enabling him to keep an assistant.”¹⁸⁷ With the unrest prior to the Revolutionary War, and with control by the “Established Church of England,” many of the residents who could afford the cost sent their sons to Presbyterian schools in the Piedmont.

In 1767, a classical school was founded near the town of Charlotte, and in 1771 the Colonial Assembly chartered the succeeding Queen’s College, to be supported from tax revenue. Subsequent approval by Governor Tryon may have been a show of gratitude for ending the earlier Regulator rebellion, but the trustees refused to appoint an Anglican as the president, and the charter was repealed by the king.¹⁸⁸ After a second charter was rejected, the trustees defied the king by operating under the name of Queen’s Museum. Prior to adopting the Mecklenburg Declaration of Independence on May 20, 1775, “literary societies and political clubs...held the significant and decisive debates” at the college and validated the king’s concern that it “would become the fountain of republicanism.”¹⁸⁹

It is reasonable to assume that after Mecklenburg had declared independence from British authority on May 20, 1775, the trustees deliberately changed the name of the institution to Liberty Hall Academy in September 1775.¹⁹⁰ After Lord Charles Cornwallis had characterized Charlotte as the “hornet’s nest of the Revolution”¹⁹¹ and used the academy as a hospital, he chose to ravage the structures and premises of the institution before retreating to Wilmington. After closing in 1784, the charter was subsequently transferred and renamed Salisbury Academy by the legislature.¹⁹²

With considerable diversity of Christian faith among the citizens of North Carolina, they consistently resisted any attempt to establish religious preference or discrimination by the government. By their actions, they sought freedom of religion, not freedom from religion. For example, there was strong opposition to any effort

by the Crown to require, by law, allegiance to the Church of England as a prerequisite for service in government. Also, the requirement that the principals of schools and academies supported by public taxes must be loyal to the Church of England ensured that education would remain the responsibility of each family or, when available, shared with a local church or a community.

Even with the schools provided by communities of various religions, education at any level was available to only a small percentage of the population. It has been estimated that in 1750 in Caswell County as many as two-thirds of the entire population could not read or write.¹⁹³ As the constitution, government, laws, and political power were established in the independent state, many of the white adults and most of the slaves were illiterate with limited ability to comprehend or influence the decisions that might determine their access to education.¹⁹⁴ Unfortunately, North Carolinians remained a profoundly illiterate population for most of the nineteenth century.

While North Carolina was struggling to become a unified and prosperous agrarian colony without public education for literacy or practical education for prosperity, James Watt (1769) developed a practical steam engine in Scotland; John Smeaton (1771) defined the practice of civil engineering and founded the Society of Engineers in Great Britain; John Arkward (1774) constructed a water-powered textile mill in England; and fundamental properties of electricity were discovered by Charles Agustin de Coulomb in France (1785) and by Alessandro Volta in Italy (1792). During the eighteenth century, the French developed technology to provide sanitation, roads, bridges, and logistics in support of armies deployed over long distances and trained the artillerymen in math and science to improve their accuracy. In addition, they were the first to recognize the opportunity to establish unique programs to educate and train technologists for civilian as well as military applications, with the National School of Bridges and Highway opening in 1747 followed by the Ecole Polytechnique in 1794.

Natural philosophy (science) was pursued by some educated colonists during the eighteenth century, but the great mathematicians, the great theoreticians of science, and the established research laboratories were in Britain and Europe. The awakening commerce in the free United States of America in the nineteenth century depended initially upon the immigration of engineers from England, Europe, the U.S. Military Academy, and experienced mechanics to design and build roads, canals, railroads, and machines.

However, ordinary Americans developed machinery powered by water or steam and were entrepreneurs who invented, discovered, and applied new fundamentals of science and technology to increase productivity. For decades and until public schools were established with universities and colleges adopting and awarding degrees in practical education, many of those mechanics developed the machinery for

the manufacturing economy. Without an aristocracy, the evolving economy enabled a democratic society of a uniquely inspired and trained middle-class citizenry.

Admission to the colonial universities usually required satisfactorily passing an entrance exam to test for proficiency in Latin and Greek. In some instances, the exam included elementary math and rhetoric. In preparation to take and hopefully pass the admission exam, young men either attended private academies, often residential, and sometimes run by the university, or they were tutored. Other schools established in North Carolina during the early colonial years, usually by one person, simply emphasized the four R's: religious values, reading, writing, and arithmetic, and were not intended as preparation for the admission exam.

In the last decade of the colonial period, academies offering special preparation for a classical education were increasingly established, sponsored by churches and often taught by ministers who were educated in England or in the colonial universities. Nevertheless, a college education at one of the colonial universities was available primarily for the privileged class, usually the son of a prosperous planter, merchant, or professional. Consequently, college graduates in colonial North Carolina simply perpetuated an aristocracy. Any expansion of prosperity for the masses resulting from practical education would have required changes in culture, society, and governance.

Developing the United States of America

Building a Country of States

Growing unrest in the colonies that led eventually to the Declaration of Independence had occurred at intervals after previous acts of Parliament; however, the aftermath of the Boston Tea Party in 1773 led to the shot heard at Concord in 1775 and sparked the revolution that grew beyond reconciliation and resulted in war. The Declaration of Independence in 1776 included thirty statements of “facts... submitted to a candid world” as proof of “a history of repeated injuries and usurpations, all having in direct object the establishment of an absolute Tyranny over these states.”

After victory at Yorktown in 1781 and the Treaty of Paris in 1783, a new country of the United States of America was established from the combination of thirteen colonies, with some states vehemently demanding the authority to govern independently. The Constitution that established a federal government was written in 1787, and the Confederation Congress met in 1789 in New York City where George Washington was installed as the first president of the United States of America.

With the structure and persons in place for governing, an immediate concern was the “price of liberty” in the debt of fifty-four million dollars for the new country. The first secretary of the Treasury, Alexander Hamilton, expected to begin payments of existing interests on the debt by securing an additional loan. Subsequently, the annual payment on the debt and additional loans was estimated to be two million two hundred thousand dollars to be paid “from the present duties on imports and tonnage” of navigation trade. Even though Hamilton was persuaded “that the proper funding of the present debt, will render it a national blessing,” he also took the position that “public debts are public benefits” and should “always be accompanied with the means of extinguishment.”

From 1700 until near the end of the Revolutionary War, the total population of the colonies grew about three to four percent each decade to more than two million seven hundred thousand people in the geography that claimed independence from Great Britain. For the three groups of four northern, four middle, and five southern colonies, the white people in the population were about evenly divided with approximately seven hundred thousand in each region. With independence, the number of black people accounted for twenty percent of the United States' population, with at least four hundred in each of the former colonies. However, ninety percent of black people in the United States were located in the southern region with forty percent in Virginia.³

The economies of the original thirteen colonies were developed primarily with navigation trade of the products from agricultural and natural resources. However, there was domestic manufacturing that included spinning and weaving wool for clothing, constructing vessels for trade, and mining iron ore for producing nails, tools, plows, and kettles. Even so, most of the manufactured products available in the colonies had been imported from Great Britain. Shortly after the Revolutionary War ended, Treasury Secretary Hamilton and his assistant Tench Coxe expressed their confidence that the United States could manufacture products to replace some of the imports from Great Britain as well as compete in trade by navigation to other countries. But throughout the eighteenth century, innovations by artisans in Great Britain created labor-saving machines for spinning yarn and weaving cloth from cotton. Their success resulted in large-scale manufacturing in factories, which created the Industrial Revolution. Subsequently, the significant increases in productivity with machines operated by common labor and replacing artisans resulted in the worldwide domination of Great Britain in the manufacturing and trade of cotton cloth and goods. Also important to dominance in trade, networks of canals and navigable waterways were constructed to increase the carry of productions from inland manufacturing communities to deep-water ports. The Industrial Revolution in Great Britain began before the Revolutionary War, but another one began after the war in the United States with extraordinary innovations by Americans, which dramatically increased productivity to carry in navigations, to harvest in agriculture, and to produce in manufacturing.

While organizing the federal government of the United States of America was underway to conduct the affairs assigned to various departments, each of the former colonies was ratifying its constitution for agreement with federal authority and establishing its own obligations obtained with freedom from the Crown. In general the Bill of Rights added to the Federal Constitution was an endorsement of freedom for white citizens; however, building a nation with "inalienable Rights" for all the people to pursue prosperity was deferred for some people to the states, acts of Congress, and amendments to the Constitution.

Beginning with the settlements and up to the Revolutionary War, most of the pursuits of prosperity in the United States depended on the availability and cost of labor. Indentured servants, apprentices, slaves, poor whites, and immigrants were the primary sources of the labor acquired by the men who could afford relatively cheap land and were committed to pursuing prosperity beyond family subsistence. Beginning with nearly seven hundred thousand at the founding of the United States, the slave labor of blacks increased at a rate of about thirty percent on average over each of the seven decades to almost four million by 1860.⁴ In addition, the number of free black people available for labor increased on average by about fifty thousand persons a year.⁵ Most blacks were in the southern region of states where the pursuit of prosperity depended mostly on slaves who labored on farms and plantations.

From a rebellion of independence in the Revolutionary War to another rebellion for independence, the geography of the United States increased in size, with most of the growth resulting from purchases, wars, and treaties that resulted in seven territories and twenty-one more states, with most of them developing west of the Mississippi River. With the population of the country increasing eightfold in seven decades to more than thirty-one million, nearly one-fifth of the growth was from immigration during the decades from 1820 to 1860.⁶ The number of immigrants entering between 1790 and 1820 was less than five percent of the number between 1820 and 1860.⁷

Among the five million immigrants entering the United States from 1820 through 1860, about thirty percent of them identified themselves as farmers or laborers.⁸ In addition to opportunities in agriculture, about two hundred fifty thousand immigrants identified themselves with one of the occupations of mechanic, shoemaker, weaver, spinner, engineer, mason, or manufacturer.⁹ Two-thirds of the immigrants settled in twelve of thirty-four states and more than half of the total in Indiana, Massachusetts, New York, Ohio, Pennsylvania, and Wisconsin. The largest number of almost a million immigrants settled in New York, with the least number of a little over three thousand settling in North Carolina.¹⁰

To increase trade among states and to connect navigation to foreign ports, incorporations of private companies were subsequently approved by legislation enacted by federal and state governments of the new country. These companies relied on the capital of investors for construction. Tolls for each carry or travel on roads, canals, and railroads supported the payment of any debt and cost of operation. Consequently, during the decades to 1860 the innovations and improvements in transportation resulted in the construction of trails, roads, canals, and railroads that spanned east to west and north to south across the country.¹¹ Even though most of the engineers who designed and supervised construction of canals were from Great

Britain, mostly graduates from the Military Academy at West Point designed and supervised construction of highways and railways.

With transportation for trade developing and commerce expanding for decades within and among states the opportunities for the people to pursue prosperity varied throughout the country as achievements in each state depended on citizens who improved their own productivity. Usually these opportunities for prosperity in each state evolved from a combination of discoveries and inventions, incorporations for capital, transportation for trade, scientific farming for agriculture, and scientific mechanic arts for manufacturing. Villages, towns, and cities developed where trade gathered for transportation to markets that also inspired commerce in the local economy. As local manufacturing and commerce attracted more citizens, many of the opportunities for employment in these urban areas required education of at least the three R's of reading, writing, and arithmetic.

Encouraging Manufacturing in a New Country

With productivity for trade in England increasing in agriculture from crop yield on larger acreage managed with scientific practices, fewer yeomen in manufacturing from multiple spinners operated by one person, and more convenient market connections, the value of exported products doubled during the first half of the eighteenth century.¹² Throughout the century as colonies developed in America, artisans of common spinners and weavers in England continued inventing and developing the machinery necessary for the Industrial Revolution that developed in the nineteenth century.¹³

However, by the design of the proprietors and by the desire of the Crown, the colonies were established with constraints on manufacturing for trade throughout both centuries resulting in the development of economies in the colonies that depended mainly on exporting raw materials and importing manufactured goods in return. In "The Commercial Policy of England Toward the American Colonies" historian George Louis Beer provides this insight into the development of the economy in the colonies: "The statesmen of England recognized that economic independence precedes political independence and is, in a measure, the cause of it. They feared that if the colonies were to learn to manufacture their essential commodities, they would gradually become estranged from the mother country and might ultimately attain political independence."¹⁴ In 1770 the value of the imports to the colonies was about one-half the value of the exports to England.¹⁵

In 1770 the colonials acquired fifty-seven categories of articles by imports that were valued at nearly three-and-one-half million dollars. In return the British continental colonies exported articles listed by the largest in weight and size of pine,

oak, and cedar boards for construction; staves, headings and hoops for casks; tobacco for pleasure; wheat, Indian corn, flaxseed, rice, and butter for eating; deer skin for tanning; indigo for dyeing; tallow, lard and beeswax for lighting; and New England rum for drinking. Tobacco, rice, bread, flour, wheat, indigo were the only articles with a value that exceeded one hundred thousand dollars, and the value of tobacco was one-fourth of the total for all fifty-seven articles.¹⁶

Measured by quantity and weight, about seventy percent of the articles were exported to the West Indies with prominent shipments for constructions and casks, with twenty percent to Great Britain and the remainder to Ireland and Africa. Measured by value, about fifty-one percent of the articles shipped from the colonies were exported to Great Britain with prominent shipments for pleasure, eating, and dyeing. For the rest, twenty-five percent of the articles by total value were exported to the West Indies, twenty percent to Europe, three percent to Ireland, and one percent to Africa.¹⁷

Production in the colonies depended on carpenters, masons, bricklayers, joiners, coopers, and tailors who were available locally; however, in England the woolens, cottons, silks, linens, earthenware, china, glassware, hardware and wrought iron, anchors, scythes, nails, steel, and axes were manufactured by artisans who exported to markets in Europe and the British colonies. For more than a century, many of the prosperous colonials imported furnishings for their homes and equipment for their farms from manufactures in England.¹⁸ As the Revolutionary War ended, the question arose as to whether with independence the new country that had been committed to agriculture should or could establish manufactures to trade among colonies and other countries.

With the outcome of the Revolutionary War, neither Tench Coxe nor John Baker Holroyd, first Earl of Sheffield (Lord Sheffield) could have foreseen the rapid expansion of the cotton economy for either country; however, Lord Sheffield as a member of Parliament was certain that Great Britain would continue to dominate over the United States in manufacturing for trade. With experience and success in commerce, Coxe was equally confident that prosperity in the United States could be realized by developing manufacturing for trade throughout this new country. Coxe was born in Philadelphia in 1755, enrolled in the University of Pennsylvania, left before graduating, entered the counting-house of the Coxe and Furman firm in 1776, and attained a majority interest with "sole management of the affairs of what was then a leading commercial house in Philadelphia" at an early age.¹⁹ Although he had been a loyalist to Britain, Coxe became a patriot and a representative of Pennsylvania at the Constitutional Convention in 1787.

As early as 1775, at the age of twenty, Coxe supported the development of manufacturing with his membership in the United Company of Philadelphia for Promoting American Manufacturers. After the Revolutionary War, he continued to

encourage the development of manufacturing as a member of the renewed Philadelphia Society and began to create public awareness of the circumstances in the manufacturing economy in the Confederacy of the United States by publishing essays. In 1791, Coxe shared with Thomas Jefferson the first six essays that were published from March to August of that year in the *American Museum* magazine in which Coxe revealed “the very great errors and deviation from fact” that he had found in Lord Sheffield’s pamphlet “Observations on the Commerce of the American States” that was published in London in 1784.²⁰

Thomas Paine had also read Sheffield’s observations and concluded that his objectives for publishing the pamphlet were “to allure the Americans to purchase British manufactures... and to spirit up the British Parliament to prohibit the citizens of the United States from trading to the West India islands.”²¹ However, Coxe was concerned about the disrespect by Sheffield of the capability of the new nation to establish and compete in manufacturing for trade when he expressed to Jefferson his belief that the essays he had published “would inspire confidence in the minds of our countrymen, and of the foreign nations, who are in alliance with us, if it could be shewn that the British nation have not that Monopoly de facto in our trade which is too generally supposed.”²²

With the publication of his “Observations” just three years after Cornwallis surrendered at Yorktown and the British army had left Philadelphia, Sheffield began by describing his sense of the sentiments in Britain about the freedom of the American colonies to promote their manufacturing and opportunities for trading with countries other than Britain. Instead of a panic over losing control and significant advantage in the commerce with trade to and from the thirteen colonies of America, Sheffield offered an analysis of the circumstances that was intended to provide “calmer reflections” among the public, with the knowledge that he provided to them about the exports and imports between Britain and American states “whereby we may ascertain the real value of their trade, foresee and judge of their true interest and probable conduct, and choose the wisest measures (the wisest are always the most simple) for securing and improving the benefits of a commercial intercourse with this now foreign and independent nation.”²³ Clearly expressed in the observations of 1784, Sheffield was confident that the “power of supplying the wants of America, of receiving her produce...belongs almost exclusively to our own merchants” and that “the industry of Britain will encounter little competition in the American market.”²⁴

Sheffield’s analysis of the seventeen articles judged most likely to be exported from Britain to America “in which Great Britain will have scarce any Competition”²⁵ included woolens, iron and steel manufacturers of any kind, porcelain and earthenware, and cotton cloth and goods of all kinds.²⁶ There were twelve articles judged that there might be competition which included linens, silks, and thread.²⁷

There were nineteen articles that Great Britain could not produce to an advantage that included fisheries, naval stores, rice, and tobacco.²⁸ Sheffield analyzed the influence of the independence of the colonies upon the commerce of Great Britain using the supposition that “To form a just notion of the question now depending, and reasonably to decide upon it, it was necessary to examine and ascertain, what are the wants of America, what this country can provide her with, which cannot be produced elsewhere on terms equally advantageous, and what are the productions which America has to give in return.”²⁹

In general, Sheffield thought that the amount and value of most products imported and exported between the colonies to Great Britain would change very little with the freedom of the American colonies. However, his conclusions were drawn from analysis and judgment that did not include the sudden joy of freedom and the gift of innovations that inspired the people who were building a new nation.

In his six essays, Coxe provided analysis almost point by point contending against Sheffield’s assertions of facts and predictions of manufactures for trade involving Great Britain and the Confederacy of the United States. Expressing concerns about nearly two dozen specific items with detailed analysis to support his claims of errors and skewing of facts, Coxe provided an abstract of one hundred exports of the United States valued at more than twenty million dollars exceeding the total value of approximately three million pounds sterling for articles exported in 1770, which would be about thirteen thousand dollars with the currency exchange rate in 1813. However, the utmost value of the six essays to the public discourse about the future of manufacturing in the development of trade commerce in the economy of the new country was provided by the confidence and vision of Coxe in his response to the assertions by Sheffield that the colonies, now free from British rule, would never become united states, would decrease in population with migration back to England, would not increase exports or imports for a long time, would not compete in carry trade without the capacity to build enough ships, and would not manufacture for themselves for a long time.³⁰

After the Congress of the Confederacy of the United States had ratified the Paris Treaty to end the Revolutionary War in 1784; but, before the Constitution of the United States of America was ratified by many of the states or George Washington elected president by the votes of the members of Electoral College in 1789, Coxe addressed the “assembly of friends of American manufactures” at the University of Pennsylvania in August 1787 at a meeting “for the purpose of establishing a society for the encouragement of manufactures and the useful arts.”³¹

Coxe began with a statement about the current benefits derived from just being in America with the “means of happiness as great and numerous as are enjoyed by any country in the world.”³² With this new nation situated geographically where “a soil fruitful and diversified—a healthful climates—mighty rivers and adjacent

seas, abounding with fish, are the great advantages,” Coxe told the audience that the natural economy had arisen from the industry of the individual citizens engaged in agriculture, manufacture, and commerce that was providing “certain subsistence” for most and “innumerable opportunities of acquiring wealth” for some citizens.³³ However, the independent united states must encourage new manufacturing, “which existed but in a small degree or not at all, before the revolution,” to provide more consumption of the increasing “produce from our lands and fisheries,” to provide for the employment “of those whom the decline of navigation has deprived of their usual occupations,” and to provide more certainty of supplies during wars.³⁴

The presentation by Coxe included descriptions of opportunities to increase production for trade in this new country by establishing mills and factories where water or wind could provide the power to operate the machinery that manufactured the products without employing artisans and tradesmen and making it possible to hire women and children as wage earners. By encouraging production of domestic manufacturing of woolen goods for trade, contributing to growth in commerce, prosperity, and wealth in England during the eighteenth century, Coxe expected similar encouragement would produce similar outcomes in this new country.

In addition, the encouragement of emigration from Europe would also “relieve and assist us” with our shortage of labor with some of these new citizens experienced in manufactures of domestic or factories production.³⁵ Including a list of more than two hundred “raw materials and natural products which now are, or may readily be, furnished” as resources for many branches of manufactures that could be situated in this country “for home consumption and use and for exportation”;³⁶ Coxe chose the breweries of Philadelphia as an example of the positive effect of developments in manufacturing that could also positively affect the development of farming, where the consumption of English beer had required four thousand bushels of barley until the introduction of malt liquors, which also required one hundred twenty thousand bushels of grain for the breweries.³⁷

Tench Coxe, with prominent politicians, established merchants, and elite manufacturers, participated in the Philadelphia Society for the Encouragement of Manufactures and Useful Arts founded in 1787. Half of the articles of incorporation of the adopted plan defined the usual designation of officers with assigned duties necessary for an organized activity to achieve their purpose and an explanation that each member of the society was required to pay into a General Fund “the sum of ten shillings, at least, and the same sum annually during his continuing a member,” to be used by the society for necessary expenses.³⁸ The second half of the plan was devoted to outlining a Manufacturing Fund with a stated purpose for “the better employment of the industrious poor.”³⁹ To endow the fund to be used “for the purpose of establishing factories in such places, as shall be thought most suitable,” the

society offered to “any one person or company... a subscription for sums not less than ten pounds.”⁴⁰

A manufacturing committee was chosen by the subscribers with the responsibility that they “shall have sole disposition of the said fund, and shall conduct the factories in such manner as they shall think most advisable,” subject to the instructions from the members of the Manufacturing Fund.⁴¹ The subscribers were the sole owners for each factory of all the “ground, buildings, implements, raw materials, and other things, purchased or paid for out of their subscriptions” and “entitled to all the profits attending the business.”⁴²

Establishing Manufacturing

Although not at the top of the agenda at the first meetings of United States Congress as it met in New York City from March 4, 1789 until March 4, 1791, the House of Representatives did request in 1790 that Secretary Hamilton provide an assessment of “manufactures, and particularly to the means of promoting such as will tend to render the United States independent of foreign nations for military and other essential supplies.”⁴³ While the first priority as secretary of the Treasury was fiscal policies for addressing the war debt of the United States, Hamilton was interested in encouraging manufacturing to increase commerce and wealth of the country. In a biography by Henry Cabot Lodge, Hamilton is characterized as a man who took “full advantage of any and every opportunity, but he had the good fortune to have a great one opened to him.”⁴⁴

Born in 1757 in the British West Indies, Hamilton was an apprenticed clerk for six years in a mercantile occupation as a young boy with limited opportunities for attending organized education except guidance from Presbyterian clergyman Rev. Hugh Knox. Without his mother, who died when he was eleven, but with encouragement by a letter of recommendation from Rev. Knox to a former colleague in New Jersey Colony, Hamilton sailed to Boston at the age of fifteen, then traveled to New Jersey.

Admitted to the Academy of Elizabethtown in New Jersey by the friend of Knox who was Headmaster Francis Barber, Hamilton completed grammar school in six months and entered King’s College (Columbia) in New York in 1773. With aggressive engagement in the public discourse of the time and his decision to support the colonies, Hamilton decided to abandon the course of study and enlisted in the army, where he was a leader in battle and served as aide-de-camp to General Washington.

At the age of twenty-five, Hamilton passed the bar to practice law in New York, served as a delegate to the Constitutional Convention in Philadelphia in 1787, and wrote the first and then fifty-one of the eighty-five Federalist Papers, in addition to

serving in government from 1789 until he resigned in 1795. He died in 1804 from a bullet wound that occurred during a duel with Aaron Burr.⁴⁵

With involvement in arranging the financial structure of the country, in developing strategies for reducing the debt, and in supporting the business of manufacturing to grow the economy, Hamilton did not respond to the request from the House of Representatives for almost two years. However, during those two years Tench Coxe was appointed assistant secretary of the Treasury, and Hamilton and was very involved in the encouragement of manufacturing.

In August 1791, Assistant Treasury Secretary Coxe convinced Secretary Hamilton to prepare a prospectus for the founders of the Pennsylvania Society for the Encouragement of Manufactures and the Useful Arts, which was organized with capital from the Manufactures Fund of the Philadelphia Society to establish a variety of companies that “ought to... procure from Europe skillful workmen and such machines and implements as cannot be had here in sufficient perfection.” Hamilton “conceived that there would be a moral certainty of success in manufactures” with the production of thirteen articles that were mostly textile goods.⁴⁶

Subsequently, the society obtained seven hundred acres to create a mill town at the Passaic River Falls in New Jersey where waterwheels could power the machines of the manufactures. This early effort to create a village of manufactures struggled with inexperienced workers, expensive investments in machinery, poor supervision, and high cost of labor. In 1793, John Nicholson was also organizing companies and establishing a similar complex of factories in Philadelphia that would follow to some extent the effort in New Jersey. Nicholson was an immigrant from Wales who became a leading merchant in Philadelphia and served as Comptroller General of the state. As a member of the Pennsylvania Society for the Encouragement of Manufactures and the Useful Arts, Nicholson owned shares in the New Jersey Society but was imprisoned in 1799 because of debt and died a year later with his estate owing four million dollars.⁴⁷

About the same time in the early 1790s, Samuel Slater, who had worked in the mills in England, immigrated to America where he built machinery, constructed a textile mill, and established a company that included a nearby village of houses, stores, and churches for the workers and families. Slater was the son of a yeoman farmer and had served as an apprentice to a partner of Richard Arkwright, who was an owner of cotton mills and often regarded as the inventor of the machinery for factories that fueled the Industrial Revolution in Great Britain. The success of manufacturing mills and factories depended on adequate capital to construct and equip, on available and trained labor, and on demand and value of products at the market, such that the income from sale was greater than the total cost to produce the goods.

All three attempts to establish manufacturing villages were able to raise capital for the start-up, which enabled the purchase of land, equipment, and labor. The

source of capital for the New Jersey Society was raised from the sale of stock, with a plan to grow from the sale of more stock or receiving net income from the factories. Unfortunately, the factories produced little if any net income, and the value of the stock in New Jersey continued to drop as investors withdrew. In contrast, the first economically successful water-powered textile mill in the United States was constructed by Samuel Slater in Pawtucket, Rhode Island and in operation in 1793, which resulted from investment in one man with the knowledge and experience who could create the necessary machines, construct the mill, train the workers, and build a village to attract the necessary labor.⁴⁸

As the interest in establishing manufacturing villages was developing in the states of New England, Secretary Hamilton responded to the House of Representatives in December of 1791 with his "Report on Manufactures," which included some recommendations from Tench Coxe that may have surprised some of the members and irritated other congressmen. The opening section of the report confronted those who were "unfriendly to the encouragement of manufactures" and those with the conviction of a belief that "agriculture is the most beneficial and productive object of human industry."⁴⁹ In addition, Hamilton claimed that some of the unfriendly ones were convinced that: "Nothing can afford so advantageous an employment for capital and labor, as the conversion of this extensive wilderness into cultivated farms. Nothing, equally with this, can contribute to the population, strength, and real riches of the country."⁵⁰ However, Hamilton countered these suppositions with the argument that: "This mode of reasoning is founded upon facts and principles, which have certainly respectable pretensions. If it had governed the conduct of nations more generally than it had done, there is room to suppose that it might have carried them faster to prosperity and greatness than they have attained by the pursuit of maxims too widely opposite."⁵¹ The facts as accepted by Hamilton led him to the conclusion that "importations of manufactured supplies seem invariably to drain the merely agriculture people of their wealth."⁵²

Although domestic manufactured products from iron, flax, sugar beets, copper, brass, tin, tobacco, wool, and wood were common in the American colonies, Hamilton described the consequences in manufacturing as a "positive augmentation of the produce and revenue of the society."⁵³ Some of the advantages and characteristics of manufacturing for commerce as described by Hamilton may have been influenced by Adam Smith in *The Wealth of Nations*, which was published in 1776. Prominent and useful characteristics of manufacturing in the pursuit of prosperity included division of labor, use of machinery, employments of classes not usually in business, promotion of immigration for increasing the supply of labor, employing diversity of talents and dispositions among the working people, more training in various fields of expertise, and maintaining a steady demand to manufacture the surplus product of the soil.⁵⁴

After explaining the economic circumstances and labor opportunities for production in manufacturing, Hamilton abandoned the suppositions and comparisons about the values of productions of agriculture and manufacturing with an assertion of “a moral certainty that the trade of a country which is both manufacturing and agricultural, will be more lucrative and prosperous than that of a country which is merely agricultural.”⁵⁵ For the development of commerce, a variety of ores from the mines, crops from the plantations and farms, timbers from forests, and products from various animals were suggested as potential sources of materials for manufacturing products for trade. Among seventeen considered, manufactures with iron were of “pre-eminent rank” compared to other metals because of the extensive use as a material in “almost every useful occupation.”⁵⁶

Wood was in abundance; however, cabinetware and shipbuilding were scarce. As a new investment, capital could establish the “mill for spinning of cotton, not long since invented in England.”⁵⁷ After reminding the members of Congress that many of the current exports were the raw materials for manufacturing in other countries, Hamilton presented the essential transformations required in the United States to expand opportunities and prosper from manufactured products, which included attention to the rights of the manufacturers, trading laws, encouraging new inventions, more discoveries at home, applications for machinery from other countries, regulations for the inspections of manufactured products, and facilitating the transportation of commodities.⁵⁸

To encourage manufacturing and commerce throughout the country, good roads, canals, and navigable rivers would diminish the expense of carriage and result in “the remote parts of the country more nearly upon a level with those in the neighborhood of the town.”⁵⁹ Expressing the need to give more attention to financial circumstances affecting his family when he resigned in 1795, Alexander Hamilton was alive when production in manufacturing similar to circumstances that he had described to Congress in the “Report on Manufactures” was established in the United States with the invention of the cotton gin in America and the importation of English inventions of machinery that were critical in building factories in which cotton yarn and goods were produced from the cotton grown and ginned in America.

Although the production by manufacturing of cotton yarn and goods in mills and factories developed at a deliberate pace over a few decades, Hamilton predicted that the obstructions in the pursuit of manufacturing in the United States would arise “from three causes—scarcity of hands, dearness of labor, want of capital.”⁶⁰ Hamilton envisioned the United States as a nation that would prosper from commerce occurring when more of the productions of agriculture and manufacturing were for markets rather than mostly domestic consumption; however, he recognized

that the markets in towns, cities, and ports were remote in distance and burdensome in passage for many in the growing population of the United States.

Connections for Trade

During the first half of the nineteenth century, the population of the country grew fourfold,⁶¹ the number of states nearly doubled, and national wealth grew almost threefold.⁶² Much of the increase in population was developing inland from the colonial states, recently established states, and territories across the south and throughout the Ohio Valley. Without eastward navigable waterways and with ranges of Appalachian, Allegheny, and Adirondack Mountains, the westward settlers in the frontiers were challenged to carry by horses and wagons through gaps, passes, and valleys their productions to markets in the east.

However, rivers beyond these mountains were tributaries to the Mississippi River with access to the Gulf of Mexico but controlled by the French until the Louisiana Purchase in 1803. At the beginning of the nineteenth century, there were more than five million persons in the entire country with almost ten percent of the population in the territories and states of Illinois, Indiana, Kentucky, Missouri, Ohio, and Tennessee that were beyond the eastward waterways. However, in just three decades the combined population of these six states increased more than eightfold approaching four million with a twentyfold increase in Ohio to nearly one million.⁶³

The Mississippi River begins in Minnesota and flows through two thousand miles of riverbanks before reaching New Orleans after being joined by many tributaries along the way, which include the Missouri River near Saint Louis and the Ohio River at Cairo, Illinois. Other cities Minneapolis, Saint Paul, Memphis, Greenville, Vicksburg, Natchez, and Baton Rouge also developed as major centers of navigation with most connected to internal towns where gatherings of productions of agriculture and manufacturing began the trip to be exported from the port near New Orleans.

The geography of the southern territories and states of Alabama, Louisiana, Arkansas, Texas, and Mississippi included access to the Atlantic Ocean, with navigation for trade to foreign countries. The rapid growth of the agricultural economy for the southern region depended to a large extent on the carry of cotton by railroads after 1830; however, transportation to markets for many inland farmers still included wagon roads and navigable waters, resulting therefore in discouraging trade for some inland farmers.

In addition, much of the southern economy also depended on the labor of slaves to produce and carry goods to markets. In the southern territories and states of Alabama, Georgia, Louisiana, and Mississippi, the combined slave population

increased more than fourfold in three decades from fewer than three hundred thousand in 1800 to more than a million before the prominence of cotton production in all the states of the Deep South.⁶⁴

The geography of all the founding colonies included access to the Atlantic Ocean with rivers, bays, and ports providing connections by navigation to each other except for North Carolina with the beaches of the Outer Banks and shallow port inland. In Virginia oceangoing vessels could dock at the wharfs of plantations and settlements located along the 132 miles of ocean shoreline.⁶⁵

Eventually settlements developed above the fall lines of the James, York, Rappahannock, and Potomac Rivers, requiring transfer of cargo to wagons for a journey over rugged roads and trails. Although the colonials were interested in internal improvements for connections with navigation, the few attempts supported by colonial governments were insignificant compared to the network of canals under construction in England.

With independence from England, the attention to internal improvements for navigation began with short canals and “river improvements... too numerous to trace.”⁶⁶ By 1800 improvements in navigation connected North Carolina to the Chesapeake Bay in Virginia with construction of the Dismal Swamp Canal, Boston to New Hampshire with the Middlesex Canal, and the Santee and the Cooper Rivers that “brought the trade of the upland rivers to Charleston.”⁶⁷

Usually the state issued a charter approving incorporation that raised capital from the sale of stock in the company that would then construct, own, and operate the canal. Tolls from transportation paid the cost to build, operate, and pay on debt before any returns on the stock. With public concerns about the means and purpose of private incorporation of projects, the Philadelphia Society for Promoting the Improvement of Roads and Navigation challenged this usual practice by proposing that the “route to the Ohio and Lake Erie... should be done by the state.”⁶⁸

Involvement of the federal government in internal improvements began with the visionary leadership of Albert Gallatin, the fourth secretary of the Treasury, who was born in Switzerland in 1761, graduated from the University of Geneva, immigrated to the United States, served in the Revolutionary War, and was elected to the Fourth, Fifth, and Sixth Congresses from Pennsylvania and as secretary of the Treasury for thirteen years.

In March 1807, Secretary Gallatin was directed by the Senate to develop a plan within the means and power of Congress of “opening roads and making canals” with statements identifying similar public projects that “require and deserve the aid of the government” and details about others under construction.⁶⁹ A year after the directive from Congress, Gallatin submitted the report “Public Roads and Canals” that provided an atlas of how the states east of the Mississippi River could be connected from north to south and east to west by roads, rivers, and canals. The

report provided detailed description of each major project with cost estimates that amounted to twenty million dollars.⁷⁰

The outline of the projects included the opening of canals for inland navigation of sea vessels from Massachusetts to North Carolina; building a road from Maine to Georgia; opening east-to-west navigation on four major rivers with construction of parallel canals, which would require locks; and building four roads starting from those four rivers and winding around the mountains to connect with four corresponding rivers and canals on the other side.⁷¹

In addition, other canals were to be constructed around falls with locks for inland navigation among states on the Great Lakes opened for navigation through the Saint Lawrence River to the Atlantic Ocean, with canals with locks around falls in the Ohio River to connect waterways to the Mississippi River and New Orleans.

Gallatin estimated that an "annual appropriation of two million dollars would accomplish all those great objects in ten years."⁷² However, the appropriation was not the only challenge for implementing the plan, since assent by every state would be required for each improvement.⁷³

There were about one hundred fifteen miles of canals in use around the time Gallatin submitted the plan.⁷⁴ However, the War of 1812 was a priority for the treasury that delayed further internal improvements for connecting a large-scale network for transportation by navigation, until 1817, when the legislature of the State of New York approved the construction of the Grand Canal.⁷⁵

This first major connection was the Erie Canal, completed in 1825, rising five hundred seventy-two feet above the Hudson River at Albany and winding three hundred sixty-three miles up valleys and around mountains to Buffalo on Lake Erie. After designing and constructing the canal with eighty-one lift locks, each ninety feet long and fifteen feet wide, and with the capacity of handling barges up to thirty tons loaded, the seven prominent engineers who led the construction became well known and were employed to construct major canals in Pennsylvania, New Jersey, Delaware, Ohio, Indiana, and Illinois.⁷⁶

Before 1840, other shorter canals were extended or added in New York, which expanded the opportunities for navigation of production to markets. With increasing convenience and cost reduction for transportation, by 1832 half a million barrels of flour and one hundred forty-six thousand bushels of wheat produced on the farmlands in the middle and western regions of the state had arrived by canal boats to the Hudson River.⁷⁷

From 1832 to 1834 the traffic of canal boats increased thirty percent on the Erie Canal.⁷⁸ With an increase in traffic from the mid-forties to the mid-fifties, the eastbound rate decreased forty percent per ton, and the westbound rate decreased nearly two-thirds per ton. Probably encouraged by the decrease in cost, the tonnage

carried by canal boats increased more than fifty percent from 1837 to 1845 and doubled in seven more years to more than two million tons.⁷⁹

Inland connections developed by the colonies were wagon roads and some trails that had been established by Native Americans. Among the longer riding trails and wagon roads connecting the colonies north to south in 1772, the Boston Post Road was the first road traveled with stagecoach service.

The trip of four weeks with stops along the way to New York was about two hundred fifty miles. Extended roadway near the coastline to Charleston, South Carolina, known as the Kings Highway, was thirteen hundred miles from Boston. A journey from Boston to Charleston of at least two months would have passed through New Bern and Wilmington, North Carolina.⁸⁰

At Fredericksburg, Virginia, two roads forked from the King's Highway to create one known as the Fall Line Road that eventually passed through Raleigh and Fayetteville, North Carolina on the way to Columbia, South Carolina, and another known as the Upper Road that passed through Hillsborough, Salisbury, and Charlotte, North Carolina on the way to Greenville, South Carolina.⁸¹

In addition, immigrants on their way into the Yadkin Valley of North Carolina traveled west from Philadelphia to Lancaster and then southwest on the Great Wagon Road to reach their choice to settle along their journey of the eight hundred miles from Philadelphia through western Maryland, the Shenandoah Valley, and Roanoke in Virginia before passing through Winston-Salem, Salisbury, and Charlotte, North Carolina to South Carolina and Georgia.⁸²

In the eighteenth century, some townships constructed connections of local roads and implemented a road labor tax that required eligible males to perform roadwork on a certain number of days each week, with a fine for delinquency. One could avoid the labor required by the road tax by paying a substantial fee each week.⁸³

Most of the earlier settlements were near waterways that were connected to markets for trade. However, as the later settlements located farther from coastal waters and navigable rivers, transportation to markets became more difficult on local wagon trails that connected with the longer roads. With the total population in the country tripling as the number of states almost doubled during the five decades after the Revolutionary War, improving transportation for trade was always a high priority in government planning but was accomplished mostly by the private sector of invested individuals.

As secretary of the Treasury, Gallatin was especially concerned about the difficulty in connection and transportation beyond the Allegheny Mountains along the waterways of the Great Lakes, Ohio River, and eventually the Mississippi River. With the support of President Jefferson, Gallatin advised Congress to include a provision in an act in 1802 for the people in Ohio to form a government before entering statehood with the requirement "that one-twentieth of the net proceeds

of the lands lying within said State sold by Congress shall be applied to the laying out and making public roads leading from the navigable waters emptying into the Atlantic, to the Ohio, to the said state, and through the same, such roads to be laid out under the authority of Congress, with the consent of the several states through which the roads shall pass.”⁸⁴ The contracts to build the first ten miles of a road westward from Cumberland, Maryland were awarded in April 1811 and completed the next year.

Although the War of 1812 interrupted any chance of the federal treasury financing an enormous project of improvements in transportation, by 1815, three additional contracts were awarded for constructing the Cumberland Road to Union Town, Pennsylvania. By 1818, the mail service was transported by coaches along the National Road from Washington, D. C. to Wheeling, Virginia.⁸⁵

The average cost per mile of construction for the first United States public road, known as the National Road, was ten thousand dollars.⁸⁶ Along the way in nearby states private turnpikes were connected, creating a network with access to the road. During the two decades devoted for the National Road to reach Vandalia, Illinois in 1830, nearly six hundred businesses were incorporated to build and operate those turnpikes for profit. More than eighty percent of those incorporated were in New York, Pennsylvania, and Ohio.⁸⁷

During the early decades of independence, the states, counties, and towns relied upon private investors to construct toll bridges and turnpike roads that provided connections to longer roads, canals, and ultimately markets for trade. As with construction of canals, a state issued a charter to a town or county for the purpose of building a road with the authority to contract with a private corporation of stockholders that constructed, operated, maintained, and collected tolls to provide passage of cattle, harvests, natural products, and manufactured goods to markets.

The first long turnpike of sixty-two miles from Philadelphia to Lancaster, Pennsylvania was opened in 1794 at an estimated cost of seven thousand dollars a mile including a bridge over a creek.⁸⁸ As encouragement to direct commerce to their markets, the number of chartered turnpike companies grew rapidly in most states, with a combined total of nearly four hundred by 1810. Turnpikes constructed by companies under the charter of townships also formed radial networks of transportation to the nearest markets and ports.

In general, fifty dollars per share in a turnpike company was a poor investment; however, the motivation may have been self-interest beyond the returns of a single investment. Although the turnpikes were constructed as routes to support commerce, all the people in the regions willing to pay the toll could access the turnpike for social, business, or pleasure affairs.

However, the rate of growth of commerce in some regions may have encouraged the investment without concerns about returns, with approximately seventy

percent of the turnpike incorporations from 1792 to 1845 in four states: thirty percent in New York, twenty-one percent in Pennsylvania, thirteen percent in Ohio, and seven percent in Massachusetts. As the number of incorporations to establish companies was increasing by 1840, the simplicity of design and avoidance of deep cuts in mud might have attracted investments by one thousand companies that constructed more than ten thousand miles of plank roads. More than sixty-three percent of the charters issued for establishing the companies to build plank roads were in three of the states, with twenty-five percent in New York, twenty-three percent in Pennsylvania, and fifteen percent in Ohio.⁸⁹

With internal improvements encouraging transportation on roads, rivers, canals, and inland waterways to increase commerce within and among states, steel rails were beginning to form another kind of network for commerce and travel over longer distances. First wood, then iron, and finally steel rails with guided horse drawn carts, in 1831 steam engines traveled from Baltimore to the Ohio River in Virginia. Travel by railroad shortened the time for long trips and greatly increased the cargo capacity as compared to a team of horses.

The expansion of railroad travel and commerce was slowed throughout the country due to the Depression of 1837; but Asa Whitney, who was a mechanic, a manufacturer, and a landowner during his career in the railway industries, envisioned in 1849 the "Project for a Railroad to the Pacific," which was anxiously anticipated from coast to coast.⁹⁰ Although Whitney's plan was not chosen, Congress created the Union Pacific Railroad Company in 1862 "to aid in the Construction of a railroad and telegraph line from the Missouri River to the Pacific Ocean."⁹¹ Even before this project was completed in 1869, railroads had become an important enabler for the growth of commerce. Also contributing to the national economy, industries were created in the northern states to manufacture steel rails, locomotives, and boxcars.

Although the first railway engine was built earlier in England, the first steam locomotive that was built entirely in America at the West Point Foundry for the Charleston and Hamburg Railroad scheduled passengers in 1830. In just five years there were about six hundred miles of railroad in operation with thirteen thousand by 1852 and increasing to more than thirty thousand miles just before the Civil War, with a majority of the railroads in Pennsylvania, Ohio, Indiana, and Illinois.

Regardless of the method of acquiring knowledge and experience, there was some uncertainty about engineering as a profession, occupation, or trade. However, by 1854 those men who had designed and supervised the construction of seventeen thousand miles of railroads and four thousand seven hundred miles of canals in operation, with another twelve thousand miles in construction, were either military or civil engineers.

The internal improvements that connected to markets the products of agriculture and manufacturing, carried over hundreds of thousands of miles, required the experience of civil engineers, who were known just as engineers before comparisons with military engineers. Like most titled professions or trades, the aspiring engineer served as an apprentice to one who had earned his title the same way.

With the expansion of both the number of states and the population, roads, canals, and railroads were constructed to connect the growing number of towns and cities, which enabled the expansion of commerce and travel among the citizens. Consequently, the demand for engineers increased; however, supplying more civil engineers depended on apprenticeships, immigrants, or hiring from other countries.

A Biographical Dictionary of American Civil Engineers contains entries of more than one hundred fifty civil engineers born before the Civil War, with one hundred born before 1830 and half of those before 1800. The education and experience of the civil engineers among the one hundred was acquired about equally in four categories of apprenticeship with little schooling, county schools or academies, colleges or universities, and polytechnics or schools of architecture and engineering.⁹²

Most of those civil engineers from another country had attended a university, college, polytechnic, military, engineering, or architecture institution before their practice of civil engineering. For those civil engineers born in America, about one-fourth had little formal schooling before pursuing the profession of civil engineering. The remainder was about equally divided between education in the county schools or academies, in the colleges or universities, or in the Military Academy at West Point.

During the period of time when the Military Academy was organizing and graduating the Corp of Engineers, Steven Van Rensselaer was concerned about the shortage of teachers in the local schools to instruct in the application of science, which would better prepare common people for their work. After two decades of experience in the local community, the Rensselaer Polytechnic Institute was organized to educate civil engineers to apply "science to the common purposes of life," which became a national landmark in organizing courses of study in engineering education.⁹³

After these institutions had organized courses of study just for engineering, Union College, the University of Virginia, the University of Michigan, and other colleges and universities introduced full courses of study in engineering into their undergraduate curricula. In some universities and colleges, engineering or civil engineering appeared in the curriculum as a partial course without defining the content, which was usually a course in math and theory for surveying, leveling, and constructing roads.

At the University of Virginia, practical education was a founding principle with the Board of Visitors resolving that engineering and surveying be established.⁹⁴

Although practical education was also a founding principle at the University of Michigan, the president, who proposed a scientific curriculum and a bachelor of science degree, had to urge the establishment of the engineering Course.

Union College was one of the first to establish a postclassical curriculum (liberal arts) that included the option for a scientific course of study that included civil engineering. Consequently, Union College was the first and the model for the development of engineering education within a curriculum of a liberal arts college.

Continuing the internal improvements throughout a rapidly growing country required an increase in the number of engineers to design, construct, and operate the expanding transportation system of bridges, roads, canals, steamboats, sea vessels, and railroads. At mid-century, the Seventh Census of the United States enumerated the employment of five million three hundred seventy-one thousand eight hundred seventy-six free males over the age of fifteen into ten categories with forty-five percent reported in agriculture and thirty percent in one category that combined commerce, trade, manufacture, mechanic arts, and mining.⁹⁵

Innovations and Prosperity in the United States

As the Revolutionary War ended, with British loyalists and military evacuating the colonies in the autumn of 1783, John Fitch, who had been captured by Native Americans and then transported to a British fort in Canada, was released for his return to the Confederation of United States. Fitch was born in 1743 in Windsor, Connecticut and educated with periodic attention in classrooms for reading and writing, self-study of arithmetic at home, and experience in work as a surveyor, gunsmith, silversmith, watch repairer, and manufacturer of brass buttons. Before the war Fitch abandoned his wife and two children early in their marriage and then wandered about the country searching for opportunities to pursue prosperity in business and in ownership of frontier property.

At the age of forty-two, while recovering from surveying in rugged landscapes of the frontier, Fitch began to explore an idea about the possibility of using a steam engine that would be arranged to propel vessels upon rivers or canals. The results of his initial concepts and efforts to realize this objective began four decades of competition in America among curious and ambitious men whose innovations and experiments about the construction of steamboats encouraged progress in the establishment of convenient and affordable transportation for carrying products of agriculture and manufactures to markets by way of rivers and canals, as well as providing travel for citizens on business or pleasure. The intrinsic value of the steamboat was the reduction from days to hours and months to weeks in the time required for hauling cargo point to point or for persons on trips over long distances.⁹⁶

Jonathan Hulls, who had attended only grammar school, was a clockmaker experienced in trade in England. In 1736 Hulls was awarded a patent in England, which was the first to design and build a small steamboat and Newcomer engines powering a stern paddle-wheel that towed other vessels in canal.⁹⁷ Following Hulls by five decades, American John Fitch began to also design and experiment with screw-propellers and screw-wheels astern on small steamboats. After investors provided funds to design, build, and then launch a larger steamboat, the first performance on water was on the Delaware River at a slow speed. Delegates of the Constitutional Convention meeting in 1787 in Philadelphia were present and probably in awe of the invention of the steamboat but not impressed with the speed.⁹⁸ After redesign of the hull to reduce friction and changes in the boiler, another steamboat traveled against the tide with thirty passengers on board for about twenty miles from Philadelphia to Burlington, New Jersey in three hours and ten minutes.⁹⁹ By 1790, there were scheduled crossings of the Delaware River in a passenger steamboat with an average speed of six to seven miles per hour.¹⁰⁰

The navigation of steamboats attracted the attention of John Stevens, who was born in Perth Amboy, New Jersey in 1749, the son of a member of the Continental Congress. Stevens graduated from King's College and was subsequently admitted to the bar. Instead of a career as a lawyer, Stevens decided to pursue engineering after he observed demonstrations by Fitch that included the results of experiments involving boats, steam engines, and methods of propelling in water.¹⁰¹ With progress, but concerned about retaining rights to his inventions, in February 1790 Stevens petitioned Congress for a patent with the claim of "an improvement on the steam engine."¹⁰² Instead of responding to his petition, in April of that year Congress passed the Patent Act.

In June 1790, Fitch petitioned again for a method of transferring the energy of steam to the force of paddles to propel the boat.¹⁰³ However, instead of recognizing independent petitions, in August 1791, John Fitch, John Stevens, and James Rumsey, another inventor with steamboats, were granted a United States patent for contributions to the development of the steamboat.¹⁰⁴

In 1798, Stevens convinced his brother-in-law, Robert R. Livingston, to join him in building a steamboat that eventually turned out to be a failure. Recognizing the challenges, Stevens continued alone with attention to the placement of steam engines on the boats and connections to rotary engines. Livingston, who would again share interests in steamboats, was born in 1746 in New York City, the son of a member of the Colonial Congress. Livingston graduated from King's College at the age of eighteen and was admitted to the bar in 1773, a member of the Provincial Congress of 1776, and a member to draft the Declaration of Independence.¹⁰⁵

Subsequently, Stevens was granted another patent in 1805 for an improvement in the method for generating steam.¹⁰⁶ By 1806 Stevens had constructed a boat to be

powered in the water by a four-bladed screw-propeller connected to a shaft directly connected to the rotary Watt engine.¹⁰⁷ With the force of the screw-propeller the steamboat crossed the Hudson River from Hoboken to New York with a top speed of four miles per hour.¹⁰⁸

After resigning as the minister to France and while touring Europe, Livingston met with Robert Fulton in Paris in 1807 where they agreed to develop plans for building their first steam-powered vessel.¹⁰⁹ Fulton was born in 1765 in Little Britain, Lancaster County, Pennsylvania. He attended school for “the rudiments of a good English education;”¹¹⁰ however, his interests were in “the workshops of the mechanics with whom he was acquainted.”¹¹¹ In 1786, Fulton traveled to England where interests and experiences for almost a decade resulted in publishing in 1795 a “Treatise on Canal Navigation.”¹¹² After designing and supervising projects, Fulton was recognized in Europe and the United States as a prominent civil engineer when Livingston proposed the experiments with steamboats.

After experimenting with boats on the Seine and purchasing an engine from the early engineering and manufacturing firm Boulton and Watt in England, Fulton returned to the United States to design and build the Clermont steamboat, named for Livingston’s home, that was launched by Fulton in 1807 on the Hudson River.¹¹³ Even though a patent was awarded to three inventors for their contributions, Fulton became recognized by many as the inventor of steamboats after launching the Clermont. The point-to point travel time of the Clermont for the first long trip of one hundred fifty miles from New York to Albany was thirty-two hours at an average speed of five miles per hour.¹¹⁴

Other innovators built a variety of steam-powered vessels with engines of different sizes that continued to reduce the time of travel to a destination on navigable waterways. Before steamboats appeared on the Mississippi River, during the seasons of harvests, thousands of flatboats traveled downstream on a trip of months with as many as three dozen articles on board that usually included oats, corn, beans, onions, potatoes, and tobacco.¹¹⁵

In 1817 the first steamboat completed the trip of fourteen hundred miles from Louisville to New Orleans in twenty-five days.¹¹⁶ However, over the next decade, the number of steamboats for carry of articles to the Port of New Orleans only increased to about ninety vessels.¹¹⁷ Although the tons of carry to the port increased tenfold by 1840, there were more than four hundred accidents with half due to explosions, about thirty percent destroyed by fire, and the rest due to snags in the river.¹¹⁸

The early development of steamboats encouraged Congress to establish procedures for awarding patents. Its authority to act was included in Section 8, Article 8 of the Constitution, with the founders deciding that “Congress shall have the power to promote the progress of science and useful arts, by securing for limited times to authors and inventors the exclusive right to respective writings and discoveries.”¹¹⁹

The Patent Act of Congress of 1790 defined the process for persons to petition the government for a patent that could last for fourteen years. Any person could offer a petition “setting forth, that he, she, or they, hath or have invented or discovered any useful art, manufacture, engine, machine, or device, or any improvement therein not before known or used, praying that a patent may be granted.” Upon the reviews by the secretary of state, secretary of war, and attorney general, with two of the three approving, patents were awarded.¹²⁰

Thomas Jefferson assumed his duties as the first secretary of state of the United States in May 1790 and served until January 1794. Jefferson had graduated from the College of William & Mary with continuing inquiries into the applications of science. Jefferson was an inventor without patents that included the well-known “plough” with scientific and mathematic principles considered to achieve deeper furrows with less resistance in cutting, lifting, and turning the sod. There were three patents issued the first year and sixty-seven in total during the three-and one-half years of service by Jefferson as secretary of state.¹²¹ In autumn 1793 Jefferson corresponded with Eli Whitney about his petition for a patent on the invention of the cotton gin.

Jefferson informed Whitney that the law required review of a model of the invention and that upon receipt of one he might deliver the patent immediately. In addition, Jefferson expressed a personal interest with three questions about the usage of the cotton gin for crops grown for household manufactures: “Has the machine been thoroughly tried in the ginning of cotton, or is it as yet but a machine of theory? What quantity of cotton has it cleaned on an average of several days, & worked by hand, & by how many hands? What will be the cost of one of them made to be worked by hand?” With favorable answers, Jefferson indicated that he would “induce” himself “to engage one of them to be forwarded to Richmond for me.”¹²²

Extraordinary innovations with almost immediate impact on agriculture and manufacturing were realized from the mechanical talents of Eli Whitney, who was born in 1765 in Massachusetts. Inquisitive and creative with mechanical skills as a young boy, Whitney was an entrepreneur who created a profitable enterprise by the age of sixteen, taught in a village school while preparing for the exam for entrance to Yale at the age of twenty-three, and then graduated after four years. The motivation to design the cotton gin developed in response to a challenge that occurred by chance when Whitney met the wife of General Nathanael Greene, the revolutionary hero in North Carolina, during Whitney’s travel to Georgia to become a private tutor.

When Whitney learned that someone else was hired into the position, Ms. Greene convinced him to visit with her family until another opportunity was available. While in the South and meeting planters, Whitney became aware of the characteristics of the cotton economy, which was labor intensive, especially in the

amount of labor necessary for the separation of the seeds from the cotton fibers. After Whitney demonstrated his skills in repairing and reconstructing an admired knitting frame, Ms. Greene challenged him to focus on developing a mechanical device that could perform the process required for cotton seed separation. In the spring of 1793, as Whitney was returning to New Haven, the cotton gin instruments were for sale from the Miller and Whitney factory. Even though the cotton gin significantly increased productivity and contributed to the growth of the enormous cotton economy established in the United States, with the continuing costs of defending his patent from duplications and the unpaid obligations from the rights purchased by states, Whitney did not become a rich man from the invention that created enormous wealth for others.¹²³

With the mechanized removal of cotton seeds replacing the labor of at least twenty-five persons, usually slaves, the increased productivity realized in the production of ginned cotton encouraged more plantings, with more exporting from the southern states. While an earlier skeptic, Thomas Jefferson acknowledged, after Whitney's invention, that the increased productivity in manufacturing could be as efficient as agriculture since "the inventions of latter times, by labor saving machines, do as much now for the manufacturer, as the earth for the cultivator."¹²⁴ While the cotton gin was reducing cost and adding value to the harvest, as does an increasing yield in agriculture, Jefferson's prediction was becoming a reality, with the inventors and mechanics creating machines that replaced labor in the processes that converted raw materials into commercial products.

Due to a contract from the federal government to manufacture rifles, Whitney encountered another opportunity for employing his creativity when he decided that rather than production of each firearm by a tradesman, he would design a rifle defined by parts so that each part could be produced with casts for molten metal, machine tools, and machinery developed by himself with sufficient accuracy for assembling the rifle by hands. With Whitney creating the machine tools operated by water power that could cut, grind, smooth, and shape identical parts in large numbers over a relatively short period of time in addition to a process of assembling the firearms without tradesmen, the value of mechanic arts to create machine tools that manufactured parts was demonstrated, and the foundation for factory production was established by his own company, profitable well beyond his death in 1825.

The 1810 Census was devoted in part to American Manufacturers and provided contemporary insight to all of those who read it concerning the consequences of replacing and supplementing labor with machines. Also "[t]he right application of the national industry, is the surest and greatest of the means to promote the wealth of nations," with the advantages of "Labor-saving processes and devices" as the "diminution of manual labor" that could be applied to the land to "produce the greatest portion of the riches." To further preserve labor for crop production, the machinery

that “beneficially abridges labor” and permits America “to produce cotton in effect unlimited,” should be applied to manufacturing in general.¹²⁵ Therefore, “it is of incalculable importance, that the acquisitions from abroad and the numerous and invaluable inventions and improvements at home, in regard to the uses of steam, have given us opportunities in manufactures by machinery, which were not even in contemplation in Europe twenty years ago.”¹²⁶ While the mechanics in America were at work pursuing those objectives, success depended on a few who devoted their resources and time to the innovation and construction of labor-saving machinery.

In 1813, Francis Cabot Lowell began the growth of the textile industries of the United States when he employed an experienced mechanic, who was living in Waltham, Massachusetts, to assist him with the replication and improvement of the water-powered looms that Lowell observed in the cotton mills during a visit to England. With the introduction and successful construction of water-powered looms that equaled the output of ten manual looms, Lowell invited investors to join him in developing mills along the Charles River, with ginned cotton entering and finished cloth shipping from the same location. Although Lowell died in 1817, the industrialists invested and moved the successful enterprise to the Merrimack River in 1823, where abundant waterpower provided increased productivity resulting in more cotton cloth and profit; by 1846, more than ten thousand people worked at ten mill complexes.¹²⁷

Reported in the 1840 Census, cotton manufacturing expanded rapidly in Massachusetts to include more than twenty thousand persons employed at two hundred seventy-eight establishments with a value of manufactured cotton goods exceeding sixteen million dollars (\$16,553,423).¹²⁸ Before the Civil War, more than half of the largest mills and three-fourths of the spindles in the United States were located in communities in Massachusetts and Rhode Island.¹²⁹

Although patents were intended as “securing for limited times... to inventors the exclusive rights to... discoveries,” the protection of those rights was left to the individuals and the courts. Even with the use of the cotton gin throughout the southern states, Whitney was unable to prosper from the multiple duplications constructed from knowledge of the patent. Fitch’s steamboats carried people and cargo on canals and rivers before Stevenson and Rumsey, yet three patents were awarded. Lowell copied as much as he could remember about the water looms in England to construct a factory for manufacturing cotton goods without authority to duplicate other patents. Since patents provided no inherent protection of exclusivity in production, maybe there were other reasons for submitting a petition.

From 1810 to mid-century there were between three and four hundred patents awarded for plows with each one searching for the perfect plough.¹³⁰ When the details of improvements were known, talented blacksmiths and mechanics could replicate the patent of each plough. Therefore, why did people enter petitions with

nearly one-half rejected, easy duplications of patented articles, and few resulting in an income? One part of the answer may be their expectations of income from business transactions or from other sources of remuneration. After six decades of patents awarded to thousands of persons, the commissioner of patents in 1859 reported that “scarcely a patent is granted which proves profitable to the inventor and important to the public.”¹³¹ Nevertheless Abraham Lincoln was interested in improving the “method of lifting vessels over shoals” in a way that “secured against injury,” which was the 6,469th patent awarded in the United States.¹³²

Among the early examples of unrealized expectations was the first patent for a cast-iron plow that was awarded to Jethro Wood in 1814. Wood was born in 1744 at Dartmouth, Massachusetts “blessed with a good education, an ample library and a well equipped workshop.”¹³³ As an adult Wood lived in an agricultural area of Scipio, New York, where, coincidentally, three other men had previously petitioned for a patent of improvements in the plough. The petition submitted by Wood described the geometric and mathematic details of “the dimensions and proportions” with the assertion “that the principal metallic material of his Plough is cast iron.”¹³⁴

Even with another patent awarded in 1819 and the use of cast iron instead of wood, plow improvements were not obvious until the plow was connected behind a team of horses and furrows plowed in a field in which pebbles and rocks were plentiful. The real Wood plow became popular among farmers; however, other plows nearly duplicating it and also popular led Wood to spend his fortune during the remainder of his life seeking payments from infringements of his patent.

Unfortunately, Wood was not successful before his death, nor was his son who died in 1845 with little more than a year left before the patent expired. Once a person of large fortune with expectations of income from the “Cast Iron Plow,” Jethro Wood died without either and “less than five hundred and fifty dollars... from his invention.”¹³⁵

John Deere built his first steel blade plow in 1837¹³⁶ but waited almost twenty-seven years after many improvements and sales to customers before securing his first patent of “new and useful Improvement in Molds for Casting Steel Plows and other Articles.”¹³⁷ John Deere was born in Vermont in 1804, apprenticed as a blacksmith, and established his own shop in Vermont before settling in Illinois in 1833. He was employed as a blacksmith before establishing an iron works business in Moline, Illinois in 1839 that provided services and produced the first ten of the iron plows for sale.¹³⁸ In 1849, the company employed twenty men who produced two thousand three hundred plows in one year.¹³⁹ By 1857 the factory employed fifty-six men who produced more than ten thousand plows in a year.¹⁴⁰ The first patent was awarded in April 1864 with Deere and Company incorporating in July and expanding business in 1869 with a store in Kansas City, Missouri that was stocked with various articles of farm equipment.¹⁴¹ Clearly Deere was more than an inventor in his business.

Congress passed an act in 1836 to eliminate the approval by three cabinet officers and established the Patent Office to be located in the Department of State with a commissioner, clerk, and staff to process petitions and award patents. Over the previous forty-six years, more than fifteen thousand patents were awarded with an average of just twenty-seven per year during the first decade of the 1790s.

However, the number of patents awarded each year increased over the decades to an average of more than five hundred patents per year during the decade prior to establishing the Patent Office. Of those awarded by the Patent Office in the first year of 1837, the patents could be roughly divided into four categories: farming with examples of a tobacco press, plows, and scythes; machines with a rotary steam engine, drilling engine, and weighing machine; processes with smelting furnace iron, making soap, and caoutchouc dressing; and items with examples of stoves, grates for fire place, and lamps.¹⁴²

The patent for caoutchouc dressing was the beginning of very unusual discoveries with many future applications enabled by the results of earlier efforts by Charles Goodyear in developing a process to prevent the undesirable odors and unstable structure of products of natural rubber (caoutchouc) when exposed to warm environments. Goodyear was born in New Haven, Connecticut in 1800 to a father who manufactured pearl buttons, scythes, and tools.¹⁴³ With experience in manufacturing, Goodyear decided to open a hardware shop in Philadelphia in 1826.¹⁴⁴ After failures in business and time spent in debtor's jail, a visit to New York introduced Goodyear to attempts and failures of others in the production of rubber articles, which led to his obsession to discover a process to stabilize natural rubber for manufactures.¹⁴⁵

Experimenting to eliminate odors and stickiness of natural rubber that had occurred in commercial products, Goodyear began with trial and failure tests to discover the temperature and chemicals that would result in reactions with caoutchouc. Even with the family suffering and broke, Goodyear was obsessed with performing experiments in his kitchen that he used for his laboratory. Eventually the first successful experiment resulted in a patent for a dressing and a smoothing of the surface of natural rubber with nitric acid; but the initial positive response from commerce diminished when expectations for the performance of products failed.¹⁴⁶ However, due to sheer luck, absolute success was obtained after natural rubber was exposed to sulfur near or on a hot stove for an uncontrolled period of time without purpose or explanation.

In the 1844 patent, Goodyear claimed that exposure to a combination of heat and sulfur resulted in more durability but less flexibility than natural rubber. The process was quickly named as *vulcanization* of natural rubber.¹⁴⁷ During an attempt to sell the formula in England, a sample of vulcanized rubber was given to Thomas Hancock, one of the prospects who eventually discovered the process.

Unfortunately, Goodyear lingered before filing for a petition until six months after Hancock had filed for a provisional patent. The first petition by Hancock and rejection by France led Goodyear to the opportunity to sell the formula for manufacturing only in the United States. William De Forest, Goodyear's brother-in-law, organized investors to establish a company that paid Goodyear fifty thousand dollars for unlimited patent rights and eventually evolved into Uniroyal.¹⁴⁸

Many patents were discoveries as with Goodyear, but few dramatically altered the employment of labor, the source of transportation, the methods of communications, and the growth in the economy of the United States. In addition, success in their pursuits of prosperity for most citizens depended on their experiences and initiative to create value from their talent or from improvements in their productivity.

As an example in agriculture, the hundreds of patents for improvements to plows by changing from wood to metals for reducing damage from rocks, by sharpening to cut into the soil, and by changing shapes to turn furrows did not dramatically change the reality that one person and two horses could prepare one-and-one-half to two acres without urgency to plant. However, there was urgency in the harvest that begins with the maturing of the grains. After cutting the stalks with a sickle or cradle scythe, the grains had to be separated from the straw by threshing. During a harvest season of the order of ten days, one man would try to cut with a sickle one-half of an acre a day or three acres with a scythe.¹⁴⁹

In June 1834 a patent was awarded to Cyrus McCormick for a mechanical reaper with eventual productions sold with a guarantee of a cutting capacity with a team of horses of sixteen acres in a day.¹⁵⁰ The effect of the mechanical reaper on the practice of agriculture was similar to the effect of the Spinning Jenny by James Hargreaves on manufacturing with significant increases in productivity.

McCormick was born in 1809 in Walnut Grove, Virginia and followed in his father's footsteps with commitments as a blacksmith and farmer on eighteen hundred acres and an interest in inventing labor-saving equipment for planting and harvesting crops.¹⁵¹

After six years of experimenting with various attempts to improve the reaper, McCormick began to manufacture and finally sold the first of two in 1840. With the demand spreading from Tennessee to Michigan and twenty reapers sold each year, McCormick decided to manufacture the reaper in Brockport, New York for convenience of shipments on the Erie Canal.¹⁵²

Although about one thousand reapers were sold from 1840 to 1851, by 1860 the McCormick Reaper Works, then in Chicago, was producing four thousand in a single year. By 1875 the McCormick Harvesting Machine Company was manufacturing twelve thousand reapers. Evolving into the International Harvester Company, fourteen hundred machines of various kinds were available to farmers by the turn of the century.¹⁵³

With travel time of hours replacing days and machines increasing productivity of labor, discoveries of electricity in laboratories by scientists began with research followed by innovations of sound, power, video, and microwave devices as systems that eventually revolutionized the economic and social structure of the United States. Before the nineteenth century, electricity was evident to scientists in many forms, with searching for a vacuum by Otto von Guericke in 1660, constructing the Leyden jar in 1775, and experiencing the presence of electrical current by Benjamin Franklin. Throughout the eighteenth and nineteenth centuries, electricity was the domain of scientific inquiry for Charles-Augustine de Coulomb (1785), Alessandro Volta (1800), Hans Christian Oersted (1819), Michael Faraday (1821), Andre-Marie Ampere (1827), Georg Ohm (1827), and Joseph Henry (1831), whose collective results provided the understanding from experiments in their laboratories about the principles that defined the properties of electrical current flowing in a conductive wire and associated energy with the electromagnetic field.

Most of their laws derived from experiments describing the steady flow of current and were established after the invention of the galvanic cell by Volta in 1800 and before the discovery by Henry in 1831 of the inductive force created by current flow. Most of those scientists remained curious about electricity, but few were interested in searching for applications. However, unusual circumstances for an unusual man led to attempts to invent a device that would control electricity so that an electronic sound message could be transmitted over a long distance over wires.

Samuel Morse graduated from Yale in 1810 with a passion to be a painter. After fourteen years in Europe and becoming an award-winning artist, he returned home essentially broke, but avowing to become an inventor with the help of his brothers.¹⁵⁴ After marketing an invention without financial success, painting portraits that included President James Monroe, accepting an unpaid professorship at NYU, and founding the National Academy of the Arts of Design, Morse returned to Europe for another three years before boarding a ship once again to return home.¹⁵⁵

While engaging in a conversation with a passenger who had heard André-Marie Ampère speak about the electromagnetic travel of electricity along a wire, Morse recalled to himself a lesson by an instructor at Yale: "If the presence of electricity can be made visible in any part of the circuit, I see no reason why intelligence may not be transmitted instantaneously by electricity."¹⁵⁶ Morse recalled that he pondered ideas throughout the night in his cabin until "the electric telegraph had already shone upon his mind in the grey dimness of its early morning."¹⁵⁷ In addition, he began to sketch the code we know today as representing letters and numbers with electrical interruptions.

Morse began earnestly in 1832 to develop the recording telegraph with a discovery of the relay that permitted connections with offices and repeaters along the telegraph lines.¹⁵⁸ With the telegraph recorder performing as designed, Morse sought

protection for his invention in 1838 with the attorney general rejecting the application due to prior public demonstrations of the recorder; however, France gave almost immediate attention and rapidly provided the protection for the patent.¹⁵⁹

Subsequently, Morse was invited by the White House to demonstrate the telegraph system to the president. The visit evolved into a bill in Congress that resulted in an appropriation of thirty thousand dollars for Morse to construct a larger system with a line running from Washington to Baltimore.¹⁶⁰

The larger project of setting poles, stringing wire, and installing repeaters for forty miles within budget required an experienced and dedicated mechanic to construct the first telegraph system in America. Ezra Cornell, a construction engineer who resided in New York, was the superintendent of the project just two decades before the founding of a university bearing his name.¹⁶¹

When the wires were finally connected to the telegraph recorders in 1844, the first message sent was, "What hath God wrought?"¹⁶² In eight years there were as many as sixty-seven telegraph companies mostly in the northeastern and midwestern states that had constructed nearly twenty-four thousand miles of wire that enabled almost instant messaging in Morse code among communities.¹⁶³

With companies incorporating for connecting one location to another, the establishment of a national telegraph network began with the merger of Western Union, American Telegraph Company, and the United States Telegraph Company by 1866, resulting in eighty-three thousand miles of wire with connections throughout the country.¹⁶⁴ By 1880, communications between parties could be conducted in minutes instead of weeks, with seventy-seven telegraph companies employing fifteen thousand persons in twelve thousand offices where operators sent more than thirty-one thousand messages.¹⁶⁵

Another invention about mid-century dramatically increased productivity throughout the country in manufacturing clothing. For centuries craftsmen and seamstresses hand-sewed seams in garments and bedding that were in a variety of materials. However, hand-sewing could be tedious and time consuming even for those who were trained with the many stitches. Consequently, efforts to replace the hands were occurring during the eighteenth and first half of the nineteenth centuries, with at least a half-dozen men inventing machines that were constructed for the purpose of sewing seams for various purposes.

Most of those machines were developed as improvements with one thread through the eye of the needle penetrating the material and then duplicating to some extent the mechanical process of stitching the seams by hand. However, the extraordinary innovation by Elias Howe, Jr. was a machine with mechanical motions of two separate threads instead of one in creating a stitch.¹⁶⁶

Howe was born in Spencer, Massachusetts in 1819 and attended the schools that were required by the constitution of the state. At the age of sixteen Howe

apprenticed in a textile factory at Lowell; but with its closure in 1837 he moved to Cambridge where he apprenticed as a mechanic for carding machines and subsequently for repairing manufacturing instruments. An obsession for success inspired his innovations in sewing machines that during 1846 became the 4,750th patent awarded in the United States.¹⁶⁷

The unique claim for sewing seams with a machine did include one strand threaded through an eye on one end of a needle and the eye of the needle passing through the cloth, similar to sewing a stitch by hand. However, what made the innovation by Howe in his sewing machines unique was a second thread on a bobbin with a device creating a loop of bobbin thread with each mechanical rotation as the threaded needle passes through the loop and is then withdrawn for each stitch. Howe was an experienced mechanic and manufactured a few machines for sale; however, there was resentment in the United States from those artisans who depended on hand-sewing for their income. In addition, there was no income from a deal made to manufacture the machines in England.¹⁶⁸

With little progress by Howe in his efforts to manufacture and sell the sewing machine, other innovators were claiming improvements and patents for their sewing machines. One of the more prominent of the innovators was Isaac Merritt Singer who had been awarded patents in 1839 for machines that drilled rocks and another in 1851 to carve metal in addition to improvements in carriages in 1859. Singer was born in Schaghticoke, New York in 1811 and then moved to Oswego and Rochester without access to any formal education before an apprenticeship as a mechanic.¹⁶⁹

With an obsession to be an actor, Singer traveled around the country appearing in numerous theaters for almost a decade before receiving his first patent in 1839.¹⁷⁰ After responding to encouragements to settle down and apply his skills as a mechanic, Singer was awarded two patents to improve sewing machines as recorded in the 1859 "Report of the Commissioner of Patents."¹⁷¹

However, there were another seventy-eight improvements for sewing machines with competition among those who were considering manufacturing and marketing their machines.¹⁷² Nevertheless, Singer and other innovators proceeded to manufacture and sell with some success when Howe claimed infringement of his patent of 1846. The claim was upheld, and Howe was subsequently convinced to combine with other manufacturers of sewing machines to join in marketing together.¹⁷³

The Census of 1860 reported that there were "few establishments in 1850; but their manufacture increased rapidly in the next ten years."¹⁷⁴ In 1860 there were seventy-four establishments that manufactured more than one hundred thousand sewing machines.¹⁷⁵ More than three-fourths of the machines were manufactured in Massachusetts, Connecticut, New York, Pennsylvania, and Ohio.¹⁷⁶ By 1867 the

Singer Company took the lead by selling more than one-half million sewing machines with eighty percent manufactured in Connecticut and New York.¹⁷⁷

Half a Century of Developing Economies

For more than two centuries the Crown and Parliament of England attempted to regulate most of the economy that was developing in each of the American colonies by discouraging manufacturing and controlling the exports of raw materials from the forests and agricultural products from large farms and plantations, while encouraging imports to the colonies of manufactured products from Great Britain. However, the majority of the population in those colonies labored as families to plant and harvest crops and to manufacture the necessary goods for their own economic system of subsistence farming.

When Washington was elected president in 1789, the United States was neither united in culture and society nor connected for trade or domestic commerce. However, by 1800 there were more than five million persons residing in twenty-three states and territories that defined at that time the geography as the United States of America.¹⁷⁸

During decades before the Civil War the economic development throughout the United States was influenced by innovations, slavery, wars, transportation, and migrations westward to the Pacific Ocean. The progress actually began with the states and federal government encouraging private ownerships to improve transportation that would connect more farmers and manufacturers to markets. With the freedom to trade among states and foreign nations, some of the initiatives among the people in each of the states increased the investments in productions of agriculture and manufacturing and exports to domestic and foreign markets.

With the population of the country growing fourfold from 1800 through 1850, the value of the foreign exports of merchandise from the United States ports declined fourfold; however, during that time the value of imports to American ports doubled to twice the amount for the exports to foreign ports.¹⁷⁹ By 1850 the value of domestic exports among the states was about five times the amount of foreign imports with the combined value of domestic and foreign exports of productions about equal to the value for imported productions from other countries.¹⁸⁰ The development of domestic exports among the states included eighty percent from productions in agriculture, thirteen percent from manufacturing, three percent from forests, one percent for fisheries, a fraction from mining, and a small number of other productions.¹⁸¹

Although there were a variety of productions in agriculture and manufacturing, some products were prominent in each one of the four regions of southern, middle,

northern, and midwestern states. Each region's improvements in transportation, capital investments, innovation, and adequate labor for productions influenced the development of these similar products for trade.

The economy of the midwestern region developed in agriculture productions with the dominant bushels and values of harvested Indian corn and wheat. The economy in the middle region was diverse and prominent in both the productions from agriculture and manufacturing. The productions of tobacco and cotton on large farms and plantations were the primary cash crops of the southern region. The northern region was prominent in the breadth of manufactured goods and the dominance in production in textile factories. The major sources of labor for productions in each region varied, with mostly migrant and immigrant families on farms in midwestern states; wage labor of men, women, and children in factories of the northern states; and a mixture of both in the middle states.

In 1790 there were slaves located in almost all of the former thirteen colonies except Massachusetts, Maine, and Vermont. However, more than eighty percent of the nearly seven hundred thousand slaves in the United States at that time were in Maryland, Virginia, North Carolina, and South Carolina.¹⁸²

In the southern region thirty-two percent of the white families owned slaves with eighty percent of the slaves providing most of the labor for the productions from agriculture. The rest of the slaves were either house servants, mostly female, or management and craftsmen, mostly male.¹⁸³ The number of slaves among the population of each of the southern states ranged from thirty-two percent in Maryland to forty-three percent in South Carolina.¹⁸⁴

The prominent productions of turpentine, tobacco, and rice in the southern region required intensive labor to grow and harvest on plantations and large farms before transporting the products to ports and exporting to foreign markets. However, the demand in Great Britain for raw cotton during the last half of the eighteenth and first half of the nineteenth centuries resulted in more plantations in the southern region with cotton becoming another cash crop.

With encouragement from the Treasury of the United States to create more wealth in the new country, the 1810 Census reported a total value of one hundred sixty-five million dollars of products manufactured in seventeen states with an average value of about ten million dollars per state. However, more than half of the total value for all the productions in the seventeen states was produced in five states with twenty percent in Pennsylvania, fifteen percent in New York, thirteen percent in Massachusetts, nine percent in Virginia, and seven percent in Maryland.¹⁸⁵ Although tobacco, naval stores, corn, wheat, rice, and lumber were the primary products exported from North Carolina before the Revolutionary War,¹⁸⁶ the emphasis on manufacturing after the war resulted in productions of manufactured articles

and goods valued more than six million dollars, which was almost four percent of total for all the states.¹⁸⁷

With a population of seven million people residing in the seventeen states in 1810, the per capita value of manufactured products was twenty-three dollars, contributing to the economy of a state as well as the country. The per capita value of productions varied among the seventeen states with forty-seven dollars per person in Massachusetts, forty-one dollars per person in Pennsylvania, twenty-six dollars per person in New York, fifteen dollars per person in Virginia, and thirteen dollars per person in Maryland. The value per capita was twelve dollars in North Carolina.¹⁸⁸

Nearly two hundred individual articles manufactured among the states were reported in the 1810 Census.¹⁸⁹ With each article assigned to one of twenty-four categories of manufactured products, about one-third of the total value of all manufactured articles was in the category of goods produced by looms. The location and geography of the establishments producing each article varied among the states; however, seventy percent of all the articles were manufactured within Pennsylvania and in the city of Philadelphia. About one-third of the two hundred individual articles were produced in North Carolina, which included implements for labor in agriculture, forests, and in-home productions.¹⁹⁰

The total value of all the individual articles in the category "all kinds of cloth and stuffs" was nearly forty million dollars, which was greater than the total value in the other categories.¹⁹¹ One-third of the forty million dollars was from productions in three states with five million dollars in New York, four-and one-half million in Virginia, and four million in Pennsylvania. North Carolina ranked fourth with almost three million dollars in value in this category.¹⁹² For one article in this category, eighty percent of the value of spinning wheels was about equally divided between North Carolina and Pennsylvania. Also, Virginia and North Carolina were about equal with the greatest number of looms produced.¹⁹³

Productions that also developed the economy of North Carolina were from the tradesmen, merchants, hatters, fullers, cobblers, gunsmiths, blacksmiths, and distillers who added value with their skills. Although there were three thousand blacksmiths and more than fourteen thousand gunsmiths in North Carolina, there were few ironworks capable of building machinery.¹⁹⁴ Even with more spinning wheels and looms than most states, few apparel goods were manufactured for sale. Excluding spinning yarn and weaving cloth in the home, the income from the sale of the products from more than five thousand distilleries exceeded the total realized by all other processes of manufacturing combined in North Carolina.¹⁹⁵

In most manufacturing processes much of the value added depended on machinery production created by the labor of craftsmen or tradesmen. For example, manufacturing cotton goods required nonskilled laborers to operate the spindle that produces the yarn for other nonskilled laborers to operate the loom to weave the

cloth. Consequently, production of spindles with important labor-saving machines in production was reported in every state. However, Pennsylvania was the only state that reported all of another sixteen types of labor-saving machines that included two hundred looms with flying shuttles and seven water frames.¹⁹⁶ In addition to fourteen hundred spindles, North Carolina reported the use of fifty-six spinning frames.¹⁹⁷

Although there were two hundred sixty-nine cotton mills under construction in 1810 throughout the country, none were in Virginia, South Carolina, or North Carolina.¹⁹⁸ With foundries and mechanics responding to an opportunity to manufacture labor-saving machinery, two-thirds of the one hundred twenty thousand spindles were produced in Pennsylvania, Rhode Island, Massachusetts, Connecticut, Maryland, New Jersey, and New York.¹⁹⁹

In addition to productions of labor-saving machines to manufacture cloth, seventy-five percent of the value of all the products manufactured in the United States was from four of twenty-four categories. Thirty-five percent of the total value was from the category with productions of articles manufactured with cotton, woolen, flaxen, hempen, and silken goods. Thirteen percent of the total value was from the articles in the category of hides and skins. Thirteen percent was from distilled and fermented liquors and eleven percent from iron ore.²⁰⁰ North Carolina ranked eighth among the seventeen states with the value of approximately six million dollars and four percent of the value from all the two hundred other articles mainly due to more in-home and diversity of articles than other states.²⁰¹

As early as 1748, seven bags of "cotton wool" were exported from Charleston, South Carolina.²⁰² However, by the turn of the eighteenth century the annual production in the United States had reached seventy-three thousand bales of raw cotton with nearly sixty percent exported.²⁰³

As machines from inventions replaced artisans of Great Britain in the production of yarns and clothes during the last decade of the eighteenth century, on average twenty-seven million weight pounds of raw cotton were imported each year into Great Britain from a number of ports in other countries.²⁰⁴ During 1800 the bales of raw cotton exported to Great Britain from all over the world doubled the average of the previous decade with about one-third imported from the United States.²⁰⁵

With the invention of textile machinery in Great Britain and the cotton gin in the United States, by 1810 the demand for raw cotton joined with tobacco, turpentine, and rice with intensive labor required for exporting the cash crops. Over the next two decades the number of slaves within the country almost doubled to more than two million with three-fourths located in Georgia, South Carolina, North Carolina, and Virginia.²⁰⁶ However, most of the slaves were located in North Carolina and Virginia and laboring in tobacco fields.

The Constitution delayed until 1808 the enforcement of any laws that would prohibit importing slaves; however about one hundred thousand slaves were imported from Africa to the United States during the decade before the 1807 prohibition by legislation.²⁰⁷ With cotton plantations developing in the south and westward expansions of the southern region, the slaves required to increase productions of cotton either moved with relocation of owners or were purchased from owners of plantations and farms who produced mainly cash crops of turpentine, tobacco, and rice.

Cotton plantations established in territories and states after wars and treaties resulted in substantial expansion of the southern region of the United States. After favorable outcomes with the Louisiana Purchase from France in 1803, the War of 1812 with Great Britain, the establishment of the Republic of Texas in 1836, and the Mexican-America War in 1846, the evolving geography of states in the southern region began with Louisiana in 1812, Mississippi in 1817, Alabama in 1836, and Florida and Texas in 1845, which joined with South Carolina and Georgia to form the region known as the Deep South. Although cotton was grown and reported in fourteen states, nearly ninety percent of the seventy-five thousand plantations that harvested five or more bales were located in the seven states of the Deep South.²⁰⁸

Over the three decades before 1830, consumption of cotton in Great Britain had almost tripled with the total number of bales imported from the United States increasing twentyfold to about three-quarters of all the cotton consumed by thousands of mills in Great Britain. At least two hundred thousand people were employed in cotton mills and factories there, with about an equal number of male and female adults employed and the number of children under the age of eighteen about equal to all the adults. In addition to exporting raw cotton to Great Britain, the consumption that was developing from cotton mills in the United States resulted in more demand in the growing cotton economy.²⁰⁹

From 1800 through 1850 the number of states increased from the original thirteen to thirty-one. Consequently the population of the country grew sixfold with production of cotton increasing twentyfold over those five decades.²¹⁰ With railroads improving transportation from plantations to markets, the development of the economies in the southern region was mostly dependent on productions in agriculture with tobacco, rice, sugar cane, and cotton as the primary cash crops that were harvested mostly by slave labor.

With labor-intensive production of cash crops restricted to the southern region, Indian corn and wheat were the prominent crops in most of the other states in 1840 in terms of bushels, values at harvests, and exports. Twenty-two bushels per person of Indian corn were harvested in the United States, thirty-two bushels per person in North Carolina, twenty-eight bushels per person in Virginia, and four-and-one-half in New York.²¹¹

The total number of bushels of wheat harvested in 1840 was about one-fifth of that for the bushels of Indian corn, with about five bushels of wheat harvested per person in the country and less than three bushels per person in North Carolina, eight bushels in Virginia, and five in New York.²¹² More than fifty percent of all the wheat produced in the country was harvested in New York, Pennsylvania, Ohio, and Virginia. Among those four states the least number of bushels of wheat was harvested in Virginia.²¹³

From estimations in 1845 of productions and consumptions in the United States, about seventy percent of the harvested bushels of Indian corn were consumed on the farms as food for animals and family. The remainder of the Indian corn was divided with twenty percent "sold to non-producers" in the United States and five percent exported to foreign countries. In addition, two-thirds of the harvested wheat was consumed by humans in the United States with one-fourth exported to foreign countries, and the rest used for seed or other purposes.²¹⁴

In 1850 twenty-five bushels of Indian corn per person were harvested in the country, with the largest values of harvests in Ohio, Kentucky, and Illinois and about ten percent of the total value of all the states.²¹⁵ There were four bushels per person of wheat harvested in the country with the largest values in Pennsylvania, Ohio, and New York, where more than forty percent of the bushels of grain were harvested--twice to ten times more than any of the other states except Illinois and Virginia.²¹⁶

The value of products from agriculture in 1852 was one billion seven hundred fifty-two million five hundred eighty-three thousand forty-two dollars. The value of the cash crops harvested in the southern region was about ten percent of all agriculture productions; however, the combined value of Indian corn and wheat was nearly one-fourth the values for all productions in agriculture.²¹⁷

In addition to productions in agriculture, thirty-four various manufactured products were reported in the 1840 Census with the total capital invested of two hundred sixty-seven million seven hundred twenty-six thousand five hundred seventy-nine dollars, which resulted in the employment of four hundred sixty thousand persons and a total manufactured value of three hundred sixty-five million dollars. The combined value of seven of the manufactured articles was more than half of the total for the entire thirty-four manufactured products. Woollen and cotton cloth, hats and bonnets, saddles and tanneries, furniture, carriages and saw-mills, grist mills, and flour mills were manufactured throughout the country.²¹⁸

Less than three percent of the population in the country was employed to manufacture the thirty-four products with fourteen thousand persons on average employed to manufacture each product. About one-fourth of the total capital invested throughout the entire country established just twenty-five hundred factories equally divided for productions of cotton and woollen goods.²¹⁹

On average among the states, three thousand persons were employed in fifty mills manufacturing cotton goods valued at two million dollars. However, two-thirds of the cotton mills and three-fourths of the employees were actually located in Massachusetts, Rhode Island, Connecticut, New York, and Pennsylvania. In North Carolina the number of mills and employees was about one-half the average for all of the states with one-fifth the value per state of the manufactured cotton goods.²²⁰

The demand for leather goods throughout every state encouraged the establishment of more than eight thousand tanneries with one per two thousand persons in the population of the country. In addition, there were seventeen thousand establishments producing leather saddles and other articles, with one establishment per thousand of the population of the country. In North Carolina there were slightly more tanneries per person than the average number of all the states, but the number of establishments per capita producing saddles and articles of leather in North Carolina was three times the average for all the states.²²¹

On average among the twenty-five states, nine hundred persons were employed in manufacturing carriages and wagons, with the total value per state of forty-three hundred dollars. However, forty percent of the men were employed in New York, New Jersey, and Pennsylvania and produced half of the total manufactured value of eleven million dollars. In North Carolina the productions were about three percent of the total manufactured value for the wagons and carriages with about three percent of all the men employed in the states.²²²

Many important products to support the usual ways of life were manufactured with cutting wood at sawmills and grinding wheat and corn at mills for various products. The value of all the manufactured products was seventy-two million dollars with nearly three million dollars on average for each of the states. The value of all the products from the mills in North Carolina was about equal to the average for all the states. However, the numbers of grist and flour mills in North Carolina were well above the average and fifth in the number for flouring mills and ninth for grist mills.²²³

The construction of vessels and ships for navigation was vital for engaging in commerce within the country and in exporting for foreign trade. The manufactured value of those built in 1840 was more than seven million dollars in total for all the states. However, more than half of the manufactured value was from construction in Maine and Massachusetts. The average manufactured value per state was two hundred eighty thousand dollars with the manufactured value of sixty-two thousand dollars in North Carolina.²²⁴

There were eighteen thousand men employed in the United States to manufacture furniture during 1840, which was valued at more than seven million dollars. On average seven hundred artisans produced the manufactured value of three hundred thousand dollars per state; however, nearly two-thirds of the persons

manufacturing furniture in the United States resided in Maine, Massachusetts, Connecticut, New York, Pennsylvania, and Ohio. There were two hundred men manufacturing furniture in North Carolina, with the value of one-tenth of the total for all the states.²²⁵

Hats, caps, and bonnets of various fashions were manufactured in various states with an average among the states of nearly two hundred thousand dollars of capital invested and about nine hundred persons employed per state. The manufactured value of hats, caps, and bonnets was nearly sixty thousand dollars per state. However, eighty-two percent of the total value of manufactured hats, caps, and bonnets was produced in Massachusetts, Connecticut, New York, New Jersey, Pennsylvania, and Ohio. In North Carolina there were one hundred forty-two persons employed with manufactured value of about one-half the average for all the states.²²⁶

With most of the employment and manufactured values in mills and factories developing in the economies of the northern and middle regions, the development of the economy in the southern region was depending more on productions from five million acres in ten states with almost eighty percent of the cotton grown in South Carolina, Georgia, Alabama, and Mississippi, where nearly one-and-one-half million or about forty-five percent of the total number of slaves for the entire United States were providing the labor for wealth and prosperity.²²⁷ By mid-century the production of ginned cotton throughout the world had reached the weight of a half-billion pounds with seventy percent grown in the Deep South, from which twenty percent was consumed by domestic and factory manufacturers in the United States.

In 1850 eighty percent of all the value of products exported from the United States was from agriculture and about ten percent from manufacturing. Over the previous half century, the value of products from the ocean and forests that were exported from the ports of the United States had decreased by ten percent among all the exported productions. Consequently, there was a ten percent increase in the value of products exported from manufacturing and agriculture. Within the products exported from agriculture, the values of tobacco and foods decreased about ten percent, and cotton increased to half of all the agricultural products.²²⁸

With eighty percent of the worldwide consumption of cotton exported from the Deep South to Great Britain, nearly two thousand of their factories, nineteen million spindles, two hundred fifty thousand power looms, and three hundred thirty thousand persons produced cotton goods valued at more than seventeen million English pounds.²²⁹

As the yield of crops declined in some of the old states, the search for practices to reclaim fertility was described in the 1860 Census with the conclusion that "enriching the soil for wheat and other cereals, the main object should be to get ammonia" by "eliminating it from organic matter in the soil, or by increasing the capacity of

the soil for abstracting it from the air, or dews, or rain, or by growing those plants which have this power, or by the direct application of ammonia in manure.”²³⁰ Soil chemistry was among the earliest contributions to scientific agriculture, with analysis and proper fertilization increasing the yield of crops.

In addition to productivity in agriculture, the development of transportation was critical for expanding the economy westward in the United States. The steamship developed by Robert Fulton in 1807, the opening of the Erie Canal in 1837, and the expansion of the railroads to Chicago in 1850, provided access to the markets of the eastern United States and more opportunities abroad. With exports of wheat from the Port of Chicago increasing from seventy-eight bushels in 1838 to more than sixteen million bushels in 1860,²³¹ expanding prosperity in the midwestern states also depended on scientific cultivation in farming and on replacing or assisting manual labor with machines that resulted in dramatic increases in productivity, such as the eightfold increase in harvesting per manhour with the reaper.²³²

Manufacturing by artisans and craftsmen, such as cabinetmakers, carpenters, tanners, blacksmiths, silversmiths, and seamstresses, provided many of the fabricated goods available for purchase. Each unit was discrete and varied to some extent depending on the skill of the craftsman and the market to which the product was sold. With improvements in the precision of tools and the ability to control accuracy, machine manufacturing began to replace the labor of craftsmen and mechanics and resulted in detailed replications, increased productivity, and lower cost of production. Machines powered by steam engine in 1787, DC batteries in 1841, electric dynamos in 1837, or electromagnets in 1825 provided new methods to transfer jobs from humans to machines.

As early as 1808, the manufacturing by Whitney of firearms for the government confined “a workman to one particular limb of the pistol until he has made 2,000” and saving “at least one quarter of his labor.” For each part there was a mold and with “such exactitude in the finishing that every part of any one musket may be adapted to all the parts of any other.”²³³ As machinery was applied to the manufacturing processes, more products were assembled with replaceable parts that were available as needed.

By mid-century the “systematic arrangement in the manufacture” of textiles, metal products, firearms, steam engines, rails, engines, railroad cars, implements, and labor-saving machines for agriculture produced a vast array of products. A visitor from England observed these precisions and concluded that a “striking feature is the admirable system everywhere adopted, even in those branches of trade which are not usually considered of much importance.” With a message for his fellow countrymen, the visitor noted that “the contriving and making of machinery has

become so common in this country... it is to be feared that American manufacturers will before long become exporters not only to foreign countries, but even to England.²³⁴

Another visitor, a machine tool designer himself, examined the musket produced at the Springfield Armory by the American system of manufacturing and concluded that "a complete musket stock could be made in slightly more than twenty-two minutes," that the separate pieces could be assembled in three minutes, and that sixteen machine operations were required to produce the thirty-two separate pieces. As the visitors observed, "[a]ll these parts are so exactly alike that any single part will, in its place, fit any musket."²³⁵

For those who attended the Second Exhibition of the Industry of all Nations held in New York in 1853, the array of labor-saving machines, firearms, and agriculture machinery was an impressive display of the creativity of the inventors and mechanics who developed the American system of manufacturing in the second largest economy in the world. As craftsmen and mechanics became mechanical engineers by education, they established and expanded the practice of machine design that enabled innovation and development of more complex machines with a variety of applications.

During the three decades after the Civil War, more than one hundred twenty thousand additional miles of railroad tracks connected thousands of towns and cities throughout the United States from coast to coast. More than one-half of the railroad mileage was in nine midwestern states, Texas, and Pennsylvania. Out of the forty-eight states, North Carolina ranked nineteenth with almost three thousand miles of railroad tracks. As the rails were nailed to the cross ties and the railroads were extended to the small towns, a combined total of one million locomotives, passenger cars, baggage cars, and freight cars were manufactured over a period of about fifty years.²³⁶

In addition to thousands of locomotive engines and steamboats, there were thousands of other applications of steam engines powering machinery in manufacturing, sawmills, mines, ironworks, distilleries, paper mills, and agriculture. The heat energy from burning coal transformed to boilers of different sizes and shapes vaporizes water into steam that creates pressure against a movable piston in a cylinder mechanically connected to a crank shaft, which delivers the force that turns wheels or propellers.

However, from the very beginning the boilers were exploding, which resulted in numerous investigations, government regulations, and inspections with alterations in construction, strength of materials, and operating procedures. Even after fifty years of utilization and corrections, in 1855, there were still one hundred fifty-five boiler explosions, with two hundred eighty-eight people injured and two hundred twenty killed.²³⁷ Clearly there was a demand for the steam engine to shorten time

in route, reduce cost in transporting passengers, and increase productivity in manufacturing and commerce, but there was also a growing demand for educating persons who would understand the scientific theories, the operating characteristics, the construction, the materials, the failures, and improvements necessary to reduce the number of explosions.

In addition to depending on fertilized soil for production of crops in agriculture and on water, wind, or steam to power machines for productions in manufacturing, the growth in prosperity provided by the Industrial Revolution in Great Britain and in the United States also depended on mining iron ore. Smelting iron at a high temperature in the presence of a specific content of carbon resulted in the production of wrought iron, cast iron, or steel.

The productions from mining iron ore were vital in the construction of steam boilers, machinery for labor-saving applications in manufacturing and agriculture, locomotives, steamboats, and the rails for hundreds of thousands of miles of train tracks. However, another source of energy to provide the power to propel the Industrial Revolution was derived from mining coal with some of the anthracite carbonized for smelting iron ore, some coal to heat steam boilers, and a fair amount for heating homes and buildings throughout America.

Although copper and gold mines had been prevalent in a number of locations in the country during the eighteenth and nineteenth centuries, the discovery of the "Iron Hills" of Michigan in 1844 began the development of mining, smelting, and hammering wrought iron into shapes for various purposes. In 1858 a blast furnace was built near the iron ore mine with coal shipped to the site to fire the furnaces.²³⁸ However, the majority of the American experience had been with working wrought iron for producing nails, spikes, and agricultural implements, with a few additional small charcoal furnaces with the melt poured into casings to form iron appliances such as stoves.²³⁹

In Great Britain the Industrial Revolution was in full control of the economy by 1820 with the annual production of five hundred thousand tons of cast iron; while in the United States, where the demand for iron had just begun, the production was twenty thousand tons or a twenty-five-to-one ratio compared to the demand in Great Britain, which signaled growth in mining for iron ore and coal if the Industrial Revolution were to expand prosperity in the United States.²⁴⁰ Subsequently, in the forty years before the Civil War, the production of iron increased to eight hundred thousand tons or about one hundred thousand tons each decade. The production of coal was just one thousand tons in 1820 and increased to nearly fifteen million tons in 1860 or an increase of about three-and-one-half million tons of coal mined every decade.²⁴¹

Recent knowledge of soil science and labor-saving in agriculture, development of engines for transporting productions to markets, and innovations of machinery

to manufacture a variety of goods encouraged the development of education at all levels that replaced many traditions. By 1860 there were six thousand seven hundred sixty-three tuition academies spread among the thirty-four states and one hundred seven thousand five hundred twenty public schools in the cities and towns of America where secondary instruction in languages, mathematics, science, history, and geography was taught, with some graduates accepted for admission to the four hundred sixty-three universities.²⁴²

As the academies grew rapidly from 1830 to 1850, fewer of these graduates enrolled in a university because some could not afford to attend, but more and more chose to pursue an occupation in the expanding economies such as commerce and transportation. Consequently, the citizens in the growing number of cities, where there were opportunities for office rather than labor employment, encouraged the grading of the public common schools into public primary schools, public grammar schools, and then public high schools to replace the dependency upon the tuition academies.

With the expansion of free education at all levels, with the growth in populations in cities and towns, with the enlargement of manufacturing, with the increases in commerce, and with mechanization in farming during the second half of the nineteenth century, the demand for workers with special knowledge, practical skills, or manual training led to the establishment of Normal schools to prepare for teaching, of business schools to prepare for commerce, of vocational schools to prepare for craftsmanship, of industrial schools to prepare for manufacturing, of technical schools to prepare for applying sciences, and of agricultural schools to prepare for scientific farming.

Some of the schooling was essentially apprenticeship programs without bondage, while others were occupational training in classrooms or laboratories. Except for learned professions of medicine, law, and theology, the concept of graduates from public schools organized to teach practical knowledge and necessary skills for employment in other professional occupations was unique in a few institutions in the United States before the Civil War. Educations were not democratic opportunities and often segregated by race or gender. However, literacy for white children was the theme to establish the elementary common school system throughout the nineteenth century. In the twentieth century the graded-school system with a four-year high school became the theme and the foundation for individual as well as community prosperity through education.

During periods of prosperity and shortages of labor in surrounding communities, women and men were recruited from nearby states to leave a livelihood of independence and limited opportunities for income to work in a cotton mill with a life of dependence on capitalism and community. As New England mills were increasing production of cotton cloth at a lower cost than domestic manufacturing,

another sector of manufacturing was producing labor-saving machinery for productions in agriculture and manufacturing. With a growing demand for labor to expand the economy in the northern region during the prior decade, a variety of labor-saving machines were produced in 1860 and valued at more than fifty-one million dollars with more than forty-one thousand workers employed at an annual wage of four hundred dollars.²⁴³

Patents for Improvements

As the country of the United States of America was established, the founders recognized the importance of patents for improvements throughout this growing country and enacted a law “to protect the inventor in the enjoyment of the fruits of his labor.” With protection of the patents of discoveries and innovations, Americans began to develop improvements in the productions in agriculture, manufacturing, and transportation.

During the first six decades as the United States of America, there were sixteen thousand patents awarded, which were divided into twenty-two categories that included improvements in transportation by steam and gas engines, in agriculture by labor-saving implements, in manufacturing by machines replacing artisans, and in civil engineering by education replacing apprenticeships.²⁴⁴ With the population increasing to more than twenty-one million in 1848, there were one thousand three hundred sixty patents awarded per person and an average of five hundred patents per state.²⁴⁵

Among the total of sixteen thousand patents, more than half were divided into categories of improvements in agriculture, metallurgy, manufactures, chemistry, calorific, hydraulics, and lumber. Although the distribution of these patents reveals the efforts for improvements throughout the country, the people residing in the four middle states of Pennsylvania, New York, New Jersey, and Delaware were awarded more patents than any other region and more patents in every category except for those improvements in manufacturing textiles in the northern region.²⁴⁶ However, in the northern region one out of four hundred in the population was awarded a patent with twice that number of persons per patent in the middle region and ten times in both the southern and northwestern regions.²⁴⁷

However, almost a half century had passed before more than one hundred patents were awarded in a single state. More than one-third of all the patents awarded in 1839 were sent to persons residing in New York, with about another third of the total awarded to persons residing in either Massachusetts or Pennsylvania. Among the total of nearly four hundred patents awarded that year, about twenty percent included inventions of engines or machines used in a wide variety of applications.

Nearly one-third of those patents of engines were awarded to persons in New York with another one-fourth awarded either in Massachusetts or Pennsylvania.²⁴⁸

In New York the machines planted corn, cleaned wheat, packed flour, cut shingles, drilled rock, split leather, washed clothes, and hammered nails. In addition, patents were awarded for a fire engine and a rotary engine. In Massachusetts the machines could reel in silk, make rivets, press clothes, card wool, spin hemp, smooth lumber, saw staves, drill iron, and cut potatoes. In Pennsylvania the machines sowed grain, twisted silk, rolled leather, and sawed staves, with other patents devoted to locomotives and steam engines. Most of those machines and engines were intended as assistance or replacement of wage labor, which increased productivity in agriculture and manufacturing, therefore increasing wealth in the economy.

During 1848 six hundred sixty patents were awarded with an average of twenty-two per state and one awarded per thirty thousand persons in the country.²⁴⁹ Although the number of patents awarded doubled during earlier decades, the number tripled during the six years from 1854 to 1860.²⁵⁰ The growth in variety and number of improvements describes the efforts by citizens in each state to improve almost everything that could assist them in their pursuits of prosperity, which would grow the economy of the country.

With duties collected from exporting productions mainly in agriculture, Congress expanded the responsibilities of the commissioner of Patents to include a report to it each year about the developments in agriculture as well as the patents awarded for improvements. The major part of the report concerning agriculture was devoted to the annual quantities and qualities of productions of most of the crops on the farms throughout the entire country. Even though some farmers were skeptical of *book farming* the commissioner provided information about recent improvements and suggested opportunities for advantages in yield and quality that were developing in Europe and Great Britain. To establish and continue improvements, the commissioner also encouraged education of scientific agriculture in schools and universities.²⁵¹

After reviewing applications in 1848 and then awarding patents for improvements in agriculture that included ploughs, cultivators, seed planters, grass and grain cutters, and corn shellers, the commissioner concluded that "[the] character of the inventions is somewhat local, adapting itself in each case to the wants of a section of the country only."²⁵² Over nearly five decades to 1849, about two thousand patents for improvements in agriculture were awarded among citizens of each state with forty-six percent of the patents addressed to persons residing in the four middle states of Delaware, New Jersey, Pennsylvania, and New York.²⁵³

The commissioner also reported in 1848 that one-fourth of the wheat was harvested by the farmers in Pennsylvania and New York where most of the patents for improvements in agriculture had been awarded.²⁵⁴ By 1850 farmers residing in

one-third of the states harvested three-fourths of the wheat, which included farmers in Pennsylvania, New York, and in the developing midwestern region where migrants and immigrants were improving land in Ohio, Michigan, Indiana, Illinois, Wisconsin, Missouri, Kansas, and Kentucky.²⁵⁵

During the fifty-nine years from 1790 to 1849, just seven percent of all the patents awarded to persons throughout the thirty states were sent to persons residing in the southern region of Alabama, Arkansas, Georgia, Florida, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, Texas, and Virginia. Furthermore, about one-half of those patents awarded were addressed to persons residing in Virginia. In addition, Virginia ranked third among all thirty-two states in the number of patents awarded for the category of improvements in agriculture.²⁵⁶

Several acts by Congress in 1807, 1818, 1819, and 1820 related to slavery eliminated the importation of slaves; however, internal markets developed where farmers and planters acquired slaves to pursue prosperity in the expanding cotton economy that was developing in the southern states. The pursuit of prosperity in the regions of the country where most of the grain was planted, harvested, and threshed without slave labor found many of the farmers and planters beginning to purchase labor-saving implements that were often manufactured in one of the middle states of Pennsylvania and New York.

In the eleven southern slave states, with thirty percent of the improved land in the country, the farmers purchased one-third of the total value of the implements and machines bought by all the farmers in the thirty-three states. However, only twelve percent of the establishments that manufactured the agriculture implements were located within the eleven slave states, and just six percent of the value of all productions was manufactured in the economy of the southern region.²⁵⁷

Wheat was an important crop in Virginia. However, for two centuries, tobacco was the cash crop with slaves providing the labor most of that time. The production of tobacco was the pursuit of prosperity that influenced the establishment of the culture, society, and economy throughout the eastern region of the state. In 1860 tobacco was planted to some extent in every state; however ninety percent of the pounds were harvested in Kentucky, Maryland, Missouri, North Carolina, Ohio, Tennessee, and Virginia with more than half from the combined harvests of Kentucky and Virginia.²⁵⁸

Although the labor of slaves produced rice and indigo as cash crops in South Carolina and sugar cane in Louisiana, the growing demands for exporting ginned cotton to Great Britain and to northern states for manufacturing encouraged raising cotton as the cash crop throughout the southern region. Subsequently the pursuit of prosperity from production of cotton on larger farms and plantations in the region of the Deep South depended mostly on the number of slaves owned for planting and harvesting the cotton.

In 1850 the combined value of all the agricultural productions was more than one billion dollars with about half from the harvests of Indian corn, wheat, cotton, tobacco, and rice.²⁵⁹ However pursuits of prosperity from production of grains mostly depended on the labor of family members, wage laborers, and labor-saving machines. With scarce wage labor in the non-slave regions of the country, the value of implements and machinery owned by the farmers per cultivated acre was twice that in the regions depending on slave labor. Also, the average returns per acre of harvested corn and wheat in the regions of wage labor was one-and-one-half times more than that realized in the regions of slave labor.²⁶⁰

In addition to patents for improving agriculture, about forty percent of the awards from 1790 to 1848 were patents for improvements in manufacturing, which included productions of textile goods, metal articles, mechanical power, grinding mills, lumber implements, and wearing apparel. About one-half of those awards to improve manufacturing were addressed to persons residing in Massachusetts, New York, and Pennsylvania.²⁶¹

Although establishments for manufacturing were located in all states, some products were manufactured mostly in regions where innovations attracted capital in pursuits of prosperity and sufficient labor was available. Over five decades since independence, about ten percent of all patents were awarded to innovators for improvements in the production of textiles with machines replacing artisans. Nearly half of those patents were awarded to persons residing in the northern region of Massachusetts, Maine, Connecticut, Rhode Island, Vermont, and New Hampshire.

The innovation of the jenny to spin cotton in Great Britain was introduced in America as early as 1775 and operating in a company established with the capital from investors. Subsequently other mills were established throughout the country but mostly in the northern states, where large-scale production began in 1833 with seventeen hundred spindles, when Francis O. Lowell chartered the Boston Manufacturing Company.²⁶²

By 1840, more than half of the cotton mills in the United States had located in the northern region of the country in which two-thirds of all the hands were employed, and seventy percent of all the spindles produced two-thirds of the value of all the cotton goods manufactured in the United States. About forty percent of the cotton mills in the northern region were located in Massachusetts where about a third of the capital and hands produced a third of the value of the cotton articles produced in the northern states.²⁶³

In addition to cotton mills there were four thousand other establishments in Massachusetts that were engaged in manufacturing a variety of articles including clothing, furniture, railroad cars, boilers, steam engines, implements for agriculture, saddles, boots, and shoes. With forty-one million dollars of capital invested (\$41,774,446),²⁶⁴ and eighty-five thousand one hundred seventy-six persons

employed,²⁶⁵ the sum of the values of the production of each of the one hundred twenty articles totaled more than one hundred million dollars.²⁶⁶ With a population of ninety-three thousand three hundred eighty-three persons living in Boston and a deep-water port for navigation trade, the local commerce included the occupations for wage labor, opportunities for exporting manufactured articles, and importing materials for production as well as articles desired but not produced locally.²⁶⁷

With the inventions of steam engines in England and steamboats in the United States, improvements in transportation in each state eventually encouraged the construction of roads, canals, and railroads. These improvements resulted in growth in the inland population who enjoyed access by navigation to deep-water ports for exporting to other countries their natural and agricultural products. Consequently, more villages became towns, and towns became cities where centers of commerce, manufacturing, and navigable trade were developing in the inland regions of the growing United States.

During colonial years most of the towns and cities were established near navigable waters as centers of trade and commerce for their region. In 1790 just five percent of the population of the United States resided in twenty-four urban places where the population was greater than twenty-five hundred persons. The major deep-water ports of New York City with a population of thirty-three thousand persons, Philadelphia with twenty-eight thousand, Boston with eighteen thousand, Charleston with sixteen thousand, and Baltimore with thirteen thousand were the only urban places with a population more than ten thousand persons.²⁶⁸

By 1830 almost one-tenth of the population in the country resided in ninety urban locales; however, the population was less than eight thousand residents in three-fourths of these urban places. All but ten of the urban places were located in the thirteen founding states; however, some were nearby mills that had located along rivers where waterfalls or dams provided the opportunity to replace the labor of artisans with machinery powered by waterwheels.²⁶⁹

Some of these towns were originally established by owners of the mills to provide housing and necessary goods for the families of the employees and often named for the owner. Some villages developed into towns as stations in the regions for the carry, by railroads and canals, of the production from agriculture and manufacturing. As factories increased production with machine power from waterwheels and employed common labor, as commerce developed with more occupations, and as transportation connected more markets for trade, the towns grew in population to become cities.

Over the next two decades the number of urban places almost tripled, with populations growing to more than one hundred thousand persons in each of the cities of New York, Baltimore, Boston, Philadelphia, New Orleans, and Cincinnati. In

addition, more than ten thousand persons lived in fifty-eight urban places, with one-fourth of those places located in states that were inland from the Atlantic Ocean but near canals, railroads, or navigations to the Mississippi River, for carry to markets for trade. With growth of the inland in production for trade, more than ten thousand persons were residing in Pittsburgh and Louisville in addition to the established cities of Cincinnati and New Orleans as the centers of trade in the western region.²⁷⁰

With fewer establishments for manufacturing and fewer large cities developing during the decade of 1836 to 1845, there were on average fewer than three patents per state per year awarded to persons in the eleven southern states of Alabama, Arkansas, Georgia, Florida, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, and Texas. In 1839, twenty-eight patents were awarded to persons in only six of the southern states, about seven percent of the total awarded that year.²⁷¹

Of the twenty-eight patents, nineteen were awarded to persons residing in Virginia. Half of the patents were improvements in agriculture that included planting, cultivating, cutting, plowing, and thrashing. The nine patents awarded to persons in five of the states also included a steam boiler in South Carolina, circular saw in North Carolina, and straw cutter in Tennessee.²⁷²

During the six decades before the Civil War, about forty thousand patents were awarded with more than half from 1850 to 1860. The innovations in transportation and communication resulted in increasing productivity in commerce and trade throughout the new country.²⁷³ In addition, innovations in machinery and engines increased the productivity of labor in manufacturing and agriculture.

In the 1860 "Report of the Commissioner of Patents" there were more than seven thousand patent applications reported, with almost five thousand granted.²⁷⁴ There were one hundred patents for improvements in ploughs as well as cultivators. In addition, there were dozens of patents for planting, seeding, harvesting, and pressing the crops for trade. For manufacturing and navigation there were in total more than two hundred fifty patents to improve steam engines, boilers, water wheels, valves, and pumps. Also, there were more than eighty improvements in all sorts of mills. For improving the everyday existence there were more than three dozen awarded for each improvement, which included bedsteads, stoves, lamps and lanterns, churns, washing machines, and firearms. The sixty-five improvements in sewing machines were the beginning of domestic manufacturing of clothes for family members.²⁷⁵

Pursuit of Prosperity

From 1820 to 1850, the proportion of the population who were identified in occupations doubled to more than five percent over those three decades. However,

the proportion in agriculture increased less than one percent with the proportion doubling in manufacturing and tripling in the learned professions. In the regions of free states, the proportions of employments in commerce, manufacturing, and mining increased threefold with only a thirty-five percent increase in slave states. For the learned professions the proportion increased fourfold in the free states and one-fourth of that proportion in the slave states.²⁷⁶

Within the total population in 1850 the number of white persons was just short of twenty million, with about eighteen percent residing in the largest urban places where employment provided incomes for subsistence or even more.²⁷⁷ There were more than one hundred thousand manufacturing establishments, including individual producers, funded with more than five hundred million dollars of capital investments.²⁷⁸

With the value of more than one billion dollars in the manufactured products in 1850, nearly a million employees received an average annual wage of about two hundred fifty dollars per laborer. About forty-five percent of all the manufacturing establishments in the United States were located in Massachusetts, New York, and Pennsylvania where half of the patents were awarded to improve production in manufacturing.²⁷⁹ In comparison, the value of the total agriculture productions in 1850 was also about a billion dollars.²⁸⁰ There were about four times more laborers in total in agriculture that included both sexes of slaves and free persons.²⁸¹

Seventy percent of all those persons in occupations in the United States in 1850 were either blacksmiths, carpenters, coppersmiths, farmers, laborers, merchants, or clerks, with more than one hundred thousand persons in each of these seven occupations. On average there were about five hundred employees in each of the other three hundred plus occupations. About one-fifth of those occupations included wage earners who manufactured a variety of goods and makers of articles that satisfied the needs and wants of the people in all the states.²⁸²

The Patent Act of 1839 required the collection and reporting of agricultural statistics;²⁸³ however, if the farmers could have read the report of the commissioner, they could have obtained information about scientific farming in addition to references about farming from clubs, journals, periodicals, and treatises that provided education about the profession and details of the practice of agriculture.²⁸⁴ In various editions, the commissioner described a path to surplus in production of crops and provided information about transportation, exports, and markets in other states and foreign countries.²⁸⁵

Nearly four percent of white persons in the population of 1840 were illiterate, increasing to five percent during the decade to mid-century. However, white illiteracy in the slave states was about three times more than in the non-slaveholding states.²⁸⁶ To eliminate illiteracy among the children there were nearly sixteen

hundred primary schools on average per state by 1840, with an average of only six hundred per state in ten of the southern states.²⁸⁷

In the seven cities of Boston, New York, Philadelphia, Baltimore, Cincinnati, Saint Louis, and New Orleans, the average population was two hundred thousand persons with an average of more than one hundred schools per city, and of one hundred sixty pupils and two teachers per school.²⁸⁸ In addition, eighty percent of the four million eight hundred thousand native whites in the country between the ages of five and fifteen were attending a school by 1850. About one-fourth of these native whites resided in the ten southern states, but fewer than half of them attended schools.²⁸⁹

While teachers in public one-room common schools for white children taught the three Rs for literacy, success in some occupations required attendance at grammar schools and private academies where many of the sixteen thousand students might be preparing to attend a college or university.²⁹⁰ The teachers at the academies were usually college graduates who had mastered the subjects required for entry to a classical education.

For students preparing to attend a college or university, there were one hundred seventy-three institutions with at least one in every state. However, more than half of the institutions were in the middle and midwestern regions, with an average of six per state.²⁹¹ The curriculum in all of the institutions of higher education included studies that required mastery of Latin and Greek, with the available books usually printed in Europe and England. However, the learned men would also have studied math through geometry, maybe calculus and sciences from the discoveries of Englishmen, Frenchmen, and Germans, with the possibility of mastering the art of surveying for claiming property.

By mid-century some of the graduates from schools, academies, and universities were among the one hundred thousand people in the occupations of the learned professions that included forty thousand physicians, twenty-four thousand lawyers, and one thousand professors. Of course, most of the twelve thousand men who were elected or appointed to serve in public office had attended a school, academy, or one of the universities or colleges. In addition, there were nearly thirty thousand teachers, consisting of males and females; however, the requirements for employment in schools and academies ranged from an elementary education for the public common schools to graduation from a college or university for most of the academies.²⁹²

A Decade of Spreading the Wealth

With almost forty-percent growth in the population during the decade of the '1850s, there were also indications of growth in the economy, with the comparisons

of the years of 1850 and 1860 revealing at least a doubling in the number of patents awarded for improvements, also for additional miles of transportations for trade, value of agricultural productions, and exports to foreign countries, capital invested, values of productions in manufacturing, number of laborers, and occupations for employment and in the number of institutions for education including schools.

Discoveries and innovations among the people in the United States in the 1850s resulted in forty-seven thousand files for a patent with twenty-one thousand awarded. That was twice the number awarded over the previous six decades beginning in 1790.²⁹³ The awards in the various regions of the country in 1860 resulted in one patent per thirty-six hundred occupants in each of the northern and middle regions, one in nine thousand in the northwestern region, and one in twelve thousand in the southern region. About half of all the patents were awarded to persons residing in Massachusetts, New York, and Pennsylvania.²⁹⁴

Nearly thirty percent of all of the patents in 1860 were either improvements in implements for agriculture or engines and labor-saving machinery. In the southern region with slave labor, the number of patents for implements in agriculture was twice those awarded for labor-saving engines and machinery. In the middle region of wage labor, there was about the same ratio but reversed in favor of engines and machinery, with the ratio in the northern region of patents for labor saving four times those for agriculture. In the developing midwest, the ratio was about even, with agriculture a few percent greater than machines and engines.²⁹⁵

In 1860 the improvements in implements for production in agriculture included seven patents for threshing machines,²⁹⁶ fifty-three for seeding machines,²⁹⁷ ten for mowing machines,²⁹⁸ thirteen for harvesting machines,²⁹⁹ twenty for cotton pressers,³⁰⁰ ninety for ploughs,³⁰¹ and seventy-eight for cultivators.³⁰² Even so, the average size of the farms remained about two hundred acres; but there was an increase of forty percent in the number, with two million farms in 1860.³⁰³

However, over the decade of the 1850s, aided by new states in the midwestern and deep southern regions, the value of production in agriculture more than doubled to two hundred million dollars as a result of planting more grains and more cotton in the southern farms. The harvests of the principal crops in these different regions of the country increased by forty percent for Indian corn,³⁰⁴ seventy percent for wheat,³⁰⁵ one hundred percent for cotton,³⁰⁶ more than one hundred percent for rice,³⁰⁷ and two hundred percent for tobacco.³⁰⁸

With the rapid increase in the number of acres of improved land and in productions from harvests in the recently admitted inland states, Joseph C. G. Kennedy, superintending clerk of the Eighth Census, described the situations of the farmers in the original thirteen states as the result of continuing their initial cultivations and improvements of the same land for decades but was not yet convinced that manure mixed with the old soil would be worth the cost even if the yield of previous

years was restored. However, over the decade of the 1850s they did increase their investments in farming by sixty-three percent with the purchase of farming implements and labor-saving machinery at an average cost of one hundred fifty dollars an acre.³⁰⁹

Superintendent Kennedy noted that “the applications for patents... has increased from three hundred and fifty in 1861, to five hundred and two in 1863” for improvements in agriculture.³¹⁰ He also acknowledged “the numerous minor inventions whereby the labors of the farm and the households have been saved.”³¹¹ With fewer men available to work on farms because of “rural labor called off by the war, manufactures, and the mines,” Kennedy reflected that it was fortunate that “the people of this country have not been slow to adopt the most efficient substitutes for animal power, and the inventive talent of the nation has found an ample and remunerating field for its exercise in originating and perfecting instruments adapted to all of the wants of the farmer and planter.”³¹²

The commissioner of patents was always encouraging scientific farming, as in 1845 when he reported that the science had “become a study, and much greater improvement may be expected.”³¹³ In fact the progress in agriculture was occurring in laboratories in England and Europe where the dependencies on “hereditary notions are yielding to analysis and the application of chemical principles.”³¹⁴ Three years later he reported that the world “within comparatively a few years, learned that agriculture offers an almost illimitable field for the operations of the scientific as well as practical experimenter. Its full development seems to require the application of all the physical sciences in some form or other.”³¹⁵ Productions in agriculture would then include the scientific knowledge about soils, manures, food plants, and animals with the “invention and improvement of useful implements and machines.”³¹⁶

In the report of 1851, the commissioner included a copy of a “Plan for an Industrial University” that was submitted by J. B. Turner, professor at Illinois College in Jacksonville, Illinois. In the plan Professor Turner proposed the construction of an institution in his state where there was “sufficient quantity of land, of variable soil and aspect, for all its needful annual experiments and processes in the great interests of agriculture and horticulture.”³¹⁷ Similar to an earlier assertion by the commissioner, the instructions would include anatomy and physiology of animals, insects, trees, and plants and the regeneration of soils. In addition, the industrial processes, trade, economy, and saving “of labor of the hand”³¹⁸ would be directed toward manufacturing all materials. “Whether a distinct classical department should be added, or not, would depend on expediency.”³¹⁹

The “practical application and diffusion of knowledge”³²⁰ at the institution would depend on a series of annual experiments by professors in one of the departments of agriculture, mechanic arts, chemical arts, mining, merchandise, and transportation. Professor Turner had concluded that the most “effectual mental discipline

possible for any man arises from setting him to earnest and constant thought about the things he daily does.... The final object to be attained with the industrial class is to make them thinking laborers; while of the professional class we should make laborious thinkers.”³²¹

Throughout the decade of the 1850s education in some form for establishing scientific agriculture became a priority in most of the states. However, the early responses were limited to magazines and societies for improving agriculture. Institutions for agriculture education were established in New York, Pennsylvania, Maryland, and Michigan that included courses of sciences and the practice of agriculture.³²² Also some of the existing colleges and universities provided options in the BA curriculum of courses devoted to the science of chemistry as related to agriculture without including the practice of farming.

In 1857 Senator Justin Smith Morrill from Vermont provided some certainty in scientific agriculture with a bill to Congress that granted lands to states that would then be sold with the funds from the sale supporting the establishment of schools for education in agriculture and mechanic arts. Although instruction in mechanic arts was included in some of the agricultural and mechanical (A&M) land-grant institutions, most of the colleges also provided courses, curricula, and degrees in civil engineering. Mechanic arts and engineering are first cousins but not brothers. The project of constructing a bridge required the mental conception with a high degree of certainty from experience to design and supervision by the civil engineer in charge of the project. Artisan hands trained as an apprentice by other experienced mechanics actually built the bridge according to the specifications provided by the civil engineer. Before civil engineering by a degree, many of those in practice began with mastering the mechanic arts.

Some of the early A&M schools established after 1860 required the mastering of knowledge and experience of some mechanic arts as a component of the bachelor of science degree in civil engineering. However, many of the engineers without formal education were those involved in transportation with the construction and operation of steamboats and steam engines. In addition, machinists who created most of the metal parts that demanded accuracy to function properly in engines and labor-saving machinery were well trained as apprentices in the mechanic arts. According to the 1850 Census, there were 512 civil engineers, 11,626 engineers, 16,004 mechanics, and 24,095 machinists employed in the United States.³²³ They were all similar in earning their occupations by experience and with the knowledge of the dire consequences with failures, but always in the pursuit of more knowledge driven by curiosity.

Before the Civil War, a number of existing colleges and universities established engineering courses and programs as additions to the existing bachelor of arts curricula or in some instances as a professional program; however, the institutions that

developed the first full curricula for engineering were located in New York at the Military Academy at West Point, Rensselaer Technical Institute at Albany, Union College at Schenectady, and Cooper Union at New York City. As useful technologies developed from discoveries and inventions, the engineering curricula were altered to include some knowledge in the sciences of physics, electricity, thermodynamics, and chemistry; however, the only degree awarded before 1860 was a civil engineering degree at Rensselaer that required one year of studies or six months for those with a college degree.³²⁴

Wages and Slave Labor

As the Civil War began, an act by Congress signed by President Lincoln established on May 15, 1862 the Department of Agriculture that replaced the Agriculture Division of the Patent Office. The duties of this new department of government included acquiring and preserving “information concerning agriculture” obtained from “practical and scientific experiments” and from collection of statistics.³²⁵ In his first report, the commissioner of Agriculture described the status of agriculture as in a divided country that “must always remain, an agricultural nation.”³²⁶

The first commissioner of Agriculture pondered “the conditions of still grander progress and prosperity” and decided that success would require the essentials of peace, demand for agricultural products, respect for labor, “knowledge and practice of agriculture as an art and science,” and education for the farmers.³²⁷ With the Constitution and slavery in conflict about the basics for developing an economy, the commissioner concluded that progress in agriculture to a large extent would depend on the conditions of labor, especially slavery that “always and everywhere degrades labor.”³²⁸ Another condition of concern about degrading labor for productions in agriculture was the development of commerce and manufacturing that provided “many avenues to wealth... independent of manual labor.”³²⁹

In 1860 the Americans pursuing prosperity in manufacturing and agriculture were competing for the labor available from slaves and wage earners, and aided by labor-saving machines. Even though there were two million farms scattered throughout the country, with three-fourths of the land in no-slave labor states, there were just twenty percent more persons in farming occupations than the total number of improved farms.³³⁰ In addition to family members, there were another eight hundred thousand farm laborers with about one-fourth located in the southern region. Many of those were free persons of color; therefore, there was less than one free person, in addition to the farmer, available per cultivated farm.³³¹

However, there was labor of almost four million slaves who were owned by almost four hundred thousand southern farmers with an average of ten slaves for each

farmer. Actually, seventy percent of the farmers in the southern region owned one or more slaves, but half owned five or more slaves. However, fewer than one percent of slaveowners were located on large farms and plantations of more than one hundred acres.³³²

The innovations and improvements in manufacturing were among the more than forty-eight hundred patents awarded in 1860³³³ and included replacement or aid of the work of artisans with steam engines and machinery in mills and in factories where persons were trained and employed for tasks requiring mostly common labor.³³⁴ One of the more prominent improvements was the sewing machine for manufacturing clothes. Productivity increased everywhere in the country before other inventors of sewing machines were awarded sixty-eight patents in 1860;³³⁵ however, more than one hundred thousand sewing machines were already produced that year by two thousand hands that were employed in just forty-eight establishments.³³⁶

A substantial part of the remainder of improvements in 1860 were comforts and assistance in the lives or livelihoods of individuals and families such as forty patents for stoves,³³⁷ fifty-three for washing machines,³³⁸ eleven for clothes dryers,³³⁹ nine for coffee pots,³⁴⁰ forty-eight for lamps,³⁴¹ eight for egg beaters,³⁴² and forty-three for churns.³⁴³ However, the vast majority of the patents were claiming improvements in transportation and production in agriculture and manufacturing.

Previous to 1860 improvements in transportation by railway resulted in almost a fourfold increase over the decade and reaching thirty thousand miles that connected inland depots to markets near deep-water ports. One-third of the total miles of tracks were in each of the midwest and the southern regions.³⁴⁴

With most of the important connections for trade by navigation in the northern and middle regions connected before 1850, just seven hundred additional miles were added over the decade of the 1850s, resulting in more than five thousand miles in the “118 canals and slack-water improvements” throughout the country.³⁴⁵ Consequently the number of steam-and motor-driven vessels built mostly for trade increased more than sixty percent to more than eight hundred boats.³⁴⁶ A majority navigated the steamboats on the waters in the middle states of the country along the northern and southern regions connecting to the Mississippi River.

Even though the total number of manufacturing establishments in the country had increased no more than fifteen percent, the capital invested had nearly doubled to one billion dollars with the average investments of seven thousand dollars per establishment and three hundred million per state. Half of the one billion dollars was invested in establishments located in New York, Pennsylvania, Massachusetts, and Ohio. About ten percent of the capital was invested in the eleven southern states with an average of nearly nine million dollars per state with two-thirds of the total invested in Virginia, Tennessee, Georgia, North Carolina, and Alabama.³⁴⁷

In fact, the total number of hands had increased nearly forty percent over the prior decade to a total of more than a million persons employed in manufacturing with one in five a female.³⁴⁸ About one in four of the entire population was employed in manufacturing with one-third of those employees residing in Massachusetts, where one in fifteen of the population was employed in manufacturing; New York, where it was one in sixteen; and Pennsylvania, where it was one in thirteen.³⁴⁹ In the founding states in the southern region one out of forty in the population of Virginia was employed in manufacturing, one in seventy in North Carolina, one in ninety in Georgia, and one in a hundred in South Carolina.³⁵⁰

About half of all the establishments that manufactured products were located in New York, Pennsylvania, Ohio, California, and Massachusetts with half of all the capital invested, almost eighty percent of all the employed hands, and half the value of all the production. The annual cost of wages was nearly three hundred dollars per hand.³⁵¹ About half the value of all productions in manufacturing was from the ten products of flour and meal, cotton goods, lumber, boots and shoes, leather, clothing, woolen goods, machinery, printing, and sugar refining.³⁵²

The Census of 1860 reported a total of one hundred twenty-five principal urban cities and towns that were located throughout all thirty-three states with populations ranging from three thousand in Lansing, Michigan, to eight hundred five thousand six hundred sixty-one in New York City. More than half of those urban places with a population of more than ten thousand persons were located in the states of the northern and middle regions where most of the canals and railroads had been connected to local stations for the carry of the productions in agriculture and manufacturing to internal markets and ports to foreign markets. Also, twenty-one of the centers for manufacturing in urban places were located in six states in the midwestern region, eleven urban centers in six states in the southern region and California in the western region.³⁵³

During the decade of the 1850s, the number of towns with a population greater than ten thousand residents increased from fifty-six to seventy-three, with eight of the cities at more than one hundred thousand persons.³⁵⁴ With expansions in manufacturing, commerce, and trade in these urban places, the pursuits of prosperity depended to a large extent upon wage laborers who could be trained for one of five hundred diverse occupations. Over the decade of the 1850s, the number of categories of occupations had doubled with the number employed increasing by fifty percent to more than eight million in total for all the state but with less than a one-percent increase of just ten thousand more farmers.³⁵⁵

The Census of 1860 listed five hundred eighty-seven occupations in which more than eight million people were employed and were one-fourth of the total population of the country. There were ten occupations with more than one hundred thousand persons.³⁵⁶ Blacksmiths, carpenters, farmers, and farm laborers were spread

throughout the population in each of the states. The miners usually labored in rural places where towns were established near the location of the mines. During the decade of the 1850s, the number of teachers for schools increased fourfold, and merchants and clerks increased eighty percent.³⁵⁷

Some occupations in manufacturing employed common laborers in factories instead of long-standing domestic productions by artisans. With machines invented during the decade, most of the artisans as shoemakers and tailors were replaced by common labor of more than one hundred thousand factory hands for making shoes. The number of factory hands tailoring clothes almost doubled. Most of these factory workers usually resided in or near the growing towns and cities.³⁵⁸

Over the five decades through 1860, the number of persons employed in manufacturing increased sixfold to become five percent of the population in the United States with eight percent of the population employed in manufacturing in New England states, seven percent of the population in the middle states, and one percent in the eleven slave states.³⁵⁹

With the growth in the number of factories and an increased employment of hands, the value of the manufactured products excluding the cost of labor and raw materials was more than eighty percent of capital invested. However, the true return on investment would include the cost of machinery, supervisors, accounting, transportation, and sales.³⁶⁰

The 1860 Census included the history of improvements in the manufacturing of certain products as well as providing current information about the establishment, capital, materials, hands, and value of these products. One of the examples was the history in the production of shoes, which included the information that: "manufacture of boots and shoes employs a larger number of hands than any other branch of American industry save that of agriculture, and more than one-twelfth of all operatives engaged in manufactures."³⁶¹ Since the Mayflower anchored in Massachusetts, innovations by shoemaker artisans in American and England had improved the methods for production.

However, as machinery and waterwheels began to replace the artisans as shoemakers with common labor of men, women, and children, the wage laborers worked long hours for a day wage of less than one dollar. The minimum weekly subsistence wage was estimated to be about eleven dollars. As early as 1820, the artisan mechanics had begun to establish institutes in a number of cities to improve their status and day wages of one to two dollars, depending on their trade.³⁶²

By 1860 the number of hands employed in manufacturing products increased to more than one million laborers divided among more than one hundred thousand establishments.³⁶³ During those decades other groups of wage earners combined into temporary unions for the purpose of encouraging other employees to join in strikes to pressure owners into increasing wages to at least the need for subsistence,

improving working conditions for employees, and reducing the work day from twelve to ten hours.³⁶⁴

In 1857, an economic crisis with failing banks and falling value of stocks resulted in layoffs and lowering of wages for many of the employed laborers.³⁶⁵ Consequently, some of the wage earners combined to establish temporary unions to represent employees in negotiations with the employers. With uncertain values of trade in the 1850s and inflation in commerce, employers had reduced the wages for shoemakers below the minimum for subsistence living.³⁶⁶ In Massachusetts the Lynn Mechanics Association of shoemakers informed its members that a committee would present a request to the employers for a raise in wages. After the employers refused to meet with representatives or raise wages, the members of the unions of shoemakers agreed to conduct a strike for wages above the level for subsistence living.³⁶⁷

With the refusal from the employers to meet for negotiations, as many as twenty thousand men and women began a strike in twenty-five towns.³⁶⁸ After parades of as many as ten thousand strikers, the arrival of the police from Boston, and the return to work of employees, the strike ended in two weeks with more than a ten percent increase in wages.³⁶⁹ Although the ten percent may not have reached subsistence for all the shoemakers, the settlement between employers and shoemakers encouraged combining for improvements and the establishment of membership unions. However, achievements in fair wages and working conditions were limited without organized unions, unity among strikers, and agreements to negotiate.

During each of the five decades from 1790 to 1840, the value of the imports into the United States was greater than the value of exports, creating a negative balance in trade until there were about equal values during the two decades from 1840 to 1860. However, the average of the values of exports over the decade from 1851 to 1860 was more than twice the average from 1841 to 1850.³⁷⁰ For 1860, two-thirds of the value of the exports were from productions of agriculture that included about one-tenth of the wheat harvest, one-fifth of Indian corn, two-thirds of the tobacco, and more than half of the cotton.³⁷¹

During 1860, the value of the exported manufactured products was just one-tenth of the value of all products that were manufactured throughout the entire United States. In addition, the value of those exported products was about one-third the value of the imported manufactured products. With some domestic competition, more than ninety percent of imported manufactured products were wares of iron and steel and goods from wool, cotton, silk, and flax.³⁷² However, for the first time the value of all domestic manufactured products was about equal to the value of agriculture productions.³⁷³

During the six decades until 1850, the geography of the United States transformed from seventeen to thirty-six separate entities as a combination of territories and states with the population increasing almost sixfold. In 1790 North Carolina

ranked third to Virginia and Pennsylvania in population. However, by 1850, New York, Pennsylvania, Ohio, Virginia, and Tennessee had populations exceeding a million persons, and North Carolina ranked tenth in population among the states.³⁷⁴

As other states were abolishing slavery in the early decades of the United States, each of the eleven southern states was embedding slavery into the structure of its society and the development of its economy. Slaves served the white people by law, with many of the owners considering themselves to be genetically superior and believing that they owned not only the labor but also the life of a slave. On large farms and plantations, the majority of males and females labored as field hands most of their adult lives. However, nearly one in five of the females were assigned to domestic labor with about one in four of the males as managers or craftsmen.³⁷⁵ To support the development of their economy, the legislators in North Carolina enacted ninety-one laws over the years from 1741 to 1831 that applied only to slaves and free persons of color.³⁷⁶

The attitudes of overseers of slave labor varied among the owners. Slaves could be whipped and even killed without legal retributions if they rebelled against their owner. Some slaves escaped to other states for their freedom, but owners could still reclaim them as their property no matter where they resided. In some instances, groups of slaves escaped to engage in violent rebellions that were organized to abolish slavery. Also, societies of mostly white persons were established to encourage the abolishment of slavery by actions of individuals and by efforts for legislation. Finally, the Emancipation Proclamation signed by President Lincoln began the abolishment of slavery in the rebelling states and later everywhere in the United States with an amendment to the Constitution. However, the results for transition from slave to freedom for all the black people did not secure their inalienable rights for pursuits of prosperity.

The prominent features of societies and economies that developed in southern regions of the United States before the Civil War were experienced by a visit and then criticized by Frederick Law Olmstead, a northern journalist and landscape architect. In addition, North Carolinian Hinton Rowan Helper blamed the illiteracy and poverty among the white people in his home state on their dependency on slavery. The research and publications of Dr. W. E. B. Du Bois during the first half of the twentieth century and John Hope Franklin during the second half reflected on the lives of slaves and identified social and economic barriers for black people derived from slavery that hindered progress of the free African Americans.

Robert William Fogel and Stanley L. Engerman provided their perspectives about the pursuits of prosperity in the southern region, with a focus on “the economics of American Negro slavery.” They provided ten “principal corrections of the traditional characterizations of the slave economy” that included the efficiency of

slave labor in the production of agriculture and their diligence in urban factories.³⁷⁷ They concluded that “[on] average he was harder-working and more efficient than his white counterpart.”³⁷⁸ In addition, large-scale farming with effective supervision and “intensive utilization of labor and capital” of slave agriculture in the southern region was thirty-five percent more efficient than the “northern system of family farming.”³⁷⁹ In addition the “slaves employed in industry compared favorably with free workers in diligence and efficiency.”³⁸⁰

Fogel and Engerman also concluded that the rate of return on investment for large plantation agriculture was comparable to that of textile firms in New England and estimated to be eight to ten percent depending on the price, age, gender, and condition for the slave laborers.³⁸¹ At an auction in 1856, the price of male slave field hands ranged from fifteen hundred to sixteen hundred dollars with the price for women and girls ranging from twelve hundred to fifteen hundred dollars.³⁸² Although varying in price and demand, some of the talented slaves were leased at a value of as much as two hundred dollars a year to work as servants, mechanics, or manufacturers.³⁸³

The superintendent of the 1860 Census reported progress in the economy of the United States during the decade before the Civil War while the total population increased by more than thirty-five percent:

More than fifty millions of acres of land were brought into cultivation. The productions of agriculture multiplied in ratio greater than the population. The products of manufacture increased nine hundred millions of dollars, or at a rate of eighty-six per cent. The banking capital ran up from \$227,469,074 in 1850, to \$421,880,095 in 1860, while the circulating currency was augmented \$52,089,560. The amount of insurances increased about \$311,000,000. More than 22,000 miles of railroad were completed, and the capital involved increased from \$296,640,148 in 1850, to \$1,151,560,829 in 1860; while to indicate on the map of our country the lines of telegraph would be present to represent the web of the spider over its entire surface. Our internal and foreign trade kept pace with our advance of production and increase of capital. Education, free to a great extent, has been made more accessible, and crime has rather diminished. We experienced no effects of wide-spread pestilence. and our country seemed the chosen abode of prosperity and peace.”³⁸⁴

He continued: “Admitting that the insurrection has tended to depress commerce, to paralyze many branches of industry, and plunged the nation into a debt of surpassing magnitude, and while the ordinary internal trade, so vast in its amount, has been suspended between the North and West and the South, there may be found abundant causes for thankfulness that the masses of our population has thus

far experienced but gently, the sufferings and desolation usually attendant upon a revolution of so wide-spread and serious a nature as this has proved.”⁸⁵

Organizing Practical Education

Search for Scientific Agriculture

During the four decades following the inauguration of George Washington, the population of the United States tripled, the number of states doubled, and the towns and cities of more than two thousand five hundred citizens increased fourfold with one or more of these communities in each of the founding states except for Delaware. More than half of these towns were located in Massachusetts (twenty-two towns and cities), Pennsylvania (fourteen), New York (nine), Connecticut (five), and Rhode Island (three), with Ohio (five) leading the Territories admitted as states to the Union.¹ The social, cultural, and economic organizations that developed in each of these communities to promote improvements of common interests depended upon the occupations, education, commerce, labor, and religion of the people who chose to live there.

In *The American Journal of Education* of 1826, Josiah Holbrook—who was born in Connecticut, graduated from Yale, inherited and cultivated a farm, and established a seminary of agriculture “to train the students in the analysis of soils, in the application of the mechanical powers to all farming operations... practical surveying, geological excursions, road-making, and the labors of the farm”—proposed “that if associations for mutual instruction in the sciences, and other branches of useful knowledge, could once be started in our villages, and upon a general plan, they would increase with great rapidity, and do more for the general diffusion of knowledge, and for raising the moral and intellectual taste of our countrymen, than any other expedient which can possibly be devised.”²

The proposal included the creation of a Society for Mutual Education “to procure for the youths an economical and practical education, and to diffuse rational and useful information through the community generally.”³ In addition, the members

were expected to “apply the sciences and the various branches of education to the domestic and useful arts, and to all the common purposes of life.”⁴ County, state, and national societies were proposed for the purpose of sharing “measures” for promoting “practical education and for qualifying teachers.”⁵

After delivering lectures in Massachusetts in 1826, Holbrook convinced farmers and mechanics in the audience to organize a society for mutual improvement that was called Millbury Lyceum No. 1, Branch of the American Lyceum. Subsequently, nearby towns created societies, and together they established the Worcester County Lyceum.⁶ A *lyceum* was first a building or place for gymnastics in Athens and subsequently a place for Aristotle to deliver lectures.⁷ Three years later as many as one hundred lyceums had been established, most of them in Massachusetts and Connecticut.⁸

The American Lyceum was established in 1831 at a meeting in New York where “one-thousand town Lyceums were represented by twenty-three delegates.”⁹ At that meeting, guidelines for organizing a lyceum and objectives for their activities were adopted in the form of a proposed constitution for all member societies. They concluded that the primary objective of a lyceum should be “the improvement of its members in useful knowledge, and the advancement of Popular Education” achieved by “meetings for reading, conversation, discussions, dissertations, illustrating the sciences, or other exercises which shall be thought expedient.”¹⁰

After abandoning farming and closing the seminary, Holbrook settled in Boston where he assisted in establishing the Boston Mechanics Lyceum in 1831.¹¹ With stops in Pennsylvania, Ohio, and New York, Holbrook encouraged statewide lyceums that were established in at least eight states and in a few other countries. By 1834, there were as many as three thousand lyceums in communities from “from Boston to Detroit and from Maine to Florida.”¹² Lyceum societies began in North Carolina in the 1830s in Fayetteville and expanded to Salisbury, Raleigh, and “almost every town and village in the State.”¹³

For eight consecutive years, the lyceums held national meetings in New York with the 1839 assembly attended by even more representatives than eight years earlier; however, that was the last meeting of the American Lyceum Union.¹⁴ The lyceums were essentially lectures for adults and dominated by educated people who were interested in promoting education, expanding their knowledge in science, and in the understanding of the rapidly developing technologies of the American Industrial Revolution underway in the larger communities of the United States.

As other societies and institutes organized to promote practical education and improvements in agriculture and the useful arts for the common people during the decades prior to the Civil War, many of the lyceums adopted other community interests such as entertainment and the performing arts. By the end of the nineteenth

century, the original objectives of the lyceums were realized by other institutions that were devoting more attention to practical education at all levels.

While the livelihood of almost all of colonial Americans was derived from agriculture on land they owned, most of them were yeoman or common farmers. With little education, they depended on ancestors, neighbors, and their own experiences to develop the practices that they used to retain soil fertility, to improve crop yield, to breed cattle, and to engage in commerce. However, when agricultural capitalists, who were prominent, wealthy, and educated, invested in land, labor, and implements to increase income, some of them were interested in the improvements in agriculture that were developing throughout the eighteenth century, especially in Great Britain.¹⁵

One of those capitalists was the most prominent plantation owner in American in 1790, President George Washington, who corresponded for nearly a decade with Arthur Young, an Englishman who traveled throughout England and France observing and recording facts about agricultural practices followed by publishing annals and books that “diffused” among his readers the knowledge for improvements through farm management. Young’s writings included the *Annals of Agriculture and Other Useful Arts*, *Travels in France*, and *The Farmer’s Letters to the People of England*. Washington concluded and informed Young that the “system of agriculture” used in Virginia and surrounding states was “as unproductive to the practitioners as it is ruinous to the land-holder” who leased the land.¹⁶

After receiving and reading a series of Young’s annals, Washington wrote that he and others “are endeavoring to get into your regular and systemic course of cropping, as fast as the nature of the business will admit; so that I hope in the course of a few years, we shall make a more respectable figure as farmers.”¹⁷ In 1791, Young inquired about obtaining details about farming in America, which inspired Washington to assess his practices in farm management as well as encouraging others to respond with information that could be analyzed to describe “the state of agriculture in America.”¹⁸

President Washington considered the objective to be “highly interesting to our country” and proceeded to inquire about “the value of our lands, with their yield in the several kinds of grain, grass, &c.—the prices of farming stock; the prices of produce, &c. together with a list of the taxes in the different States, which may in any way affect the farmer.”¹⁹ Eventually, Washington requested Thomas Jefferson, Alexander Hamilton, other plantation owners, persons representing counties and towns in Pennsylvania, Maryland, and Virginia, and the Agricultural Society of Philadelphia to join him in providing a response to Young.

After reviewing the information that described agriculture in the eastern counties of the middle states of America, Young pondered a question to begin his response: “Is it possible that the inhabitants of a great continent not new settlers who

of course live only to hunt, to eat, and to drink, can carry on farming and planting as a business, and yet never calculate the profit they make by percentage of their capital? Yet this seems to be the case.”²⁰

Some of the responders were obliged to challenge Young’s question by asserting that statistical farming for return on investment conflicts with the value of freedom derived from subsistence farming and with the realities of an abundance of land, a shortage of laborers (mostly slaves for those responders), and limited and unreliable access to markets. Although Washington agreed that “the aim of farmers in this country... is not to make the most they can from the land,” he observed that it was “an erroneous policy” that would require “time to conquer bad habits, and hardly any thing short of necessity is able to accomplish it. That necessity is approaching by pretty rapid strides.”²¹

Toward the end of his first term in office, President Washington corresponded with Sir John Sinclair, who was actively engaged in “extensive statistical inquiries, regarding the general state of Scotland, and the means of promoting its improvement.”²² Sinclair, like Young, was convinced that when the analysis of practices and profits obtained from data over a wide range of soils, drainages, and weather conditions were disseminated to farmers they would adopt those practices and management that would improve quality, yield, and profit from their efforts.

After Sinclair successfully lobbied Parliament in 1793 to create a Department of Agriculture and was appointed the first president, he named Arthur Young as the secretary who continued his work of gathering data and publishing annals about the state of agriculture in England. In a 1796 letter, Sinclair suggested that before he left the presidency, Washington should recommend the establishment of a Board of Agriculture with societies in every state capital for the purpose of gathering and disseminating agricultural knowledge.²³ Washington lamented that “It will be some time, I fear, before an agricultural society, with congressional aids, will be established in this country”; however an attempt is underway “to establish a state society in Pennsylvania, for agricultural improvements.”²⁴

The Philadelphia Society for Promoting Agriculture was founded in 1785 by twenty-three men who met to share experiences for the purpose of improving their practices in agriculture.²⁵ In 1794, members of the society drafted a plan for the establishment of a state society of agriculture that would provide “not only for the practical, but the scientific, instruction of our farmers.”²⁶ In addition, the society would connect “the education of youth with the instruction afforded to those in advanced life; and thus grounding the rising generation in the knowledge of the most important of all arts, while they are acquiring knowledge suitable for the agricultural citizens of the state.”²⁷ However, the legislature chose to wait until 1851 to incorporate the Pennsylvania State Agricultural Society and finally consider practical and scientific education for “agricultural citizens of the state.”²⁸

From 1785 to 1860, other agricultural societies were forming in all the other states with the earliest occurring in South Carolina (1785), New York (1791), and Massachusetts (1792).²⁹ In North Carolina, an agriculture society was formed as early as 1810 in Edgecombe County followed by a number of counties before a state agriculture society was organized at Raleigh in 1819.³⁰

The Legislature in North Carolina authorized an Agricultural Fund not to exceed five thousand dollars per year from the sale of unclaimed assets with the president of the county societies constituting a Board of Agriculture.³¹ Farmers could learn about opportunities to increase productivity by purchasing publications, such as the *Cultivator*, or attending meetings and lectures associated with local, state, and national agricultural societies. With more available information, they were developing interests in the establishment of more organized and formal programs in agricultural education.

The recommendations sent by Arthur Young to President Washington about improvements in agriculture for profit consisted of a systematic allocation and fencing of farm land characterized as “No keep, no livestock; without stock, no manure; without manure, no crops” that relied on observations and statistical analysis of best practices on small farms.³² In addition, most of the land in England was owned by aristocracy and rented to subsistence farmers; therefore, any improvements in agriculture in the late eighteenth century were generally adopted by a few gentlemen “who were beginning to occupy land, were better educated, commanded more capital, were open to new ideas and more enterprising than their predecessors.”³³

As productive practices of management on these larger farms “diffused” throughout England and profits increased, those aristocrats who invested in improvements were interested in education and the science of agriculture with the appointment of Dr. Andrew Coventry as professor of agriculture at Edinburgh in 1794 and with the annual lectures to the Department of Agriculture from 1802 to 1813 by Sir Humphry Davy, who devoted his attention to the “progress of chemical discovery.”³⁴ Davy described his course as agricultural chemistry with “its objects all those changes in the arrangements of matter connected with the growth and nourishment of plants; the comparative values of their produce as food; the constitution of soils; the manner in which lands are enriched by manure, or rendered fertile by the different processes of cultivation.”³⁵

Although Davy identified the relationships between science and agriculture, Justus Liebig, a professor of chemistry at the University of Giessen, conducted the research and in 1840 published a book that developed “the fundamental principles of Chemistry in general, and the laws of Organic Chemistry in particular, in their applications to agriculture and Physiology.”³⁶ Chemistry was being incorporated into more university curricula, and knowledge was being diffused through societies such as the Royal Agriculture Society of England, which was established in 1838 to

“embody such information in agricultural publications and other scientific works as have been proved by practical experience to be useful to the cultivation of the soil.”³⁷ The “alliance of science with practice” led to the end “of farming by extension of area” and began “farming by intension of capital.”³⁸

In 1803, a preeminent plantation owner, Thomas Jefferson, emphasized the importance of education to the social status and to achieving improvements in farming by proclaiming that as “a science of the very first order”³⁹ a professor of agriculture should be established in “every College and University.”⁴⁰ However, the science of agriculture that depended on geology and chemistry did not diffuse from research laboratories in Europe into the education of Americans until mid-century.⁴¹

As described by the trustees of Columbia College, “natural philosophy, or the science of experimental physics, is divided into two great branches, the mechanical and the chemical.”⁴² Although the mechanical branch was taught in most curricula, the chemical branch “has rarely or never entered the plan of... liberal education; but has been improperly considered as auxiliary only to the medicine profession.”⁴³ With the acknowledgement of agriculture as an important application, Columbia College “instituted as part of the regular academical studies” a professor of natural history and chemistry in 1799.⁴⁴

However, due to inadequate funds, in 1810, the “Professorship of Chemistry was assigned to the Faculty of Medicine and detached from the Faculty of Arts”⁴⁵ as the science of chemistry at other colleges and universities slowly diffused into curricula with the appointment of professors who, although having earned an AB, were not qualified to teach without additional studies in chemistry.

In 1817, Denison Olmstead, who graduated from Yale in 1813, was appointed as the first professor of chemistry at the University of North Carolina (UNC) after teaching at a private school, tutoring at Yale, and obtaining an MA in 1816. To prepare for this assignment, he obtained leave of absence to be a private pupil (not enrolled) of Benjamin Silliman, a prominent professor of chemistry at Yale.⁴⁶

Benjamin Silliman had been appointed to a new professorship of chemistry and natural history at Yale in 1802; but he realized that he was unprepared and during leaves of absence studied theoretical and experimental chemistry at the Medical College of the University of Pennsylvania and traveled abroad to study at the University of Edinburgh, to visit research laboratories in Europe, and to purchase equipment.⁴⁷

Throughout his life, he pioneered the expansion and the importance of education in science in the United States by preparing numerous private students at Yale for professorships in other universities, by founding the *American Journal of Science and Arts* in 1818, and by traveling for a decade or more from Boston to New Orleans to give invited public lectures on geology and chemistry to men and women.⁴⁸ By

1840, as many as thirty-seven colleges and universities in the United States had included chemistry in the arts curriculum.⁴⁹

Using a donation of five thousand dollars, in 1846 a “Department of Philosophy and the Arts” was organized at Yale as proposed by Benjamin Silliman. In addition, the Yale Scientific School of Applied Science was established, which included a professor of chemistry in its application to the arts, a professor of agricultural chemistry, and an analytical laboratory for practical education. There were eleven students in the first class with six of them graduating in 1852.⁵⁰

However, Benjamin Silliman Jr., who had joined the department after receiving an MD from the University of South Carolina in 1849, moved to the Medical School in Louisville, Kentucky in 1852, and John P. Norton, the professor of agricultural chemistry, died in 1852. Subsequently, Professor John A. Porter was hired “to take charge of the laboratory”⁵¹ and joined with William A. Norton, the professor of civil engineering who expanded the opportunities for practical education in the Science School at Yale.⁵²

In addition to the development of agricultural chemistry, the growing interest in the science of agriculture also included geology. As it was described in the nineteenth century, scientific geology “investigates the successive changes that have taken place in the organic and inorganic kingdoms of nature; it inquires into the causes of these changes, and the influence which they have exerted in modifying the surface and external structure of our planet.”⁵³ Among the sciences, agricultural geology—devoted mainly to the chemistry of rocks, minerals, and soils in arable land—was considered important as practical research.

Shortly after arriving in North Carolina, Denison Olmsted began an investigation of the geological characteristics in the Deep River area of North Carolina. After the results were published and the Board of Agriculture had rejected his offer to expand his effort without pay, the legislature directed the board to conduct a geological survey. Professor Olmsted was chosen to conduct the effort; however, after two years of investigation, but before he could finish, he accepted an offer in 1825 to become the professor in mathematics and natural philosophy at Yale.⁵⁴

A classmate at Yale who was appointed as the professor of mathematics and natural philosophy at the same time that Olmsted accepted the professorship at North Carolina, Elisha Mitchell replaced Olmsted as the professor of chemistry, geology, and mineralogy. During his four decades in this position, he continued the geological survey for the state until 1827, measured the highest elevation of a mountain that bears his name, advised the state on geologic concerns in improvement projects, and taught the sciences to the sons of planters and professionals that could be applied to agriculture.⁵⁵

The Rensselaer School opened in 1824 “for the purpose of instructing persons, who may choose to apply themselves, in the application of science to the common

purposes of life.”⁵⁶ In that same year, Amos Eaton—who graduated from Williams College in 1799, studied for two years under Silliman at Yale, returned to Williams to teach botany and geology in 1817—moved to Troy, New York in 1818 where he lectured and wrote books in chemistry, zoology, and geology. Eaton was appointed senior professor of the Rensselaer School after he completed a “Geological and Agricultural Survey” near Lake Erie that was sponsored by the founder of the school, the Honorable Stephen Van Rensselaer.⁵⁷

Ebenezer Emmons—a student taught by Eaton at Williams almost a decade earlier when in the year he graduated excelled by publishing a handbook entitled *Manual of Mineralogy and Geology*—was in the first graduating class at Rensselaer in 1826. Subsequently, Emmons studied at the Berkshire Medical School while he continued his interests in geology and mineralogy. During his fifteen-year presence in Massachusetts and before moving to Albany, New York in 1838, Emmons was engaged in three careers: as a practicing physician, as a professor of chemistry, and as a field geologist. However, the numerous reports, books, letters, and observations that he published during the three decades in which he identified, classified, and provided nomenclature for mineralogical and geological characteristics of large areas of Massachusetts and New York encouraged the North Carolina Legislature to appoint him as the state geologist in 1851.⁵⁸

After he conducted surveys in Rockingham, Stokes, Chatham, and Moore Counties, Emmons issued his first report, “Geological Survey of North Carolina” in 1852. He reminded the readers in the survey that the “principles of Agriculture and Geology”⁵⁹ depended upon recently established facts: “That soils must contain a sufficiency of certain inorganic elements; that these elements are necessary to the life of the plant; that no seed can be perfected without them; and, finally, that they are essential to the life of the animal subsisting on vegetable food.”⁶⁰

Reporting the surveys of the “Midland Counties” in 1856 and the “Eastern Counties” in 1858, Emmons concluded that he “need not dwell on the importance of agriculture” rather to state his “views of an improved agriculture; one which is understood, or one founded upon established principles,—one which leaves a beaten road and inquires into the why and wherefore.”⁶¹

By 1860, Emmons had turned his attention to the science of agricultural geology that was reported in the 1860 survey as “Agriculture of North-Carolina, Part II: Containing a Statement of the Principles of the Science upon which the Practices of Agriculture, as an Art, are Founded.” Emmons recognized that among the “Planters and Farmers of this State...the fixed prejudices to change modes of culture, and the strong tendency to unbelief of promised advantages when modifications of a system of husbandry are proposed, it has happened that professional men have taken the lead and advanced forward, when the regular bred farmer has stood still.”⁶² With “diminished expense in reaching the markets of the world” and with

“products which... have become profitable,”⁶³ Emmons encouraged the farmers to realize that “Agriculture is regarded as an art and a science.”⁶⁴

“As an art, its practice comprehends the preparation of the earth for the reception of seed, and the mechanical state best fitted for the perfection of a crop. As a science, it comprehends that kind of knowledge which relates to the structure and composition of vegetables, their adaptations to climate, soil, and the relation which any members of the kingdom hold to the forces of nature. The successful practice of the art, is more or less dependent upon agricultural science, though in order of time, art preceded science.”⁶⁵ Furthermore Emmons stated that the current “practice of the art is founded upon the simplest observations when the soil was fresh from the hand of nature and rich in all the elements of growth, when nothing perhaps was required but to gather the fruit and watch the progress of the seasons. When improvement was attempted more attention was required.”⁶⁶ After moving to Brunswick County in 1860, Emmons shared his concerns with a colleague that “the South is really in hostile attitude to the North.... The political condition under which we are living in the South is quite oppressive. I cannot but look with great fear upon the results of agitation, and it unfits me for work.”⁶⁷

Ebenezer Emmons died at home in Brunswick County in 1863. With the state geologist providing the manual of practical education derived from the sciences applied to agriculture and with the lectures by the professors in the School of the Application of Science to Arts, sons of planters who attended the University of North Carolina had the opportunity to adopt agricultural practices derived from the knowledge about chemistry and geology that would result in increased productivity and profits from their investments. Regarding practical education, Emmons set forth his belief that “Our plan, whatever it may be, must be economical, and if it be designed to exert a widespread influence, tuition must be abolished. Instruction must be as free as it is possible to make it.”⁶⁸

Search for Productivity with Mechanic Arts

During the first half of the eighteenth century while the discoveries in the evolving sciences of chemistry and geology were challenging the long-standing farming practices for maintaining and recovering soil fertility to increase productivity, access to markets and availability of labor remained primary obstacles in the pursuit of prosperity for a majority of farmers. To improve the opportunities for commerce, the construction of canals, waterways, harbors, railways, and roads for transportation relied on government charters, investment of capital, and the availability of civil engineers who were trained and sometimes educated in the application of

mathematics, hydrology, and geology that was required to design these internal improvements.

Since the practice depended on knowledge and application of scientific principles and advanced mathematics, civil engineering was considered a learned profession obtained by apprenticeship, education, or experience with assistance from professional societies. The Boston Society of Civil Engineers was established in 1848.⁶⁹ In 1852, with the announcement of their objective of “professional improvement” and encouraging “intercourse among men of practical science” through “meetings for reading of professional papers, and the discussion of scientific subjects” the American Society of Civil Engineers began the process of continuing education required for the practice of engineering.⁷⁰

Many engineers began as mechanics or artisans who designed and built mechanisms and implements crafted from metal, wood, and other materials. Others began as hired mechanics and tradesmen and with those experiences developed the interest to invent, design, or build steamboats, boats, railroad engines, labor-saving machines, and tools. While the tradesmen and mechanists were considered talented and important individuals in the community, their practices were not recognized as applications of natural science or mathematics until the last half of the eighteenth century, when physics and mathematics were emerging as required courses in the classical curricula in universities that included the knowledge of mechanics, optics, and fluids as developed by Sir Isaac Newton.

Consequently, the students enrolled in the universities learned the science and mathematics of mechanics and civil engineering, but the important practical knowledge required to apply the theory was considered a useful art and inappropriate for classical studies. In contrast, those employed as mechanics, tradesmen, or skilled laborers were obtaining practical knowledge by experience without the theory. As the economies of towns and cities relied on the application of mechanic and useful arts, an increasing demand for the talents and knowledge of skilled labor resulted in a growing number of citizens who were considered of lesser status than the professions associated with classical studies, but they were not common wage laborers.

One of the most prominent Americans without a degree in classical studies, but with more education than most mechanics and tradesmen in the eighteenth century, was Benjamin Franklin, who attended a Latin school and a writing and arithmetic academy in Boston prior to an apprenticeship in the useful art of printing.⁷¹ To prepare more people for the useful arts, Adam Smith recommended in 1776 that public education in the common schools of England include practical knowledge for children since “There is scarce a common trade which does not afford some opportunities of applying to it the principles of geometry and mechanics.”⁷²

With mechanics and tradesmen growing in number and seeking mutual benefits from social, education, and political activities, The General Society of Mechanics

and Tradesmen of the City of New York was established in 1785,⁷³ and the Massachusetts Charitable Mechanic Institution was established in 1795⁷⁴ for benevolent purposes and the promotion of the mechanic arts. In 1789, a “Sunday Society” in Birmingham, England began “instruction of young men after they had ceased to attend the Sunday school” with some “lectures on mechanics and other branches of physical science, for working men, especially those engaged in the foundries and manufactories of the town.”⁷⁵

The Sunday Society, which adopted the name of Birmingham Brotherly Society in 1796, was a precursor to the Mechanics Institutes, which were founded in the first half of the nineteenth century throughout Great Britain. During the last decade of the eighteenth century, Dr. John Anderson, the professor of natural philosophy at the University of Glasgow, lectured “on experimental physics, to which some workingmen, and others, were invited.”⁷⁶ Upon his death in 1796, his will provided funding from the estate for the establishment of Anderson’s University with Dr. George Birkbeck appointed in 1799 as the professor of natural philosophy and chemistry.

While working with the artisans in Glasgow to fabricate laboratory equipment for the sciences, Birkbeck “found them so anxious to acquire knowledge, and so full of intelligence, that he resolved to deliver a course” similar to the one by Anderson, consisting of experimental lectures on mechanics, “solely for persons ‘engaged in the practical exercise of the mechanic arts, men whose situation in early life has precluded the possibility of acquiring even the smallest portion of scientific knowledge’.”⁷⁷ The attendance of working people increased from seventy-five at the first to five hundred at the fourth lecture.⁷⁸

With increasing complexity of labor-saving machinery in the nineteenth century due in part to the demand for steam engines to power the growing economies in England and America and to the expanding railway mileage for commerce, the increasing dependence on practical knowledge (technology--knowledge of techniques) required for the mechanic arts and the trades to build and maintain the machinery and railroads was challenging to those who could not read, analyze with certainty by mathematical reasoning, and conceive and apply practical concepts embodied in natural philosophy.

To create opportunities for “laboring classes” to attend lectures about improvements in technology and to learn scientific principles of mechanics, mechanics institutes were founded in Great Britain at the Edinburgh School of the Arts in 1821 and at the Glasgow and London Mechanics Institutes in 1823.⁷⁹ In addition, the Manchester Mechanics Institute founded in 1824 may have been the first in Great Britain to provide practical education by “systematic class instruction in chemistry and mechanics” with the objective “to point out and teach the scientific principles

upon which the business of the machine-maker, the dyer, the carpenter, the mason and others depend.”⁸⁰

However, there were few books containing “the tools of knowledge” to be used in classrooms for the instruction to mechanics with most of those texts displaying “Mechanical Science” as “either partially mingled with much extraneous matter, or that, when specially displayed, the information was more theoretical than practical, and better adapted to the study of the philosopher than to the workshop of the real mechanic.”⁸¹ Nevertheless, there were six hundred ten mechanics’ institutes in England with one hundred two thousand members and another fifty-five in Scotland with twelve thousand five hundred members in 1850 to 1851.⁸²

Interests and memberships of mechanics and tradesmen diminished as they complained that the lectures were “desultory, and unpractical” and the “classes often present few, if any, advantages, except the acquirement of elementary knowledge; and those really desirous of obtaining in the Mechanics’ Institutes a knowledge of the principles of their trades, seldom find that knowledge there.”⁸³ By 1860, there was “a growing conviction that Literary and Scientific and Mechanics’ Institutes have not answered all the purposes which their original promoters so hopefully anticipated.”⁸⁴

Although there were fewer cities then and little industrialization in the United States, mechanic institutes and schools were organized in New York City (1820), Philadelphia (1824), Boston (1826), Baltimore (1825), and Cincinnati (1828) to “diffuse the light of science”⁸⁵ and “to be the promotion and encouragement of manufactures and the mechanic and useful arts.”⁸⁶ Most of the institutes began with the objectives of establishing libraries, lectures in applied science and the useful arts, exhibits of their arts at fairs, and promoting the mechanic arts.

At the opening of the course of lectures at the Boston Mechanics Institute in 1829, Joseph Story—who graduated from Harvard, practiced law in Salem, Massachusetts, served as Speaker of the House of Representatives in Massachusetts, as associate justice of the United States Supreme Court, and professor of law at Harvard⁸⁷—characterized the current social and professional status of mechanics and craftsmen by stating that “scholars of all sorts, by general consent, looked with indifference or disdain upon the common arts of life, and felt it to be a reproach to mingle in the business of the artisan. One would suppose, that the alliance between science and the arts was so natural and immediate, that little influence would be necessary to bring about their union. But the laboratory and the workshop, the study of the geometrician and the shed of the machinist, were for ages at almost immeasurable distances from each other; and the pathways between them were few, and little frequented.”⁸⁸ However, with extraordinary discoveries by artisans, “scientific men began to surrender their pride, and to devote themselves practically to the improvements of the arts.”⁸⁹ Consequently, “the benefits derived from the

connexion [*sic*]” between the arts and science resulted in dignity and importance so that “The manufacturer, the machinist, the chemist, the engineer, who is eminent in his art, may now place himself by the side of the scholar, and the mathematician, and the philosopher, and find no churlish claim for precedence [*sic*] put in.”⁹⁰

Chief Justice Story no doubt pleased the audience of mechanics and tradesmen by remarking that “This fortunate change in the public opinion, which has made it not only profitable, but honorable, to pursue the mechanical arts, is already working deeply into all the elements of modern society.”⁹¹ However, Story challenged the mechanics in his audience by asserting that “Science is becoming almost indispensable, in order to master improvements, as they occur, and to keep up, in some measure, with the skill of the age. It will otherwise happen, that a mechanic, by the time he has arrived midway in life, will find himself superseded by those, who, though much younger, have begun life under more favorable auspices.”⁹² While there are “advantages resulting from the scientific men’s becoming familiar with the workshop, and the operations of art... a far more important object, and the second great step in improvement, is to elevate mechanics and artisans to the rank of scientific inquirers.”⁹³

Unfortunately, the mechanics in North Carolina did not discover the opportunity to elevate “to the rank of scientific inquirers” for almost a century. With the beginning as early as 1802 in North Carolina, mechanics and tradesmen were establishing associations in the cities of New Bern, Plymouth, Fayetteville, Wilmington, Raleigh, Oxford, and Asheville; however, primary purposes for organizing were their efforts against the “encroachment by the Negro mechanics” and to secure unpaid debt for their services.⁹⁴

Founded with the objective for “the promotion and encouragement of manufacturers, and the mechanic and the useful arts,” in 1826 the Franklin Institute published the first volume of *The Franklin Journal* in which the activities and the progress of the institute were reported. The editor explained that the journal would contain “a great variety of matter, interesting to the artisan, and to the man of general reading” and be divided into seventeen “heads” with the essays chosen for publication reviewed either by the editor or by “gentlemen whose stations and talents are a sufficient pledge for the able manner in which they will fulfil [*sic*] their engagements.”⁹⁵

The journal was published “to diffuse information among artisans and manufacturers.”⁹⁶ They paid four dollars per annum to receive a monthly publication that contained essays that explained theories, applications or experiments associated with mechanics, natural philosophy, chemistry, mineralogy, botany, and mathematics.⁹⁷ In addition inventions, discoveries, internal improvements, and innovation in the arts were described in some detail including the introduction of new

manufacturers and agricultural implements. Also “Mechanical Jurisprudence” regarding apprenticeships, liens, and patents were interpreted.⁹⁸

With institute membership increasing more than twofold to one thousand sixty-five in just two years, the “course of instruction” was “considerably extended” to include three professors (mechanics, chemistry, and natural philosophy) who regularly lectured on the sciences as applied to the useful arts, and established schools for mathematics and drawing.⁹⁹ Although the institute was progressing in the primary objective of promotion and encouragement, there was concern expressed in the journal “that to receive the full advantage of a course of lectures, requires a degree of preparatory instruction, and a maturity of age, which many of our auditors do not possess.”¹⁰⁰

Therefore “to improve the condition and elevate the character of the operative class of society, by affording them the only effectual means for this purpose, *education*, cannot be accomplished by lectures alone.”¹⁰¹ Consequently, in some courses “the instructor converses freely with his pupils; solves their doubts, removes the difficulties which they may suggest, and never proceeds to a new subject until the former is fully understood.”¹⁰² Since the institute “was intended, more especially, for the education of youthful, than adult mechanics,”¹⁰³ the board enlarged the education plan to include a high school department where math, drawing, geography, history, and foreign languages were taught to “give to the children of our mechanics and manufacturers, who are generally in but moderate circumstances, the advantages of education which have hitherto been confined to the rich, and which have ever constituted the choicest boon that wealth could purchase them.”¹⁰⁴

As professors prepared for lectures and practitioners of applied science engaged in the mechanic arts, some of them wrote and published books in which useful arts were assigned to categories for the purpose of illustrating basic theories related to common practices. One of the earliest books published in London in 1825 and in Philadelphia in 1826 and entitled *The Operative Mechanic and British Machinist; Being a Practical Display of the Manufactories and Mechanical Arts of the United Kingdom* was written by John Nicholson, who was a civil engineer, who dedicated his work to George Birkbeck.

Nicholson asserted that inventions in labor-saving machinery “which yielded at once such immense national as well as individual prosperity, must ever be regarded as forming a new era in the arts of life and the domestic policy of nations.”¹⁰⁵ The contents included the response of matter reacting to forces, friction, and gravity; the design of levers, pulleys, wheels, axles, and gears to transmit mechanical power; the use of wind, water, steam as the source of energy to power machines; and the applications of mechanical science to the design and construction of mills, manufacturers, and buildings.

Almost two decades later and after delivering lectures “before young men, in Lyceums, and Mechanics’ Institutes, and also before the students” in college;¹⁰⁶ Alonzo Potter, professor of moral philosophy and rhetoric in Union College, published his notes in 1841 entitled *The Principles of Science Applied to the Domestic and Mechanic Arts, and to Manufactures: With Reflection on the Progress of the Arts and Their Progress on National Welfare* to provide a “convenient manual for those who are engaged in industrious pursuits, and also for students, and for popular reading.”¹⁰⁷

The content of the book was similar to that of Nicholson’s, but contained more descriptive definitions, with less science and fewer details about the practice of useful arts. However, he provided insights about the definitions and classifications of the words such as *technology* and *arts* as expressed at that time. The “(so-called) useful arts are but the practical application, to physical purposes, of mechanics and chemistry.”¹⁰⁸ Technology “as one of the sciences” embodied higher technology and required “a higher degree of knowledge and skill in those who practice,” and universal technology “comprehends the principles which apply to all the arts.”¹⁰⁹

During the decades after Mechanics’ Institutes were established in large cities, the demand for skilled labor increased as thousands of miles of canals and rivers were dredged and connected to deep-water ports; as thousands of miles of railroads were constructed throughout the states that connected millions of citizens; as thousands of steam engines propelled boats, ships, machines, and railway cars for commerce, travel and manufacturing; as fifty-six thousand miles of telegraph wires¹¹⁰ connected communities and businesses across America and to countries over the oceans; and as labor-saving machines increased productivity in labor-intensive agriculture and manufacturing where the handcrafts of many artisans, such as the in-home textile industry of America, were replaced by machine production.

In the “Preliminary Report of the Eighth Census” of the United States, the contribution of skilled labor to the expansion of prosperity was described by the author as:

The mechanic arts—particularly in our country, where they are most diffused, and all but universal—appear to contribute more directly than any others to the general comfort and improvement of the people. All others are dependent upon them for the principal agents and instruments of their success... The acquisition and diffusion of knowledge, the means of intercommunication and transportation, the comforts, enjoyments, and security of the fireside, and even the honor and integrity of the nation itself, are dependent upon the skill and enterprise of the manufacturer and the mechanic; but the results of their labors are, from their nature, less obtrusive or obvious to the general apprehension than some others.”¹¹¹

By 1860, members of a new class of Americans, who were mostly white skilled free laborers in the northern states, were establishing mechanic institutes and societies for the purpose of diffusing practical knowledge in towns and cities across the United States that included Poughkeepsie, New York, Chicago, Pittsburgh, New Orleans, and San Francisco with some institutes arranging courses of lectures in mathematics open to the citizens and education programs in the summer for young ladies, young men, and children. With the social and economic status of the skilled labor in the northern states advancing, many of the skilled laborers in commercial agricultural regions in the South were either free or enslaved blacks with white labor claiming that black skilled labor depressed the status and income of their work.

Beginning Public Education in the United States

Before the Civil War when scientific discoveries and useful technologies were employed to increase productivity in agriculture, manufacturing, and transportation; when the economy grew in wealth with prosperity beginning to spread across the United States; and when people moved to cities and towns to pursue opportunities as service providers, to engage in commerce, or to work for wages; an American innovation to improve the literacy of the people also began in the states with the establishment of systems of public education that resulted in a commitment to educate all of the children throughout all the country.

The century-long process began when Massachusetts was evolving from an agrarian to a free-labor manufacturing economy, from rural communities to one-fifth of the population living in towns connected by railroads, and from mostly native-born citizens to the recent addition of two hundred thousand immigrants.¹¹² A system of public schools based upon an article in the Constitution of statehood as revised in 1798 was established in response to the declaration “that towns of fifty families are required to sustain schools, wherein children are taught to read and write, and instructed in the English language, arithmetic, orthography, and decent behavior, for a term equal to one school of six months in each year; every town of one hundred families, twelve months; every town of one hundred fifty families, eighteen months; and every town of two hundred families, twelve months, and in addition thereto sustain a school wherein is taught the Latin, Greek, and English languages for twelve months in each year.”¹¹³

With many children working and attending school at different periods during school terms that began and ended at various times throughout the calendar year, the statement “a term equal to one school of six months in each year” described the situation where a student had to enroll in more than one school to attend a total of six months each year. The one-teacher schoolhouses, where writing, reading, and

arithmetic were taught to children of different ages for six-month terms each year, became the foundation of public education and the only opportunity to attend school for most of the children from common families in America.

In contrast, those families with adequate resources to pay tuition and board, when required, enrolled their children in private academies or subscription schools where they advanced from primary study similar to the common school to secondary studies of advanced mathematics, foreign languages, English, history, Latin, and other subjects in preparation to attend a university, for those who chose to do so. As the common schools grew in number before the Civil War, the number of academies and universities also increased throughout the United States.

The practical knowledge associated with the productivity that fueled the opportunity for wages from the growing economy was considered training and not appropriate for the classical curriculum of most of the private academies and universities that were established before the Civil War. However, the expansion of commerce and agricultural and manufacturing productivity created opportunities for those young people who enrolled in new institutions where the curriculum included practical knowledge associated with the industrial revolution in America.

Also, Americans were earning more income with some willing to pay for their children to attend the academies, which doubled in number and prepared them for attending colleges, which tripled in number. During the two decades prior to 1860, there was almost a threefold aggregate growth in the enrollment at all the academies, colleges, and public schools in the United States.¹⁴ With the Civil War ending in the spring of 1865, the states began again to expand public education, to charter state universities, to establish Normal schools, and to create agriculture and mechanic arts institutions.

Each state was progressing toward the goal of educating its citizens during different intervals of time and acting in a manner that depended on the economic, cultural, and societal attributes of the population. However, almost all the characteristics of the school system adopted by Massachusetts before the Civil War served as a model for the other states after the war. Even mandatory rather than voluntary schooling, the length of terms for attendance, and the content of instruction were duplicated in time; but the ability to fulfill the responsibility placed upon the towns in Massachusetts was unique and aided by geography, population density, and growth in commerce.

In the 1830s to the 1850s with textile mills locating near a source of water power that attracted free labor to cluster near their jobs, and then construction of railroads to transport cotton into and cloth out of the factories, the manufacturing, transportation, and commerce in these towns and cities created the demand for wage laborers and resulted in continuous employment and sustained schools. By 1850 there were six cities in Massachusetts with a population of more than one

hundred thousand and fifty-seven cities with a population of more than ten thousand.¹¹⁵ In contrast, Wilmington was the only town in North Carolina with a population greater than five thousand (7,264), and just eight other towns were more than one thousand in population.¹¹⁶

By 1852, the Commonwealth of Massachusetts had established three thousand six hundred seventy-nine schools¹¹⁷ that included primary then graded schools, high schools for male and female students, free schools supported in part by a school fund,¹¹⁸ a board of education to evaluate and recommend improvements,¹¹⁹ three Normal schools to improve the quality and increase the number of classroom teachers,¹²⁰ and a truancy law that required attendance and the enforcement of a child labor law.¹²¹ In 1860, the number of adults living in Massachusetts older than twenty who could not read nor write, excluding forty-five thousand immigrants, was two thousand, which included six hundred fifty free blacks.¹²²

By 1860 there were six thousand seven hundred sixty-three tuition academies spread among the thirty-four states and one hundred seven thousand five hundred twenty-nine public schools.¹²³ As the academies grew rapidly from 1830 to 1850, fewer of these graduates enrolled in a university because some could not afford to attend; but more and more chose to pursue an occupation in the expanding economies such as commerce and transportation.

Consequently, the citizens in the growing number of cities, where there were opportunities for office rather than labor employment, encouraged the grading of the public common schools into public primary schools, public grammar schools, and then public high schools to replace the dependency upon the tuition academies.

With the expansion of free education at all levels, with the growth in populations in cities and towns, with the enlargement of manufacturing, with the increases in commerce, with mechanization in farming during the second half of the nineteenth century, the demand for workers with special knowledge, practical skills, or manual training led to the establishment of Normal schools to prepare for teaching, of business schools to prepare for commerce, of vocational schools to prepare for craftsmanship, of industrial schools to prepare for manufacturing, of technical schools to prepare for applying sciences, and of agricultural schools to prepare for scientific farming.

Some of the schooling was essentially apprenticeship programs without bondage while others were occupational training in classrooms and laboratories. Except for learned professions such as medicine, law, and theology, the concept of organizing the practical knowledge and the necessary skills of an occupation to be taught in a public school such that the graduates would be considered professionals was unique in the United States before the Civil War. However, the educational opportunities were largely segregated by race and by gender. Even though education had never been a democratic opportunity, as literacy was the theme for establishing the

common school system throughout the nineteenth century, the graded-school system with a four-year high school became the theme and the foundation for individual as well as community prosperity through education for the twentieth century.

Practical Education in the United States

The first three presidents of the United States recognized the importance of education, and their ideas and actions influenced the development of applied science and practical education in different ways. When President Washington proposed a military academy, he described it as a corps of engineers. He understood the need for practical education that could be applied to the conduct of war. In addition to his advocacy for the academy, John Adams contributed to the constitution of Massachusetts in a section that included the phrase: "Wisdom and knowledge, as well as virtue, diffused generally among the body of the people being necessary for the preservation of their rights and liberties; and as these depend on spreading the opportunities and advantages of education in various parts of the country, and among the different orders of people, it shall be the duty of legislators...to encourage private societies, and public institutions, rewards and immunities, for the promotion of agriculture, arts, sciences, commerce, trades, manufacturers, and a natural history of the country."¹²⁴ The legacy of his vision evidenced by the second Industrial Revolution that occurred in New England in the 1800s and the Route 128 economy, a concentration of high-technology businesses that developed in the 1900s after World War II along the highway that encircles Boston, Massachusetts. With varying outcomes, other states eventually supported science and practical education in the pursuit of prosperity for more citizens.

In addition to signing the legislation that established the Military Academy at West Point, New York and founded the University of Virginia, Thomas Jefferson encouraged a flexible curriculum and the pursuit of practical education. In a letter from Thomas Jefferson to George Ticknor, a professor at Harvard, Jefferson criticized the rigidity of the classical curriculum that "disallows exclusive application to those branches only which are to qualify them for the particular vocations to which they are destined." Instead, the course of study should "allow uncontrolled choice in the lectures they shall choose to attend, and require elementary qualification only."¹²⁵

In addition to his dedication to classical universities, Jefferson believed that "It is highly interesting to our country, and it is the duty of its functionaries to provide that every citizen in it should receive an education proportioned to the condition and pursuits of his life."¹²⁶

To provide the opportunity, he proposed a practical education for the “mariner, carpenter, shipwright, ploughwright, wheel wright, mill wright, pump-maker, clock-maker, machinist, optician, metallurgist, founder, cutler, druggist, brewer, vintner, distiller, dyer, painter, bleacher, soap-maker, tanner, powder-maker, salt-maker, glass-maker, to learn as much as shall be necessary, to pursue their art understandingly, of the sciences of geometry, mechanics, statics, hydrostatics, hydraulics, hydrodynamics, navigation, astronomy, geography, optics, pneumatics, acoustics, physics, chemistry, natural history, botany, mineralogy and pharmacy.”¹²⁷ It would be more than one-and-a-half centuries before the collective visions of these founders were realized through the establishment of programs in applied science including engineers, technologists, and technicians throughout the country.

Although civil engineering was an established apprenticed profession in the United States, often pursued by men who were educated in applied math and natural philosophy (science), the earliest degree or certificate programs in engineering were not well defined or uniform in content. Without precedents, the curricula were devoted more to the level of instruction offered at a given institution than by the knowledge required for the practice of engineering. In some instances, hands-on experience introduced students to the processes and skills of the mechanic arts, which were often practiced by the trades.

In other curricula, technologists mastered the successful application of scientific knowledge by conducting experiments and demonstrations. Ultimately, the foundations in engineering education became rooted in the theories of science and the language of mathematics. While the applied math and Newtonian physics were available, much of the instruction in applied science was provided by the inferences derived from observations, yet scientific laboratories were scarce and ill equipped. In addition, scientific applications were evolving more as extrapolations from experience and used more by craftsmen and mechanics than by apprenticed or educated engineers.

By 1800, the colonial colleges had included natural philosophy in the AB curriculum, with astronomy, mathematics, botany, chemistry, physics, and geology taught where professors were available.¹²⁸ Subsequently, the applications of natural philosophy began with good intentions, but would not be sustained without a number of failures. In 1816, the University of Pennsylvania established a Department of Natural Science to offer practical education with instruction of natural philosophy applied to agriculture and arts. Due to the lack of support and the conclusion that the program was “unnecessary,” the department was abolished in 1824.¹²⁹ Another attempt to provide practical education occurred at the University of Georgia where a Department of Civil Engineering was established in 1836. After five years, due to the “lack of finances this work was abandoned and not taken up with a regular professor in charge until 1867.”¹³⁰ Although civil engineering was not a part of the

regular curriculum, it remained as an elective until 1842 when the program was abolished.

Even though a few established universities could not sustain the early programs in engineering education, there were attempts to create institutions with the primary focus on practical education. One of the early efforts began in 1819, when a graduate and former superintendent of the United States Military Academy established the American Literary, Scientific, and Military Academy in Norwich, Vermont. The academy was moved to Middletown, Connecticut before the original program was disbanded in 1829, but was chartered as Norwich University at Northfield in 1866. With high expectations, the Gardiner Lyceum opened in 1823 in Gardiner, Maine, with a curriculum in “pure mathematics and natural science, mensuration, surveying, navigation, and theoretical and practical mechanics.”³¹ In his inaugural address, the president declared that the students must be taught the “chemistry of agriculture and the arts” and the applications of the laws of mechanics. Within a decade, the lyceum closed due to the lack of funding from the legislature.³²

From 1800 and until the Civil War, the political, social, cultural, and economic attributes of the United States were strongly influenced by the increasing productivity in agriculture and manufacturing. With the expansion of roads, waterways, and railroads, more Americans could engage in commerce, purchase manufactured goods, and earn an income. However, capital, labor-saving machinery, and scientific agriculture necessary to realize the increase in productivity were not uniformly distributed throughout the country.

In most states, the practical education of scientific agriculture and civil engineering were introduced into an institute, academy, college, or university with variations of content and success. Including the circumstances in North Carolina, the earliest developments of engineering education that were implemented and sustained in eight institutions before 1860 are described below in some detail.

With the growth of investments by the states in internal improvements of roads, railroads, and canals, civil engineers were valued, but scarce, apprenticed professionals. Unfortunately, most of these institutions were prepared to teach the theory of civil engineering as an applied science, but few were ready to develop a curriculum for the practice of a civil engineer.

United States Military Academy

While as many as six institutions could not sustain the earliest programs in practical education, at least eight institutions established and sustained courses of study in applied science, practical education, or engineering prior to 1860. Each of the eight contributed in different ways to the development of curricula and the granting of degrees in engineering education.

The first institution owes its existence to the victory of the courageous but untrained and undisciplined army that defeated the English in the Revolutionary War. With his experiences as endorsement for the need, General George Washington asked the Congress to authorize an institution that would teach the arts and sciences of warfare. With the signing of the legislation by Jefferson, the Corps of Engineers of five officers and ten cadets was established at the Military Academy at West Point, New York.¹³³

The Revolutionary Army had occupied the chosen site and some buildings remained for their use, but the future of the academy would be uncertain for the next two decades due to neglect by the Congress, to the challenge of hiring competent faculty, and to the protracted development of a curriculum acceptable for practical military science and engineering.¹³⁴ With an act of Congress in 1812 establishing “well versed in reading, writing, and arithmetic” as the admission requirements, the Military Academy began at a level of academic content that was more consistent with a preparatory school than a college or university.¹³⁵

Initially, the training of military engineers did not include any instruction in the applied sciences. The 1896 report “Historical Sketch of the Department of Natural and Experimental Philosophy, United States Military Academy” provides some insight into the first attempt in America to define the scientific and mathematical foundations for an engineering curriculum. “From the time of the foundation of the Academy... until reorganized by an act of Congress in 1812... natural philosophy constituted no part of the course of instruction, although occasionally some of the more advanced students were taught mechanics and practical astronomy from ‘Enfield’s Institutes of Natural Philosophy.’”¹³⁶ To introduce natural philosophy into the curriculum, Jared Mansfield, a graduate of Yale who had taught mathematics, navigation, and the classics at New Haven and at Philadelphia, was hired to develop this new department, but was assigned for four years as surveyor general in Ohio and the northwest territory.

By the time Mansfield returned to West Point to begin his duties as the professor of natural and experimental philosophy, regulations from the secretary of war provided the outline for the curriculum in “Philosophy, embracing mechanics, hydraulics, pneumatics, optics, chemistry, magnetism and astronomy.”¹³⁷ This early attempt to organize, to teach, and to learn scientific concepts and practical applications without laboratory experiments resulted in poor performance by the students as described by the observation that “The standard of proficiency, though not very high, was apparently somewhat difficult of attainment, due mainly to a lack of competent instructors... and the only apparatus in the professor’s possession to illustrate his subject were a field transit and a clock.”¹³⁸

With unsatisfactory student progress in the study of natural and practical philosophy, a committee “was appointed to revise the course.”¹³⁹ This revision described

in detail an extraordinary effort to design the curriculum in a sequence of fundamental concepts and practical applications. The organization of theory and practice in two of the required subjects provides examples of science and practical applications available in the early 1800s: "Hydrodynamics and hydraulics—Theory of effluent fluids; principles of estimating the force, motion, and resistance of fluids; application of these principles to the construction of water mills and other hydraulic works."¹⁴⁰ "Machinery—Application of philosophical principles in the construction of the steam engine, pile engine, etc., and to the construction of the powers and maximum effects of machines. Experimental investigation of the properties of heat; Experimental investigation of the principles of common and galvanic electricity; Experimental investigation of the principles of magnetism."¹⁴¹

The curriculum included: algebra; geometry, plane and spherical trigonometry; logarithms; applications of geometry and trigonometry to the drawing of plans, to surveying, to leveling; descriptive geometry and its applications; and integral and differential calculus with numerous applications to military and civil engineering such as fortifications, bridges, roads, mines, canals, and hydraulic construction.

With a few years of experience, a review by the Board of Visitors in 1819 characterized the academic program by concluding that "Considering the Military Academy merely as an elementary School, this Course of Instruction appears in general well calculated to attain the end in view; with perhaps this exception, that the practical application of the several parts of it, particularly in the Departments of Natural Philosophy and Engineering, is not sufficiently attended to, and a disproportionate attention is paid to some parts of science which in Military Life will be less frequently employed, than others on which less attention is bestowed."¹⁴² Disagreement between those who teach and those who practice has been the grist for advancements in practical education as the interested parties search for the appropriate compromise between breadth and depth of attention given to basic knowledge that will support a life of self-education and include immediate knowledge that is relevant to practice.

This was a demanding curriculum and just one part of military science and training. With a wide range of aptitudes and achievement, the classes were divided such that "The instruction in natural philosophy, like that in mathematics, will be proportional in extent, and in the manner of conveying it to the rank and capacity of the different sections, reserving the more abstruse and profound operations under each particular head to the higher sections."¹⁴³ The approach of segmenting learning by interest and ability is practiced today by honors academic programs on many campuses.

By 1821, as reported by the Board of Visitors, the curriculum resembled in some ways the arrangement of courses of current engineering degree-granting departments. Math, science, literature, languages, drawing, and chemistry were required

of all cadets in the first three years as the foundation for a fourth year of specializations in topographical engineering, artillery, and civil and military engineering.¹⁴⁴

Although the Military Academy was established to educate army officers in the use of science and engineering to achieve military objectives, the Board of Visitors in 1821 recognized that “this Academy may, without expense, be made to furnish Civil Engineers for roads, bridges, canals, and hydraulic construction as well as Military and Topographical Engineers.”¹⁴⁵

By 1850, a “list of the Academy’s achievements in the field of civil engineering... would include trigonometrical and topographical surveying; methods of triangulation; magnetic declination; and the systems used in locating, surveying, and dividing public lands in the United States.”¹⁴⁶ Francis Brown, the president of Brown University from 1827 to 1855, said in 1850 in a report to the corporation of Brown University that the academy graduates did “more to build up the system of internal improvement in the United States than [the graduates of] all the other colleges combined.”¹⁴⁷

A brief history of the academy acknowledges that, “For many years West Point, aside from its military functions, was the only engineering school in the country, and until the Civil War it was the only one to produce any considerable number of engineers. For this reason all of the main transcontinental railroads were the work of West Pointers. They later mapped the coasts, charted the harbors, built the lighthouses and coastal fortifications, surveyed frontiers, and constructed most of the important public improvements of that day.”¹⁴⁸

In 1866, the role of engineering diminished and the curriculum was modified to reflect changes in a broader mission for the academy. By this time other engineering programs had been established to provide the growing need for technology professionals. Before the Military Academy awarded baccalaureate degrees in science in 1930s, these well-educated engineers were recognized for their academic achievement by their commission as a second lieutenant into the Corps of Engineers. These earliest methods of organizing and teaching subjects in mathematics and applied science became an integral part of undergraduate engineering curriculum that developed over the next one hundred fifty years.

Rensselaer Polytechnic Institute

A second and unique institution was created by a visionary who understood that achieving and maintaining prosperity would depend on practical education. In 1824, Stephen Van Rensselaer, who graduated from Harvard, was a member of Congress, a member of the Erie Canal Commission, and president of the first board of agriculture in New York, founded the Rensselaer School in Troy, New York “for

the purpose of instructing persons, who may choose to apply themselves, in the application of science to the common purposes of life.”¹⁴⁹

At that time, due to the cost of appropriate equipment and the dearth of qualified instructors, laboratories devoted to the applications of science were rare at academies, colleges, and universities. After obtaining encouraging results from the work of persons in his employment, Rensselaer believed that “competent instructors may be produced in the school at Troy who will be highly useful to the community in the diffusion of a very useful kind of knowledge, with its application to the business of living. Apparatus for the necessary experiments has been so much simplified... that but a small sum is now required as an outfit for an instructor in the proposed branches of science.”¹⁵⁰

The method of instruction set forth by Rensselaer was embodied in three principles: “1. To put the student in place of teacher; as he is thereby subjected to the necessity of making the subjects of study his own. 2. To cause the student to commence with practical applications of science; as he will better understand elementary principles, after he has become acquainted with the end and object of them. 3. To direct the student in his hours of exercise and amusement, to objects of a dignified and profitable nature; such as surveying, civil engineering, &c.”¹⁵¹

Even though engineering degrees came at a later date, Rensselaer’s vision embodied some of the important practices of current universities. The concept of a school to train instructors for the extension of useful knowledge would become a vital component of the land-grant colleges established later in the 1800s. In addition, the three principles of instruction are similar to current practices of recitations and laboratories associated with courses in engineering or science. The assignments to learn by doing in the industries or in the “objects of a dignified and profitable nature” are consistent with the current co-op programs that provide an opportunity to practice the knowledge acquired in the courses and laboratories.

The objective of the academic program was “to qualify teachers for instructing youth in villages and in Common School Districts belonging to the Class of Farmers and Mechanics by lectures or otherwise in the application of the most important principles of Experimental Chemistry, Natural Philosophy, natural History and practical mathematics to agriculture, domestic Economy the arts and manufactures.”¹⁵² Rensselaer envisioned that some of the graduates of the Rensselaer School would become instructors at large, who would rotate among the schools in a district and teach practical science by supervising student experiments and by providing demonstrations.

The courses of study at the Rensselaer School were divided between two fifteen-week sessions with the summer term beginning in May and the winter term beginning in January. For admission, candidates must be fourteen years of age and “well versed in reading, writing, common arithmetic, and English grammar. It is

desirable though it will not be demanded that he shall have a knowledge of the Latin language: and that he would be much better prepared if he should first receive a collegiate education."¹⁵³

Part-time students were permitted to attend lectures and a summer session of work experience. The fee per term was five dollars for part-time students and ten dollars for annual students.¹⁵⁴ The school opened in January of 1825 to test an untried method of instruction of "experimental and dissertation" that would come to be known as the "Rensselaer plan of Education."¹⁵⁵

By 1826, a preparation branch was established in response to frequent "solicitations of many gentlemen in the Southern States, and of some in the Northern... to accommodate those who were disqualified for entrance to the school proper either by want of education or because they were under seventeen years of age."¹⁵⁶ The curriculum included botany, etymology, geography, history, practical mathematics, logic, rhetoric, government, law, and parliamentary rules. These courses were complemented by a series of experimental activities termed *amusements* that were related to subjects in science and mathematics. For example, "Land surveying, taking the latitude, and performing simple hydraulic experiments... Making and using galvanic batteries and piles, electrometers and magnets... Collecting and preserving minerals, plants, and insects"¹⁵⁷ The amusements provided experiences with scientific and mathematical principles at work and illustrated the utility of practical education.

After fourteen months of operation, in 1826, the Rensselaer School was incorporated by the State of New York. Reaffirming the "Rensselaer plan of Education," the trustees amended the constitution of the school to conduct three terms each calendar year and approved a detailed structure of courses and lectures.¹⁵⁸

For example, during the fall term: "Each student shall give five lectures each week on systematic botany... or examine the operations of artists and manufacturers at the school workshops, under the direction of a professor... who shall explain the scientific principles upon which such operations depend... For the remaining twelve weeks, each student shall give fifteen lectures on mineralogy and zoology... fifteen lectures on chemical powers and substances not metallic; fifteen lectures on natural philosophy, including astronomy; and fifteen lectures on metalloids, metals, soils, manures, mineral waters and animal and vegetable matter."¹⁵⁹

During the winter term, "students shall recite to a professor... the elements of the sciences taught in the fall and spring terms; and shall study and recite, as auxiliary branches in aid of these sciences, rhetoric, logic, geography, and as much mathematics as the faculty shall deem necessary for studying land surveying, common mensuration, and for performing the common astronomical calculations."¹⁶⁰ As characterized by Rensselaer, the student must become the teacher to satisfactorily pass each subject.

During the spring term each student shall, during the first six weeks, give ten lectures on experimental philosophy; ten lectures on chemical powers and on substances not metallic; and ten lectures on metalloids, metals, soils and mineral waters. For the remainder of the term each student shall be exercised in the application of the sciences... to the analysis of particular selected specimens of soils, manures, animal and vegetable substances, ores and mineral waters... to the examination of the operations of the agriculturists on the school farms... to practical land surveying and general mensuration, to calculations upon the application of water-power and steam which is made to the various machines in the vicinity of the school, and to the examination of the laws of hydrostatics and hydrodynamics which are exemplified by the locks, canals, aqueducts, and natural waterfalls surrounding the institution.¹⁶¹

Upon satisfactorily completing the requirements, the degree of bachelor of arts in Rensselaer School, AB (R. S.) was conferred at graduation.¹⁶² The sequences of recitation and laboratory in science and engineering curricula have been duplicated in curricula for practical education in many forms by thousands of educators in institutions at all levels.

From 1826 to 1834, the school added equipment to the laboratories, reaffirmed the principles established by the founder, enrolled fewer than twenty-four students each year, was challenged by financial uncertainty, changed the name to Rensselaer Institute and moved to a new location in Troy, New York.¹⁶³ The founder had provided as much as one-half of the annual expenses and desired to discontinue that burden after 1829.¹⁶⁴

Even with limited resources, the science laboratories were equipped with: "an air-pump, a force-pump, barometer, thermometers, pluviometer, solar microscope, megascope, standing microscope, magic lantern, telescope, lenses, convex and concave mirrors, prisms, electrical machine, galvanic battery, electromagnetic instrument, magnets, sextant, theodolite, compass and chain, mechanical powers, hydrostatic bellows, hydrostatic and hydraulic cylinders and tubes, hydrometers and glass pumps."¹⁶⁵ The applied science or engineering "laboratories were furnished with the necessary forges, furnaces, bellows, lead-pots, Argand lamps, common lamps, iron retorts, or gun-barrels for gases, anvils, anvil hammers, cisterns, pipes for conducting gases from the barrels, gas pistol, iron stand, iron motor, and mercurial bath."¹⁶⁶

The breadth and complexity of the technology in these laboratories provided experience for a number of "common purposes in life." Among the total of twenty-six graduates over the age of seventeen in the classes of 1826 to 1828, four were a "Student at law," seven were a "Practicing Physician" or a "Student of Medicine," one was an "Iron Manufacturer," one was a "Merchant," five were an "Agriculturist," one was a "Civil Engineering and Land Surveyor," and six were a "Lecturer" or a

"Professor of Experimental and Demonstration Sciences."¹⁶⁷ By current standards, most of the graduates could be characterized as practicing technologists or technicians. However, a change in curriculum would provide opportunities for engineering technology.

While the State of New York was investing in internal improvements of roads, canals, and railroads to connect communities to the growing centers of commerce, Rensselaer Institute was establishing a curriculum in civil engineering. In 1835, the Rensselaer method of experiments and demonstrations was rearranged into three terms that included a common winter session and separate summer sessions for students of the "Natural Science Department" and the "Engineering Corps." The common winter session was conducted in two periods. "During the first 12 weeks, each forenoon is devoted to practical Mathematics, Arithmetical and Geometrical... During the last 4 weeks... extemporaneous Speaking on the subjects of Logic, Rhetoric, Geology, Geography and History, is the forenoon exercise. Throughout the whole session the afternoon exercises are Composition, and in fair weather, exercises in various Mathematical Arts. A course in Lectures on National and Municipal Law is given by the Senior Professor."¹⁶⁸

The twenty-four week summer session of natural science included botany with specimens; zoology with organic remains; physiology with elements of organic chemistry, geology, and mineralogy with specimens; and chemistry and natural philosophy. A three-week field trip provided an opportunity for students to collect specimens, elements, and remains for the examinations. "The afternoons of all fair days are devoted to Surveying, Engineering, and various Mathematical Arts—also to Mineralizing, Botanizing, and to collecting and preserving subjects in Zoology."¹⁶⁹ After successfully completing the courses of study in one year, the graduates were awarded a bachelor of natural sciences. It seems logical to conclude that the emphasis in the department of natural sciences was for those "common purposes in life" derived from the earth.

The curriculum for the Engineering Corps was divided into four separate intervals of time with each period devoted to practical education as learned from experiments, demonstrations, and recitations in surveying, transportation, hydrology, and machines. During the first eight weeks, the students experimented with the instruments used in surveying, protracting, leveling, calculating embankments, and in determining heights, distances, specific gravity, weight of liquids, degrees of moisture in storms, temperature, latitude and longitude by lunar observations, and eclipses. The second eight weeks included the methods of constructing bridges, arches, piers, railroads, canals, and railways. The third term of four weeks focused on the hydrostatic and hydrodynamic properties and the calculation of the parameters that characterize the quantity and force in the flow of water. The last four weeks considered the applications of steam, wind, and electromagnetism as a source

of power for manufacturing and visited “mills, factories, and other machinery or works which come within the province of mathematical arts.”¹⁷⁰

After completing the common session and the engineering session satisfactorily, the graduates were awarded a bachelor of natural science and the Rensselaer degree of civil engineer.¹⁷¹ Subsequently, the first degrees in civil engineering were awarded in 1835.¹⁷² Although the breadth of experiments spans the activities of civil engineering and these graduates were recognized as civil engineers, the content of the curriculum would be more consistent with an associate degree in civil engineering technology currently awarded by community colleges. With a change in admission requirements, a modified curriculum, and a new name, a prototype program of engineering education began with some uncertainty.

With four years’ experience, there was concern that the civil engineering graduates of the Rensselaer Institute were not receiving the recognition in practice that their preparation warranted. Addressed to “Principal Engineers and Commissioners of Rail-Roads, Canals, Topographical Surveys, Milling-Works, Water-Works, etc.,” a “Periodical Notice” from Rensselaer Institute reminded them that the civil engineering curriculum at the institute required the mastery of at least twenty-three specific skills often employed in practice.¹⁷³ The school recommended that, at a minimum, a civil engineer should be capable of mathematical and scientific analysis necessary in the surveying and topography required for establishing boundaries, roads, and canals in extreme circumstances; in the important hydrological considerations in the design of waterways, waterworks, and water power; in the essential geological, architectural, and material factors in the construction of canals, railroads and roads; and the necessary drafting to illustrate engineering concepts.¹⁷⁴

In comparison, since the certificate programs in “cities, villages, etc...” does not agree, in scarcely a single item, with what is understood by the officers of this Institute to be essential to the Engineer, it seems to be a duty to state definitely what qualifications are demanded of students, to entitle them to certificates in particular departments, and to full degrees in Civil Engineering.¹⁷⁵ Even with the advantage of completing the civil engineering curriculum at the institute, the graduates “still find themselves in need of years of labor in the field as assistants, before they are willing to come forward as *chief engineers*. How other schools manufacture engineers, as set forth in various advertisements, is a mystery not yet developed here.”¹⁷⁶ This may be the first plea for curriculum guidelines and for standards by which employees are designated as engineers. As with most practical education, the degree providers eventually accredited the academic content; but a significant number of highly qualified scientists, mechanics, and technologists without degrees became engineers by experience and contributed to the applications of science. However, as the content of the curriculum required more math and science, the delineation of

graduate engineers was refined, and their value increased with their contributions to the expansion of prosperity.

In 1847, B. Franklin Greene was appointed as the director of the Rensselaer Institute. With three years of experience and with the acknowledgement of the twenty-five years of practical education at the institute, he pointed out “certain radical defects in fundamental features of its organization.” The educational objectives “were not only too comprehensive in reach, but liable to be too vaguely and indefinitely worked out,” compounded by “the short time, allowed to be sufficient, for the preparation of candidates for the scholastic or professional degrees conferred by the Institute Board.” To address these concerns, the structure and content of education objectives were “narrowed and more thoroughly cultivated.”¹⁷⁷

After developing a reorganization plan, implementation began in 1849–50, along with a new name of Rensselaer Polytechnic Institute (RPI). The course of study was devoted to the awarding of degrees in civil and topographical engineering. The curriculum was divided into three years, with the first year dedicated to preparatory studies, the second to general studies, and the third to technical studies.¹⁷⁸ A degree of bachelor of science was awarded upon completing the general courses and civil engineer after completing the technical courses. The reorganized curriculum included a gradation in math and science that provided the theoretical and analytical foundations for defining the value of an engineering education. These Polytechnic Institute engineering graduates were prepared to explore alternatives, analyze performance, advance the applications of scientific principles, and begin the process of redefining the contributions of practical education to the pursuit of prosperity in the United States.

The new curriculum was a derivative from the two-year curriculum at the “School of General Science” and the three-year curriculum of the “Schools of Applications,” which were developed in France over the prior one hundred years.¹⁷⁹ Greene understood that the knowledge of theoretical and applied sciences would contribute to innovation and competence in the practice of engineering. He was convinced that:

The establishment of Polytechnic Institutions for educational purposes is in manifest obedience to a demand of the most general interest of the present age. In all civilized countries, the prosecution of industrial pursuits, in some one of the multiform phases, constitutes the prime business of man... But a new era for industry has commenced during the present century. Science has cast its illuminating rays on every process of Industrial Art. The discoveries and improvements which have so frequently flashed into view, have indeed, attested, in a manner the most striking, the mutual advantage to Science and Art—to theory and practice—of a better mutual acquaintance.... Hence it is, that educational establishments, having for their object the training of young

men in the various branches of Theoretical and Applied Science, respond to a want as generally as it must be earnestly felt in all civilized communities.¹⁸⁰

Under the new and more demanding plan, enrollment increased from thirty in 1849¹⁸¹ to ninety-six in 1863.¹⁸² The number of graduates began to rise from six in 1863 to an average of more than twenty per year into the twentieth century.¹⁸³ Even though the curriculum of theory and practice was replicated from the engineering schools in France, Greene defined the core of engineering education that was ultimately adopted in other institutions in the United States. As discoveries and technological improvements in manufacturing, infrastructure, energy, transportation and communication rapidly expanded throughout the last half of the nineteenth and into the twentieth century, more than one hundred other institutes, colleges, and universities experimented with curricula and degree programs in applied science and practical education.

Practical Education for Agriculture in Colleges and Universities

During the first half of the nineteenth century, the mechanic arts were contributing to the creation of a network of railways and canals that connected regions of the United States that enabled commerce among the growing number of cities. Some of the educated men who were engaged in scientific agriculture recognized that practical education derived from applied science taught in an agriculture school could eventually improve productivity for the yeomen and subsistence farmers who constituted the majority of the population in most states.

Even though legislatures funded societies for the “promotion of agriculture and domestic manufactures” as early as 1820,¹⁸⁴ scientific farming did not develop as rapidly or as extensively as was expected even though agriculture schools were organized with at least one attempt in most states; the schools were unable to continue for longer than a few years. The lyceum school for mechanics and farmers incorporated in 1821 at Gardiner, Maine and founded by Robert Hallowell Gardiner, who graduated from Harvard, closed in 1832 due to the “lack of support and patronage.”¹⁸⁵

The seminary, organized by Josiah Holbrook who graduated from Yale, opened in 1824 to teach the principles as applied to mechanics and agriculture and closed in 1825. The “Labor School” at Pendleton, South Carolina, where boys were “taught agriculture, carpenter’s work and the like” by Rev. J. L. Kennedy, opened in 1830 and closed five years later.¹⁸⁶ At the 1832 convention of the New York State Agricultural Society, five members were appointed “to draw a plan for Agricultural Schools, to embrace experimental and practical farming; together with an estimate of the expense necessary to establish and put the same in operation.”¹⁸⁷

The report in 1833 stated that “the main objects of the proposed school are, to impart to agriculture the efficient aid of the sciences, and to furnish it with the best models of practice; to teach, simultaneously, in the period of youth devoted to academic studies, the practical operations of husbandry, and such branches of useful knowledge as may tend to elevate its character, and increase its products.”¹⁸⁸ The members of the New York Agricultural Society had concluded that: “While we have special institutions for each of the learned professions, and one for military science, it is certainly inconsistent and unwise to provide no particular instruction for one of the largest and most respectable classes, and one of the most important occupations of our country.”¹⁸⁹

The plan drafted by the New York Agricultural Society Committee included the acquisition of farmland, housing, implements, animals, and a school building. They suggested that the studies include: “Practical instructions in the various operations and labors of the farm, the garden, the orchards and the shops,” and “The study of the natural sciences generally, mathematics, mechanics, chemistry and drawing, so far as these may conduce or become subservient to agriculture improvement,—together with such other branches of knowledge as will qualify the students for the higher duties of civil life, —such as will fit them to become independent electors, discreet jurors, faithful magistrates, and wise legislators.”¹⁹⁰ A “good, common school education,” at least fourteen years of age, and good moral character would be required for admission to a four-year course of study.¹⁹¹

The annual expenses would be paid by the board and tuition of one hundred fifty dollars from two hundred enrolled students and the sale of farm products. The budget for faculty and staff was roughly the same when compared to the University of North Carolina, as was the enrollment and the cost to the student to attend.¹⁹² It was intended that the school be “purely agricultural”¹⁹³ with an estimated cost for the acquisitions and construction before admitting students of one hundred thousand dollars or a tax of five cents for each inhabitant of the state.¹⁹⁴ The plan was submitted to the legislature with the question: Is it “unfair to ask, what has been done by the Legislature for a class of its citizens so numerous, virtuous, and meritorious?”¹⁹⁵

The request for public funds was supported by the assertion that “Education enables man to appreciate the wonderful provisions which God has made for his happiness in rural life, and imparts to him the ability of diffusing instruction and happiness to multitudes around him.”¹⁹⁶ Consequently, the society and economy of the state profits since “our agriculture is susceptible of improvement—that the products of its labors may be doubled, nay quadrupled” and with “the spindle and the hammer of the artisan and manufacturer, and finally, by their union, make up the mighty stream of commerce.”¹⁹⁷

To further clarify the plan, the request for legislative support included the declaration that “It is not the intention of the committee to endow an institution to rear up and educate persons in the mere theory of husbandry. It is to combine practice with science; and if it should be said that this would be a school only for the children of the opulent, the unanswerable argument is, that it is the same in regard to our colleges, and must be so of necessity.”¹⁹⁸ Twenty years after a committee of the New York Agriculture Society met to plan an agricultural school, the Legislature of New York chartered the New York State Agricultural College at Fayette; however, the president died before the opening and the plans were abandoned.¹⁹⁹

When the members of the Norfolk Agricultural Society, which was incorporated in March 1849, met with the Bristol County Society at the annual fair in Dedham, Massachusetts in September 1849, Marshall P. Wilder, president of the Norfolk Society, addressed the group on the “application of science to agriculture,”²⁰⁰ but made it clear that agricultural education “is vital to the success of our whole enterprise.”²⁰¹ In the concluding remarks, Wilder told his audience that “We must have agricultural colleges and schools, or we must have departments in our institutions of learning, devoted to this art and science... and we shall have among our yeomanry, such farmers as the world never before witnessed.”²⁰²

Invigorated by discussion, the society approved the printing of three thousand copies of the address for circulation “to arouse the attention of the public to the importance of the subject.”²⁰³ Encouraged by prominent men in attendance at the meeting, which included governors, a president of Harvard, an army general, congressmen and state legislators, the society members were optimistic that with the support of these men, a recommendation to the Massachusetts Legislature to establish an “Agricultural College or School, under the patronage of the government” would be adopted.²⁰⁴

The Senate approved a bill, “without a dissenting voice, providing for the establishment of an Agricultural College and an experimental farm.”²⁰⁵ However, the House of Representatives rejected the bill “owing to the prejudice that existed against scientific farming, or what was then sarcastically termed ‘Book Farming’.”²⁰⁶ The rejection reenergized the advocates to recommend to the legislature that they establish a Board of Commissioners to consider and report “upon the expediency of establishing Agricultural Schools or Colleges.”²⁰⁷

The legislature approved the bill and appointed five commissioners that included Marshall Wilder—who was a founding member of the New England Horticulture Society, American Pomological Society, Massachusetts Club, the Norfolk Agricultural Society, and the United States Agricultural Society—and Edward Hitchcock, who was professor of chemistry and natural history and president of Amherst College, and who was visiting European universities in 1850.

The commission requested of President Hitchcock that he extend his time to investigate the status of agricultural schools and colleges in Britain and Europe. Upon returning to the United States in December 1850, Hitchcock submitted his report containing the description of his visit to three hundred fifty-two agricultural colleges or schools in countries that included England, Scotland, France, Italy, Belgium, Austria, Prussia, Germany, and Russia.²⁰⁸

The "Report of Commissioners concerning an Agricultural School" submitted to the Massachusetts Legislature included a recommendation that the legislature appropriate "twenty thousand dollars, for the purpose of establishing a Central Agricultural College, with a Model and Experimental Farm; said institution to be open to all classes of the Commonwealth."²⁰⁹

The review of agriculture education in Britain and Europe as described by President Hitchcock provided "some general facts": "A few of them are founded and sustained by individuals, or private associations of gentlemen interested in Agriculture. A far greater number are assisted, or sustained, by the government of the country. Some consist of Professorships in Colleges or Universities. Some depend upon Colleges and Universities for a part of their Professors. The greater number are independent institutions. Some are connected with primary schools. We find among them three or four grades in the course of instruction. In nearly all cases they have smaller or larger farms connected to them."²¹⁰

Furthermore, Hitchcock suggested that "European Agricultural Schools have taught us some important lessons: 1. That these schools usually fail, if they do not receive efficient aid from the government. 2. That agricultural societies are not sufficient... especially in countries where cultivation is a good deal deficient. 3. That the theory is to be tested by practice; and such theories as will not sustain this test are to be rejected. 4. That these schools are doing very much to promote the progress of agriculture... 5. That to teach agriculture in primary schools and academies is not sufficient... 6. That agricultural professorships, in colleges and universities, are not sufficient."²¹¹

After analyzing the effectiveness of the variety of agricultural schools in Europe, Hitchcock outlined three plans that included curricula, admission requirements, library, farms, professorships, tuition and financing as recommendations for agriculture education in Massachusetts. One plan, to be endowed by the State, was described as "an Agriculture School or College of the superior class... possessed of all the means... necessary to give a finished education in the principles and practice of agriculture."²¹² A less ambitious plan, also to be endowed by the State, described agricultural institutes to "be located so near some existing literary institution, that the pupils could attend its scientific lectures and study its collections in natural history."²¹³

The third plan included the recommendation that the Board of Agriculture be given the authority to implement part or all of either plan depending on their ability to raise the money or on the sale of lands in Maine.²¹⁴ Massachusetts did not adopt any of the proposals until 1856 when a School of Agriculture was chartered by the legislature followed by a decade before the first young men applied for admission. Hitchcock's assessment of agricultural schools in Europe was often cited and used by organizations in other states when supporting the establishment of institutions devoted to practical education in schools and colleges.²¹⁵

Throughout the decade before the Civil War, agricultural societies were increasing in number and in resolve to establish practical education in all the states. It was estimated that three hundred societies were active in the United States in the early 1850s²¹⁶ as compared to nearly two hundred in France.²¹⁷

By 1860 the number in the United States had grown to nearly a thousand.²¹⁸ During this period, the United States Agricultural Society was established "to secure the advantages of a better organization, and more usefulness among all State, County, and other Agricultural Societies."²¹⁹ Among other duties, the "General Board of Agriculture," consisting of members appointed by the state societies, was expected "to examine, and when necessary report upon, the practicability of establishing Agricultural schools, colleges, and model farms."²²⁰

The societies in each state encouraged their legislators to support internal improvements that would enable more commerce and to charter institutions and organizations to diffuse applied science that would increase productivity. Although most legislatures had approved local taxes or directly appropriated funds for common schools, there was reluctance to provide any financial support for the establishment of institutions devoted to practical education due in part to the uncertainties about the content of the curriculum, about increasing the number of public education institutions, about the ability to raise capital for construction, and about the tuition needed for annual expenses that might exclude the attendance of the youth from poor families.

With many subsistence farmers opposing book farming, the support for agricultural colleges was based primarily on the promise of economic improvements in the state resulting from increased productivity and commerce in agriculture. Even though agricultural science was diffusing in most states during the 1850s through publications, fairs, and society meetings, the circumstances as described in New York and Massachusetts did not deter attempts by other states to establish practical education in colleges and universities including Maryland, Iowa, and Kansas.

Also, the quests in Illinois, Michigan, and Pennsylvania illustrate the conflicts, challenges, and varieties of responses as governments and state organizations confronted the difficulties in attempting to establish practical education for the common people in America.

Shortly after the Revolutionary War ended, Congress invited the states that had colonial claims to cede land west of the Ohio River and east of the Mississippi River to the United States for the purpose of selling the land to pay the debt incurred during the war. Congress pledged to create territorial boundaries and governments to encourage the citizens in each territory to apply for statehood when the population reached the number of citizens as prescribed by Congress.

The territories were divided into townships, with some land designated for the states to sell with the money placed in a trust fund for “the maintenance of public schools within the said township.”²²¹ With the details of the grants changing over time and adjusting to circumstances in each state, the frontier land grants from the federal government to the states for them to sell expanded to include financing construction of canals, roads, and railroads and establishing common schools and universities in these new states.

Before 1854, fifteen states had been granted more than four million acres of land to endow universities, and sixty million acres had been designated for sale or lease to establish common schools.²²² Although there were fewer than sixty thousand residents as required by Congress, Illinois became the twenty-first state in 1818. By 1850, in addition to land grants for a Common School Fund, the State of Illinois received grants for establishing a “State University or High Seminary of Learning.”²²³ Eventually the university fund was used to organize a Normal school to increase the number of teachers for the common schools in Illinois.

In 1851 farmers gathered at a convention in Granville, Illinois “to take into consideration such measures as might be deemed expedient to further the interests of the agricultural community, and particularly, to take steps toward the establishment of an Agricultural University.”²²⁴ In attendance was Jonathan B. Turner, who graduated from Yale, joined the faculty at Illinois College in 1833, resigned from the college in 1847 under pressure due in part to his expressed views as an abolitionist, and chaired a committee of mostly farmers at the convention.²²⁵ He delivered an address entitled “Plan for an Industrial University, for the State of Illinois”²²⁶ that described the buildings, farm land, and courses for educating the “industrial class” to be “thinking laborers.”²²⁷

Subsequently, the committee issued statements resolving that the existing colleges and universities were effective in preparing the youth for “professional, scientific, and literary pursuits” of life, and that the “cultivators of the soil, artisans, mechanics and merchants... desire the same privileges.”²²⁸ In addition, the committee resolved that since universities were “primarily designed to meet the wants” of the learned professions, these institutions were not organized to meet the need of the farmers and mechanics; therefore, they recommended “the establishment of a University, in the State of Illinois, expressly to meet those felt wants of each and all the industrial classes of our state.”²²⁹

Implementing the plan to charter an industrial university for the State of Illinois was defended further by the supposition that “All civilization is, necessarily, divided into two distinct cooperative, not antagonistic, classes:—a small class, whose proper business it is to teach the true principles of religion, law, medicine, science, art and literature, and a much larger class, who are engaged in some form of labor in agriculture, commerce, and the arts. For the sake of convenience, we will designate the former the Professional, and the latter the Industrial class.”²³⁰

The small denominational colleges were serving the needs of the smaller professional class in content, but the larger industrial class needed institutions “to create for them an Industrial Literature, adapted to their professional wants, to raise up for them teachers and lecturers, for the subordinate institutes, and to elevate them, their pursuits, and their posterity to that relative position in human society for which God designed them.”²³¹

The industrial university “shall be designed to furnish to the great Industrial classes of the State, our Farmers, Merchants and Mechanics, each in their own sphere, the same thorough, liberal and practical education in those various sciences underlying their several pursuits, and in all processes, principles, and arts connected therewith, as our colleges and professional schools now afford to their students of Theology, Medicine, Law, and the art of War; and shall be provided with all needful apparatus, lands, grounds, gardens, animals, drawings, models, instruments, and engines, for the proper elucidation of the same—as other schools are provided with their necessary apparatus.”²³²

In an article in the *Prairie Farmer* in 1852, Turner expanded his concept of industrial universities by asserting that “I am satisfied that if farmers and their friends will now but exert themselves they can speedily secure for this State, and each State of the Union, an appropriation of public lands adequate to create and endow in the most liberal manner, a general system of popular Industrial Education, more glorious in its design and more beneficent in its results the world than has ever been seen before.”²³³

At the fourth meeting in January of 1853, a memorial was approved “To the Honorable Senate and House of Representatives of the State of Illinois” that described the economic and social values derived from Industrial Universities and a method to fund them:

We would respectfully represent: That we are members of the industrial classes of this state, actively and personally engaged in agricultural and mechanic pursuits. We are daily made to feel our own practical ignorance, and the misapplication of toil and labor, and the enormous waste of products, means, materials and resources that result from it. We are aware that all this evil to ourselves and our country, results from a want of knowledge of those principles and

laws of nature that underlie our various professions, and of the proper means of a practical application of existing knowledge to those pursuits. We rejoice to know that our brethren in the several learned professions have to a good degree availed themselves of these advantages, and have for years enjoyed their benefit. They have universities and colleges, with apparatus, libraries voluminous and vast, able and learned professors and teachers, constantly discovering new facts, and applying all known principles and truths directly to the practical uses of their several professions and pursuits. This is as it should be. But we have neither universities, colleges, books, libraries, apparatus, or teachers, adapted or designed to concentrate and apply even all existing knowledge to our pursuits, much less have we the means of efficiently exploring and examining the vast practical unknown that daily lies all around us, spreading darkness and ruin upon our best laid plans, blighting our hopes, diminishing our resources, and working inevitable evil and loss to ourselves, to our family and to our country. Some think one half—no intelligent man thinks that less than one-third or one-fourth of the entire labor and products of our state, are made an annual sacrifice to this needless ignorance and waste. Knowledge alone, here, is power, and our relief is as clearly obvious as our wants. We need the same thorough and practical application of knowledge to our pursuits, that the learned professions enjoy in theirs, through their universities and their literature, schools, and libraries that have grown out of them. For even though knowledge may exist, it is perfectly powerless until properly applied, and we have not the means of applying it.²³⁴

...

We would, therefore, respectfully petition the Honorable Senate and House Representatives of the State of Illinois, that they present a united memorial to the Congress now assembled at Washington to appropriate... public lands... for the liberal endowment of a system of industrial universities; one in each state of the Union, to co-operate with each other and with the Smithsonian Institute at Washington, for the more Liberal and practical education of our industrial classes and their teachers, in their various pursuits, for the production of knowledge and literature needful in those pursuits, and developing to the fullest and most perfect extent the resources of our soil and arts, the virtue and intelligence of our people, and the true glory of our common country.²³⁵

On February, 8 1853, the Illinois Legislature unanimously supported the establishment of "Industrial Universities, and... the encouragement of Practical and General Education among the People"²³⁶ and requested that Illinois congressmen "use their best exertions to procure the passage of a law of Congress donating to each State in the Union an amount of public lands not less in value then five hundred

thousand dollars, for the liberal endowment of a system of Industrial Universities, one in each State of the Union.”²³⁷ Although the concept of a system of industrial universities originated in Illinois, one decade passed before the land grant to endow the Illinois Industrial University was realized and the process to open the university got underway.

With continuing encouragement from the Pennsylvania State Agriculture Society, the General Assembly enacted the incorporation of the Farmers High School of Pennsylvania in 1854. The name suggested a vocational school to reduce concern about “book agriculture”, but the objective of the founders was a college that taught useful scientific agriculture. The articles of incorporation included the requirements that the president of the society serve as an ex-officio member of the board of trustees, that the society appropriate funds not to exceed ten thousand dollars annually, and that “their committees, officers or otherwise” were required “to visit the said institution and examine into the details of its management.”²³⁸ The legislation mandated that the principal in addition to “scientific attainments and capacity to teach... shall be a good practical farmer.”²³⁹ In addition, the “professors, teachers or tutors, as shall be qualified to impart to pupils under their charge, a knowledge of the English language, grammar, geography, history, mathematics, chemistry, and such other branches of the natural and exact sciences as will conduce to the proper education of a farmer.”²⁴⁰

The school was authorized to accept gifts and bequests, but the annual income from the estates could not exceed twenty-five thousand dollars.²⁴¹ The pupils performed “all the labor necessary in the cultivation of the farm” and were “instructed and taught all things necessary to be known by a farmer.”²⁴² The General Assembly clearly stated their expectations of practical education as the “design and intention of this law to establish an institution in which youth may be so educated as to fit them for the occupation of a farmer.”²⁴³

The trustees proceeded to raise ten thousand dollars to purchase two hundred acres followed by another successful effort to raise another twenty-five thousand dollars to support the institution. The General Assembly matched the twenty-five thousand dollars. Pledging five thousand dollars and borrowing twenty thousand dollars, the funds were available so that construction could be completed and ready for the first class of sixty-nine students who paid one hundred dollars per year to attend.²⁴⁴ Without support from the General Assembly for professors’ salaries and operating expenses, the tuition was necessary even though many of the farmers’ sons could not afford to attend. Nevertheless, the enrollment steadily increased even during the Civil War, with eleven of bachelor of scientific agriculture degrees awarded at the first graduation held in December of 1861.²⁴⁵ In 1862, the name was changed to Agricultural College of Pennsylvania.²⁴⁶

The constitution of the State of Michigan, which was adopted at a convention in 1835, instructed the legislature to “encourage by all suitable means, the promotion of Intellectual, Scientifical and Agricultural improvements.” Subsequently, the interest derived from a “perpetual fund” created from the sale or rental of land granted by Congress for common schools was allocated to districts to support at least three months of instruction each year. In addition, the accruing funds from the sale or rental of lands granted for the support of a university were to remain a permanent fund with the interest providing support “for the promotion of literature, the arts and sciences.”²⁴⁷

Also, “it shall be the duty of the legislature, as soon as may be, to provide effectual means for the improvement and permanent security of said University.”²⁴⁸ In 1838, the organizing committee of the University of Michigan acknowledged that the founders recommended lectures in agriculture;²⁴⁹ but, hiring a professor of agriculture was delayed for more than a decade.

After the Michigan State Agricultural Society was incorporated by the legislature in 1849 and at the first meeting in September, the “great need of more thorough training in botany, chemistry, physiology, zoology, and mechanics” was discussed “because of their direct bearing on agriculture.”²⁵⁰ Three months later, the executive committee adopted a resolution: “That our legislature be requested to take such legislation as shall appear necessary or expedient for the establishment of a State central agricultural office, with which shall be connected a museum of agricultural products and implements and an agricultural library, and as soon as practicable an agricultural college and a model farm.”²⁵¹

During the convention for amending the state constitution that was scheduled for June 1850, a member of the convention successfully introduced the resolution: “That the committee on education be instructed to inquire into the expediency of providing for the establishment of an agricultural school and model farm connected therewith.”²⁵² Subsequently, the constitution of Michigan was amended in 1850 that included specific requirements that:

The legislature shall encourage the promotion of intellectual, scientific, and agricultural improvement; and shall, as soon as practicable, provide for the establishment of an agricultural school. The legislature may appropriate the twenty-two sections of salt springs lands now unappropriated, or the money arising from the sale of the same, where such lands have been already sold, and any land which may hereafter be granted or appropriated for such purpose, for the support and maintenance of such school, and may make the same a branch of the University, for instruction in agriculture and the natural sciences connected therewith, and place the same under the supervision of the regents of the University.²⁵³

While the constitution laid the foundation, there were conflicting and competing proposals about the way to proceed with organizing the school. The president of the University of Michigan stated that "In anticipation of this legislative grant, we have accordingly organized an Agricultural School as a part of the scientific course recently adopted by the Faculty and Regents."²⁵⁴ In addition to citing the intention to adopt instruction in agricultural education, the superintendent of public instruction stated that the existing land grant to the Normal school could result in a permanent fund "which will yield sufficient revenue in time, to carry out the purposes designed in its establishment."²⁵⁵

Led by the efforts of J. C. Holmes, secretary of the Agricultural Society, many proponents agreed that "if we expect to meet with success in establishment, continuance, and practical utility of an agricultural school, it must stand separate and apart from all other institutions of learning, and upon a basis of its own."²⁵⁶ Subsequently, the Executive Committee of the State Agricultural Society transmitted a resolution to the legislature in 1852 urging the legislature to establish a state agricultural school as "a branch of the University, and placed under the control of the Regents."²⁵⁷ However, "in the view of this society the contemplated school and farm should not be established in immediate proximity to any existing educational institution."²⁵⁸

Since the legislature did not respond to the recommendation during the 1853 session, the location of an agricultural school remained undecided, which encouraged the supporters of the three options to advocate for their plan to establish the school. Members of the Executive Committee of the State Agricultural Society visited the university and the Normal school to review and report the status of their agricultural programs. The subjects "embraced in the agricultural course" at the university included chemistry, geology, mineralogy, animal and vegetable anatomy, and physiology, and "Organic Chemistry and the theory and practice of agriculture, the origin and nature of soils, the different variety of manure, tillage, tools, etc."²⁵⁹

The studies that "will probably be adopted at the Normal School" included agriculture, mathematics, the keeping of accounts, mechanics, natural philosophy, and the natural sciences, in their application to agriculture, anatomy, to some extent engineering, architecture, and landscape gardening.²⁶⁰ The members of the executive committee who visited the two institutions reported that they were "highly pleased" with the lectures at the university; but practical as well as scientific agriculture should be taught.²⁶¹ At the state Normal school: "The teaching of Agricultural Science in this institution will be felt to a greater or less degree in almost every school district throughout our State, but we do not think the information to be derived from these sources is sufficient to constitute the education of a professional and practical farmer."²⁶²

The disagreements about the location of the Agricultural College embodied some of the issues to be confronted in every state as the public universities and colleges increased in number over the next century. In general the competing factors were expressed as: the cost of new rather than expanding existing infrastructure; the first public university preserved as the best while limiting the academic scope for other public institutions; the prestige of the learned professions as a measure of excellence with practical education considered a necessity in the expanding economy of the state; the first public and the small private universities' concerns about enrollment competition; the elegance of classical studies and scientific theory to develop the mind diminished compared to the interest in practical education in the pursuit of prosperity; and a challenge to the dominance of religion as current character of established institutions by the sectarian interests of the industrial universities and Normal colleges committed to improvements in agriculture, manufacturing, mechanic arts, and common schools.

One of the earliest examples of conflicting objectives arose in the competition concerning the location of the Agricultural College when Professor Alexander Winchell at the University of Michigan spoke to the Executive Committee of the State Agricultural Society and suggested that in addition to "Jealousy of Centralization,"²⁶³ "fear that a sufficiently technical education would not be furnished by the University"²⁶⁴ and "fear that if connected with the University it could not be sufficiently under the control of the State Agricultural Society"²⁶⁵ encouraged many of the society members to oppose affiliation with the university.

Winchell emphasized the advantages of organizing as a branch of the university as: "a great saving in the first outlay"²⁶⁶ and "a great saving in the subsequent support."²⁶⁷ If not affiliated with the university and "after the college comes into full operation, and the possession of all its contemplated advantages, it must necessarily afford instruction somewhat inferior to that afforded by the University."²⁶⁸ Regarding curriculum, the professor asserted that the "particular principles of Scientific Agriculture constitute properly an inseparable [*sic*] part of University instruction."²⁶⁹ He also believed that "An additional reason for advocating the union of the Agricultural College with the University is that such a course would tend to centralization and reproduction, instead of the dispersion and dissipation, of our educational resources."²⁷⁰

President Henry Philip Tappan of the university had previously addressed the society and proclaimed that "it is better to have one great institution, than half a dozen abortions. One great institution must be located somewhere, because we cannot locate it everywhere; let us not split it into little pieces, which shall have no strength and value anywhere. An agricultural department belongs to the University."²⁷¹

Responding to the presentation, J. C. Holmes characterized the professor's analysis as "mistaken in his premises, mistaken in argument, and mistaken in his conclusions."²⁷² Holmes defended his judgment by citing many of the conclusions of the report that Professor Hitchcock provided to the Massachusetts Commission regarding his review of agriculture education in Great Britain and Europe. Among the points he included and the most appropriate retort to organizing the Agriculture College as a branch of the university was the conclusion by Hitchcock "That agricultural professors, in colleges and universities are not sufficient... Because lectures of this sort attract but few of the students of the colleges, who are looking forward to a professional life... Because the two classes of students, who would thus be brought together, would have too little sympathy to act in concert, and as equals, in the same institution.... Because such professorships, unless numerous, would be entirely insufficient to accomplish the objects desired."²⁷³

The distinction of classes of citizens who might attend universities and agricultural schools was supported by Hitchcock by asserting that: "In this country, the cultivators of the soil are usually the owners of it; and it is they mainly who must establish an agricultural school, if one is established, for their own and their children's benefit."²⁷⁴ Committed to his judgment, Holmes encouraged the State Agricultural Society to adopt a resolution "That an agriculture college should be separate from any institution."²⁷⁵

With expedient approval of the first opportunity to decide about the location, the society quickly proceeded to prepare a resolution to encourage the legislature "to provide for the establishment of an Agricultural School, setting apart funds for the permanent endowment and support for the same."²⁷⁶

In just two months after Holmes urged the society to proceed, the legislature passed an act for the establishment of a state agricultural school that included: authorization of the executive committee of the Agricultural Society to select "within ten miles of Lansing... not less than five hundred acres, nor more than one thousand acres, in one body for the purpose of an experimental farm and site for such Agricultural School"; appropriation of "twenty-two sections of salt spring lands, or the money arising from the sale thereof... for the erection of buildings, the purchase of furniture, apparatus, library and implements, payment of professors and teachers, and such other necessary expenses to be incurred in the establishment and successful operation of said school"; organized under "the direction and supervision of the State Board of Education, an Agricultural School, by the name and style of the Agricultural College of the State of Michigan."²⁷⁷ The act stipulated that subjects of instruction shall include "an English and scientific course, natural philosophy, chemistry, botany, animal and vegetable anatomy and physiology, geology, mineralogy, meteorology, entomology, veterinary art, mensuration, leveling and political economy, with bookkeeping and the mechanic arts which are directly connected

with agriculture.”²⁷⁸ Tuition “shall be forever free to pupils from this state, and any number of pupils may be admitted who shall apply from any part of this state.”²⁷⁹

With a professor of chemistry, a professor of mathematics, a professor of English literature, an instructor in bookkeeping, assistant in chemistry, foreman of the farm, and the president who was the superintendent of the farms and gardens, the college admitted students in 1857 that “have attained the age of fourteen years, and must have acquired a good primary school education.”²⁸⁰ The first curriculum consisted of two semesters in each of four years that included subjects of agricultural science, math, mechanics, civil engineering, history, rhetoric, bookkeeping, and electives of French and German languages.²⁸¹

The bachelor of science degree was awarded to seven graduates in the first class in 1861.²⁸² With the States of Michigan and Pennsylvania establishing agricultural schools, which adopted curricula and awarded degrees; the State of Maryland established the Maryland Agricultural College while the existing universities of Georgia, North Carolina, and Yale also introduced subjects related to agriculture before the Civil War.

Although an uncertain beginning for agricultural and mechanical (A&M) practical education, the decisions made by these institutions in establishing curricula and awarding degrees reflects the four principal courses of action that occurred in the last half of the nineteenth century when “the” state universities were founded to provide practical education, when public agriculture and mechanic arts colleges were created independently of “the” state university, when established state universities added practical education, and when private colonial universities created schools to introduce the sciences related to agriculture and mechanic arts.

Civil Engineering at the University of Virginia

After Thomas Jefferson devoted years to planning the architecture, building the campus, and developing the curriculum for the University of Virginia, the first class of students was admitted in 1825. A distinguished board of visitors, including Jefferson and James Madison, had assembled professors of ancient languages, modern languages, mathematics, natural philosophy, chemistry, medicine, and moral philosophy to instruct the one hundred twenty-three students in one or more of the seven schools, in which the number and content of courses in the curriculum were chosen and taught by the professor in each discipline (school).²⁸³

As specified by Thomas Jefferson, an “elective system” instead of a standard classical curriculum was adopted at the University of Virginia with “no preordained course for the student to pursue.”²⁸⁴ Students, who established qualifications by examination to enter the Schools of Ancient Languages, Mathematics, and Natural

Philosophy, chose at least three courses from the seven schools each term that they attended the university.

The other students were restricted to enrolling in at least three courses in the Schools of Modern Languages, Chemistry, Moral Philosophy, and Medicine. Instead of completing a curriculum required to earn the traditional bachelor of arts degree, a certificate of proficiency was conferred by the faculty in each school at three levels of achievement: “evidence of a competent acquaintance with any of those particular branches,” “satisfactory evidence of his proficiency in the general studies,” or “graduation.”²⁸⁵

Since these certificates depended upon competency and not curricula, Jefferson was confident that his lifetime of curiosity and motivation to learn would be common among men who would choose to attend the University of Virginia. However, most students were unprepared to select a sequence of courses for successfully “traversing some special field”;²⁸⁶ leading the university to emend the “elective system” in 1848 by authorizing the awarding of bachelor degrees with graduation from a combination of the schools.²⁸⁷

Consistent with Jefferson’s endorsement of practical education, the board of visitors resolved in 1833 “That a class in civil engineering and surveying be established in the school of mathematics.”²⁸⁸ The professor of mathematics responded by attaching a class in civil engineering, which included “the first principles of Descriptive Geometry—of the construction of draughts and plans—of surveying—and lastly, of the construction of Roads, Canals, Bridges, and other public works.”²⁸⁹

After officially authorizing the class in 1835, the visitors board commented that with “such a course of elementary instruction upon a subject of such great and increasing interest to the community they anticipate the happiest results.”²⁹⁰ The board also appointed William Barton Rogers as the new chair of natural philosophy. At the meeting of the board of visitors in 1836, the recently hired professor of natural philosophy and the professor of mathematics were authorized, in addition to their regular duties, to jointly establish and teach the classes associated with the School of Civil Engineering.²⁹¹

Rogers was a distinguished scientist who authored texts, conducted research in physics and geology, published in scientific journals from the time of his tenure as a professor at William and Mary until he resigned from the University of Virginia, and moved to Boston in 1853 where he was inaugurated as the first president of the Massachusetts Institute of Technology in 1865 and installed as the third president of the National Academy of Sciences in 1879.²⁹²

During the first five years of Rogers’ tenure at the University of Virginia, enrollment in the School of Civil Engineering varied from year to year. At least a few demonstrated proficiency, since the two professors awarded four certificates of graduation in civil engineering in 1839.²⁹³ Most of the students who enrolled in the

School of Engineering were also enrolled in the Schools of Mathematics and Natural Philosophy.

The curricula in mathematics and natural philosophy extended over two years with a number of subjects providing important content in support of the theory of applications in the School of Civil Engineering. The courses in natural philosophy were devoted to the principles of Newtonian physics, electricity, magnetism, electromagnetism, astronomy, steam engines, hydrostatics, hydraulics, optics, pneumatics, applied math, demonstrations, and experiments.²⁹⁴

The courses in mathematics began with arithmetic and proceeded through algebra, geometry, trigonometry, and calculus.²⁹⁵ The courses in civil engineering were theories of surveying, leveling, roads, railroads, canals, bridges, steam engines, hydraulics, and geology used in engineering applications.²⁹⁶

The seventeen students who elected the School of Civil Engineering in 1837 were among a very few in the United States who attended a university that provided an opportunity for practical education.²⁹⁷ However the student interest did not continue as the enrollment dropped to three by 1841. Although the opportunity to enroll remained in the annual catalogue, no enrollment was listed during the subsequent decade.²⁹⁸

After William Barton Rogers resigned in 1853, the opportunity to enroll in the School of Civil Engineering was not included in the university catalogue until after the Civil War. With the hiring of the first professor of applied mathematics and civil engineering in 1867, twenty-five students elected to enroll in the new School of Applied Mathematics, Engineering, and Architecture.²⁹⁹

In contrast with the earlier course content devoted to the theories of engineering, there was more practical education taught in the new school, including the use of engineering instruments in the construction of roads, buildings, roofs, bridges, and tunnels; and the principles of machines and machinery.³⁰⁰ By this time, practical education in agriculture and mechanic arts was well underway in dozens of universities and colleges across the country in response to the Land-Grant College Act of 1862 (Morrill Act).

Civil Engineering at Union College

As the Revolutionary War was ending, residents in northern New York were confident that the union of states would prevail, and they began the process of establishing education to meet the needs of an ambitious community. They persisted for sixteen years before the State of New York approved the charter for Union College in 1795. Union College was nondenominational, and the curriculum was devoted to classical studies requiring mastery of French, Greek, or Latin.

In 1828, a more flexible degree with an emphasis on science, history, and modern languages provided an early model of the liberal arts education, which became prominent in the twentieth century. By 1845, the curriculum included a common first year that required plane geometry, solid geometry, trigonometry, and classical studies. During the remaining three years, the scientific course of study included algebra, differential-integral calculus, analytical geometry of three dimensions, Newtonian physics, chemistry, natural sciences, and classical studies.

With recognition of the need for more practical education, a program in civil engineering was also available. The informal curriculum consisted of: surveying and civil engineering textbooks; assignments in drawing, surveying, leveling, topography, triangulation, and road location in the field; and attending lectures “on applications of geometry to the useful arts, geodesy, civil engineering, construction, in stone, wood and iron, &c.”³⁰¹

This “special course of Civil Engineering, embracing the above subjects and exercises, and extending through the Junior and Senior years, will be given to such as may desire it. Those who go regularly through it, and evince due proficiency, will receive a special Diploma or Certificate to that effect.”³⁰² In addition to the special course, “popular lectures on Civil Engineering will be given to all Seniors during one term; and a course on the applications of Geometry in the Arts, will be given to the Sophomores during the third term.”³⁰³

Union provided one of the earliest and successful examples of establishing a bachelor of science curriculum that shared course requirements with an existing bachelor of arts degree program. Throughout the twentieth century, this precedent was adopted by hundreds of additional bachelor of science degree programs as practical education for the “professions and occupations” of life, as envisioned by William Richard Davie in 1795, rapidly expanded.

Civil Engineering at Brown University

Fifty years after Davie recommended a curriculum for the “destined profession or occupation in life,” an English and scientific course of study was established at Brown University in 1847 that embodied the concepts included in the original course of study at the University of North Carolina in 1795. The curriculum was “designed for the benefit of those who do not propose to enter either of the learned professions, but who desire to prepare themselves, by a thorough education, for some one of the more active employments of life.”³⁰⁴

The course of study was flexible with a one-year or two-year curriculum and allowed “each student, aided by the advice of the Faculty, to select from the respective Courses such studies as shall be best fitted to prepare him for the particular pursuits in which he proposes to engage.”³⁰⁵ The courses of study included math, science,

and related applications; however, modern history, intellectual philosophy, French, rhetoric, moral philosophy, political economy, and the Constitution of the United States were also available to “furnish to those who are preparing for Mercantile pursuits, or for the higher employments of Agriculture and Manufacturers, the means of securing, at a moderate expense, an education specially adapted to their wants.”³⁰⁶

In many respects, the opportunity for practical education at Brown University established the concept of combining courses in math, science, and classical studies as the core curricula for undergraduate disciplines, such as engineering, which have evolved over the last century.

Three years after establishing the English and scientific course, Brown University formalized “The Degree of Bachelor in Philosophy” for students enrolled in the two-year curriculum in “Science applied to the Arts, or Chemistry applied to the Arts, or of Agriculture” with the requirement of “proficiency in one Modern Language, the course of English Literature, and three other courses of one year each.”³⁰⁷

In addition, a “full course of Civil Engineering” was introduced with admission requiring that “the student should be well acquainted with the following branches of Mathematics, viz.; algebra, Plane and Solid Geometry, Plane and Spherical Trigonometry, Surveying, Analytical Geometry, or conic Sections; which make up the two years’ course of Mathematics taught in the University.”³⁰⁸ Combining the curriculum of the full course in civil engineering with the curriculum of the English and scientific course created all the elements of an undergraduate bachelor of science degree in civil engineering; however this combination would be debated in content and purpose by engineering educators during the next one hundred years without resolution.

Civil Engineering at University of Michigan

When the board of regents declared that the University of Michigan “shall be opened for the reception of students on the third Wednesday of September, 1838,” they resolved to hire professors to instruct in political economy, moral philosophy, modern languages, ancient and English languages, mathematics, logic and mental philosophy, natural philosophy, and civil engineering.³⁰⁹ The initial curriculum was similar to classical studies at other universities of that time including the University of North Carolina; however, during his inaugural address in 1852, the new president, Henry P. Tappan, proposed a scientific curriculum and awarding a bachelor of science degree in addition to classical studies and the bachelor of arts.

As one of the earliest proponents of undergraduate education dedicated to the applications of science to useful purposes, Tappan spoke to those concerned about any comparisons of traditional with utilitarian knowledge. “The distinction between a scholastic and practical education is like all this. Both kinds of education

are good and answer somebody's purpose. In truth, a scholastic education is altogether practical to him who desires and wants it. And practical education becomes quite scholastic to him who does not desire and want it."³¹⁰

While a visionary plan, university professors might have agreed about the dedication of students when they are motivated, but the acceptance of practical education as an equal to classical studies at most universities was challenged for at least a century by tradition, until scholastic education fragmented into narrow fields of study and applied science was claimed by faculty with specific technical interests.

Although an engineering course was taught for the first time in the scientific curriculum in 1854 and awarding "diplomas of Civil Engineer" was approved in 1855, the difficulty of hiring and retaining a professor of civil engineering delayed the full realization of the president's plan for practical education.³¹¹ Anxious about the slow pace of development, the board of regents in 1858 instructed the "Academical Faculty" to develop the "Engineering Course" of study as a part of the "present curriculum of the University" and report to the board concerning: "1st What Course of Study and practice in detail should be adopted in the Engineering Course? 2nd Should the entire course be included, in point of time within the present undergraduate course of four years, or should a fifth or University year be added to complete the course?"³¹² To prepare for the response from the faculty, the board concluded that completion of the Department of Civil Engineering was of the "highest importance,"³¹³ resolved that an engineering course be added to the curriculum and a degree of civil engineer be awarded to those who "pass an approved examination."³¹⁴ The committee appointed to study the extent and composition of an engineering course recommended to the board that they consider "extending the time for graduating as an Engineer to five years." The board responded by the action "Laid on the table."³¹⁵

In 1860, the university adopted four courses of study: the classical course, the scientific course, the course of civil engineering, and the optional course.³¹⁶ The classical course was comparable to the curriculum at Union for awarding bachelor of arts degrees. In contrast to the curriculum for the bachelor of science degree at Union, the University of Michigan did not include traditional classical studies. However, the scientific course did include courses that are currently taught as subjects in the liberal arts, such as history, English literature, foreign languages, and rhetoric.

The optional course required students to elect subjects from all the other courses; but, "Students in optional courses do not graduate" with the awarding of a degree.³¹⁷ The engineering course of study "embraces the second and third year of the Scientific Course" plus an additional year devoted entirely to the theory and practice of civil engineering.³¹⁸ The earliest graduates, who successfully completed the requirements of both courses, received the bachelor of science as well as the civil engineer degree.

With this commitment to practical education and a hope for prosperity, the president predicted that “The School of Engineering... will afford the highest advantages for producing scientific and practical Engineers to supply the increasing demands of the West, as well as of the country at large. It thus appears that our great University is directly connected with our great material and public interests, and is calculated to subserve them, beyond any Institution in the Great Northwestern and Southwestern regions.”³¹⁹

The University of Michigan claims the distinction of being among the few universities in the United States where a curriculum for a degree in engineering was adopted before the Civil War, with two graduates in 1860 awarded degrees in civil engineering.³²⁰ Although the University of North Carolina claims to be first as a public university fifty years earlier and William Richard Davie, the “Father” of the University of North Carolina, implemented a nonclassical curriculum and optional courses for the “dignified professions and occupations of life,” the first degree in engineering in North Carolina was awarded six decades after Davie’s vision was excised by a decision to abandon practical education.

Civil Engineering at Harvard College

Some of the established universities adopted a third strategy for practical education. In 1846, Edward Everett, the new president at Harvard College, included in his inaugural address two recommendations: first, the establishment of “philosophical faculty,” who would cultivate “various branches of science and literature... beyond the limits of an academical course.”³²¹ In addition, he encouraged the organization of a “school of theoretical and practical science”³²² with instruction in “Engineering, Geology, Chemistry, Mineralogy, Natural Philosophy and Natural History.”³²³

Also promoting programs of study in practical education, Abbott Lawrence, a Massachusetts industrialist, was advancing his belief that “the time has arrived when we should make an effort to diversify the occupations of our people, and develop more fully their strong mental and physical resources.”³²⁴ Convinced that while “the application of science to the useful arts has changed, in the last half-century... we have been somewhat neglectful in the cultivation and encouragement of the scientific portion of our national economy.”³²⁵

In 1847, Harvard established “an advanced school for instruction in theoretical and practical science, and in the other usual branches of academic learning,”³²⁶ which was named the Lawrence School of Applied Science in 1848 after receiving a donation of fifty thousand dollars from Lawrence.³²⁷ As an advanced school, similar in concept to the professional schools that began with medicine in 1782, divinity in 1816, and law in 1817, “graduates of the University, or of any other collegiate institution, and all persons not graduates who have attained the age of eighteen years, and

who are qualified to follow the courses of study to which they propose to give their attention, are admissible to the school.”³²⁸

The school operated separately from Harvard College with instruction restricted to “various branches of exact and physical science, and in classical learning.”³²⁹ The curricula included “pure and mixed Mathematics; Astronomy, theoretical and practical; Chemistry, in its various branches, theoretical and operative; Civil Engineering, and generally the application of science to the arts of life and the great industrial interests of the community; with the several branches of Natural Science” and classical studies “which form the preparation for academic life.”³³⁰

With no academic requirements, attendance was voluntary to all lectures and recitations given by professors in the Departments of Chemistry, Zoology, and Geology, and Engineering or special courses in botany, comparative anatomy and physiology, astronomy, and mathematics. A certificate was awarded by the school stating the “number of terms for which they have been attached to it, and of the studies pursued by them.”³³¹

Due to the challenge in hiring a professor, the Department of Engineering did not “receive special students to the course of instruction” until 1850.³³² The curriculum included descriptive geometry, drawing, mapping, surveying, and properties of materials used in railroads, canals, and bridges.³³³ Establishment of the Lawrence Scientific School involved a controversy that has occurred again and again as practical education was adopted in universities and colleges.

Lawrence expected the professors to devote their attention to the practice more than the theory of science; but Louis Agassiz, a renowned European geologist and the first faculty member of the school, was a scientist whose priority for research irritated the donor. While this conflict between the practice and teaching of the applied sciences was not resolved by the acclaim for the scientific contributions by Agassiz or by the hiring of a professor of civil engineering, the curriculum and research that embodied the application of science to the practice of engineering did occur nearby with the leadership provided by another institution created to provide practical education for prosperity in Boston.³³⁴

School of Engineering at Yale College

With the Industrial Revolution expanding in New England, Yale College established the Department of Philosophy and Arts in 1847 with a School of Applied Chemistry.³³⁵ “The instructions in the department are intended for graduates of this and other Colleges, and for such other young men as are desirous of pursuing special branches of study; but it is necessary for all students in philology and mathematical science, that they be thoroughly grounded in those studies.”³³⁶

The courses of study were arranged in a two-year curriculum, and a bachelor of philosophy was awarded to graduates.³³⁷ In 1852, the School of Engineering was established in the Department of Philosophy and operated separately from Yale College with responsibility for academic as well as financial requirements.

While Yale was pleased to hire a professor of engineering, the organization made it clear that he “will not expect any appropriations of college funds to his department” but that “he will feel at liberty to obtain funds for his peculiar objects by the voluntary contributions of those who are friendly to the cause but no interference will take place with the great effort now in contemplation to raise 100,000 dollars.”³³⁸ The tuition for each term was thirty dollars, “paid in advance” and for surveying alone the fee was twelve dollars.³³⁹ Professor W. A. Norton, who had taught at the Military Academy at West Point, accepted the offer and upon arriving, established a program similar to the one he was leaving at Brown College.³⁴⁰

The curriculum of practical education at Yale included surveying, drawing, descriptive geometry, principles of architecture, analytical geometry, differential and integral calculus, mechanics including hydraulics and pneumatics, and application of mechanics to machinery and engineering. Instruction was supplemented with “The Science of Construction in its various departments; with a discussion of the nature, strength, and mode of preparation of building materials.”³⁴¹

The practice of engineering included: “field-work; or the location of roads, surveys for excavations and embankments, &c.” Also, the “Use of astronomical instruments for the determination of time, latitude and longitude, &c.” While students were permitted to enroll for a “partial course,” admission requirements to the two year “full course” included “preparatory mathematical studies” in arithmetic, algebra, geometry and trigonometry.³⁴² Even though the courses of study included a theoretical foundation and applications to the practice of engineering and were taught in a School of Engineering by a professor of engineering, the awarding of a bachelor of philosophy degree suggests that an engineer was defined by practice not by education. This uncertainty was confronted by other universities that developed curricula and awarded degrees in civil engineering.

Developing the State of North Carolina (1776–1860)

Identity as the State of North Carolina

Although there are no preserved documents to verify the claim, some historians are persuaded by recollections and circumstantial evidence that on May 3, 1775, citizens, angered by acts of authority by the British, met at Queen's Museum in Charlotte to sign the Mecklenburg Declaration of Independence, which resolved a defense by them of their "inherent and inalienable rights of man." As free and independent people, "under the control of no power, other than that of our God and the general government of the Congress," they ordained and adopted "as a rule of life, all, each, and every one of our former laws" and without British authority to enforce them, resolved "to preserve peace, union, and harmony" in the country.² It was claimed that copies of this first Declaration of Independence were sent to the Continental Congress in Philadelphia and the Provincial Congress of North Carolina in Hillsborough as they were meeting to agree upon a response to the aggressive action by the British.

In North Carolina the colonial governor mustered an army of fifteen hundred men (thirteen hundred were immigrated Scot Highlanders loyal to the Crown) to challenge insurgency by the legislature of the provincial government established to declare independence. The revolutionary men of Wilmington engaged and defeated the loyalists at Moore's Creek Bridge in February 1776 with many of them captured and humiliated by public scorn.³ Although many Highlanders were active in the rebellion against England, others remaining loyal to the Crown left the colony before and during the Revolutionary War for fear of retribution. The king and Parliament considered the growing unrest throughout the colonies to be an insurrection, and the Crown assembled an army to quell the rebellion.

The circumstances creating the decision for separation from Great Britain began with the news that spread throughout the colonies about the encounter on April 19, 1775 of British soldiers and minutemen of Lexington in Massachusetts that resulted in a battle with dead and wounded colonial men.⁴ The Colonial Period officially ended in 1776 with the Declaration of Independence endorsed by the thirteen colonies.

Through actions of the Provincial and Continental Congresses of the united states, the thirteen colonies declared their independence from England and authorized the establishment of an army to defend the Federation of States. As the Revolutionary War began, one-third of North Carolinians did not support the act of independence;⁵ many could not read or write; most were poor; the eastern economy depended on slavery and access to markets on existing navigable waterways; the western economy was mainly subsistence farming where roads were primitive or non-existent; and the legislators from the east controlled the General Assembly. Nevertheless, the state provided considerable supplies to the Revolutionary Army and engaged the British as they proceeded from South Carolina to Virginia. Even with unsettled disagreements within the colony, the pursuit of individual freedom provided the motivation for setting aside differences to obtain this common passion for liberty.

The armed conflict between England and the colonies began in Massachusetts more than a year before the Declaration of Independence and lasted until the victory at Yorktown six years later. In between, there was jubilation when the British navy retreated from the Boston Harbor, the good fortune of fog to cover the retreat and avoid annihilation at the Battle of Brooklyn, and the courage to cross the Delaware River and then march at night in bitter cold weather to attack at dawn for a victory at Trenton. However, engagements of Continental armies fighting against a superior number of well-trained and equipped British troops resulted in occupations of Savannah and Charles Town. A strategy of attack and retreat for another day by the generals of the Continental armies had prolonged the war in the northern colonies as the British reinforced their southern campaign where they had established a stronghold.

As North Carolina proceeded toward statehood, the first priority was the establishment of a provincial government with authority to declare independence from England. Just prior to the adoption of the Declaration of Independence by the Continental Congress in Philadelphia, the North Carolina Provincial Congress meeting in Halifax had passed a resolution on April 12, 1776 that authorized the delegates from North Carolina "to concur with the delegates from the other Colonies in declaring independence... reserving to this colony the sole and exclusive right of forming a Constitution and laws for this Colony."⁶ After receiving similar resolutions from all the colonies, the Provincial Congress proceeded to adopt the

Declaration of Independence. Subsequently and without regard for other independent colonies, each colony developed principles of governance that were derived from its unique cultural, social, and economic circumstances. Without ratification by the citizens, the Provincial Congress of the state adopted the Constitution of the State of North Carolina on December 18, 1776.

After the British forces occupied Charles Town in 1780, General Cornwallis in command had expected enough loyalists to the Crown to join with his troops to swiftly and decisively defeat the rebelling colonialists in North Carolina as he would move northward toward Virginia. Cornwallis and colonial Governor Martin proceeded through the upcountry of South Carolina to meet in Charlotte where the governor proclaimed the royal government had been restored.

Troubled by persistent forays by bands of rebels, an English officer sent a message to the men from west of the Blue Ridge Mountains demanding that they cease their attacks on his troops or he would march his army over the mountains and hang the leaders and ravage the communities. The western settlers responded by assembling more than one thousand men, many of them Scots-Irish, who marched over the mountains to attack the Cornwallis detachment, mostly loyalists who were led by one of his most capable officers. The men from the western frontier (who became known as the Over Mountain Men) fought valiantly at the Battle of Kings Mountain on October 7, 1780 and decisively defeated their enemy.⁷

Following a second devastating loss by another detachment of British troops who were overwhelmed by a bayonet attack initiated by the Continentals at Cowpens on January 17, 1781, the remaining British army led by Cornwallis pursued the Continental army, which delayed engagement by an extensive and strategic march across central North Carolina. In April 1781, the Continental army, led by Nathanael Greene, met the British army, led by Cornwallis, in the Battle of Guilford Court House with the British claiming the geography, but not without a substantial loss of able troops before the Continentals withdrew from combat.⁸

The overwhelming victories at King's Mountain and Cowpens followed by the courageous performance by Greene's army at the Guilford Courthouse contributed to the eventual outcome at Yorktown. Although united to achieve freedom from England and endorsing the Declaration of Independence that proclaimed "truths to be self-evident" with "inalienable rights" to "life, liberty and the pursuit of happiness," North Carolinians remained divided in culture, economy, and politics, which were established by a century of traditions inconsistent with the promise "to secure these rights, governments are instituted among men, deriving their power from the consent of the governed."

With political dominance by the wealthier class and distrust by the common people, the North Carolina Constitution created a government that was limited primarily to the protection of individual rights and to the preservation of life and

property. Most notably, there were twenty-five statements establishing “A DECLARATION OF RIGHTS,” with some reserved for the “freeman.” Furthermore, article XLIV of “THE CONSTITUTION OR FORM OF GOVERNMENT” guaranteed “That the Declaration of Rights is hereby declared to be part of the Constitution of this State, and ought never to be violated, on any presence whatsoever.” Republican governance, with provisions similar to the colonial era, was established as described in forty-six articles with dominance by the legislature in selecting those who served in judicial and administrative positions.⁹

Replacing the Crown, the legislature selected and commissioned the governor, with requirements that he must have “in the State, a freehold of lands and tenements above the value of one thousand pounds,” to serve one year and no more than three years in six consecutive years. The Advisory Council selected by colonial governors was replaced by the General Assembly electing “seven persons to be a Council of State for one year, who shall advise the Governor in the execution of his office.” The governor had little power to act alone, except “to embody the militia for the public safety,” to “draw for and apply such sums of money as shall be voted by the general assembly,” to regulate imports and exports, and to grant pardons “except where the prosecution shall be carried on by the General Assembly.”¹⁰

A bicameral legislature was formed with each county electing two members of the House of Commons and one member of the Senate. A candidate for the House must own no less than one hundred acres of land and for the Senate must own no less than three hundred acres. Also, Article XXII forbade anyone from holding these public offices “who shall deny the being of God or the truth of the Protestant religion... or who shall hold religious principles incompatible with the freedom and safety of the State.” Freemen “possessed of a freehold within the same county of fifty acres... shall be entitled to vote for a member of the senate,” and to vote for members of the House one “shall have paid public taxes.” Landowners in the eastern counties elected a substantial majority of the legislators, who in turn elected the governor, the Council of State, and appointed judges to the Supreme Court. Therefore, governance entering statehood perpetuated many of the circumstances that led to sectional controversies as a colony.¹¹

To defend against invasions and occupations by British armies, the independent colonies established an alliance confirmed by the Articles of Confederation that were adopted in 1778. The confederation was named the United States of America, with each state retaining its “sovereignty, freedom, and independence, and every power, jurisdiction, and right... not... expressly designated to the United States.”¹² The primary objectives for the Confederacy were “the common defense, the security of their liberties, and their mutual and general welfare” and “to assist each other against all force offered to, or attacks made upon them, or any of them, on account of religion, sovereignty, trade, or any other pretense whatsoever.”¹³ A Congress was

authorized “For the more convenient management of the general interests of the United States” with representatives “annually appointed in such manner as the legislature of each State shall direct, subject to their “recall... at any time within the year.”¹⁴

Without authority to obtain the funds necessary to defend the Declaration of Independence, finances for the war effort depended on a “common treasury, which shall be supplied by the several States, in proportion to the value of all land within each State... The taxes for paying that proportion shall be laid and levied by the authority and direction of the legislatures of the several States.”¹⁵ Although the duties of the federal government were defined by the Congress, the ultimate power to act for the greater good of the Confederation rested entirely with the legislatures of the sovereign states. With independence assured at Yorktown in 1781 and with continuing debates about the lack of federal authority, a Constitutional Convention was convened in Philadelphia in 1787 and submitted a new constitution in September of the same year. After approval by Congress, the states considered ratification.

The federal and state constitutions provided different forms and functions of government with varying degrees of control of public affairs. Unresolved and conflicting views about state’s rights and federal authority remained untested for decades. However, the federal Constitution created three branches of government that were not only independent of state’s rights, but also, with separation of power, they were independent of one another. The duties of the office of the president were the actions required to administer the affairs established by law; of the Supreme Court were to interpret the Constitution and to adjudicate, when they chose, claims of violations; and of the two houses in Congress were to pass legislation related to their authority to tax, regulate commerce, coin money, establish infrastructure, promote science, declare wars, and raise and support armies.

As declared in the preamble, “We, the people of the United States of America, in order to form a more perfect Union, establish justice, insure domestic tranquility, provide for the common defense, promote general welfare, and secure blessings of liberty to ourselves and our posterity, do ordain and establish the Constitution of the United States of America.” However, “We the people” would be defined over and over again for the next two centuries before all the rights provided initially to the founders would be available to all North Carolinians as well as all Americans.

Both democratic and aristocratic tendencies of this republican form of government are illustrated by the processes defined in the Constitution to elect a president, vice president, senators, and representatives. To vote for candidates for the House of Representatives, “the elector in each State shall have the qualifications requisite for electors of the most numerous branch of the State Legislature.”¹⁶ In North Carolina, these electors (voters) “shall have paid public taxes.”¹⁷ Therefore, the concerns by free white males about federal taxation without representation were

moderated by the requirement that, “all bills for raising revenue shall originate in the House of Representatives.”¹⁸

A candidate for the United States House of Representatives must be at least twenty-five years old, a citizen of the United States for at least seven years, and a resident of the state in which they seek election. With a society and culture that valued an agricultural economy, the candidates for the North Carolina House of Commons were required to own one hundred acres in the county they represented. Although election to the House of Representatives was somewhat democratic, the selection or election of the other constitutional administrative and legislative offices of government resided with the legislators of each state. Most notably, “The Senate of the United States shall be composed of two Senators from each State, chosen by the Legislature thereof.”¹⁹

In contrast, the selection of the president and vice president began by each state appointing “in such manner as the Legislature thereof may direct, a number of electors, equal to the whole number of Senators and Representatives to which the State may be entitled in the Congress.”²⁰ Each elector voted for two persons, and the electors’ votes from all the states were tallied by the president of the Senate. A majority of the electors’ votes was required to be elected president; but, if two or more received a majority and were equal, the president was chosen by a ballot of the House of Representatives.

After the choice of the president, the person with the greatest number of electoral votes became the vice president with a Senate election in case of equal votes. Since most of the federal elections were controlled by state legislators who were predominantly elected by the privileged, the majority of the common people of North Carolina were not eligible to vote for anyone. Any significant chances of establishing public education or internal improvements in North Carolina would depend on leaders with a vision for prosperity for all the citizens.

In North Carolina, elected delegates met in Hillsborough in 1788 and failed to ratify the federal constitution by a count of 184 to 84.²¹ The major objections were implications of “The United States” instead of a confederation of states, undefined limits on federal authority, and the lack of a bill of rights, so desperately coveted by North Carolinians.²²

In addition, there were concerns expressed about the vagueness of “We the people” in the Declaration of Independence, and the implications for the state’s exclusivity for those who vote and those elected to govern. After a year outside the Union and with considerable campaigning for reconsideration, another convention met in 1789 and ratified the federal constitution by a vote of 195 to 77.²³ While the Bills of Rights was not passed by Congress before North Carolina finally joined the United States and did not eliminate discrimination by the privileged who restricted the “We,” the concern about the rights of “We the people” by North Carolinians

provided a legacy that continued to influence how “We” have been governed by “The United States” throughout our history.

Establishing and sustaining governments in North Carolina and the United States, without precedents as guidelines, resulted in political factions that developed and implemented their interpretation of the Constitution as they governed. Debates, publications, and political adversaries promoted ideologies they deemed necessary to guarantee freedom and avoid oppressive governance. Writing to John Adams, Benjamin Rush expressed frustration and uncertainty about the unsettled form and function of government:

I feel pain when I am reminded of my exertions in the cause of what we called liberty; and sometimes wish I could erase my name from the Declaration of Independence. In case of a rupture with Britain or France—what shall we fight for? For our Constitution? I cannot meet with a man who loves it. It is considered as too weak, by one-half of our citizens and too strong by the other half. Shall we rally round the standard of a popular chief? Since the death of Washington there has been no such center of the union. Shall we contend for our paternal acres and dwelling houses? Alas! How few of these are owned by the men who will in case of a war be called to the helm of our government. Their property consists chiefly in bank stock, and that to such an extent that among some of them it is considered as a mark of bad calculation for a man to live in a house of his own.²⁴

Adams replied, “You and I, in the Revolution, acted from principle. We did our duty, as we then believed, according to our best information, judgment and consciences. Shall we now repent of this? God forbid! No!”²⁵ Establishing federal authority, adapting executive power, and enabling defense of the United States would evolve from conflict, not by principles.

As an advocate for a strong central government and considered a Federalist, Alexander Hamilton proposed executive authority as necessary “to the protection of the community against foreign attacks,... the steady administration of the laws,... the protection of property” and “the security of liberty.”²⁶ With the inability of the weak government established by the Articles of Confederation to provide supplies, clothing, and ammunition to Washington’s army, John Adams, who served as secretary of war, was concerned that freedom and liberty could not be defended without a stronger central government. Supported by the Federalists and embracing a limit on republicanism, John Adams believed that a greater good for all people could be obtained through government if “the brightest and most virtuous men could be drawn into public life” and if they could serve without pandering to public desires.²⁷

The Anti-Federalists supported republicanism that was defined by James Madison as “a government which derives all its powers directly or indirectly from the

great body of the people; and is administered by persons holding their offices during pleasure, for a limited period, or during good behavior.”²⁸ Thomas Jefferson considered the competing ideologies as a natural consequence of free men with some “unwilling to cede more of their liberty than is necessary to preserve order” and others who “will wish to see one strong arm able to protect them from the many.”²⁹

With his devotion to republicanism, Jefferson defined his preference for a “government by its citizens in mass, acting directly and personally according to rules established by the majority.”³⁰ He was concerned that “the further the departure from direct and constant control by the citizens, the less has the government of the ingredient of republicanism.”³¹ Many Anti-Federalists considered too much government that was too far removed from “We the People” and perpetuated by the few who benefited to be a threat to freedom and a burden on the underrepresented.

Without forming a political organization, the Federalists supported the elections of Washington and Adams and gained prominence in the last decade of the 1700s, primarily in the northern states. With the presidential election of 1800 resulting in Thomas Jefferson and Aaron Burr receiving an equal number of electoral votes, the subsequent election by the House of Representatives became a bitter and protracted contest that energized the Federalists who supported Aaron Burr and the Democratic-Republicans who supported Thomas Jefferson. With the contest resolved by the selection of Thomas Jefferson and with the obvious need for changes in the election process, Congress proposed and the states ratified Amendment XII to the Constitution. The amendment reduced the votes by the electors of each state from two to one candidate, adjusted the case when no one received a majority by limiting the number of candidates to no more than the three who had received the greatest number of electoral votes and created a similar but separate process to elect the vice president.

During the presidency of Thomas Jefferson, with his growing trust in the inclusion of common people in the electoral process as the deterrent to tyranny and with the expansion of republicanism into the new states, some of the Federalists were concerned about the governance by the common people, and they developed a plot for New England and New York to secede from the United States.³² With rejection by Alexander Hamilton and the discrediting of the staunch proponent Aaron Burr, who shot Hamilton in a duel, the Federalists abandoned the plot and eventually dissolved into the emerging political parties of Whigs and Democrats. (The Whig Party did not sustain an identity as many members supported the new Republican Party prior to the Civil War.) Jefferson viewed the political parties as “censors of the conduct of each other and useful watchmen for the public.”³³

Ultimately, the emergence of political parties played a central role in the democratization of the nation. In addition, the party debates within each state provided the forum for addressing the need for education and internal improvements; but

the states and the nation encountered many other challenges along the way. Should those who govern be selected or elected? Should government be accountable to ideals or to the governed? Should most governing be local or unified? Is government an enemy of liberty or a liberator? Should democracy include every person in the United States? These unresolved and dividing principles of governing engendered the ideals that ultimately defined democracy in America.

In 1824, General Andrew Jackson, widely known politically and militarily, was recruited to oppose John Quincy Adams as a candidate for president. Jackson was born in South Carolina in 1767, lived in North Carolina before enlisting at the age of thirteen as a messenger in the Revolutionary War, served in the House of Representatives of North Carolina, as governor and in the Congress as a representative and a senator for Tennessee, and became a hero as a general at the Battle of New Orleans. Although Adams had abandoned the cause of the Federalists and disappointed his father by avowing full support for republicanism, he remained committed to his conviction, shared by his father, that ordinary men are not adequately prepared to govern and to represent the best interests of all people.³⁴

While Jackson won the popular vote of the few states that chose electors by public ballot, the slate of candidates was determined by the electors representing the legislative process in most states. Without anyone receiving a majority, four of the nominees receiving electoral votes were presented to the House of Representatives where John Quincy Adams was chosen to become the president. The events and candidates in this election provided another clear contrast between conflicting ideologies that defined who should govern and how they should be chosen. Shortly after Adams was sworn into office, Jackson's supporters began a four-year campaign for the presidency of 1828. Their devotion to a more democratic process that expanded the base of "We the people" was successful in 1828 in electing a man whose life experiences embodied the aspirations of farmers, yeomen, mechanics, and other common people.

While President Jackson aggressively defended states' rights and a more democratic form of government, he was convinced that "Without union, our independence and liberty would never have been achieved; without union they never can be maintained."³⁵ His support of a strong central government was tested as South Carolina prepared to nullify or unilaterally veto a federal tariff, considered as unjust by the state. Hearing rumors of secession and driven by his convictions, Jackson asserted that "when a faction in a state attempts to nullify a constitutional law of Congress, or to destroy the Union, the balance of the people composing this Union have a perfect right to coerce them to obedience."³⁶ Disagreement was expected, and appropriate means to seek adjustments are accorded by appeal, still secession is rebellion.

Furthermore, the right to secede within the Articles of Confederation of the independent states was replaced by a union of “We the people” and their vote to adopt the Constitution. Jackson ordered war ships to patrol the coast and declared that “In forty days I can have within the limits of South Carolina fifty thousand men, and in forty days more another fifty thousand... The wickedness, madness, and folly of the leaders and the delusion of their followers in the attempt to destroy themselves and our Union has not its parallel in the history of the world. The Union will be preserved.”³⁷

In other circumstances he supported republican principles of governance by opposing the Federal Bank as an unconstitutional institution benefiting only the rich and by opposing internal improvements as excessive federal intrusion into states’ rights. While Jackson’s presidency did not dissuade competing interests from pursuing their vision of representative government, it did begin the long journey to fulfill the promises of the Constitution for governing ourselves through the democratic process of voting to elect representatives, who will protect our liberty without tyranny and seek prosperity for all, without prejudice against anyone.

In the presidential election of 1828, with three-fourths of the states selecting their electors by popular vote,³⁸ Jackson received six hundred forty-seven thousand votes to five hundred eight thousand for Adams.³⁹ His popularity was validated by a victory in 1832 with six hundred eighty-eight thousand votes to five hundred thirty thousand for Henry Clay.⁴⁰ Inspired by an overwhelming victory by a man of their stature, the farmers, mechanics, and common men were encouraged to advocate for a more democratic form and function of government. Although Jackson’s personal success was admired by most North Carolinians, his veto of the Federal Bank, his opposition to federal improvement projects, his threats to invade South Carolina, and his absolute support of the Union were not uniformly supported throughout the state.

To garner support or opposition of federal policies, political realignments in North Carolina melded into the two developing national parties. For example, some of the leaders in the west who supported internal improvements to enable more commerce joined with some of the wealthy in the east who supported the Federal Bank to provide a stable currency for trade and formed the Whig Party that opposed Jackson’s decision, while many voters in the eastern counties allied with some in the west to form the Democratic Party that supported Jackson.

These undefined political processes that evolved through conflicts, progress, and popular consent were characterized by Thomas Jefferson as “Men by their constitutions are naturally divided into parties. 1. Those who fear and distrust the people,” and “Those who identify themselves with the people.”⁴¹ In North Carolina, the overriding political issue for the people of the western counties of North Carolina was a mandate for a Constitutional Convention for the purpose of achieving

representation based upon population, and for the planters in the eastern counties was a continuation of the economic, social, cultural, and political advantages acquired by them over the last century.

With continuing pressure for more than a decade and with alliances along party lines replacing regional interests, the General Assembly in 1835 agreed to a referendum on convening a Constitutional Convention. The referendum provided the first opportunity in North Carolina for all eligible voters to cast a ballot on the process and the content of changing the form and function of government. The outcome of the voting revealed the long-standing disagreement between the earlier and the later settlers in the state.

There were twenty-seven thousand five hundred fifty votes supporting and twenty-one thousand six hundred ninety-four opposing the convention. Of the supporters, twenty-four thousand eight hundred forty-nine were from the western counties and in opposition, eighteen thousand eighty-three were from the eastern counties.⁴² Meeting in Raleigh in 1835, the convention would consider amendments to eliminate religious requirements for public office, to elect the governor by the vote of all citizens qualified to vote for members of the House, to elect fifty members to the Senate from districts based upon taxes paid to the state, and to elect one hundred twenty members to the House from districts proportioned from counting all free, indentured, and apprenticed persons plus three-fifths of the number of slaves.⁴³

In addition to adopting amendments from the deliberations prescribed by the referendum, the legislature eliminated voting rights for free blacks, enacted a capitation tax for all free males between the ages of twenty-one and forty-five and all slaves between the ages of twelve and fifty-five years of age, set the term of office to two years for the governor with a limit of two consecutive terms, and established procedures for considering future amendments. However, voting rights remained the privilege of free white men who owned land or paid taxes.⁴⁴

The eligible voters ratified the amendments by a margin of twenty-six thousand seven hundred to twenty-one thousand six hundred. Of the supporters, twenty-three thousand four hundred were from the western counties, and of those in opposition nineteen thousand two hundred were from the east.⁴⁵ Even with the west gaining more representatives, the east remained in control of state government, due in part to counting slaves in proportioning the districts. Even though the outcomes maintained undemocratic restrictions on voting and representation, a political process involving two parties with comparable numbers of voters was established that debated public education, internal improvements, manufacturing, agriculture, and slavery. While the outcomes often supported tradition, liberating political leaders in North Carolina continued the pursuit, with measured success, of greater prosperity for all the citizens of the state.

Improvements in Transportation in North Carolina

For more than a century before the Revolutionary War, the economy in each colony developed mostly from the trade of its unique products from the sea, forests, and soils; however, there were restrictions on destinations for trade and in return mostly imports of articles manufactured by artisans in England and also some rare products not grown in the colonies. The centers of commerce in each colony developed around its deep-water ports with navigation available to and from foreign markets.

In colonial North Carolina the sparsely located farms and plantations were connected by roads, rivers, and sounds, but most goods traveled to markets at deep-water ports in neighboring colonies. With farms developing inland and without direct connections for transportation to markets for trade, the colonial legislature in North Carolina had assigned the authority for approving locations and routes of local roads to the justices of courts in each of the counties. A process for constructing a new road included a jury of twelve freeholders who reported to the justice their decision for a route of the road. The justice in turn appointed a company of men and then someone in charge of constructing the road.⁴⁶

As a state in 1790, the number of heads of families on farms in North Carolina had spread about equally into each of the fifty-seven counties with an average of about one thousand persons per county and two families per square mile. Combining each of the fifty-seven counties with others nearby into eight separate districts of Edenton, Fayette, Halifax, Hillsborough, Morgan, Newbern, Salisbury, and Wilmington, there were on average about fifteen thousand slaves per district, eighteen hundred per county, and two slaves per head of families. However, the number of slaves per head of family varied with five times more in each of the northeastern district of Halifax with Edgecombe, Franklin, Halifax and Martin Counties, and of Edenton with Bertie, Camden, Chowan, Currituck, and Gates Counties than in the western Morgan district of Burke, Lincoln, Rutherford, and Wilkes Counties.⁴⁷

The development of the economy in North Carolina in 1790 depended mostly on exports of tobacco in the Halifax district; turpentine, lumber, and tar in the Edenton district; and wheat and corn in Morgan district. The transportation to ports was along the colonial roads and navigable rivers. Over the next sixty years before the Civil War, the inland population and their cash crops increased with transportation to markets slowly improving.

Beginning as a state, local improvement in transportation continued with courts in each county in charge of construction and selecting overseers; however, there was a mandate from the General Assembly that roads would be twenty feet in total width but fourteen feet wide in the middle cleared of stumps and their runners. Lotteries were often the source of money to hire a company to construct the public roads; however, white taxable males between the ages of eighteen to forty-five and

black males between the ages of sixteen to fifty were the labor supervised by those appointed overseers.⁴⁸

Over the eighteenth century, Kings Highway in the east, Fall Line Road and Upper Road in the Piedmont, and Great Valley Road in the west were traveled for the trade of Native Americans and for the immigrants locating in the Yadkin valley and western North Carolina. Except for the King's Highway in the east, the other roads were parallel in a southwest direction from Virginia toward South Carolina, Georgia, and western North Carolina. Consequently, as a state, many of North Carolina's improvements in transportation during the first half of the nineteenth century were devoted to connections to other states rather than west to east for carry to markets for trade or commerce.

As the populations of farmers and farms inland in North Carolina grew, improvements in transportation became a priority to develop the commerce and economy of the state. The most convenient and simplest improvements were constructions of roads that connected to rivers and tributaries that were navigable after clearing the branches and stumps from bottoms and banks. However, most of the rivers in North Carolina do not connect directly into deep-water ports within the state. Therefore, the opportunities for foreign trade from many of the colonial plantations and farms in the state relied on ports in Charleston, South Carolina and Norfolk, Virginia.

Major improvements in transportation across county lines or boundaries of states usually began with a request to the General Assembly for awarding a charter to organize a private company to construct, operate, and collect tolls within defined locations and specific objectives. With estimation of cost approved and the value per unit of stock decided, the company was incorporated, the board appointed, and officers selected after a certain value of subscriptions were pledged by investors. The charter often included a period of time for completing construction, improvements expected, and percent return on investments from tolls collected.

Significant internal improvement in roads east to west in the United States began before 1800 with the construction of a sixty-two-mile turnpike from Lancaster to Philadelphia. During the decades after the War of 1812, improvements of toll roads east to west in the country included construction of more than one hundred miles of the public Federal Highway from Cumberland, Maryland to the Ohio River in Wheeling, Virginia.

With the success of the Lancaster toll road in Pennsylvania, the General Assembly of North Carolina authorized the construction of twelve turnpikes with tolls before 1810 with one through the Dismal Swamp. During the next fifty years, the General Assembly had already authorized the construction of one hundred nine turnpike roads to be built from subscriptions of stock, with sixty-four turnpikes for

the mountain region, nine for the Mountain-Piedmont, six for the Piedmont, and thirty for the coastal region.⁴⁹

Transportation by navigation among more than one hundred rivers and their tributaries within the state included four major rivers of the Roanoke, Tar, Neuse, and Cape Fear flowing eastward with basins in North Carolina. Of the major rivers in North Carolina flowing into another state, there is one entering Georgia, one into Virginia, with four eventually flowing into Tennessee, and four into South Carolina. Other river basins in North Carolina are connected to sounds with a few deep-water outlets to the ocean through the Outer Banks. The only exception is the Cape Fear River that flows within the state and into the Atlantic Ocean; however, the entry from the ocean to the port at Wilmington is more than twenty miles with shallow draft and uncertain shoals to navigate that discouraged large ocean vessels for trade in foreign markets.

Although the weight was limited for cargo exported from the port in Wilmington, the General Assembly awarded a charter in 1792 to the Cape Fear Company for improving transportation on the Cape Fear River from Haywood in Chatham County to Averasboro in Harnett Country. With water from numerous tributaries flowing into the Deep River from headwaters in Guilford County and tributaries into the Haw River from headwaters in Forsyth County, the merger of these great rivers to form the Cape Fear River resulted in the largest watershed in the state.⁵⁰

Another charter awarded in 1796 to the Deep and Haw River Company was replaced by the Cape Fear Company to include improvements from Averasboro to Fayetteville in Cumberland County. The charter included ambitious constructions of cutting for canals, building dams, and erecting locks. Although tolls were expected to provide the costs, there were few improvements.⁵¹

Even with insignificant improvements above Fayetteville, the General Assembly issued another charter in 1811 to establish the Cape Fear Navigation Company to focus on improvements from Fayetteville to Wilmington with the cost of the improvements supported with subscriptions of stock.⁵²

Almost two decades after improvements began along the Cape Fear, the General Assembly merged the charters of upper and lower sections of the Cape Fear River into one company authorized to improve navigation from Haywood to Wilmington. Over land Wilmington is about sixty miles southeast of Haywood; however, the length of the river along the way is about two-thirds of the two hundred miles from the headwaters in Forsyth County to the port in Wilmington.⁵³

Designated as the Cape Fear Navigation Company, the terms of the charter awarded in 1815 approved subscriptions of stocks to improve navigation and then tolls to operate and maintain the river for travel from Haywood to the port in Wilmington. With the assistance of an experienced civil engineer to survey, design, and route the locks to pass around the falls, the state invested fifteen thousand

dollars in the first round of subscriptions of stock. The work began with the purchase of flatboats for navigation, equipment to remove, and slaves to improve transportation. By 1819 the tolls for carry on the river were sufficient pay a dividend to investors.⁵⁴

In western North Carolina the route to the port in Charleston usually included some travel on or across the many rivers there. The headwaters and tributaries along the way from Mount Mitchell become the two hundred-mile Catawba River divided between North and South Carolina. Close by and among the Blue Ridge Mountains, the headwaters of the Broad River travel about one hundred fifty miles through southwestern North Carolina into northwestern South Carolina.

These two great rivers merge near Columbia, South Carolina to form the Santee River that empties into swamp land and eventually the ocean about fifty miles northward from Charleston.⁵⁵ Inspired by the development of agriculture inland in both states, the South Carolina Legislature awarded a charter for investors to establish the Santee Canal Company for the purpose of improving transportation from inland farms, plantations, and settlements to the port in Charleston.

For the western counties of both states, improvements in navigation with canals began in 1792 in South Carolina with a thirty-five-foot-wide and four-foot-deep canal that traveled twenty-three miles to merge the Santee River with the tidewater Cooper River that flowed directly toward the harbor in Charleston. There were twelve locks sixty feet long and ten feet wide and eight aqueducts along the canal that began in a lock thirty-four feet above the Santee River and ended sixty-nine feet above the Cooper River for protection from floods and tides.⁵⁶

With difficulties in raising enough money from investors and hiring enough skilled labor, eventually the company completed construction of the canal that opened in 1800 when cargoes were carried from the rapids below Columbia to the port in Charleston. By 1822 nine hundred bales of the cash crop of cotton were carried on boats for a toll of fifteen dollars and often towed by a steamboat.⁵⁷

In general, the routes for the carry of agricultural productions from farms and plantations in the western and midwestern regions of North Carolina to domestic markets and exports to foreign countries began along the same roads that were established during the colonial period. Therefore, improvements in carry along the Catawba River to navigable rivers in South Carolina near Columbia were considered a priority by both states as a way to expedite the navigation within each state to the deep-water port in Charleston.

In 1797 the General Assembly of North Carolina chartered the Catawba Company to improve transportation along the river within the state. With private subscriptions and authority, the company appointed overseers and expected those men within four miles of the river who paid taxes to assist in improvements. However, after four years the Catawba Company was replaced by the North Carolina

Catawba Company, with the authority to collect tolls and clear the river northward from the South Carolina border to non-navigable water.⁵⁸

There were similar charters awarded for improvements of transportation on the Yadkin, Neuse, and Tar Rivers with private and state investments in stock to support the cost of improvements. Even with thousands of dollars invested and some construction underway, the Tar River Navigation Company, Yadkin Navigation Company, and Neuse River Navigation Company did not complete construction of a variety of improvements. In each case the company could not continue to raise the money necessary to reach its final objectives for improving transportation.⁵⁹

In the coastal region of the state there were more than a dozen settlements and towns located along the inner banks with inlets at the Outer Banks to the ocean as well as river basins flowing into the sounds. Depending mainly on the location and the productions for trade, the populations varied from less than one hundred persons in Bath to several hundred in New Bern. The northward carry over land or by navigation from New Bern to Elizabeth City was more than one hundred miles. However, after navigation in the sounds to nearby Winton or Elizabeth City, the carry by land to the Chesapeake Bay was about another forty miles to the deep-water port at Norfolk, Virginia.

Products from farms and plantations in the northeastern region of the state were carried by wagons on roads and by flatboats navigable along the Dan and Roanoke Rivers with carry eventually on roads connecting to markets usually in Petersburg, Virginia. Permission for improvements in transportation near and across state boundaries in each of the regions connected to South Carolina, Tennessee, and Virginia usually required lengthy negotiations.⁶⁰

Shortly after the American Revolution, Virginia and North Carolina separately agreed to improve navigation on the Roanoke River with North Carolina clearing the river from the falls at Weldon to the Virginia border. More than a decade later, in 1796, a charter was granted to establish a company to improve transportation on the river, with taxable persons within two miles of the river providing some of the labor. However, little, if any, improvements were achieved over another decade.⁶¹

The General Assembly of North Carolina chartered another Roanoke Navigation Company in 1812 with the expectation of a navigable waterway from the Albemarle Sound to the end of navigation in the Dan River in Virginia. The eventual capitalization was three hundred thousand dollars with stock investment of twenty-five thousand by the State of North Carolina.⁶² In 1817 with investors from both states, improvements in transportation on the Roanoke River began from the Albemarle Sound in North Carolina to the junction of the Dan and Staunton Rivers in Virginia. Even though the project started with enthusiasm, the shortage of labor eventually resulted in purchasing slaves.⁶³

The construction from 1776 to 1800 and the success of a network of canals for transportation throughout Great Britain probably influenced similar efforts in the United States. In North Carolina, canals were planned, chartered, and begun to improve inland transportation, but only four major canals with a total of less than fifty miles were completed and operated in the state before 1860.⁶⁴ The challenges are described in detail in the January 1948 issue of the *The North Carolina Historical Review*. The fifty-six pages of “North Carolina Canals Before 1860” by Clifford Reginald Hinshaw provide substantial insight into the uncoordinated, underfunded, and slow pace of efforts to improve transportation.

Two of the canals were not designed, analyzed, and supervised with the assistance of a civil engineer. Instead, commissioners were appointed in 1766 to “lay off and design” a navigable canal that was less than two miles in length that would connect the Harlow and Clubfoot Creeks.⁶⁵ In 1790 the Dismal Swamp Canal Company was chartered; however, without a competent engineer involved, the canal was too narrow and of insufficient depth.⁶⁶

As a colony in 1766, the legislature had encouraged the construction of a canal to connect New Bern to the deep-water port at Beaufort. The Neuse and Trent Rivers merge at New Bern and enter the Pamlico Sound near the southern end of the hook in water bank. As the flow of the Neuse turns left just before joining the sound, the tributary Clubfoot Creek enters the Neuse flowing northward. Due south of the headwaters of Clubfoot but separated by land, the flow of Howell’s Creek enters into the Pamlico Sound from the north and near the Old Topsail inlet at Beaufort.⁶⁷

As a state in 1795, the General Assembly decided to authorize three men to construct a canal that would connected the two rivers for navigation directly from New Bern to the deep-water port at Beaufort. However, over the next three decades progress was slow with only one-third of the three miles completed by 1822 due in part to the increasing costs over time, various board members responsible for the projects, superintendents without experience, too few workers, and difficulty of obtaining investors. Eventually, over three decades, the major investments of loans and stock was nearly forty thousand dollars from the state. With traffic over a six-year period from 1827 to 1833, the tolls collected amounted to an average of five hundred dollars a year.⁶⁸

When the people in northeastern North Carolina and southeastern Virginia were colonials, the tobacco they grew on plantations and farms in the region was carried along roads to the Appomattox River at Petersburg, Virginia, or directly to the deep-water port in Norfolk and then exported to foreign countries. In addition, the carry of pitch, tar, and turpentine manufactured from the abundance of longleaf pines in North Carolina was often included in the navigations northward on the Pamlico and Albemarle Sounds before traveling by land to the deep-water port in the Chesapeake Bay of Virginia. However, as early as 1786, representatives

from Virginia and North Carolina met in Fayetteville to confer about constructing a canal through the Great Dismal Swamp extending into each state and expediting commerce in their eastern regions.⁶⁹

In determining the boundaries between the states in the 1720s, the survey included the Great Dismal Swamp. No doubt the representatives gathering in Fayetteville were confident about constructing a canal in swamp land since, in 1763, George Washington, who was an experienced surveyor, with a few friends, had expressed interest in purchasing forty thousand acres in Virginia within the two thousand square miles of the entire Great Dismal Swamp spread across the two states.⁷⁰ In 1764 the State of Virginia issued a charter to Washington and his friends to establish the Dismal Swamp Land Company for the purpose of draining the land to engage in agriculture.

The investment by the company in agriculture provided some dividends, but after the Revolutionary War the company began felling juniper trees on its land with lumber and manufactured shingles exported to growing markets. To carry the lumber to those markets, the trip began in a narrow canal in the swamp that on average was ten-feet wide, two-feet deep, and five-miles long from the northern edge of Lake Drummond to Suffolk Virginia.⁷¹ Shortly after carry began on the first navigations, another canal was constructed that was twelve-feet wide and four-feet deep that carried lumber from the lake to a tidewater creek where large ocean-going vessels were loaded for navigation to markets.⁷²

In 1790 the General Assembly of North Carolina approved the construction within the state of a public canal through the Dismal Swamp to connect a similar canal in Virginia. The cost of construction in North Carolina was placed at eighty thousand dollars, which was to be raised with stocks to be issued at a value of two hundred fifty dollars per share.⁷³ The Great Dismal Swamp Canal Company was incorporated, and construction could begin when the subscriptions for stock reached forty thousand dollars. Even though there were high expectations about the eventual carry on the canal, the payments of subscriptions were slow, which delayed the start of canal construction until 1793.⁷⁴

With legislators altering the plans without consulting a competent engineer, the construction began, even though no one knew how many locks were needed and how much dirt needed to be removed. In addition, there was uncertainty about the accuracy of the survey as well as the expected cost to complete the canal. However, the project did begin within each state with slow progress resulting in five miles completed in Virginia and six miles in North Carolina, but they were out of money with no credit and about halfway to completion when construction of the canal ended.⁷⁵ However, a road was constructed between the two canals that connected carry from Elizabeth City in North Carolina to the deep-water port at Norfolk in Virginia.⁷⁶

The interest from Congress and the response in 1808 from the secretary of the Treasury of the United States, Albert Gallatin, suggested that “early and efficient aid of the federal government” should be involved in internal improvements that would connect north to south along waterways, the Atlantic Ocean, and western waters and interior canals. A recommendation would have connected Massachusetts to Georgia with a canal through each state.

Even though Secretary Gallatin proposed federal projects of improvements during the first decade of the nineteenth century, which were delayed by war, there was growing unrest within North Carolina about the failure of the General Assembly to improve inland transportation to enable more commerce and trade. However, increasing taxes as the means to provide support remained unpopular and was considered to be in conflict with the reasons for the Declaration of Independence and the Revolutionary War.

In 1812 Archibald D. Murphey from Orange County was elected to serve as a senator in the General Assembly of North Carolina. Murphey was educated at the University of North Carolina, taught there for a year, practiced law, and eventually owned more than two thousand acres and one hundred slaves on plantations. Even though he was jailed for mishandling financial transactions, Murphey was involved in transportation to markets of commerce and exporting where time to markets and cost of internal navigation were important to his net income from multiple farms and crops.⁷⁷

Experiences of carry by inland navigation and roads in both North Carolina and Virginia to markets in Petersburg or Norfolk probably influenced Murphey when he resolved to the General Assembly on November 22, 1815, the third day of session, “[t]hat it is expedient to provide more efficiently for the improvement of the inland navigation of this state.”⁷⁸ In response, the General Assembly established a committee to consider the efficacy of the proposed undertaking with Murphey as chairman. Just eight days later, Murphey reported to the General Assembly the recommendations from the committee to improve inland navigation.⁷⁹

There were eleven recommendations that required action by the General Assembly. Three of the proposals were devoted to altering existing charters and awarding them “alike in every respect.”⁸⁰ Three proposals were about the rights, organization, financing, and operation of the companies. Three required mostly information and reports about the current circumstances. The remainder included the employment of “scientific topographical engineers” and the state investments in stock.⁸¹

In 1817, the legislature established the Board of Public Improvements and authorized it to hire an engineer to inform it about all the proposed and existing improvements in inland transportation. In addition, the General Assembly directed the construction of ninety-three roads by 1861 with the first road from Fayetteville to Morganton.⁸²

With three roads constructed every two years, the ninety-three roads were spread throughout five regions. Four of the roads would be built within the eastern region, two within the Coastal-Piedmont, thirteen within the Piedmont, six within the Piedmont-Mountain, and sixty-eight within the mountains.⁸³ After searching within the state and then throughout the country, a civil engineer in England was hired in 1819. Hamilton Fulton gained experience to design and build locks, bridges, and roads as an apprentice to the masters of civil engineers in England.⁸⁴

The board expected Fulton to review the design and construction of improvements underway in addition to surveying for future roads and improvements. In return Fulton identified the faults of existing improvements and provided in detail recommendations to achieve objectives established by the board.

The report of observations and recommendations from Fulton in 1822 included comments about the location, design, and construction of dams and locks to improve navigation on the Neuse River, resuming the construction on the Clubfoot and Harlow's canal, connecting three separately designed and constructed sections of the Cape Fear River, locating and designing locks to navigate the Roanoke Canal, and surveying to connect with a road from Fayetteville to Wilkesborough and then to Salem.⁸⁵

As the state engineer Fulton was involved in surveying, reviewing, criticizing, designing, and routing construction; however, the decisions for establishing chartered companies involved the General Assembly. With the money from the sale of one million acres of land claimed from the Cherokee tribe and earnings from stock in banks at hand, subscriptions of stock, loans, and direct support to the companies resulted in the construction of canals, turnpikes, and roads.⁸⁶

With the failures of companies to achieve their objective to improve internal navigation before his arrival, the Board of Improvements directed Fulton in 1823 to focus on improving navigation on the Cape Fear River between Fayetteville and Wilmington. Even though Fulton designed and supervised the construction of piers and docks along the river in addition to removing logs and trees from the river, some members of the General Assembly were unhappy about his salary (five thousand three hundred thirty-three dollars plus expenses).⁸⁷

In 1824, after a survey by Fulton, the North Carolina Legislature granted the opportunity for Buncombe County to incorporate a company for the purpose of constructing a turnpike road with authorization to obtain the capital of fifty thousand dollars with stock at fifty dollars a share. When the seventy-mile road along the way from South Carolina to Tennessee opened, the toll charges ranged from twelve-and-one-half cents for a loaded slide to fifty cents for a loaded horse.⁸⁸

Many of the mountain farmers preferred raising hogs on most of the harvested corn and then herding them to market rather than carrying the harvest in wagons along the turnpike to market. Estimations concluded that during the months of

October, November, and December at least one hundred fifty thousand hogs passed through the center of downtown Asheville. Men known as drovers and a few helpers were expected to travel about six miles a day to the next stand or a place to stop for the night. At Asheville they could occupy hotel rooms; however, a meal, feed, and shelter for hundreds of animals, and space for the drover to sleep on the floor cost one dollar.⁸⁹

Some members of the General Assembly continued to criticize the salary of Fulton and suggested that he be leased to other states. In January 1826 Fulton resigned to accept a similar position in Georgia. Fulton left behind in North Carolina many recommendations that would improve inland navigation if an experienced civil engineer guided the Board of Internal Improvements and the General Assembly in their investments in companies chartered to improve inland navigation.⁹⁰

Most of the recommendations by Fulton to improve navigation on the Roanoke River within North Carolina contributed to more than two hundred miles of navigation on the Staunton River from Salem, Virginia and on the Roanoke River to Weldon, North Carolina. Only the falls on the Roanoke River near Weldon, North Carolina was the last major impediment for navigation to the Albemarle Sound connecting through the Dismal Swamp to Norfolk.⁹¹

After surveying the area around Weldon, Hamilton Fulton and the state engineer of Virginia joined in recommending the route and locks for the canal around the falls of the river.⁹² Projects to construct the canal had begun by 1822; however, the Roanoke Company decided in 1828 to construct locks to connect the canal directly to the Albemarle Sound.⁹³ Since Fulton had resigned, the secretary of the Roanoke Navigation Company was in charge of the improvements. Although progress was slow in construction, the locks on the canal were opened in 1834. Transports of the primary cash crop of tobacco doubled, and the tolls tripled.⁹⁴

In 1833 the Petersburg Railroad operated from Petersburg, Virginia to Gaston, which was a small town in North Carolina a few miles northeast of Weldon. In 1834 another railroad connected Weldon, North Carolina to Plymouth, Virginia.⁹⁵ In 1838 the president of the Roanoke Navigation Company told the stockholders that so many means had resulted in cheap transportation with steam power that “no doubt our funds might be more advantageously applied for ourselves, and for the country.”⁹⁶ The travel in the canal around the falls to the Albemarle Sound continually decreased until its closure in 1859.

Even though railroads were replacing inland improvements in navigation, another Fulton, Robert, a civil engineer to Albert Gallatin, had proposed in 1807 connecting the Elizabeth River, in Virginia to the Currituck Sounds in North Carolina. The connection required cutting a canal of five miles to connect the sound with North Landing River in North Carolina. After sixty miles along the river

into Virginia, a cut of a nine-mile canal connected the Elizabeth River to the Currituck Sound.⁹⁷

Fulton and his counterpart in Virginia surveyed the possible connections and concluded that a route of navigation might be practical. After organizing companies and agreeing on route and financing, both states agreed about the details of construction and operating the canals. In 1855 a contract for construction began the four years until the first vessel passed through the canal.⁹⁸

The primary northbound carry for a year on the Albemarle and Chesapeake Canal was more than eight million shingles and more than three hundred thousand feet of lumber from forests. In addition, there were two hundred thousand bushels of corn from the farms.⁹⁹ The primary carry southbound was fifty thousand pounds of iron ore from mines and six thousand cubic feet of manufactured dry goods over a year of carry.¹⁰⁰

As companies improved transportation on rivers, sounds, and canals in North Carolina, steamboats appeared on navigable waterways in the eastern regions of the state. From 1817 to 1861, there were twenty-seven steam navigation companies chartered by the General Assembly.¹⁰¹ The internal improvements underway at the Dismal Canal, the Roanoke River, Clubfoot and Harlow Canal, Cape Fear River, and Sounds encouraged the development of a transportation network, with steamboats traveling hundreds of miles from town to town of carriage for passengers and hauling for commerce and exporting.

The New Bern Steam Boat Company was the first to receive a charter in 1817 for operating anywhere in the state. The steamboat Norfolk was built in Virginia and purchased for fifty-three thousand dollars. The primary route for travel was from New Bern to Elizabeth City. After three months the travel by steamboat ended with closure of the company.¹⁰² However, at least one hundred new steamboats were present and operating in North Carolina before the Civil War.¹⁰³

To purchase and operate a steamboat to carry passengers and haul cargo in North Carolina required a charter from the General Assembly that approved subscriptions of stock to establish a company. The steamboats were very expensive, which required enough passengers and cargo to hire a captain, a first mate, second mate, first engineers, second engineers, firemen, deckhands, stewards, waiters, cooks, chambermaids, and tradesmen for repairs.¹⁰⁴

From 1817 to 1860, more than forty percent of the new steamboats were operating in the Wilmington region, less than twenty percent in the New Bern region and more than ten percent in each of the Roanoke River and the Sounds. About half of the new boats navigating within the state were built in North Carolina with three-fourths of those in either Wilmington or Fayetteville.¹⁰⁵

However, all of the steam boilers and fittings to construct a steamboat were purchased out of state. Three-fourths of all the new steamboats that operated in North

Carolina from 1817 to 1860 were in the state during the two decades before the Civil War. As in the rest of the country, about one-fourth of the new steamboats purchased in North Carolina burned, sank, or exploded.¹⁰⁶

Usually there were three steamboats operating at the same time along the company route. The price of one steamboat could reach fifteen thousand dollars. The costs of wood to heat the boiler and repairs to operate could reach thousands of dollars for each steamboat. In 1850 a company reported that the cost of wood for operations was more than twenty-seven thousand dollars.¹⁰⁷

The steam engine was invented by James Watt as the colonies were revolting. After the Revolutionary War there were all sorts of applications invented where the energy of heat transformed into steam pressure provided the power to operate machinery. Before the turn of the eighteenth century, the Watt engine was providing the power to rotate the propellers of steamboats. In England by 1813, Watt engines were providing the power to rotate the wheels of wagons drawing loads of thirty tons of coal moving at four miles per hour. With experience and curiosity George Stephenson developed the carriage of passengers with the power of steam engines. In 1825 Stephenson surveyed and constructed a locomotive capable of carrying more than four hundred passengers at fifteen miles per hour.¹⁰⁸

In the United States, John Stevens, an inventor of steamboats, was certain in his correspondence with President Madison, New York Governor DeWitt Clinton, and Robert L. Livingston in 1812 that railways were superior to canals in the improvement of inland transportation as the State of New York was considering constructing a canal from the Hudson River to Lake Erie. The superiority was based on the relative cost of construction, cost and availability of common labor with fewer tradesmen, on less damage of timber with elevations above water, on fewer casualties in operation, and on less expense for transportation.¹⁰⁹

The responders were doubtful about cost, performance, and safety of railroads before actual construction. With the celebration in 1825 of inland transportation by navigation from Lake Erie to the Atlantic Ocean and the success of canal network in England, in contrast, there was little experience to rely on when constructing and operating railways. However, the president recognized the importance of developing improvements for connecting transportation.¹¹⁰

Construction on the first railroad to be built and operated in the United States for carrying passengers and hauling cargo began in Baltimore in 1827. The charter included thirty thousand shares of stock valued at one hundred dollars a share, with one-third of the subscriptions for the State of Maryland, one-sixth for the city of Baltimore, and the other shares for individuals and corporations.¹¹¹ By 1833 there were seventy-two miles of track, with the receipts from passengers and cargo of more than one hundred ninety thousand dollars and expenses of one hundred thirty-nine thousand dollars.¹¹²

The estimated cost of constructing the railroad from Baltimore to Wheeling, Virginia was one-half the cost for constructing the Chesapeake and Ohio Canals. The actual costs per mile to construct the railroad were sixty percent of the cost per mile for the canal.¹¹³ The travel time per mile on the railroad was estimated to be one-fourth of travel time per mile by canal. The progress in the construction of the first railroad was less than fifteen miles on average each year until finished in 1852.¹¹⁴

In North Carolina Joseph Caldwell, who graduated from Princeton as a mathematician and Presbyterian minister and served a second term as president of the University of North Carolina, wrote a series of essays published in newspapers combined into a book in 1828 entitled *The Numbers Of Carlton, Addressed To The People Of North Carolina, On a Central Rail-Road Through The State*. The address was numbered into twenty-two essays that focused on the importance of constructing a railroad through fourteen east-to-west counties located through the middle from north-to-south borders of the state and east to west from New Bern to Asheville.¹¹⁵

With few exceptions the improvements in transportation in North Carolina to carry agricultural products from inland farms to trade at deep-water ports were connections to ports located in or near cities that were populated with professionals, merchants, and traders, with domestic commerce and foreign trade contributing to their wealth. Caldwell considered the construction of a railroad a way to overcome inherent limits for improvements in transportation and to distribute the wealth within North Carolina.

The Numbers of Carlton proposed the construction of a railroad across the middle of the state connected by navigation on the Neuse River below New Bern through the Clubfoot and Harlowe Creek Canals to the deep port at Beaufort and through the Old Topsail Inlet to the ocean. As a result, eighty-three potential depots along the railroad tracks could become towns and centers of commerce. In addition, New Bern would become a center of commerce and exports competing with Charleston and Norfolk.

The essays present in detail the route, construction of tracks, and connections required of the railroad for most of farmers throughout the state to compete with farmers in other states in terms of time and cost for transportation from the inland counties to domestic and foreign markets. The estimated cost per mile of constructing railroads was one-third to one-half of the cost for one mile of a canal.¹¹⁶ However, Caldwell emphasized the importance of hiring an engineer to lay out the route and estimate the cost per mile.¹¹⁷

Caldwell met with citizens from Chatham, Randolph, Guilford, and Orange Counties in 1828 to deliver before two hundred persons an address in which he “set forth the causes of the failures in our former attempts at internal improvements, deducing therefrom [*sic*] lessons to impress upon the minds of his hearers the importance of concentrating the whole force of the state upon one central effort; clearly

demonstrating the great superiority of rail-roads over all other kinds of improvement, particularly in this state.” After deliberation those in attendance resolved that a committee be appointed to consider “the importance and necessity of improving the state by construction of a Central Railroad.”¹¹⁸

The committee resolved that the next legislature should construct a railroad from the community of Campbellton to the market house in Fayetteville as an experiment for citizens to “witness.”¹¹⁹ However the committee expressed concerns about the “perseverance in other important improvements in which they are engaged, and which promise a successful termination, and especially those on the Cape Fear.”¹²⁰

One year later over more than hundred persons from twenty-two counties mostly east of Orange, Chatham, and Wake, gathered in Raleigh on July 4, 1833, to attend the Internal Improvement Convention. The stated purposes of those “assembled at this place on the late Anniversary of American Independence” were “to consult on the means of improving the condition of the state” and “lay before you the results of their deliberations.”¹²¹

The assembly adopted nine resolutions to address their concern that “while most of the other states of the Union are rapidly advancing in the career of prosperity and distinction, North Carolina remains inert or at best stationary—her trade languishing—her agriculture without improvement—many of her most valuable citizens abandoning her borders, and her relative wealth and strength fast declining.”¹²² Four of the resolutions outlined the process for communicating to citizens in all of the counties with the message of an organized “liberal system of Internal Improvements,” of assistance by loans from the General Assembly, of improvements “creating and improving markets within her own limits,” of two-fifths of subscriptions of stock owned by the state and of fair competition among the companies.¹²³

Even though the central railroad was not constructed by 1850, the number of railroad companies in North Carolina was about one-half the average for all of the states, and the mileage of tracks was about the average of two hundred sixty miles per state. Over the next decade the total number of miles for railroad transportation in the country increased more than threefold.¹²⁴ The number of miles of tracks in North Carolina more than tripled to almost nine hundred miles, which was about equal to the average number of miles operating in each of the thirty-one states.¹²⁵ However, the miles of track in the interior northern states had more than doubled and constituted about one-third of all miles of railroad tracks in all of the states.¹²⁶

In 1850 there were two railways in North Carolina that included the Raleigh and Gaston Company of eighty-seven miles and the Wilmington and Weldon Company of one hundred sixty miles¹²⁷ with twenty-five stations that were from two to eleven miles apart along the route.¹²⁸ By 1860 there were an additional five railway companies that included the Atlantic and North Carolina Company operating along ninety-five miles from Goldsboro to New Bern, the North Carolina

Company along two hundred twenty-three miles from Goldsboro to Charlotte, the Western North Carolina along eighty-four miles from Salisbury to Morganton, the Western along forty-one miles from Fayetteville to Moore County, Wilmington and Manchester along one hundred sixty-one miles from Wilmington to Manchester in South Carolina, and the Wilmington, Charlotte, and Rutherford Company, along one hundred ten miles from Wilmington to Charlotte. The eight hundred eighty-nine miles of railroads improved inland access for transportation to export products from the forests, soils, and factories.¹²⁹ In addition, for a great number in the population, travel time to ports was reduced from a month to days.

In addition to turnpikes and railroads, companies were chartered to construct plank roads. The road was constructed with “laying thick, heavy planks on stringers, which were placed parallel with the direction of the road and set into the road-bed. Fine gravel or sand was spread on the road to protect it from horseshoes and steel-rimmed wheels.”¹³⁰ The Fayetteville and Western Company constructed the first plank road in North Carolina in 1849. In the 1853–1854 legislative session, eighty charters were approved to establish companies throughout the state to construct toll plank roads.¹³¹ However, during the fifties many of the roads were in need of repair almost one-half of the expected time for replacements of timbers, which resulted in fewer constructions of plank roads.¹³²

The growths in productions of agriculture, manufacturing, and improvements of transportation throughout the United States resulted in the expansion of commerce and exports encouraged from the applications of the energy of steam boilers, labor-saving machines, and other uses of mechanic arts. As the economies in the individual states expanded in wealth and population, the number of engineers was increasing from various sources of practical education and opportunities of employment available to construct and maintain the applications of extraordinary innovations.

In 1828, Thomas Telford, the first president of the newly incorporated Institution of Civil Engineering in Great Britain, described his profession as the

art of directing the great sources of power in nature, for the use and convenience of man, of the means of production and of traffic in states, both for external and internal trade, as applied in the construction of roads, bridges, aqueducts, canals, river navigation, and docks, for internal intercourse and exchange, and in the construction of ports, harbours, moles, breakwaters and light-houses; and in the art of navigation by artificial power, for the purposes of commerce; and in the construction and adaptation of machinery, and in the drainage of cities and towns.¹³³

Navigations of various waterways within and from ports to port were common in every state; however, the construction of canals for connections among waterways

required knowledge and experience of constructing locks, bridges, and roads, which was not common among many of the domestic engineers. Some engineers with experience in England joined Benjamin Wright, born in Connecticut and the chief engineer for the Erie Canal. Under the guidance of Wright and other prominent engineers, numerous men were apprenticed to the supervisors. During the eight years of construction of the Erie Canal, the experiences of many men resulted in their becoming civil engineers.¹³⁴

With the 1860 Census reporting more than eight million persons in the country employed in five hundred eighty-seven occupations,¹³⁵ twenty-seven thousand four hundred thirty-seven were civil or mechanical engineers, with the number increasing almost one-and-a-half times more than the number a decade earlier.¹³⁶ On average there were almost eight hundred engineers per state; however, nearly half of engineers in the country were employed among Illinois, Indiana, Massachusetts, Missouri, New York, Ohio, and Pennsylvania with more than two thousand in Ohio and four thousand in New York.¹³⁷

With the average of four hundred engineers per slave state, the total number of engineers employed in those twelve states was just twenty percent more than in the single state of New York. Among the slave states, almost half of the engineers were located in Kentucky, Louisiana, and Virginia. Although the number of engineers employed in North Carolina increased fivefold over the decade of the fifties, there were just two hundred eighty persons employed as engineers in North Carolina, which ranked fifth from the bottom among the twelve slave states.¹³⁸

During the decade of the fifties, the miles of railroad in operation tripled, the tonnage of cargo vessels built almost doubled,¹³⁹ the value of the production of steam engines increased in one year by sixty-six percent, and the yards of cotton productions by machines increased fifty percent with an increase of about thirty percent in hands employed in four hundred seventy cotton mills among at least seven states.¹⁴⁰

This rapid growth in all sections of the economy resulted in a demand for engineers to survey, design, and construct roads, canals, and bridges and to improve inland navigation. Therefore, when the Board of the Literary Fund of the State of North Carolina was organized in 1837, they began a search with public advertisements in local newspapers, in the *National Intelligencer*, and in the *New York Evening Star* for “a competent engineer to superintend the draining of the swamp lands of the State.”¹⁴¹ The fund was preparing to sell the dried swamp land for the purpose of establishing an endowment supporting education.

With one applicant from Beaufort, North Carolina and one from Charlottesville, Virginia, over a period of three months, Charles B. Shaw, a civil engineer from Virginia, was hired. Consequently, Shaw conducted surveys for less than two years before resigning to accept a position in Virginia as a chief surveyor for a final

segment of the Northwestern Turnpike before any efforts to drain the swamp in North Carolina were underway.¹⁴² Without any enticement for Shaw to finish the project, the Board of the Literary Fund decided not to undergo any efforts to hire a replacement.

The men who attended the Military Academy at West Point were educated in the fundamentals of mechanic arts and sciences of surveying and constructing roads, bridges, and various structures needed for military transportation. With the same principles of knowledge, many graduates of the academy designed, surveyed, and supervised construction of the roads, canals, and railroads that improved transportation throughout the country.

Establishing the Economy of North Carolina

Most of the population residing in the region of Carolina before separating as North Carolina had immigrated either from Virginia or directly from England. Some of those early settlers chose land near navigable waters to begin their lives in America with the opportunities of production in agriculture and gathering natural resources that could be exported to the Mother Country.

The development of an economy as a colony depended primarily on three distinct regions with pitch, tar, and turpentine produced from the longleaf pines in the region of eastern coastal counties,¹⁴³ rice in the southeastern counties along the border of South Carolina, and tobacco in the northeastern counties along the border with Virginia. The major crops for later settlers in the Piedmont region included their vital grains of wheat and corn to feed livestock and to grind wheat flour and corn meal for family food.

The majority of the white people living in North Carolina in 1790 probably agreed with Thomas Jefferson when he stated that with “immensity of land courting the industry of the husbandman... [m]anufacture must... be resorted to of necessity not of choice, to support the surplus of their people.”¹⁴⁴ Jefferson also expressed his belief that “those who labor in the earth are the chosen people of God” therefore “let us never wish to see our citizens occupied at a work-bench, or twirling a distaff.”¹⁴⁵

Ironically, as Secretary of State Jefferson awarded the first patents for labor-saving improvements in transportation, agriculture, and manufacturing. However, during seven decades before the Civil War most of the pursuits of prosperity in North Carolina depended mainly on increasing the number of slaves for the labor before the improvements in navigation for transportations to markets. As a state in 1790, one-third of the population was black persons with three-fourths of them enslaved. Subsequently, most of the progress in the development of the economy in North

Carolina relied primarily on fifteen thousand slaveholding family farms where productions for exports depended on the labor of six slaves per farm on average mainly in eastern counties of the state.¹⁴⁶ At least fifty-three free blacks resided in ten of these eastern counties and owned more than twenty-five hundred dollars in property.¹⁴⁷

Prosperities in statehood were similar to those as a colony in the northeastern, southeastern, and coastal counties; however, the development of cotton as cash crops was mostly on large farms and plantations that averaged two hundred acres or more, with an average of twenty slaves for the labor to harvest and carry to markets. With improvements in internal transportation and labor-saving cotton gins, seen as opportunities for additional income with little concern about the fertility of the soil, most of the cotton harvested was exported to factories in the northern states and England, which rapidly exceeded the consumption for in-home manufacturing.¹⁴⁸

For most of the plantations and large farms in North Carolina, the productions from agriculture and forests were carried by wagons on long journeys to the deep-water ports in Wilmington, Norfolk, or Charleston, where exports began by navigation mostly to markets in the West Indies and England. Exporting products from the labor in agriculture and from the families' in-home manufacturing beyond their needs for subsistence contributed to the development of the economy and wealth of North Carolina. Eighty articles exported from most of the major ports of the United States during 1790 to 1810 included corn, wheat, cotton, bricks, candles, coaches, indigo, rosin, tobacco, soap, wines, staves, shingles, board plank, and hoops.¹⁴⁹

In 1791 the total value of the prominent eighty manufactured articles exported from among the states varied from nineteen million dollars with five dollars per person to more than one hundred million dollars in 1807 and fourteen dollars per person with growth of almost fifty million dollars during two decades.¹⁵⁰ During those decades the value of the exports from North Carolina ranged from a high of nine hundred thousand dollars in 1803, about two dollars per person in the total population of the state, to a low of one hundred thousand dollars in 1808 and less than a dollar per person with an average value of exports from 1791 to 1810 of six hundred thousand dollars.¹⁵¹

With innovations underway throughout the country to improve productivity in agriculture, manufacturing, and transportation, the 1810 Census reported more than two hundred articles that were manufactured in various states and territories with ten percent of the two hundred separate articles manufactured in North Carolina.¹⁵² However, more than seven million yards in the category of "blended and unnamed cloths and stuffs" for apparel and furniture were manufactured in North Carolina.¹⁵³

The total value of the twenty-two of the articles “made” in North Carolina was six million six hundred fifty-three thousand one hundred fifty-two dollars and about twelve dollars per person in the population.¹⁵⁴ Three million dollars were from manufacturing cloths and stuff in every county, which made North Carolina number one in production and value among the seventeen states, six territories, and two districts in the country.¹⁵⁵ With productions of cloth in all of the counties, the average value was almost fifty thousand dollars per county and five dollars per person in the sixty-one counties.¹⁵⁶

Another two million dollars of North Carolina’s manufacturing economy came from productions from distilleries, blacksmiths, tanneries, shoemakers, turpentine, and iron, though none of those industries was located in all of the counties.¹⁵⁷ There were more than five thousand stills in total, located in fifty of the sixty-one counties.¹⁵⁸ In addition there were tanneries in thirty-four counties, where one hundred fifty thousand hides were processed.¹⁵⁹ In contrast there were only eighteen iron works that were located in Burke, Surry, Lincoln, and Iredell Counties.¹⁶⁰

For the most part, the pursuits of prosperity in the economy of North Carolina were by a minority of the white males in the population who organized government, acquired enough land, and bought slaves for the labor. On the larger farms, slaves were often artisans as well as labor for planting and harvesting crops and for gathering and production from raw materials. Therefore, much of the development of the economy as a free state in 1790 depended to a large extent upon one hundred thousand slaves valued at fifteen million dollars.¹⁶¹

At the beginning of statehood in 1790, there were more than five thousand free blacks residing in North Carolina, with the majority living in coastal and Piedmont counties.¹⁶² Over the next five decades the number of free blacks increased to nearly twenty-three thousand persons with ten percent and the largest number in Halifax County.¹⁶³ Although the vast majority of the black people in the state were slaves, among the ten percent of free black people a few pursued prosperity as slaveholders.

With slave labor a few free black men achieved wealth beyond prosperity by any standard. John Stanly, who was born into slavery in 1774, gained extraordinary wealth after his freedom from slavery. The early life of John Carruthers Stanly in Craven County may not be unique; but it is a story not often presented about the pursuit of wealth by a free black man who owned slaves for the labor required to achieve prosperity within the economy established by white men.¹⁶⁴

John was born the son of an African woman who arrived in America on a vessel owned by merchant-skipper John Wright Stanly who gained his wealth in land and slaves before the Revolutionary War. Named for the owner of the vessel but a slave to Captain Alexander and his wife Lydia Stewart, John was encouraged by Alexander and Lydia in his pursuit of a basic education and the trade of barbering.

Still a young boy and a slave, John was “hired out as an apprentice barber” and earned about fifty dollars a month by satisfying patrons of both races in New Bern.¹⁶⁵ At the age of twenty-one the Stewarts petitioned and received a license for John’s freedom, which enabled him to become a free black and owner of a barber shop. With the growth in customers, two slave apprentices were hired to work in the shop, which gave Stanly time to become involved in other ventures.

With income exceeding the costs of his living and operating the shop, John made his first purchase of property in New Bern in 1798 at the age of twenty-four.¹⁶⁶ With ownership of rural property by the age of thirty, Stanly had purchased more than three hundred acres of land before the age of forty. Eventually Stanly purchased more than a thousand acres for plantation farming of cotton and manufacturing turpentine.

In 1820 at the age of forty-six, John Stanly controlled the labor of one hundred eleven slaves with eighty-seven on the Hope Plantation, twenty-five on Cedar Grove, and nineteen on Folly Tract, with each unit supervised by a white overseer employed by Stanly.¹⁶⁷ The net worth of John Stanly at that time of his greatest wealth was estimated to be in excess of sixty-eight thousand dollars.¹⁶⁸ An assessment of how Stanly ranked among other wealthy free black men of that era suggests that Stanly may have been one of the wealthiest.

With decisions that might have included financial assistance for a white Stanly, the fortune of John Stanly eroded away into his fifties until he was approaching his sixtieth birthday when the last one hundred acres were confiscated by the sheriff and sold at public auction.¹⁶⁹ However, by 1830, one hundred ninety-one free black slaveholders had located among thirty-seven North Carolina counties with an average of three slaves per black holder.¹⁷⁰

Although free black property owners were achieving wealth, the number of free black slaveholders decreased to eight by 1860.¹⁷¹ With innovations of labor-saving machinery developing across the United States, subsistence farming without slave labor remained the livelihood by choice or by circumstances for about two-thirds of the white population in North Carolina.

In agriculture, corn, vegetables, fruits, and grains provided food for families and their livestock throughout the counties. Sheep in most counties and growing cotton in some counties provided the raw material consumed with in-home manufacturing of weaving cloth for family clothing, for income from trade, or for necessities in bartering.

Exports of cotton, tobacco, wheat, corn, and rice were prominent contributors in developing economies in a number of states including North Carolina. During the third decade of the nineteenth century, the average value of all exports of cotton was twenty-five million dollars per year, which was almost half the value of all domestic exports throughout the country. Also, almost half of the harvested

cotton was retained for consumption with manufacturing cotton goods within the country.¹⁷²

The value of the exports of tobacco during the decade was one-fifth the value of cotton and somewhat less for wheat and flour. The average value of the exports of corn and meal over the decade was nearly four hundred thousand dollars per year and more than two hundred thousand on average for rice.¹⁷³

Over the third decade the average value of the exported manufactured products was more than five million dollars per year and third in value among all the exports. The prominent contribution to manufacturing in North Carolina began two decades after Samuel Slater built a cotton mill village in the United States similar to those in England. The first mill in North Carolina was built by Michael Schenk in 1813 near Lincolnton in Lincoln County.¹⁷⁴ By 1820 there were two hundred fifty thousand spindles in cotton factories that were among fifteen states, including North Carolina, using ten million pounds of raw cotton.¹⁷⁵

As the number of labor-saving spindles increased in cotton mills within North Carolina, an artisan in-home production of cotton cloth was competing against machines operated by unskilled labor that eventually resulted in less production in the state by domestic weavers. With the yield in agriculture declining due to poor soil fertility, with the demand for tobacco decreasing due to poor quality, and with indebtedness increasing among backcountry farmers, Charles Fisher, a member of the House of Commons, encouraged the legislature in 1828 to consider the value of manufacturing as a source for improving economic conditions in the state.

Fisher tried to convince the legislature that “a crisis is at hand, when our citizens must turn a portion of their labour and enterprise into other channels of industry; otherwise poverty and ruin will fall on every class of our community.”¹⁷⁶ To address the situation, he proposed that using agricultural harvests as the source for manufacturing products and transporting to commercial markets would create jobs and add value to the economy of the state.

The report to the legislature included an analysis of the availability and cost of unskilled labor, of the supply of raw materials including cotton, wool, wood, and iron, of the sources of water to power labor-saving machinery, of the skilled mechanics, of capital needed to build and operate manufacturing facilities, and of the living conditions in the state. Fisher claimed that North Carolina ranked ahead of the northern states in every capacity except capital and mechanics. To address these deficiencies, he suggested that “for skill, we must in the beginning, be indebted to the North and to Europe; but let the system once take root among us, and experience will create skill at home.”¹⁷⁷

Addressing the investment of capital, Fisher was certain that “when the monied and enterprising men of the North fully understand how profitable the business may be pursued here, they will be the first to embark in it.”¹⁷⁸ However, he emphasized

his concern that agriculture had become a way of life, not just a livelihood, and that “our habits and prejudices are against manufacturing, but we must yield to the force of things, and profit by the indications of nature. The policy that resists the change is unwise and suicidal. Nothing else can restore us.”¹⁷⁹

By 1840 there were twenty-five cotton mills in North Carolina, with one thousand two hundred nineteen persons employed, operating forty-seven thousand nine hundred thirty-four spindles, and manufacturing products with the total valued at four hundred thirty-eight thousand nine hundred dollars. Ranging from two to two hundred seventy-eight mills among the twenty-five states, the average was fifty-four mills per state.¹⁸⁰

The number of mills in North Carolina ranked eleventh among the twenty-five states and produced less than one percent of the total value of cotton goods manufactured in all the states.¹⁸¹ However, eight of the states produced more than ninety percent of the total value with the ranking of North Carolina due in part to the fact that the mills were “small, independently owned, locally financed, mostly water-powered” and “run by imported technology and imported technicians and operated by local, low-wage workers.”¹⁸²

During the decade of the 1840s, the number of cotton mills in twenty-five states decreased by ten percent, while the capital invested, number of spindles, and value of manufactured articles increased fifty percent, with a twenty-five percent increase in persons employed.¹⁸³ Among the twenty-five states in 1850, North Carolina ranked ninth in the number of factories, eleventh in the number of persons employed, twelfth in the value of the products, and thirteenth in the capital invested and cotton consumed.¹⁸⁴

As the manufacturing of cotton goods resulted in more raw cotton harvested, the prominent crops in agriculture exported from North Carolina to domestic and foreign markets were wheat, corn, rice, tobacco, and cotton. The wheat harvest in North Carolina in 1840 yielded two-and-a-half bushels per capita in the state, which was about one-half of the average bushels per capita of the entire country.¹⁸⁵ However, the harvest of corn was thirty-two bushels per capita, which was ten bushels more than the bushels per capita of all the corn harvested in the entire country.¹⁸⁶

In North Carolina more and more farmland was dedicated to planting cotton to pursue opportunities for prosperity with income from another cash crop. Responding to an increasing demand, by 1840, cotton harvests had been distributed across fifty-seven of the sixty-eight counties in the state, with production in seventeen of the counties accounting for eighty percent of the total crop.¹⁸⁷ The counties reporting the largest productions were in regional clusters surrounding Cabarrus in the western, Piedmont, and from Halifax to Onslow in the east.¹⁸⁸

Although slave labor was the primary source of labor in agriculture for increasing wealth in North Carolina, black people in the state were also employed in a variety

of occupations. The 1840 Census of North Carolina reported that eighty-eight percent of white and black persons of both sexes were involved in one of seven occupational categories. Ninety-two percent of those in occupations were involved in agriculture and six percent in manufacturing. More than a thousand were involved in commerce and learned professions, and a few hundred were employed in each occupation of mining, internal, and naval transportation.¹⁸⁹

Even with the labor by slaves, unpredictable circumstances were leading to declining productivity in agriculture. Most of the earliest organizations devoted to scientific farming became inactive even though planting cotton without crop rotation began as early as 1824, resulting in decreasing profits from depletion of soil nutrients. The developing practice of replacing unproductive land by clearing or purchasing fertile acreage to maintain or increase income inspired more efforts by farmers to establish scientific practices to restore soil nutrients.

Although the North Carolina Agricultural Society was formed in 1852 for the purpose of demonstrating scientific practices, many yeomen were not willing to abandon their old ways for new methods to achieve any increase in productivity. For most, subsistence farming was enough, since they could not travel to markets with very much excess nor did they want to change their lifestyle so as to require more income.¹⁹⁰

Declining productivity eventually renewed the interests of a growing number of farmers in scientific agriculture. Before 1840 they had begun on their own to embrace it by trial and error and by analyzing the results of various ways and compounds in attempts to fertilize the soil for proper plant growth.

To further the encouragement of improvements in cultivation, lessons in soil chemistry were provided through agricultural publications, journals, and society meetings. In 1823 and again in 1844 without success, governors requested the purchase of land near the University of North Carolina to establish an experimental farm.¹⁹¹

With efforts to adopt scientific agriculture, to establish labor-saving manufacturing, and to improve transportation in North Carolina, the developing economy created a variety of occupations with wage labor. The 1850 Census reported that more than ninety percent of all the six million males in the United States over the age of fifteen were employed for wages in three hundred twenty-five occupations that were enumerated into one of ten categories.¹⁹² Although more than half were employed in agriculture, twenty percent were employed as common nonagriculture labor, fifteen percent were in commerce, trade, manufacturing, mechanic arts, and mining, and the remainder were in other occupations in small percentages.¹⁹³

North Carolina ranked eleventh among the thirty-two states with one hundred thirty-nine thousand three hundred eighty-seven men employed for wages in one hundred thirty-six specific occupations.¹⁹⁴ Ninety percent of the wage earners

were in eighteen specific occupations in which one thousand men or more were employed as smiths, carpenters, clerks, coopers, shoemakers, farmers, laborers, merchants, physician, teachers, fishermen, sawyers and wood planers in mills, makers of shingle and stave, and makers of tar and turpentine.¹⁹⁵

The average wages for gainful employment varied somewhat from state to state; however, the wages in California and the Territories were four to five times the average for the other states. Including California, but omitting the Territories, the average wages among the states for farmhands with board were about twelve dollars monthly, for one-day laborers without board about seventy-one cents, for day laborers with board one dollar and six cents, for carpenters without board one dollar sixty-five cents per day, for female domestics with board one dollar sixty-six cents, and for laborers with board for a week two dollars and seven cents.¹⁹⁶

The wages in North Carolina were three-fourths the national average for carpenters, one-half for the domestic servants, and between a half and three-fourths for all the other wage employments. In fact the wages in North Carolina for all the occupations were least in dollars and cents compared to the wages in all of the states.¹⁹⁷

With few opportunities for schooling, twenty-five percent of the adult free black persons could not read or write. Combining the fifteen percent of illiterate adult white persons and almost all of the black slaves, more than forty percent of the adult population in North Carolina were illiterate. About an equal number of males and females among the free black adults were illiterate, but twice as many females as males among white adults were illiterate.¹⁹⁸

Earlier than 1852, some academies, schools, and colleges in the state included agricultural science and actual practices in their curriculum before the University of North Carolina established a professorship of agriculture to teach applied chemistry and to improve agricultural productions from scientific experiments.¹⁹⁹

Pursuit of Prosperity in North Carolina

By 1860 most of the individual pursuits of prosperity in North Carolina were mainly from productions requiring intensive labor for prominent cash crops of cotton, tobacco, and rice in agriculture and for manufacturing products of turpentine, sawed lumber from the forests, and tobacco products from crops. Wheat and Indian corn were also important for domestic consumption of flour and meal for most of the farmers but also prominent among exports. Even with modest capital, relatively cheap land, few improvements, and scarce free labor, more than half of the sixty-seven thousand farms were larger than fifty acres with fifteen hundred farms larger than five hundred acres.²⁰⁰

The total population of North Carolina grew about fourteen percent during the decade from 1850 through 1860, with the number of whites in the population increasing fourteen percent, the number of free black persons increasing forty-three percent and slaves fifteen percent. Four percent of the total population in the state was composed of free black persons. One-third of the total population was slaves who were owned by one-fourth of the total number of white families.²⁰¹

Over the decade of the 1850s, the number of farms increased in North Carolina by thirty-two percent²⁰² and in slaveholding states by twenty percent.²⁰³ However, three-fourths of those additional slaves were the only ones owned among more than six thousand new slaveholders, which increased the number of the slaveholders to thirty-four thousand six hundred fifty-eight.²⁰⁴ In addition to the labor of slaves, there was a fifty percent increase in the value of labor-saving implements that were purchased for increasing productivity and contributing to the net value of productions in agriculture.²⁰⁵

By 1860, the United States had become a world leader in agriculture, with increases in productions and exports of tobacco, cotton, and wheat. This accomplishment was due in part to the increasing mechanization in farming that resulted from the inventions and manufacturing of agricultural implements by mechanics and tradesmen. Exhibitions in London and New York were reported in the 1860 Census as illustrations of the progress in “mechanical agriculture” resulting from “the agency of the mechanic and the engineer in the art of subduing nature to the will and service of mankind.” In addition, “[t]he magnitude of the interests involved in the successful production of a new labor-saving implement for husbandry should alone prove a sufficient spur to inventors and manufacturers.”²⁰⁶

The progress and corresponding socioeconomic consequences derived from the evolving economy varied in extent and pace from state to state, but there were similarities within some states, and regional economies were developing. By 1860, the expansion of wage labor occurring in the northern states was due to innovations of labor-saving machines that increased productivity in manufacturing. The machines to produce cotton yarn, cloth, and goods increased productivity without the skilled labor of artisans. In addition, other innovations of various labor-saving machines established a diversified manufacturing economy.

In the middle states, the expansion of opportunities for planting and harvesting grains depended on increasing productivity by inventing, manufacturing, and using labor-saving machines that reduced some of the need for common labor in agriculture and artisans in manufacturing. Also, connections inward and to other states by canals and railroads to deep-water ports encouraged a variety of productions for exports to other states and foreign countries.

In the southern states, the expansion of opportunities for prosperity depended on the migration of farming and planting cotton to the Deep South, where climate

and soil conditions were more favorable for growing the crop. Responding to the increasing demand for raw cotton, farmers acquired more land and slaves to export more cotton by connections of transportation networks developing among the states and to foreign countries for productions of cotton goods manufactured by machines.

In addition to foreign exports by navigation, domestic trade developed among states and within regions connected by canals and railroads constructed in the United States with the experience of civil engineers from England and engineers from the Military Academy. Consequently, the country's wealth grew with increasing the trade of textiles, wheat, tobacco, and cotton to the domestic markets that developed throughout it. In general, productivity in agriculture and manufacturing plus improvements in transportation identified the most prominent economic regions of the country.

The most prominent pursuits of prosperity were usually developed from innovations to improve, capital to establish, labor to manufacture, and transportation to trade in the vital markets. With fewer improvements in productivity, less capital invested, mostly slave labor, and limited transportation to markets, the economy in North Carolina developed with disadvantages in every measure of prosperity as compared to about one-half of the other states.

The innovations in North Carolina that were awarded patents for improvements were small in number and fifteenth among thirty other states. During the seven decades of 1790 through 1860, two hundred forty-eight patents for a variety of improvements for productions in agriculture and manufacturing were awarded to persons residing in North Carolina. However, from 1790 to 1850, the average per year was fewer than three patents with the ratio of one patent for fifty-five hundred people in the population. Among the eleven slave states, patent production among the populations ranged from one in two thousand in Virginia to one in six hundred seventy thousand in Mississippi. North Carolina ranked third behind South Carolina.²⁰⁷

Although small in number, the farmers in North Carolina contributed to the development of mechanical agriculture with patents granted for corn huskers, corn harvesters, cotton seed planters, cotton cleaning machines, stalk cutters, straw cutters, ploughs, cultivators, seed planters, hillside plows, seed sowing machines, harvesting machines, threshers, potato-planting plows as well as other aids to manual labor on the farms.²⁰⁸ Even though there was a limited number of skilled mechanics available to manufacture those implements, a growing demand for farm equipment resulted in the establishment of machine shops, foundries, and iron works in Charlotte, Wilmington, Salisbury, Tarboro, Fayetteville, Greensboro, and Warrenton where the implements for farming were produced.²⁰⁹

Before 1850 half of the patents also included improvements in grinding grains, manufacturing textiles, and sawing lumber. Ten of those patents were from persons residing in Wilmington, with six of them from Hervey Law that were improvements in machinery to manufacture staves and lumber. In addition, R. J. Gatling in Murfreesborough was awarded four patents for improvements in machinery for productions in agriculture.²¹⁰ There were also multiple awards in Greensborough and Raleigh with thirty other addresses from Asheville to Elizabeth City.

Beginning in 1850 through 1860, an average of ten patents per year were awarded to persons residing in North Carolina. Almost one-half of the awards were improvements in agriculture which included seeding, stalk cutting, corn planting, and threshing machines. Most of the other awards were special improvements such as a patent for a weighing machine, typograph, carriage spring, water wheel, gun lock, lounge chair, and paring-coring-slicing an apple.²¹¹

Even with improvements in labor-saving implements increasing productivity for the farmers, the pursuit of prosperity with the prominent cash crops of rice, tobacco, and cotton on large farms required intensive labor provided mostly by slaves. In 1860 there were seventy-five thousand farms in North Carolina with forty percent owned by slaveholders; two-thirds of those farms were less than one hundred acres and had an average of ten slaves per farm. However, there were three hundred farms with more than one thousand acres that were located among three-fourths of the eighty-six counties. In each of the four counties of Bladen, Chowan, Orange, and Stokes, there was at least one slaveholder who owned more than one thousand slaves.

North Carolina ranked twelfth in population in 1860 and also in the employment of free males over the age of eighteen.²¹² Sixty percent of the freemen over the age of fifteen in North Carolina were employed in the category of agriculture, which was about one-tenth of the average number employed among all of the states.²¹³ Fifteen percent of those free men were employed in one of the categories of commerce, trade, manufacture, mechanic arts, and mining, which was eighteenth among the other states in the number of employments.²¹⁴

In 1860 the average improved land for planting was three million acres per state with more than the average number in North Carolina, which ranked fifteenth in improved land among the thirty-four states.²¹⁵ With land available for planting, the farmers in North Carolina were third among thirty-four states in pounds of rice produced,²¹⁶ fifth among thirty states in pounds of tobacco harvested,²¹⁷ ninth among sixteen states in harvesting bales of cotton,²¹⁸ fourteenth among thirty-three states in bushels of wheat,²¹⁹ and thirteenth among thirty-four states in bushels of Indian corn.²²⁰ These harvests in North Carolina were about average among the states in production per person in the population with most of the economy

developing in the southern region from the cotton and tobacco with value of harvests depending mostly on slave labor.

Although the harvests of Indian corn during each year of 1850 and 1860 were about thirty bushels per person residing in North Carolina, the per capita pounds of rice increased more than twenty percent, per capita bushels of wheat almost doubled, and the per capita pounds of tobacco and cotton more than tripled during the decade. Also, there was a fifty percent increase in the value of farming implements and machinery equipment owned by the farmers.²²¹

Although North Carolina was seventh among the ten cotton-producing states in 1850 with just three percent of the ginned cotton, there were nearly three hundred thousand slaves in total in the state with many of them laboring on the plantations where nearly three hundred thousand weight pounds of cotton were harvested.²²² With production tripling from 1850 to 1860, ninety percent was harvested in two regional clusters with ten counties east of Mecklenburg and west of Wake and sixteen counties east of Wake and north of Duplin County.²²³

Even with a threefold increase in harvests of cotton over the decade of the 1850s, the crops of cotton in North Carolina remained about three percent of the total harvest in all of the sixteen cotton-producing states.²²⁴ Any additional income also depended on the price at markets with cotton trading at an average price of approximately eleven cents a pound from 1850 to 1860. With an average yield of two hundred fifty pounds of ginned cotton per acre, the gross income at market was approximately twenty-seven dollars per acre.²²⁵

The net income included the cost of fertilizer, transportation, marketing, and labor, with one hand needed for cultivating from eight to twenty acres of cotton, depending on the desire by the farmer for more profit.²²⁶ To increase plantings, some farmers rented or purchased more land valued at six dollars per acre;²²⁷ but without labor-saving machinery and depending on slave labor for planting and harvesting cotton, the availability and cost of labor limited most farmers' aspirations for prosperity from cotton agriculture.

The 1860 Census included an opinion that "[t]he growth of the culture and manufacture of cotton in the United States constitutes the most striking feature of the industrial history of the last fifty years."²²⁸ Certainly in North Carolina the harvest of cotton as a cash crop and the manufacture values of cotton products created opportunities to pursue prosperity with slave labor on large farm and unskilled labor in cotton mills.

With the few internal improvements providing access to markets for some, and as cotton plantings and slave labor migrated westward in the state onto smaller farms in the Piedmont, the demand for North Carolina tobacco that declined before 1830 was reversed by the popularity of the "Bright Leaf" tobacco, which was discovered in Caswell County in 1839.²²⁹ With nearly half of the counties reporting none in

the 1840 Census, more than two-thirds of the tobacco harvested in North Carolina was grown in the five counties of Caswell, Granville, Person, Rockingham, and Warren along the Virginia border. Twenty-five percent of the tobacco was harvested in seventeen other counties, and about five percent among the remaining thirteen counties.²³⁰ With internal improvements in transportation from 1840 to 1860 and convenience to market, the pounds of tobacco harvested in North Carolina ranked fifth among the states.²³¹

By 1860 tobacco was planted in seventy-nine of the eighty-six counties; however, farmers in counties where most of the tobacco was harvested planted less than the average amount per county of cotton due in part to circumstances related to acreage, climate, soil, tradition, and labor. For example, the amount of tobacco gathered in Granville County was the largest in the state; but the ginning of cotton ranked fifty-sixth among the seventy-four counties that reported a harvest.²³²

The opportunities for prospering from the harvest of tobacco depended to a large extent on yield and quality of the harvest per acre planted. With a wide range in quality of the leaf, which influenced the price at market, it was difficult to estimate an average net income for tobacco plantings. An example in the 1880 Census illustrates the important factors influencing net income from two acres of tobacco planted in Granville County with a yield on average of six hundred pounds per acre. With separation by the quality of the leaves, the value per pound varied among the bundles as much as ten to one with an average value of thirty-five cents per pound. With a gross income of about two hundred dollars per acre and estimated costs of nearly thirteen cents per pound, the net profit was approximately one hundred thirty dollars per acre.²³³

In fact, the value reported for the entire crop in North Carolina from 1876 to 1879 ranged from approximately fifty-five to sixty-nine dollars per acre each year.²³⁴ The report also acknowledged that “the value per acre is very low” due to “the fact that fully three-fifths of the product is of a very inferior brown nondescript leaf, bringing very low prices”; but, “the product upon suitable soils often reaches \$250 to \$400 per acre.”²³⁵

In *An Inquiry into the Nature and Causes of the Wealth of Nations*, published in 1776, Adam Smith described the influence of labor, capital, productions, and trade in the development of wealth in the economy of a country. Smith concluded that “[t]he most opulent nations, indeed, generally excel all their neighbors in agriculture as well as in manufactures; but they are commonly more distinguished by their superiority in the latter than in the former.”²³⁶ With liberty to manufacture and to export to other nations, Alexander Hamilton encouraged more manufacturing and exports to pursue opulence in the new nation. With most of the wealth invested in slaves to export tobacco, rice, and cotton, there was less capital invested in the establishments of manufacturing in slave states than in non-slave states.

The “estimate of the value of the manufactures of the United States” for twenty-four branches of articles during the year of 1810 was one hundred seventy-two million dollars, or twenty-six dollars per person in the population.²³⁷ By 1850 the estimate of the value of manufactured products had increased eightfold to forty-four dollars per person in the population of the country and equal in total value to eighty percent of the value for the agricultural products.²³⁸ Over the decade of mid-century, the value of manufactured products throughout the country increased eighty-five percent to nearly two billion dollars and sixty dollars per person in the country.²³⁹

With a total number of one hundred forty thousand manufacturing establishments located throughout all states, fifteen percent were among slave states. About one-out-of-eighty of the persons residing in those states was employed in the manufacturing within that southern region. The number of establishments, the employment of hands, and the value of products varied from state to state, with half of the establishments located in Virginia with one-out-of forty-five persons of the state population employed in manufacturing, one in seventy in North Carolina, and one in eighty-five in Tennessee.²⁴⁰

On average there were eighteen hundred manufacturing establishments per state in the southern region with North Carolina second in number with twice as many as the average. Among the southern states, North Carolina was fourth in capital invested, second in the number of hands employed, and third in the value of products manufactured.²⁴¹

The census also reported that forty percent of all the hands employed in manufacturing in the entire country resided in one hundred two populated urban centers with more than ten thousand occupants per urban center.²⁴² However, less than ten percent of those populated urban places were located in the southern region with five in Virginia, two in Tennessee, two in Georgia, one in Alabama, one in South Carolina, and one in Louisiana.²⁴³

In North Carolina about five percent of the population resided in twenty-five towns with an average of almost two thousand persons per town and populations ranging from three hundred eight persons residing in Thomasville to nine thousand five hundred fifty-two in Wilmington. The average population of the twenty-five towns was more than twenty-one hundred persons per town with at least one thousand persons residing in more than half of the towns.²⁴⁴

There were about equal numbers of white and black persons residing in the towns. However, ninety percent of the black persons were slaves with about ten percent more black females than black males for both free and enslaved black persons. Many of the white and black residents, both male and female, in those towns were employed in commerce or manufacturing.²⁴⁵

Most of the in-home manufacturing by artisans was by farm families, with the value of productions rising to more than two million dollars and from fourth in rank among the states during 1850 to third place in 1860 behind Kentucky and Tennessee.²⁴⁶ At the same time, manufacturing establishments were employing unskilled labor in the production of cotton and woolen yarn, cloth, and goods.

The value of all the products from manufacturers in the United States was increasing in 1850, with one billion nineteen million dollars in products and employment of nearly a million persons whose yearly earnings on average were almost two hundred fifty dollars. The value of products per establishment was eight thousand dollars per capita in the population of the country.²⁴⁷ By 1860 the value of manufacture products had increased by eighty percent, the number of persons employed increased forty percent, and the average wage earnings by nearly forty percent per hand.²⁴⁸

Over the decade at mid-century, the number of manufacturing establishments in North Carolina increased about forty percent by 1860. There were three thousand six hundred eighty-nine establishments located in the state with an average of four persons employed per establishment compared to nine for all manufacturing establishments in the country and an average yearly wage that was fifty percent less than the average throughout the other states. The average value of all the products manufactured in the state was less than half of the value for all the states, with one-sixth the value per capita compared to the average value for the entire country.²⁴⁹

With about a thirty percent increase over the decade, there were one hundred forty thousand manufacturing establishments in the United States by 1860. North Carolina's establishments represented just one percent of all the capital invested in manufacturing throughout the entire country, one percent of the all labor employed, and one percent of all the value in products manufactured in the country. Instead, about sixty percent of all the manufacturing establishments in the country had developed in Ohio, Illinois, New York, and Pennsylvania.²⁵⁰

The number of manufacturing establishments in North Carolina in 1860 was about equal to the average number for all the states, but the annual wages per hand were about one-half the average for all the establishment in the country. With subtraction of the costs of labor and raw materials from the total value of all the products manufactured in the establishments throughout the country, the remaining value was about fifty percent more than the capital invested in those establishments. In North Carolina the manufactured value of the products minus the cost of labor and raw materials was nearly twenty percent less than the average value for all the establishments.²⁵¹

With less than the average per state in investments, wages, and product values, nearly ten million dollars of capital was invested in thirty-six hundred establishments that employed twelve thousand males and two thousand females who

produced in North Carolina one-tenth of the six hundred individual articles manufactured within the United States. On average there were twenty-five establishments producing the same article in various counties. However, almost ninety percent of the investments produced just fourteen of the sixty-two items manufactured in the state.²⁵²

On average, among the eighty counties, there were forty-six individual manufacturers per county of similar articles with an average capital invested of three thousand dollars per establishment, which was less than half the average capital invested per establishment for all manufacturing in the country.²⁵³ Also two-thirds of the manufacturing establishments in North Carolina were located in the six counties of Beaufort, Bladen, Cumberland, Duplin, New Hanover, and Randolph.²⁵⁴

One-third of the nine million dollars of capital was invested in sixty percent of the thirty-six establishments that manufactured just five individual products. However, seventy percent of the total value of all products manufactured in the state was from those establishments located throughout the state and producing crude and distilled turpentine, cotton goods, sawed lumber, manufactured tobacco, flour, and meal.²⁵⁵

Flour, meal, and sawed lumber were produced in eighty percent of the counties, crude and distilled turpentine in thirty percent, cotton goods in one-fourth, and manufactured tobacco in one in five of the counties. In addition to the preeminent products in value, shoes and boots were produced in thirty counties, agriculture implements in fifteen counties, and machines and engines in the five counties of Alamance, Cumberland, Rowan, Guilford, and Wake.²⁵⁶

In New Hanover County and in the town of Wilmington there were three hundred fifty-five establishments with each one manufacturing one of the eleven separate products. With just seventy-two establishments, there were twenty-one different articles manufactured in Lincoln County. The most diverse economy with twenty-five different articles manufactured in two hundred nineteen establishments was in Cumberland County and the town of Fayetteville.²⁵⁷

The measures of success in life for many of the white persons in North Carolina may have been the ownerships of land and homes, with the pursuit of prosperity and wealth depending upon an income to hire labor, support the family, and gain a net income. Some of those opportunities to pursue prosperity were among the one hundred ninety occupations listed in the 1860 Census for two hundred thousand persons residing in North Carolina. In *Ante-Bellum North Carolina* Guion Griffis Johnson combined the one hundred ninety-five occupations into eight categories of employment. This distribution into eight general categories resulted in about forty-five percent of the total two hundred thousand listed as farmers, thirty-two percent common laborers, fourteen percent tradesmen, four percent professional workers, two percent merchants, one percent white-collar workers, three-fourths of

one percent manufacturers, six tenths of one percent planters, and a remainder of others.²⁵⁸ On average there were twenty-five individual manufacturers of similar articles located among the counties with an average capital invested of three thousand dollars per establishment, which was less than half the average capital invested per establishment for all manufacturing in the country.²⁵⁹

Six percent of the total number of occupations which were most likely to achieve some level of prosperity were professional workers, merchants, and planters. Most of the sixty percent of the persons reporting occupations as farmers and tradesmen could have achieved at least the level of subsistence. After arranging the groups, Johnson concluded that: "If occupations, land, and slaves be taken as indices of wealth, it is evident that the average per capita wealth in the State was not large. There were few overgrown estates, and the majority of the inhabitants lived upon the produce of their own labors."²⁶⁰

Those poor persons gainfully employed as laborers in North Carolina earned hourly wages of fifty-four cents in their occupation, which was one-third less than the average for the other states.²⁶¹ In addition, many of the laborers were tenants who leased land or crop-shared while incurring debt that often exceeded their share of the return on the harvest. There was another "class of poor whites in the State, the ne'er-do-wells, known variously as vagabonds, clay eaters, sandhillers" that were uneducated, did not seek an occupation, and lived in an empty cabin or squatted on land to build a hut.²⁶² To obtain money for buying clothing or other needs, a squatter would seek labor if the farmer could trust him to finish what he had started.

An appraiser from Fayetteville provided a measure for poverty as "the whole household property of families of this class at less than \$20."²⁶³ The social rank of free black persons was based mainly upon the color of their skin²⁶⁴, with slaves lower because they were also considered property. However, poor white people often competed for the same occupations of tenancy and low wages, which added to the division by color between the white and black communities.²⁶⁵

Most of the black people were involved in agriculture as a slave or free-wage earner. However in *The Free Negro in North Carolina*, John Hope Franklin describes various pursuits of prosperity for about ten percent of the free blacks. In addition, the 1860 Census reported that fifty-three free black persons owned property valued from twenty-five hundred to twenty thousand dollars.²⁶⁶ With so few persons with values enough for prosperity, the per capita wealth of all the free black property owners was two hundred eighty-seven dollars.²⁶⁷

Depending on location and occupation, the annual wages for free black men varied from sixty dollars per year as a regular farmer, to one hundred twenty-five dollars for ordinary farming, and to one hundred seventy-five dollars per year for turpentine hands.²⁶⁸ The annual wages for skilled labor ranged from four hundred

dollars per year for carpenters to one hundred sixty dollars for brick makers, with wages of blacksmiths, coopers, and shoemakers in between.²⁶⁹

Although the vast majority of the occupations were in agriculture, children of free black families served apprenticeships under black and white masters of various occupations. The law of the state regarding apprenticeships required that feeding, housing, clothing, and caring for the health of the apprentice was the responsibility of the master until a certificate was earned.²⁷⁰

Prior to 1860, more than two hundred black males in Craven County earned apprenticeships among twenty-one occupations. The majority of the certifications were for occupations as a spinner, farmer, carpenter, cooper (makes and repairs wooden barrels), or shoemaker.²⁷¹

The daily wages of labor in North Carolina were one dollar fifty-six cents for a carpenter and seventy-seven cents for unskilled workers. Monthly wages as farmhands were ten dollars thirty-seven cents with boarding.²⁷² Wages of nonagricultural labor in the United States in 1860 were about a dollar a day.²⁷³ The annual earnings of textile worker were about one hundred ninety dollars.²⁷⁴ In comparison the cost of acquiring a slave in 1859 ranged from one thousand to two thousand dollars depending upon age, gender, and skills.²⁷⁵

For those farmers immersed in the culture, society, and economy of North Carolina in 1860, there were few material or income measures of prosperity other than the value of their property of land and slaves. As comparative measures of income, the approximate annual salaries in dollars at that time for educators were two thousand a year for the president of the University of North Carolina, fifteen hundred at Trinity College (to become Duke University), fifteen hundred for a university professor (one thousand at Trinity College), eight hundred for university tutors, and one hundred for public school teachers.²⁷⁶ The average annual income of a civil engineer could exceed two thousand dollars. Four years of tuition, board, and books to attend a university or college could total from five hundred to one thousand dollars.

Clearly, any combination of education, skills, profession, farm size, and number of slaves increased the chances for a white male to realize prosperity. However, most North Carolinians were unprepared and many unmotivated to pursue any opportunity by the means available to them.

In the eleven slave-labor states in the southern region, about one in seven on average of the population were wage earners, from one in five in North Carolina and Tennessee to one in eight in Mississippi and South Carolina.²⁷⁷ On average there were two hundred forty thousand wage earners per state with the number of occupations in North Carolina about average and sixteenth in the total number of occupations.²⁷⁸ In North Carolina more than fifty percent of the occupations were listed as farmers or farm laborers.²⁷⁹

With an average of two thousand residing in twenty-five towns,²⁸⁰ there were also hundreds of other smaller communities developing throughout North Carolina where persons were employed as merchants or clerks in stores that stocked items for the needs and desires of mostly the farmers and farm laborers. About one-fourth of the state's employees were either free or enslaved servants, housekeepers, overseers or common laborers, while nine percent of the skilled labor force were carpenters, blacksmiths, coopers, mariners, mechanics, millers, seamstresses, shoemakers, or turpentine makers.²⁸¹

With mostly skilled or unskilled labor employed in commerce, manufacturing, and agriculture, there were four thousand other persons in North Carolina who were professionals trained or educated as physicians, nurses, lawyers, engineers, professors, and teachers. Also there were eighteen hundred persons available for constructions as machinists, mechanics, civil and mechanical engineers, and surveyors.²⁸²

By 1860 twenty of the thirty-four states of the United States had established medical schools, fifteen had established law schools, twelve had established scientific schools, and seventeen had established agriculture schools. However, before the Civil War, only a law school was established in North Carolina.²⁸³ In the development of higher education there were two hundred literary (classics) colleges located in thirty-two of the states with an average of six per state and actually four in North Carolina.²⁸⁴

However, there were more than one million free persons in the country over the age of twenty who could not read or write. During the decades before 1860, there were encouragements by the public and elected persons to establish public schools in every state. In North Carolina the percent of illiterates among the population was twice the national average and the largest percentage among the thirty-four states.²⁸⁵

More than one hundred thousand public schools were established in the country before 1860 with an average of three thousand one hundred sixty-three per state; North Carolina had two thousand nine hundred ninety-four. However, the annual financial support to schools in North Carolina was two-and-one-half dollars per student and about half of the average support to all the schools in all the states.²⁸⁶ In addition the percentage in attendance in North Carolina was less than half the average of all students in the country.²⁸⁷

At that time, the population of North Carolina ranked twelfth²⁸⁸ and the number of employments ranked sixteenth among the thirty-four states.²⁸⁹ In North Carolina, sixty percent of the freemen over the age of fifteen were employed in the category of agriculture, which was tenth among the states. Fifteen percent of the freemen over the age of fifteen were employed as described by the category of

commerce, trade, manufacture, mechanic arts and mining, which was eighteenth among the other states.²⁹⁰

The influence of the developing cotton economy during the decade of the mid-century in North Carolina was exemplified by the more than five million pounds of cotton produced annually in thirty-nine cotton mills. These mills employed seventeen hundred hands who on average earned one hundred seven dollars a year. These operatives managed more than forty thousand spindles that spun more than three million pounds of yarn for the production of more than four million yards of cloth valued at one million dollars.²⁹¹

The complexity of designing machinery and constructing and organizing labor in factories to obtain productivity required men with knowledge and experience in the integration of technology, labor-saving machinery, water power, and trained labor, who were the engineers of the Industrial Revolution in the United States. With just four institutions establishing courses of study for civil engineering, most of the certified engineers had served an apprenticeship or supervised employment before the American Society of Civil Engineers was established in New York City in 1852.

Public Education in North Carolina

In the constitution of North Carolina of 1776, without prescribing the extent or means required for implementation, article XLI authorized “That a school or schools shall be established by the Legislature, for the convenient instruction of youth, with such Salaries to the masters, paid by the public, as may enable them to instruct at low prices; and all useful learning shall be duly encouraged, and promoted, in one or more universities.” It has been suggested that Article XLI was copied from the constitution of Pennsylvania and that the Scot-Irish immigrants from that state insisted on a provision to establish schools and universities.²⁹²

Although the precedent for levying taxes to support education had been established by the Colonial Assembly with the initial chartering of Queen’s College, the North Carolina Legislature did not create or support a system of public education during the first six decades as a state. Even though the legislature, with some reservations, enacted laws to provide income from import duties and taxes on land, slaves, and property as a means of supporting the War of Independence,²⁹³ the revenue was insufficient to support education at any level. Without internal improvements and with a sparsely distributed population, there was limited commerce and widespread poverty. Without adequate roads, communities remained isolated. Without schools, illiteracy increased. With inadequate infrastructure and little education at

any level throughout the state, North Carolina was often referred to as the Rip Van Winkle State.²⁹⁴

Numerous recommendations for public funding of education were received by the General Assembly; however, with continuing opposition to taxation that prevailed during the Colonial Period, the pleas were either ignored or rejected. Therefore, any response to the growing demand for education depended on influential citizens and community support to establish or incorporate schools and academies.

Without evaluating the content of curricula or the qualifications of the teachers, the legislature approved more than twenty requests from 1766 to 1800 to incorporate academies, schools, or seminaries located in the counties of Franklin, Richmond, Currituck, Onslow, Bladen, Moore, Duplin, Brunswick, Craven, Cumberland, Davidson, Burke, Washington (now in Tennessee), and the towns of Lumberton, Wadesborough, Henderson, Elizabeth, Salisbury, Kinston, Pittsborough, Warrenton, Edenton, and Wilmington. In some instances the General Assembly authorized the academy to conduct a lottery and to deduct ten percent of the prize money for construction.²⁹⁵

With increasing population and availability of graduates from the recently established University of North Carolina, the interest in establishing academies was promoted even more by the larger communities after 1800. From the earliest graduates of the university, teachers and principals were hired by existing or planned academies. With baccalaureate graduates to teach their students and with the opportunity for academy graduates to attend the university, more schools were adopting a curriculum that prepared students to pass the entrance exams.

As an example, the Raleigh Academy was chartered in 1800 to admit young males and, even though they could not attend the university, females, for instruction “in the most useful and necessary Branches of Education, viz: The Sciences, Classics, Arithmetic, English Grammar, Reading, Writing, Needle Work, etc.” Tuition for English grammar, the classics, and sciences was thirteen dollars per year, with boarding available at fifty dollars per year.²⁹⁶ Academies generally emphasized classical studies in Greek and Latin, English grammar, and arithmetic in a multiple-year curriculum. In the larger academies, practical courses such as chemistry and surveying were available. While most academy graduates did not attend a university, they were among the best educated citizens in the state.

With smaller communities struggling to start and sustain elementary education, academies, and training programs, a growing number of North Carolinians were joining the advocates for a system of public education to be supported by appropriations from the legislature. Responding to general unrest and after Governor William Miller reminded them of their lack of support for education, the legislature, in 1815, created the committee “Seminaries of Learning” for the purpose of developing recommendations for their consideration.

An earlier proponent for internal improvements and an influential senator, Archibald Murphey was chosen as chairman of the committee that presented a report to the legislature in 1816 that described a gradation of schools in learning from “the first rudiments of education... to that in which the highest branches of the sciences are cultivated.”²⁹⁷ Since all the citizens would be taught in them, the priority must be schools with first “the learning indispensable to all—reading, writing, and arithmetic.”²⁹⁸ These schools, which are “the most difficult of organization and the most expensive to the State; but they will be the most useful”; the report noted that they “must be scattered over every section of the state, for in them education must be commenced, and in them it will terminate as to more than one-half of the community.”²⁹⁹ The legislature responded to the report by establishing another committee of three persons with Murphey as chairman “to digest a system of public instruction” and report to the next session of the General Assembly.³⁰⁰

In the second report in 1817, details of organization, funding, and curricula for the graded schools were described. With the governor serving as president, a board of instruction would be established to oversee the placement and the operation of the schools and academies. Each county would have at least two primary schools, and the state would be divided into districts with one academy in each of them. The curriculum at each level would be developed “to make the progress of education natural and easy,” beginning with the rudiments in primary school and proceeding to languages, ancient and modern history, mathematics, and other branches of science to prepare the student for admission to the university.³⁰¹ The report proposed that the state pay one-third the cost of establishing and one-third of the cost of operating the schools, but conditioned upon free education for the children of the poor. Even though the report was widely distributed and recommended for further study, there was no formal action by the legislature.³⁰²

Although the legislature did not provide support for another nine years, Murphey’s leadership and his plan for a coordinated system of education inspired his followers to continue their pursuit of approval and financial support for a system of public education. In 1825, Speaker of the House Bartlett Yancey, who studied law under Murphey, introduced legislation to create a fund for the establishment of common schools in North Carolina. The “Literary Fund” would be similar to the method of public support for education in other states, including Pennsylvania. The source of money consisted of “dividends arising from the stocks then held or afterwards acquired by the State in the banks of New Bern and Cape Fear, the dividends arising from the stocks owned by the State in the Cape Fear Navigation Company, the Roanoke Navigation Company, and the Clubfoot and Harlow’s Creek Canal Company, the tax imposed by law on license to retailers of spirituous liquors and auctioneers, the unexpended balance of the agricultural fund, all moneys paid to the State for entries of vacant land, and all the vacant and unappropriated [*sic*]

swamp lands of the State, together with such sums of money as the Legislature may hereafter find it convenient to appropriate from time to time.”³⁰³

Even though the largest acreage of vacant land had been ceded to the federal government in 1789 to establish the State of Tennessee, and the swamp lands were inaccessible, the Literary Fund reported receipts in 1828 totaling \$78,696, which included a balance due from the State Treasury of \$28,184.³⁰⁴ In fact, due to shortages in revenues until 1830, the State Treasury routinely depended on loans from the Literary Fund to pay the disbursements authorized by the legislature. After the entire fund income for 1832 was depleted by the Treasury for current operation of state government, rather than investing in the future of education, members of the fund characterized that action as “the conduct of a improvident heir, who wastes in mere indolence what has been saved, by the industry and economy of the ancestor, for the lasting improvement of the inheritance.”³⁰⁵

In 1825 the legislature appointed “a standing committee of four persons from the community at large, to whom it was prescribed to consider the subject of popular education through the ensuing year and report to the General Assembly at its next session.”³⁰⁶ Joseph Caldwell, president of the University of North Carolina, was appointed chairman and began his assignment by publishing articles about popular education in the *Raleigh Register* under the name Cleveland. Due to illness and his inability to attend committee meetings, Caldwell prepared a delayed report of eleven letters that he first circulated among the members and then submitted them to the General Assembly in 1832. Subsequently, he published the letters that provided a critical review of the current circumstances, the moral and pragmatic reasons for establishing public education, and the details that must be addressed in implementing any plan. He was concerned that there were no current standards by which effective teaching and learning were measured.

At a minimum, “Reading, spelling, writing, arithmetic, and geography constitute the basis of modern education in primary schools.”³⁰⁷ In addition, effective teaching requires that “The essential subjects of art and intelligence in the education of a child are incorporated and intermingled throughout, with the best moral influence that should reign in the heart, illuminate the features and give its own proofs of inward reality by the optward [*sic*] action.”³⁰⁸ The classroom environment must develop character by examples of virtue “in impressive and brief narratives, in small books,” by repression of “selfishness, impatience and insolence” and by confronting “Faults and vices of mind and conduct” with “unhappy effects.”³⁰⁹ He concluded that an educational corps of teachers analogous to the corps of engineers at West Point should be established with training occurring in a central school for teachers because to “educate a young man in a college, is to disqualify him almost with certainty for the permanent business of an elementary schoolmaster.”³¹⁰

With the form and function of government in North Carolina remaining unsettled, Caldwell proposed popular education as an essential part of achieving and maintaining a stable government by the people. "The monarch may dread popular education, on account of the light which it sheds into the national mind respecting the great objects of civil government, and the abuses of power. The republican too, may regard with malignant eye the diffusion of knowledge among the people, if he apprehends that it will impair his own influence, or threaten his comparative estimation in the community."³¹¹ He reminded the readers that their government that avows to protect liberty and property, to guarantee freedom of speech and the press, and to ensure national security depends on the "will of the people. And are the rights of mankind and the obligations of civil society, generally, understood or respected by the ignorant?"³¹²

In 1790, with fiscal conservatism and aversion to taxes, "the total expenses of the State Government were only \$41,480, and \$24,000 spent on the cost of the legislature."³¹³ In 1805, an echo of the annual plea for education was amplified by Governor James Turner with his message of "let me again recommend to the serious consideration of the General Assembly the proper education of the youth of our State."³¹⁴ With the expansion of democracy in national and state elections, the organization of political parties to support candidates for election, and leaders advocating the expansion of prosperity, the General Assembly began to yield at a slow pace for proposals to address the needs for internal improvements, education, constitutional reform, and commerce.

In 1829, the president of the University of North Carolina, Dr. Joseph Caldwell, expressed his concerns about the prevailing culture by proclaiming that "As we now are, and with such plans as we now practice, we correspond in public improvements and in popular education, not with the nineteenth century, but with three centuries ago. Can we, as a population, continue to endure a thought like this?"³¹⁵ Caldwell characterized the situation as a "widespread and fatal delusion that taxation for such purposes was considered contrary to a republican form of government. There can be no doubt that the dominant sentiment made it well-nigh impossible, during this period, to carry through legislation on any subject not connected with the bare preservation of life, liberty, and property."³¹⁶ Also, the eastern and western "jealousies were kept alive by lack of the means of communication between the sections, while commerce and trade languished and the masses of the people remain poor and ignorant, ready to oppose internal improvements and State aid to education as leading to aristocracy and taking the position that plain farmers and mechanics needed no education," resulting in a culture with stagnant expectations and ruinous tendencies.³¹⁷

In 1833, Governor David Lowry Swain chided the legislature for spending "more for [their] service than the amount of their disbursements."³¹⁸ In 1835, he suggested

that the out-migration of North Carolinians over the last decade was because “no adequate provision has been made to diffuse even the elementary principles of education among the poor;... there is not a single work of Internal Improvement in progress” and there was “no fund that deserves the name provided for the future development of our resources.”³¹⁹

As late as 1835, the actual expenses of the state government were eighty-seven thousand dollars with forty thousand dollars spent to support the legislature.³²⁰ With the legislature reluctant to address backwardness within the state, many families, especially in the backcountry, moved to other states or the frontier for promising opportunities. The out-migration would grow to an estimated one-third of the population by 1850. However, wealthier citizens controlled the legislature and saw no need to tax themselves to support education and internal improvements, since many of the poor in the west saw no need for government. The culture of individualism and financial conservatism did not promote prosperity but tolerated ignorance with prejudice, mediocrity, and poverty prevailing.

In addition to proposing a two-year curriculum for primary education, Caldwell suggested an annual salary of one hundred dollars and a training program for teachers who would be selected by school commissioners in each county.³²¹ After developing a financial model to estimate construction, which was six thousand dollars, and annual costs for each school house,³²² which was one hundred dollars,³²³ and with doubt that a tax assessment would be popular, Caldwell suggested that a system of voluntary public education be established to the extent possible from the support that could be provided by the Literary Fund and the county commissioners.³²⁴ While the letters were widely distributed, the legislators did not pass any legislation to establish or approve a tax to support a system of popular education until proposed by the Literary Fund in 1838, which embodied many of the principles proposed by Murphey in 1817 and Caldwell in 1832.

Even without public funding, an education industry of hundreds of schools and academies, with residential arrangements available for white male and female students, had developed across the state by 1830. Educational opportunities included courses, training, and entire curricula in a variety of choices such the classics, military, sewing, art, practical science, farming, weaving, and elementary education. The common (elementary) schools included instruction in reading, writing, and arithmetic for a fixed term. Typically, the number of accepted students each term was fifteen with the cost of boarding and tuition for each chosen course comparable to that charged by academies. Without standards for course content or qualifications to teach, the programs of study were irregular and uncertain. Even though North Carolina remained mostly rural and sparsely populated, the expanding commerce of the agricultural economy stimulated the growth of towns and small communities where practical education and literacy were encouraged, but most

smaller communities could not institutionalize their effort. Shortage of teachers, unpredictable student demand, and unmet financial requirements challenged the most committed.

With the responsibility to increase the value of the assets that would provide annual earnings for public education, the Literary Fund Board decided to explore the possibility of draining swamps and selling the claimed land for farming. In 1837, the fund contracted with Charles B. Shaw, a civil engineer from Virginia, “to examine Grants in the Secretary of State’s Office, to make such plots, etc., as may aid him in the examination of the swamp lands in the Eastern parts of the state belonging to the Literary Fund, & that when he shall have finished them that he procure the necessary instruments & proceed to the examination & surveying, etc. of the Swamp Lands.”³²⁵ The cost estimate for the project was four hundred fifty-seven dollars for surveying equipment, three hundred thirty-five dollars for expenses while in the field, one thousand dollars for an assistant, and twenty-five hundred dollars for Shaw per annum.³²⁶ Based upon the subsequent field study and survey, Shaw estimated a cost of two hundred thousand dollars to drain the swamps.³²⁷

The directors of the fund approved the project with the expectation of increasing the value of their assets; however, the untimely resignation of Shaw, the numerous delays in acquiring rights of way from absentee owners of swamp land, the unexpected errors in estimating elevation of different swamps, the deeper-than-expected drainage canals, and the unanticipated shortage and unpredictable cost of labor resulted in considerably more expenses than estimated and little if any return on the investment to drain the swamps.³²⁸ Even without a significant income from this investment, the value of the fund assets in 1838 was greater than the combined legislative appropriations of one million two hundred fifty-one thousand eleven dollars from 1823 to 1832.³²⁹

One hundred years passed, and hundreds of requests were ignored by the legislature of North Carolina before the entreaty by colonial Governor Gabriel Johnston in 1736 became a reality. His conviction that education is a moral and practical obligation of the privileged to expand opportunities for prosperity to the common people was finally given a chance. In 1838, the president and directors of the Literary Fund, along with the Senate Committee on Education, reported that although the invested value of one million seven hundred thirty-two thousand four hundred eighty-five dollars was one of the largest among the states and current annual earnings were estimated to be seventy-five thousand dollars, the fund could not adequately support the number of common schools needed across the dispersed population.³³⁰ The committee recommended that the state be divided into one thousand two hundred fifty school districts of approximately thirty-six square miles each.³³¹ The Literary Fund would provide at least one hundred dollars per annum to each district that would be supplemented by a local tax.³³² It was also reported that in

Massachusetts, the Literary Fund provided one-half and in New York one-tenth the costs for common schools.³³³

The division of counties into school districts would be conducted by a committee to be chosen by the courts in each county. By an act of the legislature, voters in each county were permitted to decide on the establishment of a tax and, if approved, superintendents were chosen to organize the schools. Mr. W. W. Cherry, chairman of the Committee on Education, was concerned about receiving adequate support for the local tax and suggested that: "Those who have mixed much with the people of our State know that there is an average of nearly one half in every family of the State, who have recd [*sic*] no education and who are as yet unprovided [*sic*] with the means of Learning even to read and write! Are you not willing, not only to contribute yourselves, but to stir up your neighbors to the importance of the matter and get their consent to pay this small tax?"³³⁴ The referendum on education passed in "nearly every" county, and the process of building and staffing classrooms began in 1840. By 1858, the North Carolina school fund exceeded the similar funds in Maine, New Jersey, Maryland, Virginia, Massachusetts, and Georgia by as much as five hundred thousand to one million seven hundred thousand dollars; plus, the education system included as many or more colleges, academies and schools as the other southern states.³³⁵

With support from the Literary Fund and local taxes, the number of public common schools increased more than threefold in the decade of the 1840s, with enrollment growing nearly sixfold. As a result of subdividing, there were eighty counties in 1850 with one hundred four thousand ninety-five students attending two thousand six hundred fifty-seven common schools being taught by two thousand seven hundred thirty teachers for four months a year at a total cost of one hundred fifty-eight thousand five hundred sixty-four dollars.³³⁶ With annual support of public education increasing to two hundred sixty-eight thousand seven hundred ten dollars by 1860, the Reverend Calvin H. Wiley, the superintendent of Common Schools, stated that North Carolina is "clearly ahead" of other southern states in public education and "compares favorably in several respects with some of the New England and North-western States."³³⁷ The per capita expenditure per white person was fifty cents as compared to eight cents in Virginia and one dollar in New York.³³⁸ However, further expansion of public academies, Normal schools, colleges, and universities would be delayed, and education at any level for one-third of the people in North Carolina would depend on the elimination of slavery as a result of the Civil War.

In North Carolina, during these two decades before the Civil War, the number of academies increased from one hundred forty-one³³⁹ to four hundred thirty-four³⁴⁰ with many of the graduates contributing to the increase in the number of white males attending the six colleges, which had more than doubled in number, while

colleges for females increased from one to thirteen.³⁴¹ To educate the children of white families, one or more public schools were established in all but four counties of North Carolina in 1840 with the total number increasing nearly fivefold and the annual attendance swelling sevenfold by 1860.³⁴² Although not mandatory, it was estimated that two-thirds of school-aged white children in North Carolina attended these schools.³⁴³

Throughout all the states, about twenty-five percent of the total white population was attending school with eighteen percent in North Carolina and more than twenty-five percent in Pennsylvania and Massachusetts.³⁴⁴ As secession led to war, eligible young white males, who were teachers, professors, tutors, students, yeomen, laborers, professionals, and politicians, volunteered to join the North Carolina militia or were conscripted to serve in the Confederate army.

Consequently, women and children in the family unit were challenged to perform the labor vacated by males, and this resulted in a decline in agricultural production and a decrease in commerce for personal prosperity. With less income to support education at all levels, many of the common schools closed; fewer teachers were available; and, with a priority for the provisions for the soldiers rather than for marketing farm products, there was a reduction in local income and in the number of children attending schools. By 1863, only one-half of the counties reported active public schools with about one-third as many children attending and about one-third of the number of schools that reported operation before the Civil War began.³⁴⁵

Practical Education in North Carolina

By 1800, twenty-four universities and colleges in the sixteen states had been founded.³⁴⁶ In North Carolina, four colleges and one university (University of North Carolina) were admitting students before 1800, with two colleges closing by 1822.³⁴⁷

In the United States, most of the institutions of higher education were private, some were affiliated with a Christian denomination; and, with few exceptions, the curriculum in each college and university was devoted to an education in classical studies. While most educators did not foresee the impact of applied science on industrialization or a need to change the classical curriculum, there were a few visionaries within the state and nationally who promoted practical education.

Inspired by the need for internal improvements of roads, canals, and railroads to expand commerce and by the advantages derived from improved productivity in agriculture and manufacturing, these leaders encouraged academies, institutes, colleges, and universities to experiment with curricula that provided instruction

in applied science. The content in the curricula that provided practical education varied with each institution, but usually included the knowledge and practices associated with the profession of civil engineering or the chemistry of soils to promote productive agricultural practices and experiments to demonstrate scientific principles. Baccalaureate degrees and certificates were awarded with an array of descriptions including philosophy, natural philosophy, applied science, engineer, and civil engineer.

Considered preparatory for admission to a university, a few academies included the applications of engineering and civil engineering, usually surveying, as applied mathematics in the curriculum. The programs adopted by institutes were either similar to the ones at academies or were more advanced in applications with prerequisites of higher levels of science and mathematics.

The established universities experimented with curricula and degrees in applied science and with professional studies as a minor within the curriculum of classical studies. By current classifications, these early curricula spanned the current education programs for engineers, engineering technologists, and engineering technicians. In some instances, the application of practical knowledge was described as the mechanic arts and usually included inventors, assemblers, or users of machines to replace labor or increase the productivity of humans.

Prior to 1860, engineering, applied science, mechanic, or mechanic arts in various forms were introduced by as many as fifteen universities, colleges, institutes, and academies.³⁴⁸ Then, as now, there were overlapping knowledge and unresolved disagreements about the responsibilities of each contributor to the applications of science for the purpose of expanding prosperity.

The bill to charter the University of North Carolina was introduced in the legislature in 1776, but was postponed for twelve years before the efforts by William Richardson Davie, who was born in England in 1756, immigrated to South Carolina in 1763, attended Queen's Museum College in Charlotte, graduated from the College of New Jersey (Princeton) in 1776, served as a colonel in the Revolutionary War, practiced law in Halifax County, represented Halifax County in the legislature from 1786 to 1798, and served as governor in 1798, obtained the votes for approval.³⁴⁹ With a loan of ten thousand dollars, eventually forgiven, and with private support, the trustees appointed Davie to be chairman of a committee to proceed with selecting a site, developing a curriculum, and hiring a faculty.³⁵⁰

Recognizing his extraordinary vision and success in every detail from charter to graduation, the trustees designated Davie as the "Father of the University" in 1810.³⁵¹ Freshmen were admitted in 1795, who were the first and only graduates of a public university in the 1700s. From the beginning, politics influenced the financing and the stability of the university with the situation characterized publicly as the faculty promoting education "inconsistent with Republicanism" that "created

an aristocracy of the learned who would trample upon the rights and liberty of the ignorant.”³⁵²

Capital and operating funds for the university were obtained from tuition, donations, lotteries, sale of lots, escheats, room, and board.³⁵³ While access by the university to the escheats and sale of unclaimed property was restored, the legislature denied this funding opportunity for a few years as an indication of their annoyance with the Federalists’ view of the trustees and faculty. By 1840, the income from all sources exceeded immediate needs, and an endowment of investments was established that would eventually enable the admission of some students, without means, who did not have to pay tuition.³⁵⁴ Even so, without public funds to assist in expenses, the majority of the students were sons of the privileged, many from out of state.

When the University of North Carolina opened on January 15, 1795 with limited resources, a unique curriculum developed by a committee of the trustees was implemented by the Reverend David Ker, who was born in North Ireland and was a graduate of Trinity College, Dublin, in charge.³⁵⁵ After one year of experience “with the raw, mostly untaught youths of diverse ages and acquirements,” the institution was divided into two branches, called “The Preparatory School” and the “The Professorships of the University.”³⁵⁶

Unprepared for the Professorships of the University, students entering the preparatory curriculum were tutored in writing, arithmetic, grammar, geography, English literature, and translations of Latin texts with Greek optional. The curricula for the Professorships of the University, developed by Davie, contained visionary and untested departures in content and structure from the narrow tradition of classical studies.

Davie expressed the kernel of his challenge as “The variation of the plan from that of other colleges makes the question of degrees a difficult one. A bachelor’s degree generally imparts a knowledge of the learned languages as well as the sciences. To confer such a degree upon a person who can understand neither Latin or Greek, does not appear to be proper.”³⁵⁷

After expressing his support for classical education and the significance of the AB curriculum, Davie endorsed the need for practical education as an alternate with “The ruling or leading principle in our plan of education is that the student may apply himself to those branches of learning and science alone which are absolutely necessary to fit him for his destined profession or occupation in life.”³⁵⁸

For those concerned about the potential conflict of content and degrees awarded, he contended that “One study does not imply the necessity of any other, unless of one necessary to make it intelligible. But I am well convinced of the utility and policy of conferring degrees and granting special certificates.”³⁵⁹

The courses assigned to the five Professorships of the University in the curriculum published in December 1795 defined classical studies at the University of North Carolina with the addition of opportunities of electing chemistry and philosophy of medicine, agriculture, and mechanic arts in the Davie plan. The professor of chemistry and philosophy of medicine, agriculture, and the mechanic arts at the University of North Carolina may be the earliest recognition by the universities devoted primarily to classical studies of the importance of practical education for professions and occupations.

Although the professions of medicine, law, and divinity would be included in the curriculum at a number of colonial universities, the inclusion of agriculture and mechanic arts within a curriculum of classical studies probably occurred first in America at the University of North Carolina. While content assigned to the four professors of classical studies was identified, agriculture and mechanic arts were not described in any detail.

In later years, within the curriculum of classical studies, applied chemistry and applied mathematics provided the foundations in applied science and practical education for these two professions. Over time, surveying became a required course for all graduates. With land considered the primary wealth and with some planters' sons enrolled, one cannot help but wonder whether surveying was a valuable skill even without the mechanic arts.

Davie's introduction of practical education was innovative; but Davie's concept about diversity in curricula with some students organizing their own plan of study to achieve a specific objective was visionary. In addition to the flexible curricula, he proposed two degrees that would be awarded depending on the language requirements: "First. The degree of of Arts (A.B.) evidenced by a diploma in the Latin language, for proficiency in English, the sciences, and either Latin or Greek. Second. A diploma in English certifying knowledge and progress in the arts and sciences, to one omitting both the classics."⁶⁰

Little did Davie suspect that higher education would eventually adopt his principles of flexible curriculum and degrees for "profession or occupation" or that hundreds if not thousands of "profession or occupation" degree programs would exist in the twenty-first century. Davie's curricula embodied principles that were thirty years ahead of the University of Virginia in introducing the elective curriculum, fifty years ahead of Harvard, Brown, and Yale in their development of scientific schools, sixty-five years ahead of practical education by the Land Grant legislation, and one hundred years ahead of the proliferation of curricula devoted more to occupation or profession than to the centuries-old traditions of classical education.

The essential features of flexibility, multiple degrees, or certificates within one academic unit, were the blueprint for the evolution of the curricula at the leading universities of today. Ironically, a graduate in the first class in 1798, Hinton James,

became a civil engineer apparently through the option in the curriculum and an apprenticeship. He had a distinguished career devoted to coastal waterways (Cape Fear) used for navigation.³⁶¹

Unfortunately, experimental programs in colleges and universities fade away or are terminated due to changes in leadership, loss of key faculty, or lack of student interest. With Davie leaving the state, students revolting “against the disciplinary authority of the faculty,” a number of faculty resigning and aggravating public criticism, Davie’s “Enlightenment curriculum” had challenged tradition with insightful alternatives but also incited retrospective tendencies.³⁶²

By 1804, the flexibility envisioned by Davie was abolished by the elimination of the curriculum in English for the pursuit of an occupation or profession. Under the leadership of the Reverend Joseph Caldwell, a 1791 graduate of Princeton, a professor at the University of North Carolina since 1796, and appointed as the first university president in 1804, the university formally adopted the tradition of classical studies as established by the colonial universities.³⁶³

One might conclude that the choice simply illustrates peer pressure among universities to follow the most respected and not be too bold with introducing change. It may be that the emphasis on the mechanic arts and engineering was not sustained due to the cost of equipment to teach surveying; UNC’S surveying instruments were a gift that went missing during the Civil War.³⁶⁴ Nevertheless, the university, the state, and the citizens of North Carolina lost the opportunity to lead rather than to follow during the one hundred fifty years when education increased opportunities for prosperity by those entering the “destined profession or occupations in life.”

Unfortunately, there were other lost opportunities, but beyond the control of the university. In the meantime, science, engineering, agriculture, and the mechanic arts appeared and disappeared in various curricula as new institutions attempted to describe useful education and training. Scientific agriculture as a practical learning experience appeared in 1832 in an advertisement in the *Raleigh Register* by the board of managers of the proposed Wake Forest Institute. “The object of the Institute is to enable young Ministers to obtain an education on moderate terms, and to train up youth in general to a knowledge of Science and practical Agriculture.”³⁶⁵ Therefore, “Every pupil shall labor three hours a day, under the direction of an experienced and scientific farmer.”³⁶⁶ The total academic year expenses were sixty dollars for no more than fifty students with none under twelve years of age.³⁶⁷

The institute was chartered in 1833 and transitioned to Wake Forest College in 1839. It seems reasonable to assume that the labor served two purposes: reducing the cost for those of moderate means and teaching future ministers the practices of scientific agriculture for crop yield with productive soil. In addition, the young ministers were learning how to provide the essential needs for their family by farming. It is doubtful that the trustees of Wake Forest expected the ministers to be

agricultural agents of their time, but the odds are that they shared, free of charge, their acquired knowledge with the members of their church.

Originally chartered as Western College of Lincolnton in 1821 and approved by the legislature in 1824 to relocate the charter to Mecklenburg County, Davidson College opened in 1837 and established a Manual Labor Seminary. With support by Presbyterians, the opening was advertised, and many of the features of the seminary were described in an article in the *Southern Citizen* published on February 14, 1837. "All the students will be required to perform labor, Agricultural or Mechanical, three hours each working day."³⁶⁸ The reduction in the cost of boarding depended upon the demands on the laborer.

For example, the cost of board was reduced from thirty dollars to fifteen dollars per session for students performing the most rigorous labor.³⁶⁹ With tuition of fifteen dollars per session for students enrolled in the curriculum of languages and science, the annual payment for attending ranged from sixty to ninety dollars depending upon the demands of labor. Although agricultural and mechanical labor by the students was required at Davidson, the practical knowledge obtained during attendance was derived by supervised work (apprenticeship) rather than studies devoted to the successful application of knowledge (technology). The concept of teaching the technologies that support the applications of science to agriculture and mechanic arts in the classroom was considered, by most educated people of that time, a misdirected effort.

Using the establishment of the Military Academy at West Point as the paradigm, other unique schools, academies, and institutes were formed with the objective "to give the youth a good practical scientific education" and to provide physical and disciplinary development through military training.³⁷⁰ On June 29, 1829, a "Plan and Course of Study of Bingham's School" appeared in the *Raleigh Register* to announce the opening and to seek applications for admission to the "Roanoke Institution for Practical Scientific Instruction" at Littleton in Warren County, which moved to Oxford before opening.³⁷¹ "No candidate will be admitted into this institution, who is under ten years of age, who cannot read and spell, and who is not of good moral character.... The cadets will be divided into two Departments. Those under fourteen years of age will constitute the Junior, and those over, the Senior. The whole expense per Academic year, will be for the Junior \$160, and for the Senior \$175.... This expense will include every charge for Board, Tuition, Fuel, Lights, Washing, Public Lectures, use of Arms and Accoutrements, Room Rent, and in short every expense except clothing and books. The academic year will consist of 46 weeks, and will be divided into two sessions."³⁷²

The proposed curriculum was described with content in classical studies, applied mathematics, applied science, and general studies in English. Classical studies included Greek, Latin, French, and Spanish. Grammar, geography, history, rhetoric,

composition, criticism, logic, and moral philosophy were among the subjects in English. Realizing the deficiencies of common schools, “The rudiments of Education as Reading, Spelling, Penmanship, & etc. will be thoroughly taught, and the Junior Classes will in this respect, receive particular attention.”³⁷³

In addition to arithmetic, algebra, logarithms, geometry, and trigonometry, other subjects in math and applied science were included so that “Particular attention will be paid at this Institution to Practical Education. Classes in Mathematics will be practically taught the application of Trigonometry to Heights and Distances; Triangular Surveying; Leveling and Engineering; Gradation of Roads and Streets, the use of the Barometer, when applied to taking the altitude of mountains and other eminences. They will frequently be taken out to practice with the Compass and Chain, Theodolite and Levelling Rods, and accompanied by their instructors, will occasionally take excursions for the purpose of making observations in Botany and Mineralogy.”³⁷⁴ A book devoted to civil engineering was cited as a text.

With minimal education required for admission and with the broad and demanding curriculum, this experiment in practical education was no doubt challenged to prove the value promised with the announcement of the opening. In addition to acquiring practical knowledge, the “Youths may here be prepared for admission into any of our Colleges or Universities, either one or two years in advance; for admission to the Military Academy at West Point or the Navy; or they will be carefully instructed in the various branches necessary to a finished education.”³⁷⁵ After the examinations of the first graduating class in 1831, a Committee of Visitors issued a report that stated their impressions of this new and different institution of education.

As described by Charles Lee Coon in *North Carolina Schools and Academies, 1790–1840: A Documentary History*:

The examination commenced on Monday the 7th of June, and continued from day to day, until the Friday following; during which time the Cadets underwent an accurate and thorough examination in the English, French, Latin & Greek languages, and in the various branches of the Mathematics. In all these studies, they manifested a proficiency and readiness, to be acquired only by constant application, under the most judicious instruction, and acquitted themselves in a manner that reflected great credit, both on Pupils and Instructors. Notwithstanding the difficulties incident to the commencement of every institution they have attained a method and system in their operations, seldom observed in older Establishments.... The Committee have taken much pains to make themselves acquainted with the plan of instruction pursued here, and to ascertain the success which has attended its incipient operations—the result of their observations and inquiries, has been such as to satisfy them that the great

ends of Education—the developing and invigorating the mental and bodily faculties, and preparing youth for future usefulness, are here judiciously and industriously pursued.³⁷⁶

Unfortunately, the experiment was challenged by finances, location, and criticism. With the second year of operation in 1831, a school opened in Fayetteville and the Oxford school moved to Raleigh. Reacting to concerns about cost, the school responded by stating that “with the impression of the public that our terms are now too high, induces us to put the terms down to \$150.”³⁷⁷ As might be expected, the public announcement that practical education, rather than purely classical education, prepares students for a useful life or entrance to preeminent universities was challenged. Appearing in the *The Star* on February 17, 1831, GASCA, a pseudonym for someone publishing an opinion and a common practice at that time, provided a critique of the Bingham School curriculum containing practical knowledge at the expense of classical studies by stating his concerns that this new school for the application of science has “no libraries, scarcely any apparatus and not sufficient buildings for the comfortable accommodation of a large number of persons... The people of North Carolina, at least those who are friendly to the interests of education and a judicious instruction of the youth of the State, must lament the establishment of the above mentioned schools among us. These institutions seem intended to give our young men a complete and classical education, and to dispose with the necessity of a regular course at the university.”³⁷⁸

Over the next one-and-a-half centuries, practical and classical education will compete to define the purpose of colleges and universities. With the relocation of the founder to Alabama to become the engineer on the Dale Town, Woodville, and Greensborough Railroad, one of the earliest institutions of practical education in North Carolina closed in 1833 in Raleigh and in Fayetteville.

As communities grew in population, developed infrastructure, and engaged in commerce, training professionals who served public interests was essential and usually provided either by an apprenticeship or education. Rensselaer's founder was convinced that education and training in the useful arts of the applied sciences would increase prosperity among the members of the community. Awarded the first degree of civil engineer in the United States in 1835, thousands of graduates of RPI (Rensselaer Polytechnic Institute) have contributed to the expansion of prosperity in Albany and throughout America for more than one hundred sixty-seven years.

Another technology support program was chartered in Cincinnati in 1829 as the Ohio Mechanics Institute, which provided practical and continuing education for the mechanics who worked in the developing industries in the city. Although the institute experienced financial challenges during the Civil War, as mechanics

became technicians and then engineers, the academic curricula evolved into engineering degree programs over the next century.³⁷⁹

The development of engineering degree programs usually began with more practical than theoretical knowledge when established for local prosperity, but more as applications of science when taught at existing classical college or university. As these early programs evolved, faculty hiring, employer requirements, and careers of graduates influenced the merging of the important practical and theoretical knowledge into generally accepted engineering curricula.

In 1833 in North Carolina, as Fayetteville was becoming a town with aspirations for prosperity, a Memorial of Trustees, “committed [to] Guardianship of a High School of the first order,” incorporated the Donaldson Academy and Manual Labor School.³⁸⁰ They were certain that the community would benefit from the establishment of a department to prepare teachers, a department to give attention to those with “mechanical pursuits,”³⁸¹ “a knowledge of science, when connected with Agriculture and the Mechanic Arts” and “Civil Engineering [as] another branch of education.”³⁸² After erecting the building and accepting applications for admission, they found themselves with only fourteen thousand dollars in subscriptions and needed another ten thousand dollars to purchase equipment and implement their vision of providing practical education. They requested that the legislature authorize the Literary Fund to lend the needed money; however, the request was denied, with the response that the fund was for the common schools.

Regrettably, this important experiment in practical education for the common people did not occur only in North Carolina. It was developing in New York and Ohio, where educated and trained mechanics and engineers were available to advance the expansion of transportation and labor-saving machines for manufacturing. With steam power replacing horsepower and skilled labor needed to build, maintain, and operate the trains, barges, and ships in the expansion of commerce, opportunities for prosperity from wages were available within those states for those willing to leave the farm. Consequently, where these centers of commerce prospered, the skilled, trained, and educated work force developed.

Meanwhile in 1839, another group of citizens, involving those who sponsored Brown’s Schoolhouse in Randolph County, organized an effort to develop an academy they eventually called Union Institute. They raised the money to erect the building and hired Brantley York as the teacher. He was born in 1805 and had irregularly attended schools for about a total of a year with discontinuities due to closings, moving, and lack of a teacher. York lamented that “Education during my boyhood was at an extremely low ebb, there being but very few schools, and they of a very low grade.”³⁸³

Describing the impact of scarce opportunities for education in his community, he stated that “There may be ignorant persons not superstitious, but the superstitious

are almost invariably ignorant. The people of this neighborhood believed in Witchcraft, Ghost-seeking, haunted houses and fortune telling.³⁸⁴ With York's limited classroom education and even with his admirable self-education, the breadth of curriculum at Union Institute would have been limited if not for his assistant teacher Braxton Craven.

When York resigned in 1842, Craven was chosen as the teacher of the institute. He was just twenty years old and provided leadership for four decades. Craven was born in 1822 in Ramseur, a small community in Randolph County. He was orphaned at an early age and was subsequently raised by a Quaker couple.³⁸⁵ He attended a subscription school and then New Garden Boarding School from 1839 to 1841, where he studied Latin, Greek, geography, chemistry, philosophy, astronomy, surveying, geometry, mensuration, algebra, and history.³⁸⁶

Taught by a graduate of Haverford College, Craven excelled at every subject and mastered many on his own. As the status of the institute grew under his leadership, he became concerned that his lack of a college degree might reflect poorly on the institute. He decided to request that Randolph-Macon College permit him to take all the exams required for a bachelor of arts degree. Subsequently, he received an honorary AB degree in 1849. In 1851 he was awarded MA degrees by Randolph-Macon and the University of North Carolina.³⁸⁷

During his first decade as principal of the institute, Craven expanded the curriculum and established an academy that included the five Departments of English, Mathematical, Natural Science, Latin, and Greek. With confidence in his achievement, Craven asserted in the Union Institute Catalogue of 1849 that while "few persons can obtain a Collegiate education," graduation from an academy "is evidently preferable to a partial course at College." Craven considered the institute curriculum sufficient preparation to gain entrance, but if one chooses not to attend college "we believe our course is well selected, that it will properly develop and discipline the mind."³⁸⁸

With inspiring tutelage at the New Garden Boarding School, self-educated accomplishments, and years of success as an educator, it is not surprising that Craven contributed to the debate concerning the establishment of public education in North Carolina. After a thorough study of common schools in the United States and Europe, he published articles on the organization of schools and training teachers.

Craven was especially critical of the "public opinion" or the culture of North Carolina that had "made us tools of oppression"... and... "made our people believe that they were fit for nothing but to be hewers of wood and drawers of water; that they were to be servants forever; while other states have been moving in rapid strides to the perfection of every art we have been compelled to refrain from every improvement."³⁸⁹ With most people embracing subsistence agriculture as a way of life as

well as a livelihood and remaining unimpressed with education and training, “We have not been allowed to spin and weave the cotton raised on our own borders; we have been prohibited to make our clothes, shoes, wares, mechanical, farming, and culinary implements.”³⁹⁰

We import “our hats, shoes, brooms, axe, handles, and scythe sheaths, whilst our forests abound in furs, our fields in sedge, and our groves in timber.”³⁹¹ The craftsmen in our shops “have always come from a distance, other states have sent us their refuse tailors and mechanics of every sort.”³⁹² North Carolinians do not aspire “to teach a high school or college, to superintend a factory, to survey a public road, to make a pair of fine boots, or extract a decayed tooth.”³⁹³ Craven was critical of the widely held public opinion in North Carolina that accepted and often ignored the backward circumstances, while other states were expanding prosperity by educating the children and supporting internal improvements to encourage commerce.

With the passage of the Education Act in 1839, which resulted in an increasing number of public common schools and a corresponding need for more teachers, Craven developed a curriculum to graduate teachers and admitted a class of students in 1848 and 1849.³⁹⁴ Satisfied with their preparation to teach in common schools, he was ready in 1851 to commit to the curriculum for teachers and to change the name of the institute to Normal College. Normal College was chartered by the legislature to train teachers for public common schools, and Craven applied for a ten thousand dollar loan from the Literary Fund. Before the loan was secured and with confidence in his purpose, Craven established the Departments of English, Mathematical, Natural Science, and Latin to provide a four-year curriculum for classical studies and a three-year curriculum for the English Scholar (no classical language requirements).³⁹⁵

Students who successfully completed the first year in either curriculum were admitted to the Normal Department where they were “not only taught *what*, but *how* to teach; they are instructed in the proper principles of school government, and everything that tends to make them efficient and useful teachers.” When “deemed suitable” to teach, they were awarded certificates to teach that expired in one or two years unless they completed the junior term in classical studies or the senior term in the “English Course” of studies.³⁹⁶

In addition to the practical education in the Normal Department to prepare teachers for the common schools, the classical and English course of instruction included an opportunity for all students to complete a course in the second term of the senior year in architecture and civil engineering in 1850, mechanics and civil engineering in 1856, and civil engineering and reviews in 1857.³⁹⁷ The classical course and the English course were similar to the curricula envisioned in 1796 by Davie at the University of North Carolina that included mechanic arts. Although neither

institution awarded a degree in engineering, both courses of study were adequate preparation for an apprenticeship, if the graduate pursued a career as an engineer.

Even with a decade of unresolved disagreements about the organization and requirements for teacher education, the Literary Fund loan was approved in 1854 at the time that the college reached an enrollment of one hundred ninety-five students.³⁹⁸ However, with continuing criticism and unmet financial requirements, the Normal Department was abandoned and the charter was transferred in 1857 to the North Carolina Conference of the Methodist Episcopal Church and became Trinity College. Even though the classical course and the English course of instruction included the opportunities for engineering education, Trinity did not adopt a curriculum or a degree in engineering until other universities accepted practical education for undergraduates.³⁹⁹

University of North Carolina

Chartered as a public university with legislative authorization to acquire escheats, the annual budget of the University of North Carolina also depended on revenue from an endowment and from payment of tuition, room, and board by the students. Without public funding from the legislature to subsidize the budget, the combined income from the students—with each paying from two hundred twelve to two hundred sixty-six dollars per year depending on the meal plan, on the wood used for heat, on the oil used for light and on the amount of washing—amounted to more than half the budget for the total salaries of the professors and tutors.⁴⁰⁰

Without a subsidy from public funds and with a self-perpetuating board of trustees which approved enrollment, admission requirements, curricula, and tuition, the University of North Carolina operated in a manner similar to the private colonial colleges in the north. The enrollment grew to four hundred sixty before the Civil War with thirty percent of the students (most of them privileged by birth) from other southern and a few northern states, with many graduates achieving distinction as politicians, professionals, military officers, diplomats, and merchants.⁴⁰¹ Attracting one of the largest enrollments in the country, the University of North Carolina was among a few southern universities capable of maintaining classical studies, sustaining more costly practical education, and encouraging the mechanization of agriculture and labor-saving machinery in manufacturing.⁴⁰²

Practical education was restored by fiat at the University of North Carolina in January 1852, when the trustees, meeting in Raleigh, resolved “That a professorship of Civil Engineering or other same is hereby established in the university; that the Faculty be directed to report, as early as convenient, a plan for organizing the same.”⁴⁰³ At a meeting in December, the trustees again “resolved that the Executive

Committee and the President of the University be directed to provide for instruction in Civil Engineering & Agricultural Chemistry & the application of science to the mechanic arts, at the university with as little delay as possible: and that they be empowered for this purpose to establish one or more additional professorships with a salary or salaries not exceeding in the aggregate \$2800.⁴⁰⁴ The Reverend Charles Phillips, tutor of math, and Benjamin Sherwood Hedrick, an 1851 graduate of the university who then studied at Harvard, were selected and established curricula as the first professors of civil engineering and agricultural chemistry respectively.⁴⁰⁵

Before embarking on a leave of absence for a year of special study at Harvard, Phillips requested assurances from David Swain about “the intentions and expectations of the Trustees, as to the results of their plans” to establish a “School for the application of Science to the Arts.” “Is it to be supplementary to (or independent of) the College course, where professional instruction is to be given” as an elective or “so interwoven in the general College system as to afford facilities of its own to every candidate for A.B.?”⁴⁰⁶

During the year in Cambridge, further correspondence with President Swain revealed a sense of excitement and purpose about the establishment of practical education at the University of North Carolina. With experiences at Harvard directing his insight, Phillips described two programs for civil engineering with different curricula for those whom “for the sake of convenience, I shall call Amateur and Professional Students.” In current curricula, the concept of a minor or major in a discipline corresponds to Phillips’ characterization.⁴⁰⁷

Upon the return of Phillips and Hedrick, the School for the Application of Science to the Arts was created “to prepare young men for professional life as Engineers, Artisans, Chemists, Farmers, Miners and Physicians.”⁴⁰⁸ Courses within the school were intended to provide fundamental rather than practical knowledge, and attention was “chiefly directed to the obtaining of a familiar acquaintance with those theories which Science of the day presents as applicable to the Arts of civilization.”⁴⁰⁹

Candidates for the degree of bachelor of arts pursuing “Amateur” status as an engineer could “substitute Civil engineering... for the Ancient and Modern Languages, or for International and Constitutional Law” during the second term of the senior year.⁴¹⁰ With an average yearly enrollment of sixty-six students in the School for the Application of the Sciences, with approximately forty percent from other states, nine out of ten of the total enrollment from 1855 to 1860 elected to be “amateur students” in practical education while pursuing an AB degree. About ten percent of these “amateur” students opted for the course in engineering with the remainder reflecting their interest in the principal application of science at that time by choosing analytical or agricultural chemistry.⁴¹¹

As an alternative, “Those students of the University who seek for a professional education, may leave the Academic course at the end of the first term of their Senior year, and devote themselves entirely to their own special studies during a period of eighteen months. At the end of six months, they will receive the degree of Bachelor of Arts,... at the end of their fifth year the degree of Master of Arts.”⁴¹² Even though three-and-one-half years in the classical curriculum provided more than adequate math and science as the foundation for engineering studies, “professional” engineering education within a classical curriculum was not widely adopted. In addition, there is no record that indicates that students were willing to commit to a five-year program to achieve professional status.

Another “professional” option was available to those who desired to study civil engineering without admission to the classical courses. Entering directly into the Department of Civil Engineering, the degree of bachelor of science could be earned in two-and-one-half years. “Applicants for admission into this Department will be expected to manifest great familiarity with the various processes in Arithmetic, Algebra, Geometry, and Plane and Spherical Trigonometry, together with its applications in Surveying, Navigation, Heights, and Distances. These preliminary acquisitions are indispensable.”⁴¹³

Graduation requirements included:

FIRST YEAR

Church’s Analytical Geometry; Church’s Differential and Integral Calculus; Davies’ Descriptive Geometry; Davies’ Shades and Shadows.

SECOND YEAR

Smith’s Mechanics and Engineering; Mahan’s Civil Engineering; Gillespie on Roads and Railroads; Trautwine, Borden, Long, &c. on Geodesy and Earth Works.

THIRD YEAR

Applications of Science to various constructive Arts; Reviews of previous studies.⁴¹⁴

The Department of Civil Engineering provided a unique opportunity for a practical education without pursuing classical studies and resembled the opportunities at Harvard and Yale, but the admission requirements of advanced math with practical applications limited the enrollment to graduates of colleges, universities, and some of the larger academies.

However, from 1855 to 1860, as many as twenty-one students, with fourteen from other states, enrolled in the bachelor of science in civil engineering curriculum, and as many as six, with four from other states, graduated.⁴¹⁵ Although the preparatory school curriculum at the University of North Carolina was established for admission to classical studies, graduates were not prepared for admission to the

Department of Civil Engineering. With demanding prerequisites that were not widely taught in schools or academies, opportunities for prosperity through engineering education were not available to most of the people in North Carolina.

As engineering education was adopted by more institutions of higher education, the success of the engineers who earned their professional status mainly by experience created some uncertainty for decades about the relative importance of theory and practice in the evolving curricula as the content was debated and adjusted. Some advocated theory as learning from the top down to discover applications. Others supported experience as the insight necessary to develop theory. As expected, there were disagreements between those who develop the curriculum, those who set standards for the profession, and those who hire the graduates.

Contributing to the advancement of engineering education, at least three distinct approaches to establish successful programs included: the curricula at the Military Academy at West Point and RPI that integrated math, science, theory, and practical knowledge; the curricula at Union College, Brown, and Michigan that integrated a portion of the classical education with applied science and engineering; and the curricula at Virginia, Harvard, Yale, and UNC that resembled professional or graduate education. These early experiences, with contrasting programs, assisted the development but did not resolve the challenges for engineering educators as they searched for the educated engineer as well as engineering education.

How many engineering graduates are needed to support the developing economy and infrastructure? What basic knowledge in science, math, and technology is required to support an engineering curriculum? How much of the curriculum should be theory versus laboratory experiments? Should existing universities adopt engineering curricula, or should new institutions, such as RPI, meet the challenge? Should engineering education be a professional or graduate program of study? Is engineering more than the application of science? Who decides? Many of these questions were answered in the next fifty years. Answers to some did not become clear for another one hundred years.

The practical education, which evolved in established universities during the last half of the nineteenth century, was in response to the efforts of community leaders who encouraged the faculty to abandon the rigid structure and content of the established classical education to organize new and substantially different curricula that included applied science. Therefore, to understand the challenges in the development of practical education in evolving institutions it is important to briefly review the educational framework available to the founders.

Although teaching and learning, as exemplified by Socrates and Plato, have thrived for thousands of years, institutionalizing the process of admission, curriculum, and awarding degrees began in universities created prior to and during the Renaissance. The University of Bologna (1088) is the oldest university in the Western

World. Oxford (1167) and Cambridge (1209), the prototypes of colonial universities in America, were founded more than two centuries before the invention of the printing press (1452). Just sixteen years after landing at Plymouth, the Pilgrims founded Harvard University (1636) with six men in the first class. During the next one hundred forty years, William and Mary (1693), Yale (1701), Princeton (1746), Columbia (1754), University of Pennsylvania (1755), Brown (1765), Rutgers (1766), and Dartmouth (1769) were established in another seven of the thirteen colonies.

These colonial universities were modeled after the English universities that produced so many outstanding men, some of whom were leaders in founding the new country, some were successful in commerce, and some became professionals in medicine, law, government, and religion. They provided the standard by which the new public and private universities were created and judged until the twentieth century. A classical education embodied the literature, poetry, culture, history, philosophy, and politics of the Romans and the Greeks, often studied in the original language of the authors.

The knowledge obtained from these classical subjects formed the foundation for discourse between faculty and student to develop the mind of the student for inquiry, for critical thinking, for establishing character, and for universal perspective. While the curriculum focused primarily on classics, to varying degrees the natural philosophy of physics, chemistry, and biology and the applications of geometry and calculus were emphasized. In some instances, professional courses were available as preparation for entry into an apprenticeship that was required to practice law or medicine. Math, natural science, and professional studies were clearly secondary in terms of the time devoted to each; however, they served the useful purpose of a different learning experience based on theorems, theories, logic, and the rigorous language of science and mathematics. The degrees awarded were universally a bachelor of arts (AB).

View of Education for Prosperity before Confederacy

Before 1860, the advancements in education in North Carolina included the emergence of twenty-eight colleges; however, none included practical education as a priority. Except for the University of North Carolina, all were private, most were affiliated with a religious organization, about one-third were for females, and some were in transition from a status as an academy, institute, or school; twelve eventually closed.⁴¹⁶ In the 1860 Census, sixteen of the twenty-eight were reported as colleges,⁴¹⁷ with nearly thirty percent of the students enrolled at the University of North Carolina. By that time, the colleges of Wake Forest, Davidson, Trinity, and the University of North Carolina had collectively granted two thousand bachelor

of arts degrees during their existence, with a primary commitment to classical education.⁴¹⁸

Even though most colleges maintained their own preparatory program, “Great was the scholastic mortality,” as attrition established the fact that at least one-half of the matriculates at Wake Forest, Davidson, and the University of North Carolina were either impeded or unprepared to master a classical curriculum.⁴¹⁹ Without any precedents, the expectations and goals of public education and the requirements for entry to college were not connected. Consequently, private tutoring or attendance at an expensive academy was required to successfully matriculate. Without dramatic improvements in public education, opportunities for prosperity through attending one of the colleges or universities remained a privilege for few North Carolinians.

As many as one in four of the white population in North Carolina over the age of twenty was unable to read or write.⁴²⁰ Necessarily, most of the efforts in public education were focused on literacy. While one hundred five thousand twenty-five students attended one of nearly three thousand public schools (elementary), only thirteen thousand one hundred sixty-nine were enrolled in the four hundred academies or other schools (high school). The public schools operated on an annual budget of two-and-a-half dollars per student with less than one-third of the revenue from taxation and more than half from public funds (Literary Fund) as compared to the national averages of four-and-a-half dollars per student with the percentages from taxation and public funds essentially reversed.⁴²¹

Although the student-to-teacher ratio was about the same, the annual expenditure per pupil in the academies was more than ten times that for the public schools with less than five percent of the revenue from taxation and public funds and with more than ninety percent from tuition and fees charged for attendance.⁴²² Of those who graduated from the academies, only a few, whose families could afford the expenses for attendance, would take the entrance exam for admission to a college or university. While progress in public education was acclaimed by the superintendent of Common Schools, it was forbidden by law and unlikely by circumstance, so only a few of the non-whites in North Carolina could attend school to learn to read or write. In total, almost seventy-five thousand people in North Carolina were illiterate without any prospect of pursuing opportunities for prosperity through education at any level.⁴²³

By 1860, the State of North Carolina had become more democratic geographically; but as many as eight out of ten of the adult population were not eligible to vote.⁴²⁴ While most citizens did not welcome government intervention into their life or livelihood, they did value their freedom, independence, and religion. For the two centuries prior to the Civil War, the influence of government on the lives of the people of North Carolina came about through the decisions of leaders who

depended on others of privilege rather than public opinion to support their convictions. Crucial action or inaction by the few who influenced so many in the pursuit of prosperity and practical education in North Carolina can be variously characterized as courageous, noteworthy, disappointing, ignoble, and self-serving.

The development of settlements established east to west in the colony and State of North Carolina were influenced by geographical surroundings, size of farms, soil for crops, transportation to markets, dependency on slave labor, and representatives in government. Often, the development led to disagreements and unfairness in governing which defeated attempts to unite and improve the development of education, transportation, and representation. Foremost in division, the necessities for founding plantations along the coastline were unlike those for subsistence farming in the Piedmont by recent immigrants. For a century, the established settlements in the east had control of government and most of the opportunities for trade. In addition, the everlasting division about taxation from the established haunted all the efforts for public education.

The liberty provided by the Declaration of Independence, Revolutionary War, and the Constitution of the United States established freedoms from government control and opportunities for prosperity. The protection of innovations in the Constitution and freedoms in the Bill of Rights were the foundations for creating opportunities for prosperity. In North Carolina the challenge of unfair governance by the Regulators, the demand for freedom at the Battle of Moore's Creek, and the assurance of fairness in the Bill of Rights, illustrate the passion to seek and the courage to defend freedom. Noteworthy contributions to education spanned the lives of three important contributors: the vision and tenacity of William Davie in the founding of the University of North Carolina, the leadership of Archibald Murphey in the establishment of public education, and the genius of Braxton Craven in advocating and creating education at all levels for the benefit of the state.

The primary disappointments resulted from the decision to delete practical education from the courses of study at the University of North Carolina, from the inaction regarding public funding of internal improvements and education, and from the inability to sustain academies and schools that provided training in scientific agriculture and mechanic arts. The ignoble hypocrisy in the passion for freedom while supporting indefensible attributes of human bondage resulted in a lifetime of suffering for each slave and in prejudice toward all black people for generations. Governing by policies of exclusion and neglect, the legislature perpetuated the selfish undemocratic tendencies of the privileged and prosperous planters, while prolonging backwardness and ignorance in many parts of our state. The reaction to each of these circumstances shaped the opportunities for prosperity as practical education and training become available at all levels for more North Carolinians.

As the United States grew in geography and population, the number of colleges and universities increased to four hundred sixty-seven with a combined enrollment of fifty-six thousand one hundred twenty, which represented about two-tenths of one percent of the thirty-one million Americans as reported in the 1860 Census.⁴²⁵ With an average of one hundred twenty students and six professors per institution and with an expenditure of about fifty-five dollars per student, the reported annual budget averaged about six thousand eight hundred dollars and was provided primarily from endowments, tuition, room, and board.⁴²⁶ With opportunities to increase productivity in agriculture and manufacturing through inventions and technology, existing and new universities were responding to the need for graduates with more practical education.

The 1860 Census provides insight into the rapid development of practical education, with the majority of the colleges as theological, medical, legal, scientific, agricultural, normal, or military colleges, schools, or departments, and the minority classified as “Literary institutions conferring degrees of A.B., A.M. &c.” colleges.⁴²⁷ Of the seventeen institutions offering scientific programs (civil engineering, analytical chemistry, or mining), ten were in the nineteen northern and midwestern states and one in each of the southern states of Virginia and Louisiana.⁴²⁸

New York, with five, and Massachusetts, with two, were the only states in which more than one institution offered scientific education.⁴²⁹ Among these seventeen institutions, at least one institute, four colleges, and two universities established a curriculum with two awarding certificates or diplomas in civil engineering and one awarding a bachelor of science degree. However, only a few civil engineering degrees were awarded before 1860 by each of these eight institutions.

While the existing colleges and many of the new educational institutions included applied science in their curriculum, with some establishing practical education curricula and degrees as the primary purpose, the number of engineers graduating from programs at the Military Academy at West Point, Rensselaer Polytechnic Institute, and the evolving programs in other institutions was far less than required by expansions in commerce, transportation, and manufacturing throughout the country.

Including the few graduates from each university, college, institute, or school, a total of five hundred twelve civil engineers were reported by twenty-three of the thirty-nine states in the 1850 Census.⁴³⁰ In addition, there were more than eleven thousand unclassified engineers reported with more than half of them in Massachusetts, New York, Ohio, and Pennsylvania.⁴³¹

With an expanding infrastructure to support a growing economy that depended on the applications of science and a growing demand for labor-saving machinery, the number of civil and mechanical engineers reported in 1860 had more than

doubled in just ten years, with nearly two-thirds of them in Illinois, Indiana, Massachusetts, Missouri, New York, Ohio, and Pennsylvania.⁴³²

The sum of the number of engineers reported by the fifteen slave states was less than the sum reported by Pennsylvania and New York with North Carolina contributing one percent of the total for all the states.⁴³³ Almost all of those engineers were trained as an apprentice, immigrated, attended a school or academy, or advanced by experience as a mechanic or tradesman. Regardless of their method of preparation, the engineers who built ships, canals, bridges, roads, railroads, locomotives, steam ships, labor-saving machines, and mechanized agricultural equipment were truly pioneers with extraordinary creativity, intuition, practical knowledge, and dedication to the use of their special talents to advance the economy and the standard of living for all the citizens of the United States.

Opportunities without Courage

As the changing economy was affecting the various regions, the westward expansion of Americans, the building of railroads, the connectivity of the telegraph, the growth in manufacturing jobs, the increasing productivity derived from mechanical agriculture, the establishment of practical education by existing and new universities and colleges, the availability of public education for more Americans, and the controversies resulting from slavery were altering the social, political, and economic foundations throughout the country. Although the primary disagreements that defined the Confederacy of slave states were the right to secede and the morality, viability, and constitutionality of human bondage, the evolving attributes of prosperity occurring in the nineteen northern and western states were not prominent in the fifteen border, middle, and deep southern states.

By 1860, the assets and infrastructure in the nineteen northern and western states included more than ninety percent of all manufactured cotton goods;⁴³⁴ more than eighty percent of the pupils in public schools;⁴³⁵ of the urban centers of commerce,⁴³⁶ of the newspapers and periodicals,⁴³⁷ of the free labor in manufacturing,⁴³⁸ of the recent immigrants,⁴³⁹ and of the libraries and the volumes in them.⁴⁴⁰ In addition more than three-fourths of the banks⁴⁴¹ and professional civil and mechanical engineers,⁴⁴² two-thirds of railroad miles,⁴⁴³ and sixty percent of the population in the country⁴⁴⁴ were in northern and midwestern states. In turn, the southern states were vastly superior in the production of cotton and tobacco, but North Carolina was not prominent in total or per capita production of either crop.⁴⁴⁵

Influenced by opportunities for wages in the developing economies in northern and western states, workers migrated to communities where they operated labor-saving machinery that increased productivity in manufacturing. In some

instances, such as the manufacturing of cotton goods, the labor of craftsmen and tradesmen was replaced by unskilled workers; in other circumstances, such as building labor-saving machinery and steam engines, skilled mechanics and tradesmen were essential for production. While most Americans were inclined to work on their own terms, the skilled and unskilled manufacturing jobs required the employees to participate in coordinated efforts and to be on time and sustain their contribution to the final product.

With workers moving closer to factories and mills, the nearby towns and villages grew in population as the manufacturing establishments prospered. By 1860, the value of products manufactured in the ninety-three cities and towns with a population greater than ten thousand people was more than forty percent of the production for the whole country. Nearly one in six Americans lived in these largest cities and towns, with seventy-eight of these communities in northern and western states and none with a population greater than ten thousand in Arkansas, Mississippi, North Carolina, or Texas. In addition, there were at least three times more in each of the states of New York with fifteen and Massachusetts with eighteen, more than any of the other states. However, the combined value of manufactured products in the two largest cities of New York City and Philadelphia was about fifteen percent of the value of the entire country.⁴⁴⁶

In the largest towns and cities, about one in seven of the residents was engaged in manufacturing with about one-third female and as many boys and girls employed as needed. Many of the residents not working in manufacturing in these larger communities were engaged in occupations that provided services and goods required for livelihood by those without opportunities for farming, weaving, and attending livestock. The 1860 Census reported the number of citizens in each state engaged in each of five hundred eighty-seven occupational categories that characterized opportunities to pursue prosperity in the evolving manufacturing as well as the dominant agricultural economies of the growing United States.⁴⁴⁷

All the states reported about fifty occupations in common that by tradition or necessity were part of many communities, regardless of size. These included: agricultural owners, workers, suppliers, and processors; trades such as blacksmiths, gunsmiths, wheelwrights, mechanics, carpenters, brick masons, and cabinet makers; professional services by physicians, dentists, lawyers and engineers; and community services by merchants, barbers, seamstresses, housekeepers, grocers, and milliners. However, many of the other nearly six hundred occupations were clustered in the larger communities where the demand created the income to support them. As men and women moved to these towns and cities seeking employment in commerce, manufacturing, and transportation industries, entertainment, education, publishing, and financial institutions were established to attract the interests of this growing population.

These community institutions required professional as well as wage-earning employees, such as actors, insurance agents, booksellers, bankers, surgeons, reporters, stock dealers, type-founders, editors, importers, lithographers, musicians, opticians, notary publics, and publishers. Consequently, the development of the manufacturing economy in the northern communities created more occupational opportunities, as exemplified by the more than three-fourths of the occupation categories in Pennsylvania where five towns and cities had a population greater than ten thousand, compared with the cotton economy that developed in the southern states with fewer and smaller towns and with none greater than ten thousand and about one-third of the occupation categories in North Carolina. Although the assertion by Adam Smith that “the most opulent nations, indeed, generally excel all their neighbors in agriculture as well as in manufactures; but they are commonly more distinguished by their superiority in the latter than in the former” was a commentary about an entire country; the comparative “opulence” of geographic regions in the United States reflected this prediction.⁴⁴⁸

By 1860, the value of the exports from the agricultural economy of the southern states was twice the value from the northern states.⁴⁴⁹ In turn, the growing income in the southern states was purchasing more of the products manufactured in the northern states. The primary contributor to both circumstances was the agricultural economy that produced seventy-five percent of the world's supply of cotton and forty percent of the value of exports from the United States. Since any abrupt decrease in the labor provided by slaves would interrupt the manufacturing economies of England and the northern United States, the southern states were confident in their ability to protect their livelihood and their way of life.

While sharing many ancestral, political, and economic characteristics with other southern states, the agricultural economies of the deep southern states of Alabama, Mississippi, South Carolina, Georgia, Texas, and Louisiana depended on more and larger plantations, on more slaves, on access to markets through deep-water ports where larger communities engaged in commerce, on international trade, and on cotton production that provided more income and prosperity to more planters.

Although the agricultural economy in North Carolina included exporting the cash crops of cotton, tobacco, rice, wheat, and corn, the primary motivation of most farmers was self-sufficiency rather than commerce. While ranking sixth in total population among the fifteen southern slave states,⁴⁵⁰ by 1860, North Carolina ranked third in the number of free blacks (sixth among all states),⁴⁵¹ fifth in tobacco production,⁴⁵² seventh in the number of slaves,⁴⁵³ seventh in the number of plantations larger than one thousand acres,⁴⁵⁴ and ninth in cotton production.⁴⁵⁵

With nearly seventy percent of the sixty-seven thousand farms on less than one hundred acres, most farmers did not need and probably could not afford slaves;⁴⁵⁶ but some of the thirty percent who owned less than ten probably worked side by

side with them in the field.⁴⁵⁷ With diversity of religions and ancestry, with limited commerce to produce income, and with an expansive geography of isolated communities, the dominant cultural characteristics of the free people of North Carolina were based upon independence and self-sufficiency with ambivalence toward pursuing opportunities for unnecessary prosperity.

Although the value of manufactured production per capita in North Carolina was one-third the national average, one-fifth that of New York State, and provided limited family income, there were opportunities during the 1850s for prosperity for more free white farming families.⁴⁵⁸ Canal transportation in the east and railroads into the western and upper Piedmont enabled more farmers to ship their harvests to markets in other states and abroad. Responding to the opportunity to advance beyond subsistence crops and encouraged by a period of stable demand, more farmers planted tobacco and cotton with overall production increasing in almost every county.

However, opportunities for prosperity from additional income were limited to those with access to more suitable land and to extra labor. Since there were about four farmers for each farm laborer and about one-third as many slaveholders as farmers reported in the 1860 Census;⁴⁵⁹ most of the one hundred twenty-five thousand families in the state⁴⁶⁰ who lived on small farms depended primarily on themselves for the labor required to obtain income from agricultural products.

Until threatened by deprivation, many of the farmers in North Carolina preferred their independence derived from planting tobacco or cotton on a small farm for needed income rather than the obligation and dependence required of the unskilled labor in the factories and mills in the northern states. With contrasting circumstances, the attraction of wage earners to work in manufacturing in Massachusetts resulted in almost twice as many hands in factories as on farms; while in North Carolina there were twenty times more farmhands, even excluding slaves, than factory workers. The challenge in both states was access to additional labor in pursuit of prosperity.

Without access to free agricultural workers, the pursuit of more income from increased production for yeomen as well the planters usually resulted in acquiring slaves. The 1790 Census reported that about one-fourth of the population or slightly more than one hundred thousand in the fifty-six counties of North Carolina were slaves, with more than half of the total in seventeen eastern counties that included Caswell, Orange, Wake, and Cumberland. On average, there were roughly three thousand slaves in each of the seventeen eastern and one thousand in each of the other counties, with the largest population of more than six thousand in Halifax and the least of fewer than four hundred in Moore County.⁴⁶¹

On farms of more than two hundred acres, the planters produced tobacco in the northeastern and rice in the southeastern counties, which required a large number

of slaves to plant and harvest these crops. As more farmers pursued prosperity from agriculture, the number of slaves as a percentage of the population in North Carolina increased from twenty-five to thirty-three percent during the seven decades prior to 1860.⁴⁶²

In addition to a threefold increase in the number, the changes in distribution of slaves among the counties reflected the need for labor in a growing agricultural economy. In response to geographic expansion westward and additional plantings of cotton from 1800 to 1860, the population of slaves in each of the counties of Mecklenburg and Rowan grew within their boundaries of 1790 from sixteen hundred to more than five thousand in 1820;⁴⁶³ and, by 1860, the number of slaves in all the counties that were subsequently created from the original three totaled three hundred thirty-one thousand fifty-nine.⁴⁶⁴

Within the eighty-seven counties of 1860, there were more than one thousand slaves in seventy-six of them, with the largest population being eleven thousand eighty-six in Granville and the fewest being one hundred four in Watauga.⁴⁶⁵ In ten of the counties with the largest harvests of cotton or tobacco, the slaves outnumbered the free population; while in the far western counties, the free persons outnumbered the slaves by as many as ten to one.⁴⁶⁶ Without labor-saving machinery for planting and harvesting the cash crops, the demographics of the slave population followed the labor required to pursue the opportunity for prosperity by income from agriculture. With concerns by some, but defended by most in North Carolina, the pursuit of increased prosperity depended more on preserving human bondage than establishing a culture of individual initiative or creativity for developing labor-saving machinery.

To supply cotton for the expanding, productive, and prosperous textile manufacturing economy in the northern states and without further increases in the productivity of planting and harvesting, many of the farmers in the southern states borrowed money to acquire more land and slaves to expand their production by more than three hundred percent during the three decades prior to the Civil War.⁴⁶⁷ Consequently, the number of slaves in the United States nearly doubled by two million from 1830 to 1860 with three-fourths of the total increase in number occurring in the six states of the Deep South where the slave population more than tripled with aid from the sale of the slaves by owners in the Upper South.⁴⁶⁸

Even though Congress enacted legislation in 1808 banning the importing of slaves, the prosperity derived in agricultural production between 1830 and 1860 was achieved with a ninety-seven percent increase in the number of slaves.⁴⁶⁹ By public opinion, by economic priorities, and by moral leadership, the northern states were abolishing, while the southern states were increasing dependency on slavery. In significant ways, the North and South were different cultures, societies, and

economies dedicated to achieving prosperity by either preserving the past or pursuing the future.

With slavery providing the labor for prosperity by a few who owned large farms and plantations and with governance controlled by the same people, the economy of the dominant society and culture in North Carolina depended on sustaining human bondage; even though many, who did not own slaves, opposed them. Due to fewer recent immigrants than most states, to federal laws preventing slave trade from offshore, and to a cultural bias that devalued the social standing of farmhands, the pursuit of prosperity within North Carolina was limited by the availability of agricultural labor.

A few North Carolinians, with some predisposed to abolish slavery, were asserting that illiteracy, poverty, and shortage of labor that existed in the state were due to the acquired dependency on slavery that discouraged free labor as wage earners. However, as W. J. Cash so explicitly describes, there were risks for public assertions against slavery: "Let a Yankee abolitionist be caught spreading his propaganda in the land, let a Southerner speak out boldly his conviction that the North was essentially right about the institution, and he was not merely frowned on, cursed, hated; he was, in this country long inured to violence, dealt with more pointedly and personally; he was hanged or tarred or horsewhipped. At the very luckiest, he had to stand always prepared to defend himself against assault."⁴⁷⁰

One of the more curious circumstances arising for those who engaged in the public discourse and questioned the value of slavery resulted from an article in the *Raleigh Standard* written by Benjamin Sherwood Hedrick in which he explained the reason why he supported John C. Fremont, a Republican candidate for president. Hedrick made it clear that his support was, in large part, due to Fremont's stance on the prohibition of slavery in the new western states. In defense of his agreeing with Fremont, he stated that by returning the slaves from the new states to the old states there would be sufficient labor for North Carolina to "develop the immense wealth which must remain locked up for many years to come. Whilst the new States, free from a system which degrades white labor, would become a land of Common Schools, thrift and industry, equal if not superior to any in the Union. But letting that be as it may, still no one can deny that here in North Carolina we need more men, rather than more land. Then why go to war to make more slave States, when we have too much territory already, for the force we have to work it?"⁴⁷¹

While Hedrick admitted his tendencies against "slavery in the abstract" as did Fremont, he avowed that it was not his "object to attack the institution of slavery."⁴⁷² Unfortunately, this defense did little to avoid the furor of public opinion or gain support from his colleagues at the University of North Carolina. As a professor of agricultural chemistry who had recently returned from Harvard to begin a program in scientific agriculture, he was removed in 1856 by action of the trustees when they

declared his position vacant. Hedrick moved to Boston and eventually served in the Patent Office in Washington.

In 1857, Hinton Rowan Helper, who grew up in North Carolina, accentuated his crusade against the institution of slavery by publishing his book *The Impending Crisis of the South: How to Meet It*. In essence, he attributed poverty and illiteracy in North Carolina to the dependency on slave labor and the characteristics of the society, economy, and culture that were required to perpetuate the prosperity for so few. Helper suggested that the citizens of the slave states be given the opportunity to vote on “slavery or no slavery” and expected that the “no slavery” vote would win.⁴⁷³ Helper’s confidence was encouraging with the inclusion of a large number of quotes by prominent men of the south, including Washington, Jefferson, and Madison, who had spoken publicly about their desires to address the contradictions of freedom for all except slaves.⁴⁷⁴

Expressing his concerns about the effect on free men, Helper warned that slavery “is an evil—it is an institution which presses heavily against the best interests of the State. It banishes free white labor, it exterminates the mechanic, the artisan, the manufacturer. It deprives them of occupation. It deprives them of bread. It converts the energy of a community into indolence, its power into imbecility, its efficiency into weakness.”⁴⁷⁵ To achieve his objective of replacing slave labor with poor white labor, Helper developed an eleven-point plan to encourage the demise of the institution of slavery where the southern non-slaveholding whites were to engage in social, political, and economic boycotts of the slaveholders.⁴⁷⁶ In addition, a tax for each slave would be assessed against the slaveholders for the cost of “transportation of the Blacks to Liberia, to their Colonization in Central or South America, or to their Comfortable Settlement within the Boundaries of the United States.”⁴⁷⁷

In support of the reasons for his concerns about the “impending crisis in the south,” Helper compared and ranked many of the categories pertaining to the economic, education, and demographic data reported by the states in the 1850 Census. After reviewing data that included the number of books, periodicals, journals, newspapers, and libraries in each state, and with all the southern states ranking well below average in each category, Helper asked “What has produced this Literary Pauperism of the South?” His answer: “That word is—slavery!”⁴⁷⁸

In evaluating the educational resources in the slave states, Hinton concluded that “Southern colleges are colleges only in *name*, and will scarcely take rank with a third-rate Northern academy, while our academies, with a few exceptions, are immeasurably inferior to the public schools of New York, Philadelphia and Boston. The truth is, there is a vast inert mass of stupidity and ignorance, too dense for individual effort to enlighten or remove, in all communities cursed with the institution of slavery. Disguise the unwelcome truth as we may, slavery is the parent of ignorance, and ignorance begets a whole brood of follies and vices, and every one of

these is inevitably hostile to literary culture. The masses, if they think of literature at all, think of it only as a costly luxury, to be monopolized by the few.²⁴⁷⁹

Using the data for the literacy of adult whites over the age of twenty-one, Helper compiled a table in which North Carolina ranked last, with one in seven people illiterate as compared to one in five hundred sixty-eight in top-ranked Connecticut.⁴⁸⁰ Concluding this four-hundred-page discourse of his contempt for slavery, Helper reminded the readers that “The truth is, slavery destroys, or vitiates, or pollutes, whatever it touches.”²⁴⁸¹ Helper was ostracized and considered a traitor by most Southerners, but his views were widely discussed and adopted by many Northerners. When his book was published in the year prior to the Civil War, Helper was living in Baltimore.

For almost a century, the prevailing culture throughout America embraced ideals established when the Revolutionary War victory assured individual freedom from oppressive authority as well as liberty for each state to adopt its own governance. Most Americans were either first-, second-, or third-generation landowners with the conviction that their freedom, as freemen, depended on self-sufficiency. Except for the few merchants, professional practitioners, and craftsmen, productive agriculture was a livelihood of necessity for the entire family during these decades.

For those who wanted to pursue prosperity from planting, harvesting, and marketing crops, more than family labor was required. However, indentured servants, apprenticeships, tenets, and slaves were considered property by contract or purchase and “unfree” for hire. Even though agricultural “hands” were available for hire during the growing season, they were scarce in comparison to the number of family farms and considered paupers in the community. Therefore, any prosperity obtained by most Americans was derived from the “fruits of one’s own labor.”

As the manufacturing economy developed in the northern states during the decades before the Civil War, a growing number of men and women abandoned agricultural livelihood to work for wages the year-round. Rejecting self-sufficiency, one became submissive to the demands of the employer with the knowledge that the job depended on satisfying the owner. With most Americans considering self-sufficiency, freemen, and freedom to be interdependent and fundamental principles of their society, these working arrangements were considered by many in the north and south as “wage slaves” who had lost their traditional freedom.

Some cited the fact that for many wage earners, especially single women, attaining adequate and reliable subsistence from income was challenging and “that the system of wages must be supplemented by some other system or else one half of the human race must forever be the virtual slaves of the other.”²⁴⁸² With rapid expansion of manufacturing in the northern states before the Civil War, the demand for wage earners increased, workers changed employment more often for a better job, and the

income of an entire family of factory workers provided a level of prosperity equal to or in some instances exceeding the self-sufficiency of farm families.

With increasing numbers and dispersion of factory workers, prominent individuals, political parties, newspaper editors, and public groups in the northern and western states began to advocate a modification of the concept of freemen to include the right of labor to choose when and where he works to realize an income as “fruits of his labor.”⁴⁸³ With the effort to advance this ideology of “free labor,” some proponents argued that slavery denigrated white labor and proposed that slaves become wage earners as a path to their freedom.⁴⁸⁴

Consequently, the growing support for free labor became an economic as well as a moral challenge to the institution of slavery. Although the transition from slave to freedman did not occur without conflict, the ideology, which defined free labor as a hallmark of freedom, did unify political, social, cultural, and economic efforts to prohibit slavery in the western states and, for many, to abolish it in the southern states.⁴⁸⁵ While the institution of slavery became a moral issue for most Northerners, for the prosperous Southerners, it remained a way of life.

Unfortunately, any will to act against slavery by anyone in North Carolina was tempered by collective fear and evasion as described by Alexis de Tocqueville after his visit to the United States in 1835. He reported that many planters were “freely admitting that slavery is prejudicial to their interests; but they are convinced that, however prejudicial it may be, they hold their lives upon no other tenure.”⁴⁸⁶ He also noted that “the more the utility of slavery is contested, the more firmly is it established in the laws.”⁴⁸⁷

Much has been written about the Civil War, with some writers describing the abolishment of slavery as a political strategy by President Lincoln to sustain the war instead of negotiating an agreement of succession by the southern states. Regardless, de Tocqueville predicted, “Whatever may be the efforts of the Americans of the South to maintain slavery, they will not always succeed.”⁴⁸⁸ It may be debatable as to whether an economy that depended on slavery in an amoral world could have prospered; however, the people of the culture and society, who ignored the historical fact that the will to be free never wanes, were unprepared to act on moral grounds and include all the citizens of the state in the struggle to seek prosperity for everyone.

In *A Journey in the Seaboard Slave States*, Frederick Law Olmsted described North Carolina in the 1850s as a state with “a proverbial reputation for the ignorance and torpidity for her people... Owing to the general poverty of the soil in the Eastern part of the State, and to the almost exclusive employment of slave labor on the soils productive of cotton; owing, also to the difficulty and expense of reaching market with bulky produce from the interior and western districts, population and wealth is more divided than in the other Atlantic States; industry is almost entirely

rural, and there is but little communication or concert of action among the small and scattered proprietors of capital.”⁴⁸⁹ Relying on data from the 1850 Census, Olmsted estimated that “more than one fourth of the native white adults... cannot read or write” due mainly to “the distance at which families reside apart preventing children from coming together in such numbers as to give remunerative employment to a teacher.”⁴⁹⁰

These circumstances were well known by a growing number of citizens who were advocating changes to provide opportunities for education and prosperity. Even with their efforts, most North Carolinians acquired fewer assets and achieved less prosperity than settlers in many of the other states during the two hundred years prior to the Civil War. Unfortunately, the difficult road to prosperity for all North Carolinians included the defeat of the southern culture and economy that depended on slavery, before slowly rebuilding opportunities for prosperity over the next one hundred years.

Wealth and Prosperity in North Carolina

Wealth and prosperity are connected, but each one defines different objectives by a person or in the economy of a state or country. Wealth is the accumulation of capital, property, precious metals, or rare items of value to others. In 1798, Adam Smith began efforts to define the wealth for nations when he asserted that labor was the basis for the value of all products. David Ricardo in 1817 added the next step that all wealth was accumulated from the productions of labor. For some people wealth provides the access to opportunities for prosperity; however, for a majority of persons the pursuits of prosperity are their efforts and accomplishments of personal economic, social, and employment objectives in the desires and rewards of their livelihood.

In 1860, the wealth invested in land for productions in agriculture and capital invested in establishments for manufacturing in the entire country was nearly three hundred dollars per capita with about half of that amount invested for North Carolina if slaves are counted in the population and not counted in wealth that was lost with their freedom.⁴⁹¹ The estimate for the entire wealth per capita for the United States was five hundred fourteen dollars, and three hundred sixty for North Carolina, which was the least in the entire country.⁴⁹²

Pursuits of prosperity in North Carolina were uncertain in 1860 in the future direction and success in the economy, even though most of the white population were satisfied with isolation and subsistence farming. Even with railroad connections for trade, the population remained in small dispersed communities without supporting public schools. Taxing the wealth of property was unpopular among

almost everyone, resulting in fewer schools and a growing number of illiterate people. With most of the capital invested in farms and slaves and with few innovations to create occupations for wage labor, the poor white and freed black persons competed for the existing opportunities as wage laborers.

The development of the economy in the State of North Carolina depended mostly on the investments in land and slave labor to trade cash crops in the pursuits of prosperity. Although there were investments in manufacturing establishments, most of the impediments for prosperity were not economic barriers, but social and cultural characteristics and behaviors developed from the dependence on slavery that lingered for more than a century after freedom. One of the major current and future penalties to all the population in the state during the slave economy was the requirement of illiteracy by slaveowners for most black people and acceptance of this by many of the white people.

With almost half of the free population in North Carolina illiterate after the Civil War and with few innovations creating occupations of common wage labor, the establishment and support of public schools for every person was the most important path for encouraging pursuits of prosperity. However, the division of black and white cultures, societies, and education prolonged poverty and resulted in racism with inequalities in pursuits of prosperity.

Part II

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Two Societies, Two Economies, Too Divided, Two Results

Slavery and Politics

The Declaration of Independence claimed liberty from the king of England and freedom from his taxes. The details of each state constitution were drafted and adopted by prosperous men who were influenced by the culture, society, and economy they had created.

During most of the eight decades before the Civil War, the pursuit of prosperity in the southern states was restricted mostly to those who could obtain capital, acquire slave labor, and engage in commerce derived from agriculture. In contrast, most of the large cities with manufacturing industries were developing in the northern states where professional, trade, and service occupations provided opportunities for employment as free wage laborers.

With slave and free labor developing at different paces in contrasting societies and economies, southern politicians were concerned about preserving the right for new states to choose slave labor, since the population and the number of members in the House of Representatives in slave labor states were in the minority. Although the Civil War is often discussed as a disagreement about the rights to secede and protection of slaves as property rights, the reasons really didn't matter when the military victory by the northern states resulted in the collapse of the society and economy of millions of Americans in the eleven states that had seceded.

Subsequently, the southern states were required to abandon the defining characteristics of the antebellum south and rejoin the United States that was becoming more democratic in voting, more educated, more prosperous, more culturally integrated, and less racially prejudiced.

However, progress throughout the country was fraught with violence, discrimination, poverty, and disappointments; the self-evident truth as described in the

Declaration of Independence that claimed “that all men are created equal, that they are endowed by their Creator with certain unalienable Rights, that among these are Life, Liberty and the Pursuit of Happiness” was realized with uneven measures over the next century.

While unyielding commitment to the Constitution protected the rights of states in 1860 to choose free or slave labor, unparalleled prosperities from agriculture in the slave states and from manufacturing in the free labor states supported two societies and economies with unresolved and deepening conflicts dividing the country into the North and the South and to some degree within most of the states. With predictions of Civil War between the slave and free labor states, perpetual union or sovereignty of states became a constitutional enigma that resulted in political and regional disagreements without concerns about the consequences of defeat or victory after a war that would further divide the economic, social, and political relationships between and within the states.

For two centuries prior to the Civil War, most of the white citizens in the American colonies and then states shared a passion for their freedom to pursue subsistence or prosperity without interference from the government while living in scattered and sparsely populated communities where the social, cultural, and economic characteristics were established by their ancestors. However, during the first half of the nineteenth century, many of those customs, adopted in isolation, were challenged by local, state, or federal legislation devoted to internal improvements, public education, voting rights, poll taxes, tariffs, slavery, and states’ rights.

Correspondingly, as canals and railroads enabled commerce between communities and states; as pursuit of wealth by planters, traders, and manufacturers in the burgeoning cotton economy resulted in more plantations with slave labor in the Deep South and more factories with wage labor in the north; as growth of manufacturing resulted in a movement of the population from farms to towns and cities to become wage earners; as more immigrants pursued prosperity in the eastern cities and along the frontier of the westward expansion of the United States; and as more white male farmers, yeomen, and laborers became active in political parties; within regions of the country and within sections in each state, expansion of opportunities to earn an income in excess of subsistence was resulting in communities of free laborers.

The characteristics of their pursuits for prosperity depended in part on the availability of capital, on access to mechanics and tradesmen to build and operate machinery that increased productivity, and on the actions or inactions to establish liberating and progressive governments that supported internal improvements and public education. As the United States grew in population and increased in the number of states, the Mason-Dixon Line, which was surveyed prior to the Revolutionary War, became an *ex post facto* dividing line of contrasts between the original

northern and southern colonies when comparing the population of slaves, illiterates, or factory workers.

In addition, the convenience of the Mason-Dixon Line, when extended to the Mississippi River, roughly defined four sections of the United States where different circumstances influenced the development within each region. The territory west of the Mississippi River, from Canada to Mexico, was filling with immigrants and adventurous easterners who saw opportunities in settling on unclaimed land to become farmers, ranchers, and miners. Therefore, their primary opportunity for prosperity was limited to the contents or use of the soil.

With the growing transportation hub of Chicago, with the growing population in towns along the Ohio and Mississippi Rivers, and with the adoption of labor-saving agriculture, the midwest, east of the Mississippi and bridging the northern to the western states, was becoming the major producer and exporter of grains in America. In these states, which were sparsely populated and depended on free labor, practical education as well as classical education developed with the founding of their earliest public universities as exemplified in the opening of the Universities of Michigan, Indiana, and Iowa before the Civil War.

In addition, the Federal Land Grant Program of 1862, which encouraged the development of institutions that included curricula of practical education in agriculture, mining, and mechanic arts to pursue prosperity, led to the growth and creation of many of the prominent and large public institutions such as Michigan State, Ohio State, Iowa State, and the Universities of Illinois, Wisconsin, and Minnesota.

Although the thirteen states east of the Mississippi River were the founders of the United States of America and fought together for their liberty, each evolved with a unique economy, society, education, and governance, with regional political alliances developing between states, and with common interests in commerce and labor. In the northern states, larger cities, immigration, manufacturing, free labor, capitalism, and practical education occurred earlier and more rapidly throughout the region than in the southern states.

However, there were significant differences within these larger regions with lower illiteracy rates, less diversity in manufacturing, and earlier elimination of slavery in the New England states than in Pennsylvania, New Jersey, and New York. Below the Mason-Dixon Line, the slave states that bordered on Pennsylvania and Ohio were connected not only by location, but also by ancestry and commerce; therefore, various regions of these states adopted both the southern and northern economies of agriculture and manufacturing, free and slave labor, and most remained in the Union during the Civil War.

The states of the Deep South were connected by the society and culture of large plantations, by the prosperity of the labor-intensive agricultural economies of

cotton, rice, and sugar with the number of slaves exceeding that of whites in Mississippi and South Carolina, and by the dedication to states' rights to protect their property that included the slaves. The midsouth state of North Carolina, geographically and culturally connected to the deep southern states and isolated from the border of northern states, was less prominent in the commerce of agriculture than the Deep South and significantly less productive in manufacturing than the North with a large number of illiterates in a dispersed population who depended on subsistence farming without slaves.

From the Revolutionary War to the Civil War, the dependency on slave labor in the pursuit of prosperity was decreasing in the northern states, while increasing in many of the southern states. In New England, the citizens of Vermont were first to support the abolition of slavery, at least partially, by approving the declaration of the right in the State Constitution of 1777 that "no male person born in this country, or brought from over sea, ought to be holden by law, to serve any person, as a servant, slave, or apprentice, after he arrives to the age of twenty-one years; nor female, in like manner, after she arrives to the age of eighteen years, unless bound by their own consent, after they arrive to such age, or bound by law for payment of debts, damages, fines, costs, or the like."¹

In 1780, Massachusetts, which included the District of Maine, adopted a constitution with the declaration that "All men are born free and equal, and have certain natural, essential, and inalienable rights"² that was "construed as abolishing slavery"³ by a ruling from the Massachusetts Supreme Court. The State of New Hampshire declared "all men are born equally free and independent" in 1783 with essentially the same rights for "all men."⁴ These early actions to abolish slavery by a state constitutional process in New England states were regarded as a "State's Right" since the Constitution was silent on human bondage. During the eight decades of statehood, migration from farms into the growing cities and immigrants from Europe provided labor for agriculture and manufacturing in New England.

The states of Pennsylvania (1780), Rhode Island and Connecticut (1784), New York (1799), and New Jersey (1804) adopted, by statutes, a plan for the gradual abolition of slavery, followed by other states in the midwest. Consequently, during the first four decades of the nineteenth century, slavery slowly declined in the northern states to less than one hundred persons in total in Connecticut, Indiana, Iowa, New Hampshire, and New York and more than one thousand in total in New Jersey, Illinois, and Pennsylvania. By 1850, throughout all the northern states there remained just two hundred thirty-six slaves in New Jersey with a few serving as "apprentices for life" until 1860.⁵

As the northern states were abolishing slavery, prominent planters in Virginia were supporting similar actions within their state. Shortly after the end of his second term in office, George Washington wrote to his nephew to express his sorrow

about “the loss of your Servant; but it is my opinion these elopements will be MUCH MORE, before they are LESS frequent; and that the persons making them should never be retained, if they are recovered, as they are sure to contaminate and discontent others. I wish from my Soul that the Legislature of this State could see the policy of a gradual abolition of Slavery; It might prevt. much future mischief.”⁶

Decades after Thomas Jefferson published *Notes of the State of Virginia* in which he expressed hope “for a total emancipation. . . with the consent of the masters, rather than by extirpation”⁷ and proposed a plan for colonizing the freed slaves,⁸ Thomas Jefferson Randolph introduced in the Virginia House of Delegates in 1832 a resolution to submit to the vote of the people of the state a plan to abolish slavery in a manner similar to that proposed by his grandfather.

The delegates rejected the resolution by a vote of seventy-three to fifty-eight.⁹ While a minority of the white families in Virginia owned slaves, a majority of those in government were planters who depended on slavery for the labor necessary to maintain their prosperity in the agricultural economy. Whether the fifty-eight voters in support of the resolution were as pragmatic about the business of agriculture as Washington or as uneasy about “inalienable rights” as Jefferson, the institution of slavery was under attack within as well as outside southern states.

Most of the contrasts within and between the regions of the expanding United States of America occurring before 1860 were by choice or geography. The natural features of each region dictated the areas where prosperity began due to the location of fertile soil and weather for growing, hydropower for manufacturing, waterways for engaging in commerce, and deep-water ports where towns and cities developed with a diversity of occupations serving the needs and desires of the population. With choices of free or slave labor, classical or practical curricula in public or private education, agricultural or manufacturing production, and canal or railway improvements, the pursuit of prosperity in each region depended on investing capital and the availability of labor

In 1750, the earliest pursuits of prosperity derived from agriculture were most prominent on large plantations in Virginia and Maryland where more than half of the slaves in the colonies harvested tobacco for export.¹⁰ Due in part to diminishing soil fertility and quality of the tobacco crop in the upper southern states during the decades before the Civil War, many of the slaves in those states were sold and relocated to the seven Deep South states of South Carolina, Georgia, Alabama, Louisiana, Florida, Mississippi, and Texas, where they provided labor for the expansion of the economy derived from growing and exporting rice, cotton, and sugar cane. In some instances the plantation owner relocated with his slaves to these seven states where the soil and climate was more favorable for growing cotton.

Consequently, by 1860, less than half of the slaves remained in the other eight slave states, and slaves accounted for two percent of the total population in

Delaware, one-third in North Carolina, but almost sixty percent in South Carolina.¹¹ With federal law prohibiting the importation of slaves, the escalating cost of buying slaves from other owners resulted in the planters of the southern states increasingly borrowing more capital to purchase land and expanding production in labor-intensive agriculture. In contrast, capital in the free labor states of the North was invested in machinery to increase productivity with low-wage earners—who recently immigrated or relocated to the towns or cities—working in textiles mills, foundries, and factories.

In the midwestern states, where farm equipment and tools that increased productivity in mechanized agriculture were manufactured, the economy depended on free labor for factory workers as well as farmhands to operate reapers, threshers, and balers. Also, by 1860, the value of manufactured products in the northern states exceeded that of agriculture in the southern states; however, the free labor employed in the factories was about one-third the slave population working on farms.¹²

With democracy, capitalism, and free labor expanding in the United States, there were disagreements about the authority claimed by Congress to designate the territories for free or slave labor before admission as a state. The Southerners in Congress asserted that the right to choose belonged to the state since slavery was not prohibited by the Constitution. After all, the institutions of slavery, indentured service, apprenticeships, sharecropping, and tenancy were acceptable to varying degrees in all the original colonies as a means to obtain labor.

Even though there was always some opposition to slavery in every colony and state, the political interests in abolition developed gradually from 1776 to 1861 as free labor increased in northern states, as abolitionist societies organized throughout the country, as territories sought statehood, and as prosperity for southern planters depended on sustaining or increasing the number of slaves in the Deep South. Although the abolition of slavery had been approved in all the northern states by 1804, the prevailing national political parties of Democrats and Whigs were not divided by regional interests and often united in purpose since each needed support from both parties to elect presidents and enact legislation demanded by their supporters.

However, with greater population growth in the northern states resulting in more members in the House of Representatives, and with the expansion of slave labor in the Deep South, the southern states were concerned about representation in the Senate where by 1820 the twenty-two states were evenly divided with eleven permitting and eleven rejecting slavery by their own laws. A petition to Congress for statehood in 1818 by the territory of Missouri threatened the balance of power in national politics.

To reach a compromise, the District of Maine (1820) and the territory of Missouri (1821) were admitted, which by their choice of labor maintained the balance of representation in the Senate. In an attempt to control the division of slave and

free states, Congress stipulated that within the territory of the Louisiana Purchase, “which lies north of thirty-six degrees and thirty minutes north latitude, not included within the limits of the state” of Missouri, “slavery. . . shall be, and is hereby, forever prohibited.” The Arkansas territory south of the latitude was admitted as a slave state in 1836.¹³

The Voice of Slavery

While the southern states were expanding the use of slave labor, rebellions on Caribbean Islands intensified the desire for freedom in slaves and the fear of retribution in slaveowners within the United States. The rebellion of 1791 in the French Colony of Saint Dominique resulted in thousands of slaves and colonists killed with plantations looted and burned and some owners relocating to America where the slaves they brought with them told others how the insurrection in the French Colony eliminated slavery and created a colony ruled by the black population.¹⁴

Gabriel Prosser—who was born a slave in 1776 on a tobacco plantation in Virginia, taught to read and write by his owner’s wife, trained as a blacksmith, and hired out in the community as a tradesman—was inspired by the Caribbean rebellion and began in August 1800 to carry out his plan for a slave revolt in Richmond, Norfolk, and Petersburg using the Saint Dominique motto of “death or liberty.”¹⁵ Due to betrayal by an informed slave, Governor James Monroe became aware of the plan and mustered the state militia to capture the conspirators. After a month of eluding the law, Prosser was arrested in Norfolk, tried, found guilty, and executed by hanging. In total, thirty-five slaves were found guilty and hanged, and ten more were banished from the state.¹⁶

In close proximity, slave conspiracies were reported in northeastern counties of North Carolina in 1802 and in Wayne, Sampson, Johnston, and surrounding counties in 1805. Dozens of slaves were interviewed, tried, and found guilty of participating in planning or knowledge of conspiracies to rebel, with at least eight hanged.¹⁷

A similar event occurred in Charleston, South Carolina in 1822, when Denmark Vesey—who bought his freedom with prize money from a lottery, became a skilled carpenter, and achieved a status of prosperity in the community—recruited free and enslaved blacks to overthrow the white government in Haiti.¹⁸ After a recruited slave told his master of the plan, Vesey and at least twenty-one other conspirators were arrested, tried, found guilty, and executed by hanging.¹⁹ Although these insurrectionists did not achieve their goal, the rumors about the events created fear of a slave rebellion among whites that became a reality in 1831 at Southampton, Virginia when Nat Turner—who was born in 1800, ran away from one master, returned, and

was sold—led an insurrection, which he avowed as a fulfillment of a vision from God to free the slaves.²⁰

He recruited between sixty and seventy blacks, both free and slave, who gathered knives, hatchets, and axes and used them to massacre approximately sixty white men, women, and children.²¹ Within a week, two hundred fifty federal troops arrived, and the militia, as well as local vigilantes, killed at least one hundred twenty black men, women, and children.²² Two months passed before Turner was arrested, tried, and hanged.²³ With fear based on reality, the majority of citizens, who did not own slaves, expected the slaveowners and the government to protect them from insurrections. Correspondingly, the slaveowners expected the government to enact legislation to enable them to protect their investment and to control the behavior of their slaves.

Since the slaves were not citizens of the United States and did not enjoy the rights guaranteed by the federal constitution, codes that pertained to their behavior and procedures for due process for crimes were adopted and administered in each slave state. Subsequently, slave codes defined the relationship between the slave and the master and the boundary of their world. In North Carolina, the obedient slave was never rude, insubordinate, nor slanderous about whites and never cohabitated with a free person of color nor left the boundary of the plantation without a pass signed by his master. A slave could not teach another slave how to read or write, preach publicly or to a meeting of slaves of different masters, hire out his time, set a fire to woods without permission, trade with other slaves, visit another plantation not owned by his master, or adopt the appearance of a freedman.²⁴ For many violations of the code, punishment, usually the whip, could be administered by the owner, the slave master, or volunteers serving as slave patrols,²⁵ who were authorized by the legislature to monitor the travel of all blacks and enforce the codes established in towns and counties.²⁶

For those charged with a misdemeanor, a single judge heard the evidence and passed judgment with the right of appeal by the master on behalf of the slave. Trials for capital crimes were assigned to the Superior Courts with the benefit of a lawyer for the accused.²⁷ Any person who vengefully punished a slave that resulted in his or her death was subject to the same laws as if he had killed a freeperson, except where the slave was resisting his master or was an outlaw.²⁸ Even with the attempt to suppress insurrections and to prevent slaves from escaping bondage, the desire for freedom was so great that men, women, and children embarked on a dangerous journey into the frontier, Canada, or a northern state where slavery had been abolished.

Two verses from a poem written by George Moses Horton, a slave in Chatham County North Carolina, and published in 1829 expressed the unrealized hopes of so many who risked their lives for a chance to be free.

“On Liberty and Slavery”

Alas! and am I born for this,
 To wear this slavish chain?
 Deprived of all created bliss,
 Through hardship, toil and pain!

...

Oh, Liberty! thou golden prize,
 So often sought by blood-
 We crave thy sacred sun to rise,
 The gift of nature's God.²⁹

However, the Federal Fugitive Slave Law of 1793 guaranteed the owner that the slave could not claim freedom even though he or she had moved into a state or territory in which they could not be enslaved and that if an agent or attorney could prove rightful ownership to the satisfaction of an appropriate judge, the slave could be arrested and returned to the plantation of origin.³⁰

While reporting the total number of slaves who escaped and remained free of bondage is problematic, there is substantial evidence that the slaveowners advertised and offered rewards for their return.³¹

Any opposition among the citizens of the colonies concerning the institution of slavery usually depended on convictions based on religion. Among the earliest were the communities of Quakers in the colonies of Pennsylvania, Delaware, Maryland, Virginia, and North Carolina who were joined in their effort by faith in God but divided on their participation in slavery. In the early eighteenth century, the annual meetings reminded Friends to be “concerned in the importation of slaves or purchasing them for sale,” to “use those well they are possessed of,” to “endeavor to restrain from Vice, and to instruct them in the principles of christian [*sic*] religion.”³²

As the colonies progressed toward and into statehood, the epistles to Friends slowly advanced, at a different pace in each state, from the cause for freeing their own slaves to the moral imperative of abolishing human bondage.³³ Encouraged by the participation of prominent Quakers in the establishment of the first Abolition Society in Philadelphia in 1774,³⁴ societies, expressing opposition to slavery and using a variety of names for the organization, began to form throughout the thirteen colonial states including an Abolition Society in Virginia in 1790.³⁵

In 1823, the first American Convention for the Abolition of Slavery was held in Philadelphia and was attended by Benjamin Lundy, who had begun a monthly publication *The Genius of Universal Emancipation* in 1821.³⁶ After returning from the convention to his home in Ohio, he decided to relocate to Baltimore and began a journey in 1824 that included a stop at Deep Creek, North Carolina where he delivered his first address against slavery.

Before leaving on his trip to visit other places in the state and with his encouragement, those in attendance at the meetings at Deep Creek formed an anti-slavery society. When Lundy left the state, he participated in the establishment of at least twelve abolition societies. William Garrison, who eventually became a prominent abolitionist, joined Lundy in the editorship of the monthly publications in Baltimore until he moved to Boston and issued in 1830 his own journal *The Liberator*.³⁷

Even though publications attracted subscribers who opposed slavery, disagreements about priorities and convictions divided the efforts of abolition societies. Coinciding with Lundy's untimely death in 1839, the Massachusetts Abolition Society was formed by previous members of the Massachusetts Anti-Slavery Society with a public discourse between them about their division of principles.³⁸

The conflicting convictions about women's ability to serve as full members,³⁹ "doctrines and measures" of anti-slavery and abolition activities,⁴⁰ and "hostility to political action"⁴¹ were defended by each society; ultimately the disagreements were about devotion to emancipation by legislation, to abolition by disunion of states, or to results achieved by moral and religious persuasion. With human bondage diminishing throughout the northern states as the abolitionists were mounting attacks on slavery in the southern states, slaves were escaping the control of their masters and traveling with the support of people along the trails to freedom known as the "Underground Railroad."

Free blacks, fugitives from slavery, members of churches, and abolitionists were active in leading these slaves through the network; however, Harriet Tubman—who at the age of twenty-five escaped from slavery on the eastern shore of Maryland and gained her freedom in Pennsylvania where she worked in hotels and "club houses" in Philadelphia—was known as "the Conductor of the Underground Railroad" with her courageous endeavors during at least nineteen dangerous journeys into southern states to guide groups of escaped slaves along the path to freedom with the total number reaching at least three hundred.⁴² Harriet Tubman was known by the slaveowners throughout the southern states with a twelve-thousand-dollar reward for her head "for enticing away parties of slaves from their master."⁴³

The slaves knew of her success from the families who escaped to freedom and longed for others to join them. In the northern states Fredrick Douglass praised her efforts as, "Excepting John Brown—of sacred memory—I know of no one who has willingly encountered more perils and hardships to serve our enslaved people than you have."⁴⁴ Even though there were increasing success for those obtaining freedom from slavery along the Underground Railroad and increasing concerns about a political imbalance in the number of slave and free-labor states in Congress, owners were encouraged by the Fugitive Slave Act of 1850 that required citizens in all states to assist in the capture and the return of slaves to their owners.⁴⁵

In response, the anti-slavery societies began advocating “a clean sweep of slavery everywhere.”⁴⁶ However, the Kansas-Nebraska Act by Congress in 1854 appealed the prohibition of slavery north of latitude 36°30’ contained in the Missouri Compromise and permitted the territory to choose free or slave labor by the will of the people.⁴⁷ Subsequently, there was a rush to populate Kansas with both sides claiming the right to govern.

At the Ladies’ Anti-Slavery Society meeting in Rochester, New York in 1855, Frederick Douglass—who was born into slavery in 1818, served a number of owners, taught himself how to read and write, mastered the trade of caulker in the Baltimore shipyards, hired out to produce an income for his owner, escaped to Massachusetts and joined with the abolition movement in the Northern States—described his assessment of the doctrines of the “Anti-Slavery Movement” by rejecting all the objectives of the societies except the Liberty Party in New York that “asserts the power and duty of the Federal Government to abolish slavery in every State of the Union.”⁴⁸ However, this assertion was challenged by the violence that erupted in Kansas in 1856 when John Brown led a company of men, which included his sons, to search for pro-slavery men that resulted in murdering and mutilating their bodies outside of their homes with families nearby.⁴⁹

The Browns were white men with family roots in Connecticut and involvement in the abolition movement in New England before moving to Kansas in 1855 to participate in the conflict with their commitment to a state free from slavery.⁵⁰ By avoiding the law for three years after the murders, John Brown had time to plan an insurrection against slavery and to recruit and train a group of men to conduct a military raid to confiscate weapons at the federal arsenal at Harper’s Ferry in Virginia by overpowering the guards.⁵¹ During the conflict that resulted in the raiders occupying the arsenal, at least four civilians and ten of the Brown’s party were killed, including two of his sons.⁵²

When federal troops led by Colonel Robert E. Lee arrived, they overpowered the encamped raiders with four of them captured, five escaping, and Brown wounded.⁵³ One week later, John Brown was tried in the Jefferson County Courthouse in Virginia, found guilty of treason against the state, and hanged in December of 1859.⁵⁴ Many abolitionists considered the government to be pro-slavery and agreed with his last words: “I John Brown am now quite certain that the crimes of this guilty land will never be purged away but with blood. I had as I now think: vainly flattered myself that without very much bloodshed; it might be done.”⁵⁵ Many pro-slavery Southerners agreed that war was inevitable; but they expected a different outcome.

Although a growing number of slaves were fleeing through the Underground Railroad to seek freedom and whites were supporting anti-slavery societies, the Supreme Court ruled in the Dred Scott case of 1857 that without amending the Constitution all blacks, freed or enslaved, were not and could never become citizens of the

United States. Those who claimed “all men are created equal” were reminded that “the enslaved African race were not intended to be included, and formed no part of the people who framed and adopted this declaration.”⁵⁶

Since they arrived as property and did not immigrate by their own will, they had no rights guaranteed by the Constitution and could “lawfully be reduced to slavery . . . bought and sold, and treated as an ordinary article of merchandise and traffic whenever profit could be made of it.” However, each state maintained the authority to “confer within its own limits . . . the rights of citizenship” yet that did not entitle anyone in other states or the Union. In the opinion of the Court, “the justice or injustice, the policy or impolicy, of these laws” was a question that “belonged to the political or lawmaking power.”⁵⁷

Even though the slave states agreed with the ruling, there was continuing concern that the balance of power in Congress was tilting northward with a majority of the growing population westward with more territories applying for statehood. In addition, minor political party movements with platforms that opposed compromise and supported the abolishment or containment of slavery were forming in the midwest and attracting members from the two prominent parties of Whigs and Democrats.

Political Secession

In the presidential election of 1856, the Whigs resolved that “They have no new principles to announce; no new platform to establish; but are content to broadly rest—where the fathers rested—upon the Constitution of the United States.”⁵⁸ With concerns that political parties “founded only on geographical distinctions” would threaten the Union “of wide spread geographical sections materially differing, not only in climate and products, but in social and domestic institutions,” the party platform proclaimed that “civil war is raging, and. . . the Union is in peril” and that Mr. Fillmore was the candidate best qualified to “restor[e] peace.”⁵⁹

The Democratic Convention adopted a platform resolving “That the Federal Government is one of limited power, derived solely from the Constitution” with “no power. . . to interfere with or control the domestic institutions” of the states.⁶⁰ While the platform addressed foreign affairs, the “great highway” from coast to coast, opposition to a national bank, industrial policy, public lands, and fiscal responsibility of government operations, the majority of the resolutions supported federal policies of compromises and rights of “actual residents” in territories to decide by a constitutional process about “domestic slavery.”⁶¹ By “fellowship with and desiring the cooperation of all who regard the preservation of the Union under the Constitution as the paramount issue, and repudiating all sectional parties and

platforms concerning domestic Slavery,” the Democratic Party presumed that “civil war and disunion” could be avoided—if Democratic candidate, James Buchanan, born in Pennsylvania, was elected and continued the policies of compromise with the congressmen from the slave states.⁶²

While the Whigs and Democrats were supporting the precedents established by the Constitution and by Congress that protected slavery as a right for states to decide, a growing number of citizens were opposing the compromises that permitted slavery to expand into the territories and disagreeing with the Supreme Court interpretation of the Constitution that denied U. S. citizenship to any black person. Agitated by the political concessions to slavery, many of the abolitionists—who rejected the complete dedication to moral persuasion of the Garrisonians—established the (Abolition) Liberty Party in 1839⁶³ and held a convention in 1843 where the delegates agreed on twenty-one resolutions that included declarations that “human brotherhood is a cardinal principle of true Democracy” and that “the General Government has, under the Constitution, no power to establish or continue slavery anywhere.”⁶⁴

With a resolve “That we inscribe on our own banner, ‘Free Soil, Free Speech, Free Labor, and Free Men,’ and under it ‘we will fight on, and fight ever, until a triumphant victory shall reward our exertions,’”⁶⁵ the Barnburners who abandoned the National Democratic Party to create the Free Democratic Party (Free Soil Party) convened in New York to nominate Martin Van Buren in the 1848 presidential election.⁶⁶

Subsequently, the Liberty Party fused with the Free Soil movement in 1848 and joined with the Anti-Slavery Whigs to found the Republican Party. The first state convention of the Republican Party met in Jackson, Michigan in 1854 and resolved that slavery is a “great moral, social, and political evil”⁶⁷ and violates “the inalienable right of equality.”⁶⁸ The party resolved to “hold ourselves absolved from all ‘compromises,’ except those expressed in the Constitution, for the protection of slavery and slave-owners,”⁶⁹ to repeal the Fugitive Slave Law, to oppose the repeal of the Missouri Compromise, to support the containment of slavery by legislation in Congress, and to battle “against the schemes of aristocracy.”⁷⁰

During the summer of 1854, political conventions were held in Wisconsin, Massachusetts, Vermont, Indiana, and Ohio where resolutions supporting anti-slavery principles were adopted and candidates designated as Republicans were elected.⁷¹ At the 1856 National Republican Convention in Philadelphia, Abraham Lincoln—elected as a Whig for four terms as a member of the State House of Representatives and a one term member of the U. S. House of Representatives from Illinois—was nominated and ran second in the balloting as the party candidate for the vice president of the United States.⁷²

The party platform supported internal improvements, the coast-to-coast railroad, admitting Kansas as a free state, exercising congressional sovereign power over the territorial governments to prohibit polygamy and slavery, enforcement of the Northwest Territory Act of 1787 that abolished slavery in the national territories, and opposed the repeal of the Missouri Compromise. While most anti-slavery proponents in the party preferred abolition, the political reality of states' rights in the Constitution encouraged their efforts toward containment.⁷³

In the 1858 campaign, the incumbent Democrat Stephen A. Douglas was challenged by the Republican candidate Abraham Lincoln to serve as the senator from the State of Illinois. In his speech to more than one thousand Republican delegates, Lincoln began with the party resolve that "We are now far into the fifth year, since a policy was initiated, with the avowed object, and confident promise, of putting an end to slavery agitation. Under the operation of that policy, that agitation has not only, not ceased, but has constantly augmented. In my opinion, it will not cease, until a crisis shall have been reached, and passed. A house divided against itself cannot stand." Furthermore, Lincoln declared that "Either the opponents of slavery, will arrest the further spread of it, and place it where the public mind shall rest in the belief that it is in the course of ultimate extinction; or its advocates will push it forward, till it shall become alike lawful in all the states, old as well as new—North as well as South. Have we no tendency to the later condition?"⁷⁴

While Lincoln lost in a close race, the seven debates with Douglas conducted throughout the state addressed many of the controversies about slavery that were developing throughout the country with the expansion of slave or free labor into the Territories becoming the unresolved imperative that divided the Democratic and Republican Parties, the northern and southern states, and within the Democratic Party.⁷⁵ Offered as a compromise, Senator Douglas proposed his concept of "Popular Sovereignty" that provided the Territories the opportunity to adopt or prohibit slavery in their constitutions or do nothing, including not protecting slave property.⁷⁶

The vagueness and ambiguity of territorial sovereignty was attacked by some southern Democrats as a violation of guaranteed protection of property rights provided by the Constitution and was considered as another concession to slavery by some northern Democrats. In addition, the Dred Scott decision by the Supreme Court that identified slaves as property, supported states' rights, and enforced the Fugitive Slave Act of 1850, resulted in uncertainty about the rights and process by which the growing number of Territories could become a free or slave state and became the political battle ground between those who supported and those who opposed slavery.

With delegates from all the states in attendance at the Democratic Party Convention in Charleston, South Carolina, in 1860, the majority report of the platform

committee presented by W. W. Avery of North Carolina included the resolve "that Congress has no power to abolish Slavery in the Territories. . . that the territorial Legislature has no power to abolish Slavery in the Territories, nor to prohibit the introduction of slaves therein, nor any power to destroy or impair the right of property in slaves by any legislation whatever."⁷⁷ After considerable debate, antagonistic parliamentary procedures, and competing minority reports, the Democratic Party considered a platform that included "Inasmuch as differences of opinion exist in the Democratic Party as to the nature and extent of the powers of a Territorial Legislature, and as to the powers and duties of Congress, under the Constitution of the United States, over the institution of Slavery within the Territories. . . the Democratic Party will abide by the decisions of the Supreme Court of the United States on the questions of Constitutional law."⁷⁸

As a protest of failure by the party to support states' rights and the protection of slave property, some delegates from Alabama, Mississippi, Louisiana, South Carolina, Florida, Texas, Arkansas, Georgia, Delaware, Virginia, Kentucky, North Carolina, and Maryland withdrew from the convention.⁷⁹ On the last day of the convention, the remaining delegates, after agreeing that the party choice must receive at least two hundred two of their votes, nominated candidates and conducted fifty-seven ballots with Stephen A. Douglas receiving the most, but not enough to be elected. Requesting full attendance by authorized delegates replacing the withdrawals, another convention was scheduled for June 18 in Baltimore to elect a candidate for president of the United States.⁸⁰

Meanwhile, those delegates from Alabama, Arkansas, Texas, Louisiana, Mississippi, Georgia, South Carolina, Florida, Tennessee, and Virginia who had seceded in Charleston convened in Richmond, adopted the majority platform proposed in Charleston, elected John Erwin of Alabama as their candidate for president, and adjourned on the same schedule as was held at the National Convention in Baltimore.⁸¹ When the convention of the National Democratic Party was called to order in Baltimore, the credentials of the replacement delegates from Alabama and Louisiana were rejected resulting in further withdrawals from Virginia, North Carolina, Tennessee, Maryland, California, Delaware, Kentucky, Missouri, and Massachusetts. The remaining delegates elected Stephen A. Douglas as their candidate for the presidency.⁸² The delegates who withdrew convened in Baltimore June 28 and unanimously elected John C. Breckenridge as their candidate and approved the majority platform as presented by W. W. Avery from North Carolina.⁸³ With three candidates and two platforms, the Democratic Party was divided by geography, states' rights, and slavery.

By 1860, the National Whig Party was disintegrating as members were developing regional interests, supporting candidates in other parties, and joining with the American Party in the southern states to form the Constitutional Union Party,

which convened in Baltimore on May 9 where delegates representing voters in twenty states elected candidates for president and vice president. The party platform declared that "Whereas, Experience has demonstrated that Platforms adopted by the partisan Conventions of the country have had the effect to mislead and deceive the people, and at the same time to widen the political divisions of the country, by the creation and encouragement of geographical and sectional parties; therefore, Resolved, That it is both the part of patriotism and of duty to recognize no political principle other than THE CONSTITUTION OF THE COUNTRY, THE UNION OF THE STATES AND THE ENFORCEMENT OF THE LAWS."⁸⁴

In addition, the representatives resolved to "maintain, protect, and defend, separately and unitedly, these great principles of public liberty and national safety, against all enemies at home and abroad."⁸⁵ In the first ballot, John Bell of Tennessee received more votes than Sam Houston of Texas, but not enough to be the party choice. On the second ballot for presidential candidacy, Bell received the necessary votes and was unanimously chosen. Edward Everett was nominated to be the party candidate for vice president. "Believing that peace may once more be restored to the country," the party declared that the Constitution "has solemnly bound every citizen of the United States to maintain a more perfect union."⁸⁶ Most of the unionists in North Carolina, who were yeomen and did not own slaves, were members of the Whig Party within the state and supporters of the national Constitutional Union Party.

Republican Party delegates representing all the free states and the slave states of Delaware, Maryland, Virginia, Kentucky, Missouri, and Texas convened in Chicago and elected Abraham Lincoln on the third ballot to be their candidate for the president of the United States.⁸⁷ With a commitment to the principles of the Declaration of Independence and to preserving the Union and states' rights as guaranteed in the Constitution, the majority of the platform was devoted to an effort to contain slavery to the existing slave states. Recent conflicts in Kansas, proposals to reopen African slave trade to the United States, and consequences of the Dred Scott decision by the Supreme Court were declared as criminal, deceptive, subversive, and desperate circumstances in the Territories that violated the intent of "our Republican fathers, when they had abolished Slavery in all our national territory, ordained that 'no person should be deprived of life, liberty, or property, without due process of law' . . . and we deny the authority of Congress, of a territorial legislature, or of any individuals, to give legal existence to slavery in any Territory of the United States."⁸⁸

In addition, the party supported internal improvements, a coast-to-coast railroad, "liberal wages" for working men, "adequate reward" to mechanics and manufacturers, "remunerating prices" in agriculture and "national commercial prosperity and independence."⁸⁹ Declaring "frauds and corruptions at the Federal metropolis," the Party proclaimed "that a return to rigid economy and accountability is

indispensable to arrest the systematic plunder of the public treasury by favored partisans.”⁹⁰ As soon as Lincoln was elected as a candidate and the platform announced, the politicians in the slave states recognized that either candidate of the divided Democratic Party would be challenged to win the election against those united in opposition to slavery. While the Republican platform held in “abhorrence all schemes for Disunion, come from whatever source they may: And we congratulate the country that no Republican member of Congress has uttered or countenanced the threats of Disunion so often made by Democratic members, without rebuke and with applause from their political associates,”⁹¹ during the fall of 1860, the governors of the Deep South states, led by South Carolina, were corresponding about the possibility of secession should Abraham Lincoln win the election.⁹²

Less than twenty-four hours after Lincoln was elected president of the United States, the South Carolina Legislature authorized the election of delegates and a convention at which they should consider disunion to become a sovereign state.⁹³ In Congress, a committee comprised of a member of the House of Representatives from each of the thirty-three states was created on December 4, 1860 to propose legislation that would discourage the act of disunion by the slave states.⁹⁴ Without the Republican candidate party Abraham Lincoln on the ballot in North Carolina in 1860, the contest for the popular votes in the national election in the state resulted in presidential candidate John C. Breckenridge of Kentucky receiving a majority with forty-eight thousand five hundred thirty-nine votes. However, the combined votes of John Bell of Tennessee with forty-four thousand nine hundred ninety and Stephen A. Douglas of Illinois with two thousand four hundred one indicated that those eligible to vote in North Carolina were about evenly divided about their priority in the growing conflict of protecting slavery or supporting the Union as presented in the party platforms.⁹⁵

For the next three months, Congress drafted and passed legislation to preserve the Union as thirty-three states while slave state legislatures authorized secession conventions to consider disunion with the expectation of compromise by some and resolve to act independently by others. With a sense of urgency, the secession convention in South Carolina met on December 20 with the delegates voting unanimously in support of a resolution to secede from the Union.⁹⁶ Within two months, Georgia, Alabama, Florida, Mississippi, Louisiana, and Texas adopted similar resolutions or ordinances for secession.⁹⁷

From February 4 to 9, a Provisional Congress of the members of the Confederate states drafted a constitution and selected Jefferson Davis as their president. By March 3, an urgent attempt to lure the return of seceded states and to seek allegiance from other slave states resulted in both Houses of Congress passing and President Buchanan signing in agreement a potential thirteenth amendment that read, “No amendment shall be made to the Constitution which will authorize or

give to Congress the power to abolish or interfere, within any state, with the domestic institutions thereof, including that of persons held to labor or service by the laws of said State.”⁹⁸

Even though the proposed thirteenth amendment was approved by a few states, the slave states remaining in the Union were divided in their resolve of loyalty and their right to secede. The eight slave states in the upper and mid-south considered secession but remained in the Union. A Peace Conference to keep states in the Union was organized in Washington; the General Assembly of North Carolina voted on January 29, 1861 to support attendance at the conference on February 4, but the plan created there wasn’t satisfactory to either side.⁹⁹ North Carolina also considered whether to authorize a referendum for voters to determine if delegates should be convened to debate and recommend Union or Disunion. By a margin of six hundred fifty-one, the voters rejected a convention; however, if the delegates had convened, the Unionists would have outnumbered the Secessionists by seventy-four to forty-six.¹⁰⁰

In the inauguration on March 4 with President Lincoln addressing his “Fellow-Citizens of the United States,” he reminded the seven states in secession that the United States Constitution was adopted “to form a more perfect Union” between the founding states that had agreed beforehand to a confederation and “perpetual” Union.¹⁰¹ Avowing that, “no State upon its own mere motion can lawfully get out of the Union,” Lincoln proclaimed that the “Union is unbroken,” and requires that by constitutional authority and responsibility “the laws of the Union be faithfully executed in all the States.” Therefore, as president, he would be required “to hold, occupy, and possess the property and places belonging to the Government and to collect the duties and imposts” within the seceded states. In carrying out his duties he asserted that “there needs to be no bloodshed or violence, and there shall be none unless it be forced upon the national authority.” To all fifteen and in particularly to those slave states remaining in the Union, Lincoln pledged that he had “no purpose, directly or indirectly, to interfere with the institution of slavery in the States where it exists.”¹⁰²

However, Lincoln left unanswered three questions that were important to the slave states. “Shall fugitives from labor be surrendered by national or by state authority?” “May Congress prohibit slavery in the Territories?” “Must Congress protect slavery in the Territories?” Claiming awareness of the proposed amendment passed by Congress, he thought it to be that the “Federal Government shall never interfere with the domestic institutions of the States, including that of persons held for service” and asserted that as “implied constitutional law,” he would “have no objection to its being made express and irrevocable.” While firm in his resolve to “preserve, protect and defend” the Constitution of the United States of America, he reminded the secessionists that “In your hands, my dissatisfied fellow-countrymen,

and not in mine, is the momentous issue of civil war. The Government will not assail you. You can have no conflict without being yourselves the aggressors."¹⁰³

On March 11, 1861, just one week after Abraham Lincoln was sworn in as the 16th president of the United States, representatives from the seven states of the Deep South convened in Montgomery, Alabama, and approved their constitution as a Confederacy of sovereign states.¹⁰⁴ With the states of Delaware, Maryland, Missouri, and Kentucky remaining in the Union, the Civil War began without declaration, but with division of loyalty to the Union or support of the Confederacy within and among the Border and middle southern states. With slaves outnumbered by free blacks ten to one and less than two percent of the entire population, the Delaware Legislature, which was dominated by Unionists, unanimously rejected secession in the House of Representatives with concurrence in the Senate on January 3, 1861.¹⁰⁵

In Maryland, the free blacks nearly equaled the number of slaves, who represented about twelve percent of the population.¹⁰⁶ Although support of the Confederacy in Maryland was in evidence when troops from Massachusetts traveling through Baltimore to Washington were harassed by a mob to the point that they fired into the crowd with shots returned and four soldiers and twelve civilians killed,¹⁰⁷ the governor refused to call a special session of the legislature to consider secession due in part to the estimate that "four-fifths of the people of the State regarded the attitude of the cotton states as radical and ill-advised."¹⁰⁸ Still, one-third of the Maryland white men who fought in the Civil War wore gray.¹⁰⁹

In the newest Border State of Missouri, the number of slaves outnumbered the free blacks by more than thirty to one but represented less than ten percent of the population.¹¹⁰ Even though the governor and legislators supported the Confederacy, the Unionists maintained control of Missouri with nearly three-fourths of the volunteers joining the Union army.¹¹¹ With labor-intensive agriculture in Kentucky, slaves outnumbered the free blacks more than twenty to one and constituted about twenty percent of the population.¹¹² With the pursuit of neutrality unsuccessful, the state remained in the Union, but Kentucky volunteers were more evenly divided with two-fifths joining the Confederate army.¹¹³

While prosperity in agriculture in the Border States depended on slave labor, the development of manufacturing, mining, foundries, and mechanical agriculture was depending more on skilled and free labor provided in part by the increase in foreign immigration during the decade prior to 1860 when the total to these four Border States was about sixty-percent of the total for all the fifteen slave states.¹¹⁴ The 1860 Census reported that about one-half of the immigrants who arrived over the last decade identified their occupations as farmers (fourteen percent), mechanics (six percent), laborers (eighteen percent), manufacturers (less than one percent), and engineers (less than one percent).¹¹⁵ Among the slave states, only Florida had fewer foreign immigrants than North Carolina during the decade; only seven hundred

seventy-five of the nearly two million who relocated to the United States settled in North Carolina.¹¹⁶

Within the mid-south states of Arkansas, Tennessee, and Virginia there was considerable opposition to disunion, but the call for troops by Lincoln resulted in a shift in political and public support toward secession. After Arkansas adopted an Ordinance of Secession on May 6, 1861,¹¹⁷ the federal arsenal at Little Rock, which had been wrested from the Union in February,¹¹⁸ became the symbol of Union or sovereign control within the state. With federal forces occupying Little Rock in September 1863, citizens in counties north of the Arkansas River began the process of establishing a second government that would reclaim the status of Arkansas as a member of the Union.¹¹⁹ By 1864, there were two governors, two legislatures, and two capitals, with an estimate of more than ten thousand volunteers from within the state in the Union army.¹²⁰

In northeastern counties of Tennessee, opposition to disunion by citizens was intensified when a convention of delegates from all the counties met on May 6, 1861 to consider the adoption of an Ordinance of Secession in their State.¹²¹ Even though four hundred sixty-nine delegates representing twenty-six eastern Tennessee counties met in Knoxville on May 30 and recommended a policy of neutrality similar to Kentucky, the Ordinance of Secession was approved by the voters of Tennessee on June 8.¹²² At a convention in Greenville on June 17, the delegates who had supported remaining in the Union met and authorized a committee to petition the General Assembly for the formation of a new state in east Tennessee.¹²³ With the failure of the petition, many young men—as many as forty-six thousand according to one estimate—from Tennessee joined the Union army, with thirty to forty thousand from east Tennessee; Tennessee provided the most Union soldiers from the eleven seceded slave states.¹²⁴

While the circumstances were similar in northwestern Virginia, where forty thousand of the forty-four thousand votes cast were against the Ordinance of Secession, on May 23, 1861, reaction to approval of disunion by a statewide majority resulted in a different outcome.¹²⁵ Within a month, delegates from the pro-union counties convened in Wheeling to adopt a “Declaration of the People of Virginia”¹²⁶ on June 13, 1861 to claim the rights to continue the government of Virginia that was abandoned by secession to the Confederacy.¹²⁷

The delegates organized the administrative offices, established the General Assembly, and initiated an oath of office of solemnly swearing to support of the Constitution of the United States.¹²⁸ On August 6, the delegates reassembled and adopted an ordinance to separate from the Commonwealth of Virginia and establish West Virginia,¹²⁹ which was admitted to the Union on June 30, 1863 after two years of political maneuvering in Congress concerning the abolishment of slavery and the counties to be included in the new state.¹³⁰ Even with West Virginia becoming

a Union state, an estimate of seven thousand citizens volunteered for the Confederate army, while more than thirty thousand served in the Union army.¹³¹ Loyalty to the Union in Arkansas, Tennessee, and Virginia occurred with regional support among mostly self-subsistence farmers who were less committed to the politics of states' rights and slavery guaranteed by the Confederacy than to the freedom and liberty guaranteed by the United States Constitution.

The secessionists in North Carolina were not relieved of their anxieties by Lincoln's assurances when they proceeded to organize the Southern Rights Party, with delegates from twenty-five counties convening in Goldsboro on March 22 and recommending to the legislature that North Carolina join the Confederate States of America.¹³² Despite the efforts of the Southern Rights Party and secessionist Governor John Ellis, the Unionists in North Carolina prevailed until mid-April¹³³ when the attempt to re-supply the federal garrison at Fort Sumter, South Carolina was preceded by the South Carolina Militia bombardment on the twelfth followed by Lincoln's request for troops from North Carolina on the fifteenth, to which Governor Ellis replied to the secretary of war of the United States: "You can get no troops from North Carolina."¹³⁴

The governors and legislatures of the four Border slave states remaining in the Union reacted by convening delegates to reevaluate earlier decisions. At conventions in Virginia in April and in Tennessee in May,¹³⁵ delegates adopted ordinances to repeal or nullify earlier commitments to the Constitution of the United States. Subsequently, these declarations of disunion were ratified in each state by popular vote of one hundred twenty-five thousand nine hundred fifty to twenty thousand three hundred seventy-three in Virginia¹³⁶ on May 23, and of one hundred four thousand nine hundred thirteen to forty-seven thousand two hundred thirty-eight on June 8 in Tennessee.¹³⁷ Without ratification by a popular vote, the State of Arkansas seceded on May 6 when the convened delegates voted sixty-five to five in support of "An Ordinance to dissolve the union now existing between the State of Arkansas and the other states united with her under the compact entitled 'The Constitution of the United States of America'."¹³⁸

At a special meeting on May 1, the North Carolina Legislature ordered the seizure of all federal property and approved another election of delegates and another meeting in Raleigh on May 20 to consider the matter of secession. Surrounded by states in which ordinances of secession had been adopted, the delegates mostly debated procedures for achieving disunion and finally agreed to repeal the North Carolina ratification of the United States Constitution without approval by the legislature or the governor and without a popular vote as was required to join the Union in 1789.¹³⁹ President Davis quickly acknowledged the decision by North Carolina to become the last and eleventh convention to approve an ordinance of secession. Although the first shots of the Civil War were more symbolic of ownership

of property in the seceded states, the call for troops of seventy-five thousand by Lincoln and of sixty thousand by Davis represented the resolve of each to embark and expand a war to protect the perpetual union or establish sovereignty at will.¹⁴⁰

Destruction by War, Reconstruction by Politics

The Civil War began with the Union of twenty-four states and a population of nearly twenty-four million people preparing to invade and to reclaim eleven seceded states proclaiming to be a Confederacy with a population of nine million people who were preparing for a war to defend their borders as a newly formed country. During the entire war, as many as two million men served in the Union armies with more than eight hundred thousand in the Confederate armies. While the total number of soldiers may not have been the deciding factor in each engagement, the ability to supply arms, ammunition, food, shoes, clothing, and medical supplies to support the soldiers for the entire war was crucial for the Union and Rebel armies to maintain encounters of death and destruction. In almost every measure of preparation, the North could manufacture more of the equipment required for war, while the South relied more on importing the necessities that they could not manufacture in quantity or quality.

In 1860 there were three times as many firearms factories in the New England and the middle states producing more than thirty times the value of those manufactured in the southern states.¹⁴¹ Springfield rifles used by the Union soldiers were manufactured in New England, where sixty percent of the total value of firearms in all the states was produced in 1860.¹⁴² The comparable weapon used by the Rebel soldiers was the Enfield 1853 Rifle-Musket that was manufactured in England. Although both northern and southern states produced raw materials for manufacturing cloth, more than ninety-five percent of the value of the production of men's clothing in the United States was in three thousand northern factories in which most of the one hundred thousand sewing machines were located after they were manufactured in the twelve northern states in 1860.¹⁴³

In addition, almost ninety percent of the twelve thousand establishments that manufactured boots and shoes were in the northern and midwestern states, and the value of those produced was twenty times greater than those produced in the southern states.¹⁴⁴ None of the one hundred fifty iron ore mines and only five percent of the six hundred twenty-two coal mines were operating in southern states with just one of the sixteen new coal-fired iron locomotives produced in a southern state in 1860.¹⁴⁵ Comparing North Carolina with the total production in all of the Confederate states, the value of the products from sixty-two shoe and boot establishments was less than four percent, and the value from the six men's clothier establishments

was also four percent of the value produced in the eleven seceded states.¹⁴⁶ Although the production of firearms in the southern states was not sufficient to arm all the soldiers, the value of firearm production in North Carolina was about ten percent of the value for the eleven seceded states.¹⁴⁷

In *Battle Cry of Freedom*, James M. McPherson explained the details of the enormous efforts required in the build-up for war with the description of the challenges faced in providing supplies to hundreds of thousands of soldiers with nearly two dozen noncombat items described, which included clothes, shoes, encampment gear with mules, horses, equipment to shod and ride, and forage to feed the animals that provided the mobility for the armies. While most of these supplies traveled with the soldier or the army, McPherson estimated that under certain conditions “a campaigning army of 100,000 men . . . consumed 600 tons of supplies each day.”¹⁴⁸ In most instances, the supply lines for Union armies were in a Confederate state and depended on troops to secure the passage through unfriendly towns and routes for the wagon trains, railroads, and ships.

The 1860 Census considered the prior decade as “particularly distinguished by the progress of railroads in the United States,”¹⁴⁹ which were privately owned and operated, although the State of North Carolina owned an interest in a critical part of the important Confederate supply system from Wilmington to Richmond.¹⁵⁰ During the decade before the war, the number of miles in the country increased by two hundred fifty percent with about thirty percent of the total miles in the southern states, one-half of those railway tracks built in Virginia, Georgia, and Tennessee, and nearly nine hundred miles in North Carolina.¹⁵¹

With the expansion of the railroads, a number of routes from interiors to the Mississippi River and to the Eastern Seaboard were established with some connections completed by barges and steam vessels on lakes, rivers, and canals. By 1850, a railroad line connected the Mississippi River to the Atlantic Ocean, from Memphis through northern Alabama, Chattanooga, and Atlanta to Charleston. By 1858, the Virginia railroad “extended to a connexion [*sic*] with the Memphis and Charleston and with the Nashville and Chattanooga,” creating a path of railroads across the south.¹⁵²

By 1860, the third largest economy in the world, which was developing on the plantations of the deep southern states of South Carolina, Georgia, Alabama and Mississippi, depended on the growth of a network of railroads connecting plantations to Memphis, Savannah, Mobile, Charleston, and Vicksburg to efficiently ship their harvests to markets in the northern states and to Europe. Subsequently, some intense battles occurred during the Civil War near these railroads since connections were important for moving supplies, troops, and harvests for the support of the economy of the Confederacy. However, the Confederacy never took control of the system of railways in the seceded states, which resulted in chaotic circumstances

for meeting the needs of the highest priority in the movement of troops with the railway agents in a state uncertain about the scheduling and deployment of locomotives and freight cars.¹⁵³

As preparation for engagement in the Civil War began, the northern factories increased production as needed for uniforms, shoes, boots, rifles, and ammunition for their troops while the southern states were inspiring women to sew and owners of mills to produce cloth as they were securing harbors and engaging in bargaining overseas for the necessities to wage war in exchange for the cash crops of cotton and tobacco.¹⁵⁴

When the congress of the Confederate States of America met in Richmond during March 1862, the cotton and tobacco planters reported to those present a “preamble and resolutions,” which they had adopted at a meeting in Richmond “urging the Government to adopt measures for the purchase of the entire crops of cotton and tobacco now on hand throughout the Confederacy, in order to prevent their appropriation by the enemy.”¹⁵⁵ The tobacco and cotton crops that had been planted, tended, and harvested by slaves were usually exported to New England states as well as England and throughout Europe. With southern harbors open for shipping, the Confederacy established the Bureau of Foreign Supplies in 1864 “for the purpose of exporting cotton and other produce to supply, by no imports, the military and other necessities of the Government during the continuance of the war with the United States.”¹⁵⁶

The bureau was charged with purchasing, exporting, and selling cotton and with purchasing the “munitions of war and such other supplies as may be required by the several Departments of Government.”¹⁵⁷ To obtain additional revenue for the war, the Treasury Department was authorized to issue stocks or bonds in exchange for tobacco or cotton “which may be sold or hypothecated to foreign governments at peace with the Confederate States” or others who are “not alien enemies or citizens of the United States.”¹⁵⁸ Even with government assurance of a market for the harvest, the plantation economy could not increase the slave workforce to grow more acres of cotton to increase exports for the support of the war effort, which was unlike the industrial economy in the north that depended on free labor that could be increased in the factories as the production of arms and needed provisions was required for the armies during the years of a growing number of battles against the enemy.

As southern and northern men prepared for war, most of the members of the public were proud of their soldiers who volunteered to preserve the Union as a Yankee or to claim sovereignty for their State as a Rebel with the northern and southern states both relying on their interpretations of their constitutions that were similar except for articles devoted to states’ rights and especially protecting slavery in the Confederate states. However, a document entitled the Articles of Confederation

had been signed on November 15, 1777, which established the United States of America as a “perpetual Union between the states of New Hampshire, Massachusetts Bay, Rhode Island and Providence Plantations, Connecticut, New York, New Jersey, Pennsylvania, Delaware, Maryland, Virginia, North Carolina, South Carolina, and Georgia.”¹⁵⁹

In addition, the document guaranteed that: “Each state retains its sovereignty, freedom, and independence, and every power, jurisdiction, and right, which is not by this confederation, expressly delegated to the United States, in Congress assembled.”¹⁶⁰ President Andrew Jackson had decided that perpetual Union of the States trumped the sovereignty of each state when he threatened to invade his state of birth, South Carolina, a few decades earlier.¹⁶¹ President Abraham Lincoln had come to the same conclusion to claim unity as he called for troops after the attack on federal property at Fort Sumter. In the first sixteen months of the war, there were one hundred five engagements between units of the armies of the Union and the Confederacy with one-third occurring in Virginia and the rest in West Virginia, North Carolina, Maryland, Tennessee, Kentucky, Missouri, Arkansas, Oklahoma Territory, Texas, New Mexico Territory, and Indian Territories.¹⁶²

With the capital of the Confederacy located at Richmond, Virginia, one-hundred seven miles almost due south from the capital of the Union, two battles referred to as Bull Run or Manassas occurred nearer the Union capital just thirty-two miles into Virginia. The first battle at Manassas occurred in July 1861 with the second one beginning in August one year later. The total casualties from these two battles were more than twenty-six thousand men with at least twenty-two thousand of the losses in the second battle. In these early engagements in Virginia, the total casualties in the Union armies was more than one and one-half times the losses in the Confederate armies.¹⁶³

During May 1863, a battle occurred at Chancellorsville, Virginia, which is about halfway between Richmond and Washington. The losses for each army were about the same as in the second Manassas battle with more than twenty-four thousand casualties in total.¹⁶⁴ While the major battles were occurring near the two capitals, units of the Union armies and navy were engaging in expeditions along the North Carolina waterways for the purpose of occupying communities and then establishing blockades for the canals and inlets through which the Confederate armies were supplied by importing from other countries. Beginning with Fort Hatteras in August 1861 until the spring of 1862, the Union troops invaded and eventually occupied New Bern, Fort Macon, Washington, Plymouth, and Beaufort harbor.¹⁶⁵

With military occupation secured in May 1862, President Lincoln appointed Edward Stanly—who, before moving to California in 1853 where he was an unsuccessful candidate for governor, had represented North Carolina in the House of Representatives for three terms, served in the State House of Representatives for

three terms and one term as speaker—as the military governor of the state in hopes that the citizens of eastern North Carolina would rejoin the Union by oath of allegiance and then influence others to follow.¹⁶⁶ The occupation by Union troops in eastern North Carolina restricted the use of canals and closed the port at Beaufort to Confederate barges and ships; however, the port at Wilmington and the railroad from Wilmington through Goldsboro to Richmond remained a primary supply line for the Confederate armies.

In Virginia, with the objective to invade and occupy, the 1861 to 1862 campaigns by the Union armies in general were not as successful as efforts in North Carolina until the withdrawal of General Lee at Antietam in nearby Maryland in September 1862.¹⁶⁷ With measured success of the Union armies at Antietam,¹⁶⁸ President Lincoln announced the Emancipation Proclamation on January 1, 1863 which redefined the objective of the war for many people by freeing the slaves in the seceded states except Tennessee, West Virginia, and Union-controlled portions of Louisiana and counties in eastern Virginia.¹⁶⁹

Although the war began with disagreements about the perpetual bond of states to the Union versus state sovereignty, abolitionists in the North and slaveholders in the South were now engaged in a war with moral and economic consequences. In the remaining thirty months of the war there were two hundred seventy-nine engagements of units and armies of blue and grey uniformed soldiers in nineteen of the thirty-five states and four territories.¹⁷⁰ During this time the Union armies extended their westward and southward movements into the states along the great rivers of commerce connecting Tennessee, Missouri, Arkansas, Mississippi, and Louisiana with one hundred engagements in total in those states to disrupt the ability to wage war by destroying military assets and supply lines of transportation.¹⁷¹ In January 1862, North Carolina military Governor Stanly resigned in part because of his disappointment about the issuance of the Emancipation Proclamation, but the military was relieved due to their concerns about his decisions to return runaway slaves to plantations.¹⁷²

Without replacing the military governor, the Union navy and the army in North Carolina eventually turned their attentions toward occupying Fort Fisher and Wilmington to further diminish the supplies to the Confederacy. Without open access through the ports, rivers, and canals and with the Confederacy resorting to evasion, Governor Zebulon Vance recalled after the war the value of the blockade runners by describing supplies from them which he had distributed on an occasion which included two hundred fifty thousand pairs of shoes, fifty thousand blankets, cloth for two hundred fifty thousand uniforms, twelve thousand overcoats, two thousand Enfield rifles with one hundred rounds of ammunition each, coffee, bacon, and medicine for the troops.¹⁷³

However, as battles were fought with as many as twenty thousand or more soldiers killed or ultimately dying from battle wounds, military discipline in the armies was challenged, with a division commander in a Confederate army court martialed for disobeying orders, another accused of drunkenness while in battle, and a general accused of inept leadership.¹⁷⁴ Dissatisfaction among the generals about the leadership of the northern army of the Potomac was in evidence while the morale of the men in ranks resulted in a desertion "rate of a hundred or more a day during January" in 1863.¹⁷⁵ In the Confederacy, the demands of war on the economy and the shortage of the supply of food resulted in an increase of seventy percent in prices during the four months after Gettysburg in July 1863.¹⁷⁶ In addition, with a secret group of Unionists in North Carolina assisting in organizing antiwar meetings, William W. Holden was urging negotiations for peace with editorials in the Raleigh, North Carolina *Standard* newspaper as early as the summer of 1863.¹⁷⁷

The supply lines for Union armies in Virginia extended through mostly uncontested areas; in contrast, the support for the ninety thousand troops in the northern armies of the Confederacy defending against Union armies in engagements near Richmond included the same railroads through Tennessee, North Carolina, and most of the southern states that also connected through ocean ports, canals, and rivers for the purpose of exporting cotton from plantations and importing the supplies to support the war.¹⁷⁸ At a critical time and place for maintaining the network of railroads, northern armies began attempting to capture the vital railroad crossroad connections at Chattanooga, Tennessee where Confederate troops and their supplies had been routed between Atlanta, northern and southern Alabama, Memphis, Virginia, Kentucky, and midwestern states from the beginning of the war. After a prolonged engagement with the Confederate armies defending an advantage, the decision by Lincoln to create a division including Chattanooga and placing Grant in command, included armies engaged in the bottleneck at Chattanooga led by Generals William Sherman, Joseph Hooker, and George Thomas.¹⁷⁹

With Grant's arrival in Chattanooga in October 1863, the Union armies were emboldened by their generals and proceeded to dislodge the Confederate forces by November with the Rebels retreating along the railroad tracks toward Atlanta. With Grant reassigned to command with General Meade against General Lee as the Rebel commander, during May 1864 the southern armies were engaged in battles against northern armies at the Wilderness, Spotsylvania Court House, and Cold Harbor in Virginia, which concluded with a total of seventy-five thousand three hundred casualties within the month, with twenty-five thousand nine hundred troops lost for the southern states' armies without an end to the Civil War.¹⁸⁰

In August 1864, Atlanta, with a population of nearly ten thousand, was a growing center of commerce with connections by railroads to the deep-water ports of Savannah and Charleston, to south-central Alabama, and before the recent defeat,

a line through Chattanooga to the Mississippi River and midwestern states. The Union armies commanded by General Sherman marched to the outskirts of Atlanta where he paused while other Union army units weakened the supply lines to the Confederate armies by destroying railways and munitions factories until the engagements in the city began, which finally resulted in the occupation of Atlanta.¹⁸¹ With the city in shambles and his army of sixty thousand men ready to march, Sherman began in November to depart from the Atlanta area without establishing supply lines and to “move through Georgia, smashing things to the sea” along the way to provide more of a “psychological effect” to be “a demonstration to the world.”¹⁸²

Because Sherman abandoned the usual supplies that would have required replacing three hundred sixty tons to be consumed daily, large groups of foraging soldiers pillaged the farms, plantations, and communities for food which left a mark of devastation across Georgia about twenty to sixty miles wide on the two hundred eighty-five-mile march from Atlanta to Savannah.¹⁸³ There were no Confederate armies large enough or positioned to stop or even slow him down with most of the attention in Virginia, where sixty-three engagements occurred in the last twelve months of the war.¹⁸⁴

With Sherman marching from Savannah through South Carolina and with the fall of Fort Fisher and Wilmington in early 1865, the Civil War was coming to an end in North Carolina. Sherman’s armies marched from near Charlotte to near Raleigh engaging in skirmishes along the way. President Lincoln was inaugurated for his second term on March 4; the Battle of Averasboro occurred on March 16 with eight hundred sixty-five Confederate soldiers killed and ninety-five Union soldiers killed with five hundred thirty-three wounded and fifty-four missing; General Lee surrendered to General Grant at Appomattox on April 9; President Lincoln was shot by John Wilkes Booth on April 14; and General Sherman and General Edward Johnson signed the terms of surrender for the Confederate armies in North Carolina at the Bennett House outside of Durham on April 29, 1865. In Western North Carolina near Waynesville, the last shots between Union and Confederate armies occurred on the same day as in Texas.¹⁸⁵

During the four years of the Civil War, six hundred twenty thousand American men lost their lives, with three hundred sixty thousand of them in the Union armies and two hundred sixty thousand of them in the Confederate armies.¹⁸⁶ The 1860 Census reported that nearly one hundred twenty-nine thousand white males between the ages of twenty and sixty were living in North Carolina.¹⁸⁷ While only twenty battles occurred in North Carolina,¹⁸⁸ one hundred twenty-five thousand white males from the state served during the four years of the Civil War with many of them in the armies that were engaged in some of the one hundred twenty battles in Virginia¹⁸⁹ as well as in other states; more than forty thousand soldiers from

North Carolina died in battle or from disease, which represented more casualties than the number lost from any one of the other southern states.¹⁹⁰

In addition to a conscription of troops for their army, a Confederate tax, which aggregated to ten million dollars by 1864, was levied on the citizens by the North Carolina Legislature for the Confederacy to pay the escalating costs of equipment and supplies for war. In addition, the legislature imposed a tax to pay for the cost of defending within the state against the Union armies. Consequently, internal support of the war, including the taxes, resulted in a state war debt of more than sixteen million dollars with the counties incurring a similar amount used in the main to support the impoverished families of soldiers.¹⁹¹

Peace with Uncertainty

President Lincoln had declared the seceded states to be in rebellion when he delivered a "Proclamation of Amnesty and Reconstruction" on December 8, 1863, in which he claimed his authority as provided in the Constitution "to grant reprieves and pardons for offenses against the United States." If the states did not have the right to secede, Lincoln reasoned that they were in rebellion rather than within another country; therefore the Reconstruction was a matter of returning the governance of the states to their relationship with the United States as it was before their secession. To obtain a full pardon of citizenship and restoration of all rights of property, Lincoln insisted that a "person shall take and subscribe an oath, and thenceforward keep and maintain said oath inviolate."¹⁹² The oath required faithful support, protection, and defense of the Constitution of the United States and the support of all acts passed by Congress during the existing rebellion referring to slaves and all proclamations of the president.

However, there were exceptions to the opportunity for amnesty, which included:

civil or diplomatic officers or agents of the so-called confederate government; all who left judicial stations under the United States to aid rebellion; all who are, or shall have been military or naval officers of said so-called confederate government, above the rank of colonel in the army, or of lieutenant in the navy; all who left seats in the United States Congress to aid the rebellion; all who resigned commissions in the army or navy of the United States, and afterwards aided the rebellion; and all who have engaged in any way, in treating colored persons, or white persons in charge of such, otherwise than lawfully as prisoners of war, and which persons may have been found in the United States service as soldiers, seamen, or in any other capacity.¹⁹³

In the United States from colonial times through the mid- to late-nineteenth century, the term “colored” was used, as in the above quotation, to refer to non-white individuals, many of whom were of African ancestry. Between that time and the early twenty-first century, other labels such as “Negro,” “black,” “African American,” and “person of color” have been used during various periods, with intent to leave behind the racial traditions and attitudes associated with slavery and segregation and to convey strength and racial pride. The term “black” emerged in the mid-twentieth century as a more powerful word than “African American” and as a linguistic parallel to “white.”¹⁹⁴ In this book, the term “black” is used to refer to these individuals when not quoting directly from other sources.

The Reconstruction plan proclaimed by Lincoln permitted a state in rebellion to establish a process of identifying “a number of persons, not less than one-tenth in number of the votes cast in such State at the Presidential election of the year of our Lord, one thousand eight hundred and sixty, each having taken the oath aforesaid, and not having since violated it, and being a qualified voter by the election laws of the state,” who could then proceed in establishing a republican form of government that would in turn be recognized by the United States.¹⁹⁵

In opposition to Lincoln’s Reconstruction plan, on July 2, 1864, Congress passed the Wade-Davis Bill that would have established military law in each state, required a majority of the enrolled voters to take the oath (as opposed to Lincoln’s ten percent), and prescribed in detail the control of the Reconstruction process. Although Lincoln avoided the control by Congress with a pocket veto (retaining the bill unsigned until it is too late for it to be dealt with during the legislative session), the outline of the procedures remained a priority of many of the members of the Republican Party of Lincoln.¹⁹⁶

In his last public address on April 11, 1865, President Lincoln provided insight into the challenges in restoring the states in rebellion to the Union when he stated that: “Unlike the case of a war between independent nations, there is no authorized organ for us to treat with. No one man has authority to give up the rebellion for any other man. We must begin with, and mould from, disorganized and discordant elements. Nor is it a small additional embarrassment that we, the loyal people, differ among ourselves as to the mode, manner, and means of reconstruction.”¹⁹⁷ In addition, Lincoln described an example of Reconstruction currently underway in Louisiana in which twelve thousand persons had sworn allegiance to the Union and then these franchised voters “held elections, organized a State government, adopted a free-state constitution, giving benefit of public schools equally to black and white, and empowering the Legislature to confer the elective franchise upon the colored man.”¹⁹⁸

However, Lincoln recognized the challenges ahead when he acknowledged that Congress had prepared a Reconstruction plan and possessed the power to reject

persons elected in the southern states to serve from each of the states. Led mostly by Republicans, members of Congress were opposed to Reconstruction by Lincoln because the consequences produced leaders of the secession who repelled emancipation with black codes and opposed free labor on plantations.

In addition, some members of Congress led by Thaddeus Stevens considered each state of the Confederacy as an enemy to be conquered and then administered by Martial law until a new form of government as a territory could be established and proceed to implement the requirements for admission as a state to the Union. In this circumstance, the precedent from other wars of acquiring land from the conquered could lead to Congress claiming the same power used in the process of admission of territories to the Union.¹⁹⁹

However, President Lincoln avoided this question with a perplexing answer when he stated that:

I have been shown a letter on this subject, supposed to be an able one, in which the writer expresses regret that my mind has not seemed to be definitely fixed on the question whether the seceded States, so called, are in the Union or out of it. It would perhaps, add astonishment to his regret, were he to learn that since I have found professed Union men endeavoring to make that question, I have *purposefully* forborne any public expression upon it. As appears to me that question has not been, nor yet is, a practically material one, and that any discussion of it, while it thus remains practically immaterial, could have no effect other than the mischievous one of dividing our friends. As yet, whatever it may hereafter become, that question is bad, as the basis of a controversy, and good for nothing at all—a merely pernicious abstraction.²⁰⁰

The question expressed to President Lincoln three days before he was shot by Booth was answered by President Andrew Johnson when he established military rule with provincial governance in all the seceded states which resulted in each one of five districts under the control of a commanding general. Uniting North and South Carolina with the headquarters in Charleston, South Carolina, Major General Daniel E. Sickles was appointed as the commanding general of the Second Military District reporting “to the General-in-Chief of the Army, relating to the issue made by the civil authorities.”²⁰¹ The chief of the army, who reported to President Johnson, distributed troops among the states to preserve the peace and order and to implement instructions from President Johnson.

The Congress was not in session as President Johnson began to organize his Reconstruction plan for the seceded states, which was almost the same as the Lincoln plan in that there was an immediate process for returning persons in rebellion to the status of citizens of the United States so that they could restore civilian government for their state under the requirement of their existing constitutions. With the

armies in place, and given the experience he earned in the two years after the Union troops were captured Nashville in 1862 when President Lincoln appointed him as the provisional governor of Tennessee, President Johnson did not hesitate with his own process of reconstructing the states in rebellion to the United States.

Johnson had experiences in the economy and the politics of the southern states before secession during his two terms as governor in Tennessee before his election to the Senate in 1856. A strong Unionist from eastern Tennessee, Johnson refused to vacate his seat as a senator from the State of Tennessee in Congress even though the state had seceded. While provisional governor, Johnson had required an oath of allegiance to the Union for obtaining eligibility to vote or seek election or appointment to office, and he “unilaterally decreed the end of slavery in Tennessee” with a constitutional amendment following the proclamation in early 1865.²⁰²

Johnson was sworn into office as the vice president to Lincoln in March 1865; just one month later, he was now in charge of the difficult task of ending the Civil War and beginning the Reconstruction of the defeated South with a devastated economy, bankrupted governments and institutions, and four million black people freed from slavery but trapped by poverty, ignorance, prejudice, and a color barrier of white supremacy that must be removed or at least abated. It is difficult to imagine the sense of uncertainty and the corresponding behavior of nearly ten million people in the eleven states regarding their individual situations; but no doubt, Johnson was confident that his experiences in Tennessee should be the foundation on which all the states in rebellion must stand and that North Carolina and the other states were just behind Tennessee in readmission.²⁰³

President Johnson appointed William W. Holden as the provisional governor of North Carolina on May 29, 1865,²⁰⁴ which was the same day that he issued his “Proclamation of Amnesty” for the Confederate states. With this first step in Reconstruction similar to the Lincoln’s process, the president was granting an opportunity for a pardon and amnesty to people who were directly or indirectly involved in rebellion against the United States by avowing an oath of allegiance. The affirmation of the oath required of each person “that I will henceforth faithfully support, protect, and defend the Constitution of the United States, and the Union of the States thereunder; and that I will, in like manner, abide by, and faithfully support all laws, and proclamations which have been made during the existing rebellion with reference to the emancipation of slaves.”²⁰⁵

In addition, this oath of allegiance to the Union was required to become eligible to serve in public office or to vote. However, there were fourteen classes of citizens who were “excepted from the benefits of this Proclamation”²⁰⁶ which included some government, judiciary, military, foreign service, and civilians who “voluntarily participated in said rebellion” and had left home in the North and moved to the South and others who owned taxable property worth more than five hundred twenty

thousand dollars.²⁰⁷ For those fourteen classes, an opportunity reviewed by a “special application may be made to the President for pardon . . . and such clemency will be liberally extended as may be consistent with the facts of the case and the peace and dignity of the United States.”²⁰⁸

After President Johnson appointed William Holden as the provisional governor of North Carolina, Reconstruction as defined by the president required the election of delegates who would assemble in a Constitutional Convention that then established the form of government that enabled elections of a civilian governor, state legislators, and members of the House of Representatives with two United States senators then elected by the state legislators. However, the process could not begin until Governor Holden identified those men with Union sentiments before and during the war qualifying them to affirm the “iron-clad oath”²⁰⁹ and then appointed them as justices of the peace to administer the amnesty oath to the candidates to run in the election of the delegates to the constitutional convention. In addition, sheriffs, clerks of court, three thousand magistrates, mayors, and commissioners of towns and other officers were appointed by the governor in three months as the provisional government began to operate across the state.²¹⁰

When President Johnson was considering William W. Holden for provisional governor of North Carolina, he probably knew that Holden was a Unionist who was also a secessionist before the war but later advocated for a negotiation of peace. Holden was no stranger to political activities in the state with his involvement in establishing the Democratic Party when he was subsequently involved in the election of Governor David S. Reid in 1852. Holden had prepared in early life for involvement in public affairs with experiences in printing, composing, writing, and editing newspapers. He was employed as a printer by the *Star* newspaper when he first located to Raleigh; however, he reached a pinnacle in political discourse as the owner, publisher, and editor of the *North Carolina Standard* in 1842 in Raleigh where he observed, reported, advocated, and wrote during secession and war about important events and issues placed before the governor and legislature.

In earlier years, Holden had lauded the effects of free suffrage for white males provided in the 1835 Constitution as “the source of benefit to the State, in that it greatly liberalized the view of public men in legislation,” which in 1848 with “no doubt led to the assumption of debt of more than two millions to internal improvements.”²¹¹ When the Democratic Party began their convention on April 23, 1860 in Charleston, South Carolina, the discussions among the delegates from the southern states involved the predictions and claims about which delegations would promote secession.

With urging from other delegates, Holden spoke for ten minutes before the convention about his duty to his state in evidence by “an immense majority of the people in my state with George Washington the Father of the Country would frown

indignantly on the first dawning of every attempt to alienate any portion of our Country from the rest, or to enfeeble the sacred ties which link together various parts.”²¹² However, one year later after Fort Sumter and the call by Lincoln for troops, he was elected as a delegate to the secession convention where he supported disunion.²¹³

During the first two weeks of April 1865 when the surrender of Lee and the assassination of Lincoln occurred, the southern states were in disarray while waiting and hoping for a short period of time before restoring alliances with the United States as had been proposed by Lincoln in his plan for Reconstruction. For North Carolina, the appointment of the provisional governor and the announcement of the opportunities for amnesty occurred on May 5, which was followed by the Constitutional Convention that met and then adjourned in five months with the provision of a civilian government to be established one month later with the elections of the governor and legislators. Therefore, President Johnson had implemented a process for restoring governance to the states in rebellion, which for North Carolina began in May and ended just six months later in November.

While Reconstruction was underway in North Carolina, Major General Carl Schurz—who was born in Germany, educated at the gymnasium of Cologne and the University of Bonn, compelled to flee a revolution, worked as a newspaper correspondent in Paris, taught school in London before immigrating to Philadelphia in 1852, then moved to Wisconsin to study law, settled in Milwaukee where he practiced law, and represented Missouri in the Senate from 1869 to 1875²¹⁴—was asked by President Johnson to leave on a three-month mission through South Carolina, Georgia, Alabama, and Mississippi for the purpose “of inquiring into the existing condition of things, of laying before you whatever information of importance I might gather, and of suggesting to you such measures as my observations would lead me to believe advisable” as understood in a letter from Schurz to the president. (Initially Louisiana was included, but they agreed on the four visited.)²¹⁵

Schurz met with military officers and civil officials and heard harsh attitudes against the purposes of Reconstruction expressed in many conversations with plantation owners, lawyers, physicians, travelers, and hotel guests. Some of them were secessionists and some Unionists before the war. Schurz was convinced rather quickly that reorganizing the society of more than three million people in four states with the combined number of black population in the majority and restoring the primary economy of plantation agriculture with a system of free labor after the long history of master and slave relationships would present an array of unexpected situations that were sure to arise without a plan. He also believed that Union oversight would discourage the establishment of a system of free labor for the freedmen to receive fair wages.²¹⁶

Reporting on his just three-month visit to four states did not capture the full range of attitudes from three million people; however, Schurz was confident that the extremes, while not rebellious comments, provided a reason for his concerns about the premature Reconstruction underway in North Carolina with the appointment of a provisional governor and the approval of the Constitutional Convention without a plan to initiate a system of free labor to replace slave labor.²¹⁷ In supporting his concerns about the president's decisions, Schurz highlighted the attitudes of people he interviewed that were consistently expressed and seemed to be ingrained into the southern society about the need to continue to control the work of freedmen with punishments, about the establishment of local laws to control the status of blacks in the community, about the lack of control with the system of free labor, and about the admission to the Union as a return to their prewar society and economy.²¹⁸

While the abolishment of owning another human to control their labor was accepted, most of the people in the South were not prepared to change their social relationship with black people as was expressed in an odious declaration that "the negro exists for the special object of raising cotton, rice and sugar for the whites, and that it is illegitimate for him to indulge, like other people, in the pursuit of his own happiness in his own way."²¹⁹ In general, those who shared their opinions with Schurz depicted the Negro as "lazy. . . improvident . . . inconstant."²²⁰

With so many assertions containing similar attitudes about the work of slaves, Schurz surmised "that the success of negro free labor would depend not only on the aptitudes of the laborer, but also on those of the employer."²²¹ Included in his summary of the condition of Reconstruction in the southern states, Schurz criticized the current situation with the statement that:

The general government of the republic has, by proclaiming the emancipation of the slaves, commenced a great social revolution in the south, but has, as yet, not completed it. Only the negative part of it is accomplished. The slaves are emancipated in point of form, but free labor has not yet been put in the place of slavery in point of fact. And now, in the midst of this critical period of transition, the power which originated the revolution is expected to turn over its whole future development to another power which from the beginning was hostile to it and has never yet entered into its spirit, leaving the class in whose favor it was made completely without power to protect itself and to take an influential part in that development.²²²

North Carolina Reconstructed

During the time that Schurz was on the mission for President Johnson, Governor Holden continued to appoint government officials, recommend pardons to the president, and on August 8 issued a proclamation for the purpose of electing delegates to attend a Constitutional Convention on October 2 near the end of Schurz's mission to the four states. Justices of the peace continued to administer the amnesty oath to all those who were not in the excepted class and to those who wished to vote or stand for election as a delegate. For those in the excepted class, they applied to the governor who either rejected or recommended approval to the president. Approval to pledge the amnesty oath was not automatic with as many as forty persons not allowed to take the oath in just one county. However, most of the members who were elected to serve in the convention that opened in October had been opposed to secession and vowed the oath with some upholding loyalty since their activity in the peace party during the war. The convention of 1865 adjourned on October 20 after adopting ordinances to amend the constitution, which repealed secession and abolished slavery forever. While in session, Governor Holden reported to the president that the convention decided to "involve itself in a bitter discussion of the State debt made in aid of the rebellion."²²³

Governor Holden, in a telegraph to the president, stated that "Our people are believed to be against assuming the debt by a large majority. Is it not advisable that our Convention. . . should positively ignore this debt now forever? Please answer at once."²²⁴ The president answered the next day with the simple and absolute statement of: "Every dollar of the State debt, created to aid the rebellion against the United States, should be repudiated, finally and forever."²²⁵ While an ordinance from the convention that "declared all debts and obligations created in direct or indirect void"²²⁶ relieved the state from taxing the citizens to pay the debt of rebellion, there were undesirable consequences with the school fund and the university endowment included in the repudiation of Confederate and state bonds to fund the war that contributed to the closing of the University of North Carolina.

With the ordinances prepared for the referendum, an election for governor, the state legislators, and seven congressional representatives to be seated in Washington was held on November 9, 1865, with Jonathan Worth receiving a majority by nearly six thousand out of sixty thousand of the votes. Worth was vigorously and publicly opposed to the secession of North Carolina from the Union before the war; however, he was also loyal to the state as secretary of the Treasury and not connected to the peace movement during the war. Decades before the war, Worth had been active in the development of education in North Carolina after attending schools in Randolph County and the Greensborough Male Academy before becoming a law student of Archibald D. Murphey. While practicing law in Asheboro, Worth

was elected to the House of Representatives for two terms and then elected to serve in the Senate from 1840 to 1861 where he “wrote the law that established the basic structure of the state’s antebellum school system.”²²⁷

Even though the election was completed with expectations of rejoining the Union in time, during the campaign some of the heated public discourses among candidates were reported in the newspapers and interpreted among readers in the northern states as hostility toward the Union. In addition, with members of Congress expressing concerns about the failure of Reconstruction, President Johnson sent a warning to Governor Holden stating that: “The results of the recent election in North Carolina have greatly damaged the prospects of the State in the restoration of its governmental relations. Should the action and spirit of the legislature be in the same direction, it will greatly increase the mischief already done and might be fatal.”²²⁸

While President Johnson spoke with Schurz before he left on the first of July and assured him that North Carolina was “especially favorable” for an experiment and with “the Gulf States, he was very doubtful and even anxious”;²²⁹ Reconstruction of other states was already underway with Constitutional Conventions in Mississippi in August and in Alabama, Georgia, Florida, and South Carolina during the following three months.²³⁰ In addition, the three requirements of abolishing slavery, repealing secession, and repudiating the debt of war were followed in each state, which began as an experiment. On December 23, 1865, W. W. Holden was told that his service as provisional governor had ended followed by notice to Governor Worth that his term had begun.²³¹

While those eligible to vote were establishing the civilian government of North Carolina, the Freedmen’s State Equal Rights League held a convention in Raleigh in October 1866 with one hundred fifteen delegates representing sixty counties of the state, and J. H. Harris of Wake County presiding as president.²³² The convention spanned four days of debates, discussions, speeches, and resolutions to establish a Constitution of the Equal Rights League, a Constitution of the Educational Association of the Colored People of North Carolina, and a Constitution for the Auxiliary for the Educational Associations. With twelve articles to organize and perpetuate their effort, the primary object of the Equal Rights League was the “repeal of all laws and parts of laws, State and National, that make distinctions on account of color.”²³³ However, the Educational Association for Colored People was created for the purpose of aiding “in the establishment of schools, from which none shall be excluded on account of color or poverty, and to encourage unsectarian [*sic*] education in this State, especially among freedmen” as they had defined in the constitution of the association.²³⁴

A number of people were invited to address the convention, with some unavailable; however, current Governor Worth spoke with a message devoted to “morality,

education and religion.”²³⁵ The recorded minutes of the convention reveal that Worth also urged the people in attendance “to acquire habits of industry, sobriety and honesty” in addition to “knowledge and wealth” as expressed in his conclusion.²³⁶ By acclaiming that the “two races should mutually sustain each other,” former Governor Holden then encouraged the freedmen to first “get homes, and the next was, while they still labored to improve and add to their possessions, to educate their children.”²³⁷ In his conclusion, Holden suggested that social relationships be established so that “the true interest of the colored race was to cultivate the friendship of the whites; and the whites would also find their true interest in doing justice to the blacks and in cultivating their friendship.”²³⁸

In an address to the “White and Colored Citizens of North Carolina,” the members of the Freedmen’s Convention offered a plea “for equal rights without regard to complexional differences.”²³⁹ Of immediate interest, “We appeal to your religion and humanity. We claim by merit the right of suffrage, and ask it at your hands. We believe the day has come, when black men have rights which white men are bound to respect. We intend to live and die on the soil which gave us birth. Oh, North-Carolina the land of our birth.”²⁴⁰ Although suffrage for all men was achieved within the decade, prejudice and violence preempted friendships for too many white and black people with members of the Ku Klux Klan determined to interfere with the rights of blacks to vote and to serve in government.²⁴¹

As black men were seeking the right of suffrage and white men were pledging an oath to vote, civilian authority was restored in the southern states with some of the elected governors and other officials beginning to reclaim full control of the administration of their states with approval required from the president, which in some situations the action disturbed the Unionists and the military regional generals. In one instance, the regional general prohibited the governor from forming a militia in Mississippi; however, the president ruled in favor of the state in rebellion.²⁴²

Other civilian governments established school systems to educate only the white children, enacted black codes in Louisiana to prevent freedmen from entering white neighborhoods, created towns that denied blacks the opportunity to live there except as servants, and passed legislation in South Carolina to control the labor of black people constricting their occupations to only a farmer or a servant with the requirement of an annual contract.²⁴³

With growing resistance by the states in rebellion toward any attempt by the Union to govern the residue of slavery-based “black codes” for controlling the freedmen in the society, the fall session of Congress opened in 1865 with the members responding immediately to those circumstances by not seating the representatives who had been elected in a number of states in rebellion. With a sense of anger toward the circumstances that occurred during Reconstruction established by the president, Congress considered enacting legislation that would prevent the states

from discriminating against freedmen using the black codes and against the minority of Unionist. However, to avoid presidential involvement, Congress decided to direct its concerns about the rights of the freedmen toward the development of the Fourteenth Amendment to the Constitution. Ratification of the amendment would bestow citizenship on all people born in the United States and enact that "No State shall make or enforce any law which shall abridge the privileges or immunities of citizens of the United States."²⁴⁴

In addition to creating citizens with privileges and immunities of the United States with life, liberty, and property protected by due process of law, the Fourteenth Amendment declared that no state could "deny to any person within its jurisdiction the equal protection of the laws." To avoid benefitting the southern states from emancipation alone, the amendment deleted the prior three-fifths-of-the-slaves rule employed before the war in counting voter representation by substituting the rule of counting the number of male citizens of twenty-one or more years of age who have the right to vote as the determining factor of the members in the House of Representatives from each state. Disturbed by the rise of the Confederate leaders who created the path taken in the years before the war, the amendment demanded that the men who served in the military and government under oath to the United States before the Civil War and then were engaged in "insurrection or rebellion" could not serve as a "Senator or Representative in Congress, or elector of President and Vice-President, or hold any office, civil or military, under the United States, or under any State."²⁴⁵

To clarify the debate occurring in some states about the great debt incurred by the Confederacy and the states, the amendment declared that "neither the United States nor any State shall assume or pay any debt or obligation incurred in aid of insurrection or rebellion against the United States, or any claim for the loss or emancipation of any slave; but all such debts, obligations, and claims shall be held illegal and void." Although Congress enacted the Fourteenth Amendment on June 16, 1866, the amendment to the Constitution granting citizenship to the freedmen was not ratified by the Union states until July 9, 1868.²⁴⁶ However, the State of Tennessee ratified the amendment and was subsequently readmitted to the Union on July 24, 1866. Apparently, some members of Congress considered the Fourteenth Amendment as the foundation for Reconstruction with citizenship and equality providing future opportunities for the freedmen; however, ten of the southern legislatures did not agree and failed to ratify the amendment with only thirty-three votes in these legislatures in favor of the amendment.²⁴⁷

The unexpected two-thirds majority victory of the Republicans in the congressional elections in 1866 effectively eliminated the president's control of Reconstruction so that Congress was the sole authority in the readmission of the states in rebellion. In December, Congress began the debates about the requirements for the

readmission of the southern states that culminated in the Reconstruction Act of 1867, which they placed on the president's desk in March. As expected, the president vetoed the bill, which was promptly followed with an override by the Congress.²⁴⁸ To justify expanding military rule in the southern states, the act by Congress declared that "no legal State Governments or adequate protection for life or property now exists in the rebel States. . . and whereas it is necessary that peace and good order should be enforced in said States until loyal and republican State governments can be legally established" the states were divided into five districts with an army commander of at least the rank of brigadier general assigned "to protect all persons in their rights of person and property, to suppress insurrection, disorder, and violence, and to punish, or cause to be punished, all disturbers of the public peace and criminals."²⁴⁹ The commander was free to choose between civil and military tribunals without interference from the state.

In addition, a "convention of delegates elected by male citizens of said State, twenty-one years old and upward, of whatever race, color or previous condition" were to convene and "shall have formed a constitution of government in conformity with the Constitution of the United States," which must be ratified by qualified voters and then submitted to Congress for approval.²⁵⁰ The act also mandated that the Fourteenth Amendment must be ratified by the legislature with the members elected by the requirements of the Constitution, then approved by Congress before any senators or representatives will be admitted to seats in Congress.

Although the attempt by Congress in 1864 to control Reconstruction with the Wade-Davis Bill was vetoed by Lincoln, President Johnson was restrained from controlling Reconstruction by the Tenure of Office Act passed by Congress in 1867. The act overrode a veto that eliminated the authority of the president from removing any "person holding any civil office to which he has been appointed by and with the advice and consent of the Senate" even though they may disagree and act against the president's instructions.²⁵¹ On the same day of March 2, 1867, an act on the command of the army was also passed over the protests of the president; it required that "all orders and instructions relating to military operations issued by the President or Secretary of War shall be issued through the General of the army."²⁵²

In addition, the general of the army could not be "removed, suspended, or relieved from command, or assigned to duty elsewhere than at said headquarters, except at his own request, without the previous approval of the Senate."²⁵³ Since the military was to be responsible for the details of Reconstruction as described by an act of Congress and the secretary of war and general of the army reported to the president, who was by the Constitution in charge of all agencies implementing the laws, Congress had created a situation where the actions of the president were held hostage to legislative approval.

President Johnson considered the Reconstruction Act of 1867 of the Republican-dominated Congress to be a radical plan that he criticized by stating that: "We have seen this Congress pretend to be for the Union, when its every step and act tended to perpetuate disunion and make a disruption of States inevitable."²⁵⁴ However, Thaddeus Stevens expressed the mood of the Congress when he declared: "No power but Congress had any right to say whether ever, or when, they (the rebel States), should be admitted to the Union as States and entitled to the privileges of the Constitution of the United States."²⁵⁵

Nevertheless, President Johnson vetoed, and the Congress overrode, every bill related to the implementation of the Reconstruction Act of 1867. With members of the military assigned the duty of overseeing the transformation of the social, economic, and government of the eleven states, the secretary of war and the general of the army reported to Congress for outcome and to the president for the administration of the processes as required in Reconstruction legislation. Beginning with disagreements and removal of the secretary of war without consent of the Senate and bypassing the general of the army with appropriations to provisional commissioners, the president was charged by the House of Representatives with eleven articles of impeachment, which included conspiracies to avoid the Command of Army Act and the Tenure of Office Act, "utterances, declarations, threats and harangues. . . unbecoming in the Chief Magistrate of the United States. . . has brought the high office of the President of United States into contempt, ridicule, and disgrace,"²⁵⁶ and violations of the Constitution. However, with a trial held by the Senate, President Johnson was found not guilty on the one vote of one article of the eleven articles of impeachment charged in the House of Representatives that survived the proceedings in the Senate.²⁵⁷

However, military rule was once more established in North Carolina with Reconstruction defined by Congress, and General Daniel E. Sickles was assigned the duty again as the commander in the Second District of North Carolina and South Carolina. Even though Congress provided to him the authority "to suspend or remove from office . . . any officer or person holding . . . any civil or military office,"²⁵⁸ General Sickles empowered Governor Worth and his officials to continue with their administration of the governmental affairs of North Carolina without military interruptions unless required. However, the commanding general was in charge of implementing the Reconstruction Act for establishing the new government of the state that was to be determined by a process of identifying those persons eligible to register the voters, those eligible to vote, and those eligible to be nominees for serving as delegates to a convention or to be nominees to serve as elected officials in the state or United States.²⁵⁹

To begin the long process of a military-controlled establishment of civilian government as required in detail by the Republican Congress, an announcement in

May was followed in July with the establishment of one hundred seventy districts where nominations were accepted for the persons who would register the eligible voters for the conventions and the elections. All the citizens involved in the registration process, all the voters, and all nominated candidates for any public office were obligated to swear the oath affirming the requirements of citizenship and age and that they were never disenfranchised for participation in any rebellion or Civil War against the United States. In addition, all those who served in government before the Civil War, either in the state or the United States, may have been disenfranchised depending on their service during the war.²⁶⁰

Periodically, a list with tentative approval of those who met the requirements to be registered voters was posted publicly in each district, which may be subsequently altered, and finally sent to General Edward R. S. Canby, Sickles's replacement, which he reviewed for the reasons of any rejected black men. Registration was closed in October with one hundred six thousand seven hundred twenty-one white men and seventy-two thousand nine hundred thirty-two black men empowered to vote for the delegates to one of the important Constitutional Conventions in the history of the state.²⁶¹ Subsequently, the election of delegates and the votes for or against a convention were held on November 19 and 20 with one hundred twenty-five thousand nine hundred sixty-seven votes cast or about seventy percent of the one hundred seventy-nine thousand six hundred fifty-three people registered.²⁶² The votes about the constitution were almost three to one in favor of holding the convention²⁶³ with one hundred seven Republicans and thirteen Conservative delegates elected to be in attendance.²⁶⁴ The delegates met in Raleigh on January 14, 1868 to begin an unusual task to form a constitution to establish a government for a society that had existed for two hundred years, which was suddenly altered by a war that created a moral and economic dilemma for most of the citizens who were not eligible to vote.

The men who represented the people of the state who were to be governed by the form of the constitution included eighteen recent citizens from Union states (also known as carpetbaggers) and fifteen black men,²⁶⁵ with some free black men from Union states and a few freedmen with the majority of the delegates consisting of native white men who were not of prominence to the citizens of the state since the disenfranchisement eliminated those men who had served in government or were active in the war. However, former Union soldiers were among the carpetbagger delegates: one was a native of New Hampshire and formerly an editor and lawyer, one was a native of Ohio and a graduate of Rochester University, another native of New Hampshire was a newspaper editor and twice a member of the Ohio House of Representatives, and one was a minister was from Massachusetts.²⁶⁶

Among the black men: one, James Henry Harris, was born a slave in North Carolina, became free in his teens with endorsement by Governor Manly, apprenticed as a carpenter and opened his own business in Raleigh, left the state to attend Oberlin

College in Ohio, and was commissioned to organize a regiment in the United States army;²⁶⁷ another one, Abraham H. Galloway, was born a slave, escaped, and became a well-known advocate for equal rights for women as well as black people, and he eventually returned to eastern North Carolina to aid the Union army even though he was unable to read or write throughout his life;²⁶⁸ and one, James Walker Hood, was born free in Pennsylvania where his family helped to establish the African Methodist Episcopal Zion Churches and where he attended school six weeks a year until he was sixteen, after which he studied theology for the ministry without instruction, except for tutoring in the classical language of Greek. Subsequently, he obtained a license to preach and established A.M.E. Zion Churches in North Carolina.²⁶⁹

With the thirteen black men and carpetbaggers in attendance, reporters were demeaning the assembly as the “so called” convention and were derisive about the delegates as a body of the whole as not representing “the true people of the state.”²⁷⁰ However, the revision of the constitution proceeded with the task at hand, and proceedings ahead were divided into nineteen standing committees with ten devoted to the articles of the constitution of which the carpetbaggers were the chairmen of ten of the nineteen.²⁷¹

After three months of amending sections of the existing constitution and writing new laws for other sections, the convention adjourned on March 17, 1868 with registered voters to decide the outcome on the date scheduled by the commanding general.²⁷² With the vote for civil offices scheduled for the same day as the referendum on the new constitution, the politics preceding the elections of 1868 were intense and infected in one county by the scare tactics of the KKK. William W. Holden was the candidate for the Republican Party with Thomas S. Ashe chosen as the candidate of the Conservatives or national Democratic Party. The majority of the registered voters in both parties were native North Carolinians who were pro-Union during the Civil War but not necessarily in favor of universal suffrage. The Democratic Party was opposed to ratifying the constitution that they claimed would make the black man a political equal, which would result in him attempting to become a social equal as illustrated by the failure to require the separation of the races in the schools, militia, and the university.

The Republican Party reminded registered voters who were Unionists or not involved in the war about the necessary actions for the end of military rule and readmission to the Union. Regarding their interference, in “Reconstruction in North Carolina,” Hamilton describes the Klan incident that was reported by a newspaper in Raleigh as: “According to the Standard, the Klan in Warren County indulged in a grim joke as a threat to the negroes. Night after night, in their fantastic costume, they dug graves along the roads which led into Warrenton. But there was no noticeable effect upon the vote in the county, where there was a large negro majority. In

Raleigh and Wilmington placards were posted all about the streets.²⁷³ Elections were held on April 21, 22, and 23 with one hundred seventeen thousand four hundred twenty-eight white and seventy-nine thousand four hundred forty-four black registered voters, and eighty-five percent voting. Holden received fifty-five percent of the votes for governor with the constitution ratified by about the same percentage of voters.²⁷⁴

When comparing the 1868 Constitution of North Carolina with the founding Constitution of 1776 as amended in 1835, Article I contained the original twenty-five Bill of Rights sections that assured protection of liberty for the people with twelve more sections added to the twenty-five regarding protection against slavery, servitude, secession, suspension of habeas corpus, or incurring public debt in aiding rebellion against the United States. Section 1 of the Bill of Rights, with words borrowed from the Declaration of Independence, stated: "That we hold it to be self-evident that all men are created equal; that they are endowed by their Creator with certain unalienable rights; that among these are life, liberty, the enjoyment of the fruits of their own labor, and the pursuit of happiness."²⁷⁵

For a century that phrase of "all men" had meaning for the free white men who wrote the document, but black freedmen were now included with the enjoyment of their labor to be decided. Some of the changes in the other nine articles were elimination of property ownership as a requirement to be elected and serve as governor or in the General Assembly, suffrage for "every male person who is naturalized, twenty-one years old or upward,"²⁷⁶ creation of a state board of education with a system of education, establishment of a capitation tax on every male inhabitant over twenty-one and under fifty-five years of age, placement of the university under the control of the state with trustees from each county, and "education extended to the youth of the State free of expense for tuition"²⁷⁷ to the university, as far as practical. When the delegates had adopted the Constitution, they advised General Canby of the two hundred sixty-four offices combined in executive, judiciary, legislative, county, and congressional offices that had to be filled in the elections.

While not included as a direct statement on social relationships or economic equality, the delegates did leave messages of concern in the creation of the Constitution by the inclusion in the Bill of Rights the statement that "the enjoyment of the fruits of their labor" is an unalienable right and by resolutions in the convention: "That it is the sense of this Convention that intermarriages and illegal intercourse between the races should be discountenanced, and the interests and happiness of the two races would be best promoted by the establishment of separate schools"²⁷⁸ and "that the next Legislature take into consideration the condition of the landless population of this State, and if practicable devise some means by loan or otherwise so that all citizens of the State can be permanently located on a small freehold, so that all will be fully identified with the interest of the State."²⁷⁹ Finally, the voters

replaced the House of Commons as the electors of the governor, the judiciary, and the chief officers of government departments.²⁸⁰

On June 25, 1868, the process to readmit North Carolina to the United States was underway in Washington with the passage of a bill to permit those who were recently elected to represent North Carolina in Congress to claim their seats that also included the removal of disqualifications for seven hundred persons. With that news of passage, Governor-elect Holden immediately summoned the legislature to assemble on July 1 and began to organize the state government with all the elected officials affirming the oath of allegiance to the United States. In addition, General Canby instructed the chief justice-elect to take the oath of office before a United States commissioner so that the chief justice could administer the oath to his associates. Governor Worth, with a "question as to the constitutionality of the legislation" under which he was elected,²⁸¹ reluctantly surrendered the office by military removal to William W. Holden who in turn took the oath of office on July 1, 1868 with an inaugural address before an enormous audience on July 4.²⁸²

After the oath of office, the legislature met on July 2 and ratified the Fourteenth Amendment to the United States Constitution that resulted in General Canby immediately issuing an order to all military officers that their interference with civil functions must cease.²⁸³ Although the Constitution of North Carolina of 1869, which led to readmission to the United States, was written by men who expected a social and political democracy as an outcome of their deliberations and the affirmation by some of the citizens, those legislators had not owned plantations before the war, controlled the agricultural economy for a million people, or been chosen to represent the majority with deeply rooted traditions in a society where whites were considered superior to blacks.

A More Democratic North Carolina without Prosperity

Over the two centuries from the founding of the Carolina colony, the economy that developed in North Carolina was derived primarily from self-sufficient labor within the yeomen families on small farms with the production of grains and woven cloths and from the labor of slaves on larger farms with the production from natural resources of timber and turpentine near the coast and with more recent crops of tobacco and cotton exported through towns along railroads and through ports to northern states and Europe. During the growth in the population of the state over the multiple generations of families when cultural and social characteristics among the people in the different regions of the state were developing with the expansion of commerce arising from the larger farms, the white people of the state accepted, for the most part, the rights of the owners to control every activity, to punishment

for any reason, and to sell any of their slaves to anyone even though the slave family would lose a father, mother, daughter, or son.

Although losing the Civil War with the subsequent periods of Reconstruction that required the white citizens of the state to confront slavery as their degradation of humanity and to abandon their acceptance of ownership, most of them were not prepared to consider a freed slave as a citizen with rights guaranteed to be equal to those of white people. Consequently, the attempts to establish equal rights through the political process uncovered the anger of prejudice, the violence of hatred, and the ignorance of absolute segregation scattered among the majority of the voting population of whites that was prominent with the affirmation of the first civil rights for the freedmen as guaranteed in the Fourteenth Amendment to the Constitution. When President Johnson decided that North Carolina should enter the last phase of Reconstruction, Governor Holden immediately organized the public election of legislators and a governor to establish a civil government.

During presidential reconstruction Provisional Governor Holden was instrumental in the establishment of the Republican Party and ran as the candidate of the party in the election to restore civilian government to the state with the membership of the party consisting primarily of native Union supporters and recent immigrants called carpetbaggers who were from other states and supporting the ratification of the Fourteenth Amendment. Jonathan Worth was the candidate of the Conservative Party, which was renamed the Democratic Party, to replace Provisional Governor Holden with the membership of the party supporting him consisting mostly of native citizens, which included Unionists, who were qualified to vote and opposing the ratification of the Fourteenth Amendment. Subsequently, Jonathan Worth was elected governor along with new legislators who rejected the Fourteenth Amendment. However, with the subsequent Act of Congressional Reconstruction requiring affirmation of the Fourteenth Amendment before admission, the public discourse and newspapers editorial pages increased the fervor about the suffrage of the freedmen. About the same time there were a number of societies developing in North Carolina with opposing purposes of aiding or defeating the equal rights of citizenship for black males.²⁸⁴

While there were a number of secret orders of men with opposing objectives, the Ku Klux Klan and the Union League were among the most active and organized groups in North Carolina. Consequently, Governor Holden was aware of the activities of both groups before he read about them in the *History of North Carolina* written by Major John W. Moore. Subsequently, Holden corresponded with Captain Samuel A. Ashe and shared with Ashe sections of the book in which Moore described events and actions involving the governor that he claimed were either incorrect, out of context, misleading, incomplete, or misunderstood.

In one instance, Holden cited and then clarified from his experiences an incomplete comparison from Moore's statement that: "In society there was great confusion in the presence of two rival secret societies. These were known as the Union League and the Ku Klux Klan. The negroes and a few white men belonged to the former, and, in those sections of North Carolina where the Regulators of old were found, the famous White Brotherhood or Ku Klux also became numerous during the years subsequent to the advent of their arrival. . . . The new State Governments were greatly disturbed by the Ku Klux Klan."⁸⁵ Holden wanted to make it clear that: "It is sufficient to say that the former was comparatively harmless, and was unarmed, and the later was armed. I was myself at the head of the League in this State, and the violations of law complained of were without my knowledge and against my orders."⁸⁶

The league was founded in 1862 in the North with the purpose of encouraging more loyalty to the Union effort when the war was at a low point for the northern armies. Membership in the North Carolina league included local councils of black men, white men, black women, Republican voters, northern immigrants, and native unionists. By 1867, there was a total membership of three thousand white men in Buncombe and Rutherford Counties with as many as seventy thousand members for the entire state by 1869.⁸⁷ As the pride in membership grew and influence of the league expanded with Governor Holden as their president, some of the local councils of black men within the league began to train as military units with their members engaging in illegal activities by opening a jail to release a member or interfering with their arrests.

In addition, some of the local councils of black men began to meet in secret, which in turn led to the suspicion that, due to the timing of their meetings and the burning of barns, cotton gins, churches, and dwellings, the councils were involved or at least inspiring members to undertake those actions. The counties in which most of the leagues were suspected of conducting these activities of destruction and violence were Orange, Jones, Caswell, Granville, Chatham, Edgecombe, Wake, and Gaston. With the affirmation of the Fourteenth Amendment that resulted in voting rights and in the election of black men to serve in government, the league had achieved its primary purposes and was also losing membership while other societies were rising to begin their cause for white supremacy.⁸⁸

The Invisible Empire was the original Ku Klux Klan that began in Pulaski, Tennessee in 1865 and grew rapidly throughout the south. Secrecy, an oath to "reject and oppose the principles of the radical party"⁸⁹ and distinguishing dress described an unusual society with a purpose of denying equal rights to black men. As the membership in the Union League was decreasing, the number of men in the Ku Klux Klan dens in the counties was growing with a total of as many as five thousand in the counties of Alamance, Orange, Guilford, Lenoir, Cleveland, and Rutherford

and a total estimated to be forty thousand for the entire state.²⁹⁰ Governor Holden described the Klan camps throughout North Carolina by explaining that:

These combinations were at first purely political in their character, and many good citizens were induced to join them. But gradually, under the leadership of ambitious and discontented politicians, and under pretext that society needed to be regulated by some authority outside or above the law, their character was changed, and these secret Klans began to commit murder, to rob, whip, scourge and mutilate unoffending citizens. . . . They met in secret, in disguise, with arms, in a dress of a certain kind intended to conceal their persons and their horses, and to terrify those whom they menaced or assaulted. They held their camps, and under their leaders they decreed judgment against their peaceable fellow-citizens, from mere intimidation to scourgings, mutilations, the burning of churches, school-houses, mills, and in many cases to murder.²⁹¹

During the months after the Civil War, there were a total of two hundred sixty lawless events conducted by members of the Ku Klux Klan that included whipping, shooting, wounding, lynching, or killing of as many as eighty-six white and one hundred seventy-four black persons in twenty counties with one-third of the events occurring in Alamance County.²⁹² In January 1870, the legislature passed a law to provide “for the better protection of life and property,” which enabled the governor to declare a county in a state of rebellion or insurrection and to act by declaring military law if necessary.²⁹³

In March 1870, a town commissioner was lynched in Alamance County with Governor Holden declaring the county in insurrection. Two months later a Republican state senator was murdered in the Caswell County Courthouse with the Ku Klux Klan accused of being involved in both killings. The governor declared Caswell County to be in a state of rebellion, which was considered by some as a political decision; later in life Holden claimed, “I did not care how the elections of 1870 went if by what I did I saved one human life.”²⁹⁴ After a controversial hiring of a former colonel of the Union army, the formed militia of six hundred men gathered in Yanceyville to march on the Caswell County Courthouse. Even though their presence calmed the community, Colonel Kirk proceeded to arrest as many as one hundred men including prominent citizens. While in custody, an application for a writ of habeas corpus issued on behalf of these prominent persons was denied by Kirk.²⁹⁵

Subsequently, with a challenge presented to him, the chief justice judge of the state ruled that since the prisoners were held under the authority of Governor Holden the courts could not become involved. While the controversy in the courts was underway, the decisions made by Holden were criticized in national newspapers and in the local *Sentinel* in Raleigh. Josiah Turner, the editor of the *Sentinel*, was a harsh critic of the Republican Party and driven to end the political career of

Holden as governor in the coming election. After Holden had alluded to Turner as “the King of the Ku Klux Klan”²⁹⁶ and Turner had described Holden as a “devil incarnate . . . wicked rascal” and a “pumpkin-faced” man who lies like a thief;²⁹⁷ Governor Holden decided to have the militia arrest Turner and placed him in the jail in Yanceyville. After those arrested were released and Kirk had evaded the charges of arresting on false charges, not one person involved in these events was ever tried; however, during the legal procedures one of the arrested men did confess his membership in the Klan and provided the names of fifteen others. Although the Democratic Party won the majority of the seats in the House and Senate, Holden was elected to serve a second term in 1870.

With a veto-safe General Assembly of Democrats, there were fifty-six Republicans, one hundred eleven Democrats, and three Independents with twenty-two blacks and only four carpetbaggers in the legislature.²⁹⁸ When the General Assembly met on November 21, 1870, the agenda was short on the number of objectives with the leadership devoted to nullify, to remove, to abolish, and to impeach anything related to the Republican years.

The agenda item exciting the greatest passion was the removal of a Republican governor with the process beginning in the House of Representatives by the adoption of eight articles of impeachment that included unlawful recruiting of troops, arresting citizens when there was no insurrection or rebellion, unlawful arrest and imprisoning of Josiah Turner, unlawful arrest and detaining of John Kerr and three other citizens, and refusing to obey writs of habeas corpus for a number of persons. The Senate did not find Governor Holden guilty in the way he handled the situations in Caswell and Alamance Counties, but he was found guilty on the remaining six counts that included arresting and detaining prominent members of the Democratic Party. On March 22, 1871, W. W. Holden was impeached as governor of North Carolina.²⁹⁹

Even though the State of North Carolina was represented again in the Congress of the United States, as long as the Republican parties were in absolute control of governments in Raleigh and Washington, the concerns about congressional Reconstruction continued to influence the outcomes of elections and events, as occurred in 1871 with public debate and the defeat of a referendum for a Constitutional Convention to develop amendments to reform county government, to reduce the number of government officers, and to pay on the public debt without taxation.³⁰⁰ However, with the impeachment of Governor Holden, Tod Robinson Caldwell—who was a graduate of the University of North Carolina, served four consecutive terms in the House followed by one in the Senate, was elected as the lieutenant governor and then replaced Holden as governor—completed the term and won a close election as the Republican candidate in 1872 as the Democrats were gaining control of the House and the Senate.³⁰¹

Consequently, the members of the General Assembly were beginning to reflect broader interests in governing with a large number of veterans of the Confederate army, farmers, and lawyers with sixteen black men elected as members of the House and two carpetbaggers in the Senate.³⁰² One of the more important matters before the 1872 legislature was the amendment that transferred the authority for the trustees of the university from the board of education to the legislature.³⁰³

Ironically, in the first opportunity to vote in a presidential election after the Civil War, General Ulysses S. Grant was the candidate of the Republican Party and Horace Greeley that of the Democratic Party. While the Republican majority for Caldwell was one thousand eight hundred ninety-eight, Grant was in the majority by twenty-four thousand six hundred seventy-five votes.³⁰⁴ Nevertheless, representation by Democrats in Congress and the North Carolina Legislature was increasing as Republican governors and presidents were winning by narrow margins. In addition, before the 1874 General Assembly met in Raleigh in November, Lieutenant Governor Curtis Hooks Brogden had replaced Governor Caldwell who died in July from uric acid poisoning while attending a meeting in Hillsboro.

Brogden was a self-educated man who was involved with politics for fifty years with seven terms in the lower House, three terms in the Senate, and a decade as state controller before election as the lieutenant government and replacing Caldwell as governor. In addition, Brogden was elected to serve one term in the Congress after he decided not to run for governor in 1876.³⁰⁵ The party of this new Republican governor was definitely in the minority with thirty-eight Democrats and twelve Republicans in the Senate and with ninety-three Democrats and twenty-seven Republicans in the House. For the first time since the congressional Reconstruction began, there were no carpetbaggers elected in 1874; however, seventeen black citizens were elected.³⁰⁶

With Democrats constituting more than the two-thirds as required in each House of the General Assembly to call a convention, an election of delegates created equal interests for Democratic and Republican candidates where a total of one hundred ninety thousand two hundred twenty-eight people voted, with the Republican candidates receiving just one hundred fifty-four more votes than the Democratic candidates.³⁰⁷ The membership representing the people of North Carolina consisted of fifty-eight Democrats, fifty-eight Republicans, and three Independents with thirty-two from the existing legislature and with six being black men.³⁰⁸ With the election of delegates open to all voters and with even representation by parties, the debates at the convention resulted in thirty chapters of amendments with about one-third dedicated to reorganizing the Judiciary Department of the 1865 Convention and about one-fourth defining, clarifying, and assigning the activities of governing.

A silent message to the Ku Klux Klan was added as a precaution to the rights of people "to assemble together to consult for their common good, to instruct their representatives, and to apply to the Legislature for redress of grievances. (But secret political societies are dangerous to the liberties of a free people, should not be tolerated)."³⁰⁹ The guarantee of voting rights was for "every male person, born in the United States, and every male person who has been naturalized, twenty-one years old or upward, who shall have resided in the State twelve month next preceding the election, and ninety days in the county in which he offers to vote, shall be deemed an elector."³¹⁰ Without screening the delegates to achieve a desired political outcome of the convention as was the case in 1865, the rearrangements of the Judiciary and details of governing were responses to our way in North Carolina.

While Reconstruction had arranged a new social bond between some black and white people, traditions reappeared with the amendment that "the children of the white race and the children of the colored race shall be taught in separate public schools, but there shall be no discrimination made in favor of, or to the prejudice of, either race."³¹¹ In addition, "all marriages between a white person and a negro, or between a white person and a person of negro descent to the third generation inclusive, are hereby forever prohibited."³¹² While all the amendments were approved by the voters in the 1876 elections, Reconstruction ended, and rebuilding North Carolina for the twentieth century began with the Governor Zebulon B. Vance, who was educated by his mother, attended the University of North Carolina to prepare for the practice of law, served as governor during the Civil War, and served in the United States Senate after two terms as governor.³¹³

However, the social and political decisions begin to depend on the traditions of white supremacy while the struggle for prosperity does not succeed without leadership for everyone. In July 1868, Congress approved an order that the commissioner of the bureau "shall, on the first day of January next, cause the said bureau to be withdrawn from the several States within which said bureau has acted and its operation shall be disconnected."³¹⁴ Consequently, bureau courts were disbanded in early 1869 with the withdrawal of the assistant commissioners and subordinates; however, the superintendents of education remained until the summer of 1870.³¹⁵

In 1869, General Ulysses S. Grant, who was supported by Republicans with a commitment of continuing Reconstruction, was elected as the eighteenth president. However, in July 1870, Georgia, which had been readmitted but expelled, was readmitted a second time as the last of the eleven states that had seceded almost a decade before they were represented again in the Congress of the United States. Although all the eleven states were readmitted to the United States within five years after the war, the end of Reconstruction did not occur until Union troops were withdrawn from each of the eleven states. During the two terms of Grant, the troop

withdrawals left Florida, South Carolina, and Louisiana under occupation as the elections of 1876 were underway.

Rutherford B. Hayes of Ohio as the Republican Party candidate was running against Samuel J. Tilden of New York as the Democratic Party candidate in a tight race for the office of the president of the United States. When the early results were known during the days after the November 7, Tilden was announced as the winner by some newspapers. However, the result for the Electoral College count resulted in Hayes leading one hundred eighty-five to one hundred eighty-four for Tilden.³¹⁶ When the popular votes were known, the situation became uncontrollable with four million three hundred thousand votes for Tilden and four million thirty-six thousand votes for Hayes.³¹⁷ Subsequently, voting results in Florida and Louisiana were challenged and analyzed for mistakes and fraud without reaching conclusions that were decisive in establishing the winner of the election.

Finally, Congress established by law a commission to address the situation that again depended on analyzing the results of voting sent to them from the two states in question. Almost four months from the expectation that Tilden would win, Rutherford B. Hayes was announced by the commission as the next president of the United States.³¹⁸ Within weeks after inauguration, President Hayes ordered the troops to be withdrawn from South Carolina and Louisiana, which ended Reconstruction and the occupation in the South by Union troops that had lasted for more than a decade.³¹⁹

During the thirteen years that included two periods of Reconstruction with distinctly different objectives, the leaders in government in Washington were divided over the process and goals for restoring the states that were in rebellion to the Union. The first Reconstruction era began in the defeated states as the Civil War was ending with the franchising of qualified citizens by their affirmation of an oath of loyalty to the United States who would then become the representatives of the people within each state in rebellion during their efforts to obtain readmission of the state to the Union. Reconstruction plans of Presidents Lincoln and Johnson depended on the establishment of a provisional government with those citizens participating in organizing, executing, and controlling the Constitutional Conventions and elections to create a civil government with the expectation of restoring social, political, and economic order as soon as possible, but without slavery.

However, after Tennessee was admitted and the other ten states were denied admission by Congress, Reconstruction was no longer emancipation and then a process for restoration. With veto-safe legislation, the Republican Congress began a ten-year effort in transforming social, political, and economic traditions for the states in rebellion that was administered by the United States military. With all the men who were active in rebellion eliminated by firmly controlling affirmation of citizens who were franchised, the execution and control of conventions and

elections in the ten states were in the hands of freedmen, scalawags (natives who participated with the Republicans in Reconstruction), and carpetbaggers. While a selected minority of the population throughout the eleven states represented more than ten million people who were sparsely located over more than five hundred thousand square miles, the establishment of civil rights and voting rights for the freedmen were enacted by the state assemblies that were elected in the states by the vote of a selected minority while Congress mandated the legislation that was enforced by an occupying army.

When Reconstruction ended, majority rule returned to those who would govern as military oversight retreated from the states. However, another period of social and political unrest in the eleven states began, which became a continuing struggle lasting throughout most of the twentieth century that was focused on equal opportunities under the law for black people and the battle to end legislated segregation based upon the ingrained notion of white supremacy. As an epilogue or prelude to the unfinished efforts of the Civil War, much has been written in detail about the personalities and events that influenced the social, political, and economic developments in the southern states during the decades associated with the Civil War-era with the outcome described in general as a moral imperative, a progressive agenda, unconstitutional governing, regressive mandates, unfinished emancipation, and/or limited accomplishments.

John W. Moore, who graduated from the University of North Carolina in 1853 and served in the North Carolina Calvary, wrote in the *History of North Carolina* published in 1880, that the war and Reconstruction had ended with determination evolving by “a vast majority of the white men of the State to bear true fealty and allegiance to the government of the United States, and at no hour since has there been a change in this disposition.”³²⁰ However, Moore justified secession as resistance growing “out of their well-grounded apprehension that the party which elected Mr. Lincoln would destroy the sanctions and checks of the national organic law, if not the very form and pretence of the Constitution.”³²¹ In regard to Reconstruction, Moore remained concerned about “the bloody phantom of a threatened empire”³²² as exemplified by those men who “no longer boast in Washington like Thaddeus Stevens, of their disregard of its sanctions.”³²³ Moore wrote, “We neither need the ‘strong man’ nor that increase of Federal power which is sought to the detriment of the individual States.”³²⁴ With two decades of reflection: “The people of the South are now almost universally rejoiced that slavery has forever departed from the land and that the colored race is clothed with those civil rights, which are necessary to its altered condition of life.”³²⁵

A quarter of a century later, Joseph Gregoire de Roulhac Hamilton, who was awarded a Ph.D. in American history at Columbia University in 1906, was the alumni professor of history at the University of North Carolina when *Reconstruction*

in *North Carolina* was published in 1914. In the conclusion written in the twentieth century, Hamilton begins by stating that:

The crime of Reconstruction is to-day generally recognized by all who care to look facts squarely in the face. To a close observer of Southern conditions, the heinousness of the offence is increased by the knowledge that the South of the present time is still laboring under the burdens thereby imposed. It has made many a Southerner fail to comprehend the wonderful benefits which have really come to the South from emancipation, and it has drawn the sections apart when, with the barrier of slavery removed, they should have come together. So far as North Carolina was concerned, the partisan plan was one of greatest folly. . . . The result was that politics was embittered and freedom of political thought and action was restricted to such an extent that a condition of affairs existed that bore a striking resemblance to that of the fifties, when slavery stifled freedom of speech and thought, with the one difference that in the later case, the very preservation of good government was at stake.³²⁶

Just two decades after Reconstruction ended, in 1895 W. E. B. Du Bois was the first African American to be awarded a Ph.D. at Harvard. Subsequently, Du Bois served as a professor at Atlanta University from 1897 to 1910 before he dedicated the rest of his life to public activism for social change that would secure human rights for black people. In the book *Black Reconstruction in America—1860–1880*, which was published in 1935, Du Bois expresses with vexation that:

The unending tragedy of Reconstruction is the utter inability of the American mind to grasp its real significance, its national and worldwide implications. It was vain for Sumner and Stevens to hammer in the ears of the people that this problem involved the very foundations of American democracy, both political and economic. . . . We apparently expected that this social upheaval was going to be accomplished with peace, honesty and efficiency, and that the planters were going quietly to surrender the right to live on the labor of black folk, after two hundred and fifty years of habitual exploitation. And it seems to America a proof of inherent race inferiority that four million slaves did not completely emancipate themselves in eighty years, in the midst of nine million bitter enemies, and indifferent public opinion of the whole nation. If the Reconstruction of the Southern states, from slavery to free labor, and from aristocracy to industrial democracy, had been conceived as a major national program of America, whose accomplishment at any price was well worth the effort, we should be living today in a different world.³²⁷

As the civil rights movement was challenging segregation in the schools, John Hope Franklin, who was awarded a Ph.D. in history at Harvard before teaching

at Fisk University, Saint Augustine's College, North Carolina Central University, Howard University, Brooklyn College, University of Chicago, and Duke University, had written a number of books about the circumstances encountered by slaves, free blacks, and freedmen in the South with a conclusion published in 1961 in *Reconstruction after the Civil War* that: "Reconstruction was over. The South was back in the Union, with a leadership strikingly like that of the South which had seceded in 1860. The period had brought changes, to be sure, but most of them had taken place in the North . . . It was now an industrial colossus with new values, new leadership, and new aspirations . . . The South, having changed much less, was more than ever attached to the values and outlook that had shaped its history . . . The Union had been preserved and human slavery had been abolished; but these were achievements of the war. In the postwar years the Union had not made the achievements of the war a foundation for the healthy advancement of the political, social, and economic life of the United States."³²⁸

In the epilogue of *A Short History of Reconstruction—1863–1877* published nearly a century after the Union troops vacated the southern states, Eric Foner, who was awarded a Ph.D. in history and is a professor of history at Columbia University, expressed in his conclusion that:

To be sure, the era of emancipation and Republican rule did not lack enduring accomplishments. The tide of change rose and then receded, but it left behind an altered landscape. The freedmen's political and civil equality proved transitory, but the autonomous black family and a network of religious and social institutions survived the end of Reconstruction. Nor could the seeds of educational progress planted be entirely uprooted. . . . Nonetheless, whether measured by the dreams inspired by emancipation or the more limited goals of securing blacks' rights as citizens and free laborers and establishing an enduring Republican presence in the South, Reconstruction must be judged a failure.³²⁹

Labor Searching for Prosperity in the Aftermath of War

WHEN THE CIVIL WAR ended, the circumstances controlling the daily subsistence for millions of people throughout the states of the Confederacy and all of the Union were suddenly altered so that they had to search for situations that provided the means for a living. In the northern states there were as many as one million soldiers in the Union armies about to become civilians with a large number of them having recently immigrated to America for the purpose of joining the Union army.¹ For those soldiers who immigrated and remained after the victory, they had to choose a first home in America where there were opportunities for earning a livelihood, maybe among the five million persons of foreign birth including the one-and-a-half million immigrants who entered during the last ten years with the majority being Germans and Scandinavians settling in the states and territories along the western frontier, plus the Irish in the major cities.² Many of the citizen soldiers were young men who had grown up on farms that prepared them for the opportunity to claim one hundred sixty acres of land free of charge along the frontier of the growing country.³

Although, comparing the reports in the 1860 Census with the 1870 Census, there had been only about a sixteen percent increase in the acres dedicated to farms for all the states over that decade, in Illinois, Indiana, Iowa, Minnesota, Missouri, and Wisconsin the farming acreage had increased more than forty percent with the farmers in those states purchasing equipment that totaled in value more than thirty percent of all farming implements and machinery bought for the purpose of growing and harvesting one-fourth of the value of the farm productions reported in 1870 for the entire country.⁴

For those seeking opportunities in the factories near the cities, they were in competition with the workers who had lost their jobs in manufacturing the products for supporting the war. With the population of the United States increasing about twenty percent from 1860 to 1870, the growth in the total number of jobs in manufacturing reported in all the states over that decade was almost sixty percent.⁵ The establishments with the largest total number of hands employed and with the largest percentage increases over the decade were in the iron, the lumber, and the machinery industries with the number of jobs doubling.⁶

While hiring fewer hands in fewer establishments, the agricultural implements industries also doubled in number and tripled in the number of hands employed.⁷ With more than ninety percent of the growth in employment occurring in the industries that were reported in the Union states, half of that growth was reported by Pennsylvania, Ohio, New York, and Massachusetts.⁸ Within the geographic regions associated with twenty-five large cities located in those four states, there were a total of more than a million persons working in agricultural, personal and professional services, trade and transportation, manufactures and mechanical, and mining industries with the occupations in the manufactures and mechanical and mining industries employing the greatest number of persons.⁹

In the southern states, although most of the Reconstruction was politically initiated, W. E. B. Du Bois got it right with the declaration that the public did not comprehend the importance during the Reconstruction of the economic as well as political foundations for achieving democracy in the country, which remained a challenge for a century. The war had eliminated slave labor, but tenancy in farming, white supremacy in politics, and low wages in occupations remained as barriers to prosperity from gainful employment for most black adults in the south, including North Carolina, as they pursued prosperity beyond mere subsistence.

In the fall of 1865, as the course of action for Reconstruction in the seceded states was developing in Congress, Correspondent Sidney Andrews of the *Boston Advertiser* and the *Chicago Tribune* traveled for fourteen weeks throughout the Carolinas and Georgia to observe and report on the social, cultural, and economic activities occurring among the people in these states. In his "General Conclusions" of the situations, those considered to be representatives to Congress were characterized as men who are "either of bitterly rebellious spirit or are encased in the poisonous bigotries of the State supremacy."¹⁰ In addition, he was concerned that the "freedom of speech" was not "fully secured in either of the three States" when "holding and openly advocating even moderately radical sentiments on the negro question."¹¹ However, Andrews did consider the "late private soldiers of the Rebel army" to be "the best class of citizens in the South" who were willing to work if they could decide what to undertake.¹² However, the women, preachers, Rebel ex-officers, and young men who avoided service in the army were characterized as the bad classes who remained rebellious, malignant, and hostile about their circumstances.¹³

Apparently, Andrews also encountered a number of grown white middle-aged men in North Carolina whom he described as having "no ostensible business but lounging and whiskey drinking."¹⁴ In addition, he proclaimed that papers throughout the state had reported that they had never before seen so many "men, - vagrants, consumers, non-producers, non-taxpayers. The chief pity of the matter, however, is that they seem to have no desire for work."¹⁵ To further emphasize this perspective,

an extract from a paper in North Carolina was included that instructed that "We trust our law-makers will do all in their power to compel the freedmen to work for an honest living; but we consider it equally incumbent on them to take steps to reduce the amount of vagrancy among the whites."¹⁶ However, Andrews was not optimistic about encouraging these white men to enter the "useful occupations" since "more than half the blacksmiths, most of the brick-masons, and nearly all the hundred or more carpenters that I have seen were colored men."¹⁷

Even though the total number of carpenters in the entire country had increased by more than one hundred thousand or forty percent as reported in the 1870 Census when compared to the 1860 Census, the similar comparison of the numbers from the former Confederate states, which increased and decreased from state to state, was a total increase of two percent or eight hundred carpenters in total in the southern states. However, there was about a twenty-five percent increase in the total number of blacksmiths in the former Confederate states as well as in all the states of the country when combined as reported by the census for the decade from 1860 to 1870.¹⁸

In contrast to the increasing production in agriculture and manufacturing in the northern and western states of the Union, with infrastructure devastated where armies were engaged and without adequate capital and transportation, the farmers and manufacturers in the states of the former Confederacy were struggling to establish opportunities for laborers to earn a living. In addition, most of the labor opportunities in the former Confederate states were associated with agriculture with an eighteen percent reduction in the acreage farmed, with a thirty percent reduction in the bales of cotton harvested, and with nearly a two-thirds reduction in the production of tobacco in 1870 as compared to 1860.¹⁹

For the white veterans who could return to a farm, most were re-engaging into the cycle of subsistence that depended on their labor as well as that of their family. Among other laborers who could not directly control their opportunity to provide for a living, millions were freedmen and their families who had to decide where and how to apply what they knew about farming to earn wages or to seek another trade. From the remarks within "The Census Agricultural Year" of the 1870 Census, apparently many of the decisions resulted in labor on the "plantations of the old slave States" where many were "squatted all over by the former slaves, who hold small portions of the soil, often very loosely determined as to extent, under almost all varieties of tenure."²⁰

Although the former Confederate states reported that the total number of farmers and planters in the eleven states had decreased by just a few percent with a decrease in acreage dedicated to farms and with drastic reduction in the tobacco harvest and substantially fewer cotton bales produced, the total number of laborers reported in the eleven states who were working in agriculture for wages states had

increased from less than two hundred thousand in 1860 to more than one million three hundred thousand in 1870.²¹ In addition, the number of domestic servants had increased from a total of five thousand persons as reported in 1860 from five of the thirty-four states at that time to almost a million persons from the eight hundred in Oregon to the one hundred fifty-five thousand in New York with an average of twenty-five thousand servants for the total from all the thirty-eight states in 1870. There were nearly one-quarter of a million domestic servants reported in 1870 from the eleven former Confederate states with almost twenty-seven thousand in North Carolina.²²

In each of the former Confederate states, the opportunities for labor beyond self-subsistence were uncertain with the economy and employment depending mostly on the harvest of the cash crops in each state. Comparing the data from the 1860 Census to the 1870 Census, North Carolina reported almost twenty percent or one million fewer acres designated for farms and a seventy percent or twenty-eight million pounds' reduction in the harvest of tobacco, but about the same production in the number of bales of cotton.²³ Although the economy of North Carolina was negatively influenced by a lack of capital, debt, destruction of railroads, social unrest, cultural discrimination, and political contests for control of the governance of the state during the Reconstruction, a more important challenge was evolving that concerned the transition from slave labor to wage employment and the opportunity for livelihood and prosperity for about one-third of the citizenship of the state.

After the emancipation of the slaves and with federal troops occupying southern territories as the war was ending, large gatherings of blacks followed the Union armies searching for security and provisions, which ultimately resulted in the establishment by Congress on March 3, 1865 of the Bureau for the Relief of Freedmen and Refugees, which was "to continue during the present war of rebellion, and for one year thereafter" for the purposes of supervising and managing all the abandoned lands while controlling all the "subjects relating to refugees and freedmen" from within the "territory embraced in the operations of the army."²⁴ In addition, the commissioner of the bureau was authorized to provide "provisions, clothing, and fuel, as he may deem needful for the immediate and temporary shelter and supply of destitute and suffering refugees and freedmen and their wives and children."²⁵

With approval from the president, the commissioner was authorized to confiscate or buy "tracts of land within the insurrectionary States" and to assign to a male refugee or freedman "not more than forty acres of such land, and the person to whom it was so assigned shall be protected in the use and enjoyment of the land for the term of three years at an annual rent not exceeding six percentum upon the value of such land, as it was appraised by state authorities in the year of eighteen hundred and sixty, for the purpose of taxation."²⁶ If the appraisal could not be found, the commissioner established the annual rent. At any time during the term,

the occupant could purchase the land and receive a title from the government of the United States.²⁷ Subsequently, the bureau was able to confiscate, claim, or buy about eight hundred thousand acres of farm land with an additional fifteen hundred pieces in towns.²⁸

In North Carolina, almost one hundred thousand acres of farmland was in the possession of the bureau with another two hundred eighty-seven pieces of property in the towns.²⁹ Also, the bureau leased a variety of parcels of land to freedmen with a large tract of sixty thousand acres in Louisiana and individual forty-acre homesteads promised to freed blacks by General Sherman in South Carolina.³⁰ Including the farmland and town property confiscated by the bureau, the leases produced a revenue of approximately four hundred thousand dollars.³¹ In the beginning of confiscation of land, original owners who could not prove consistent loyalty to the Union, both past and present, were not eligible to reclaim their land. However, President Johnson decided that owners of confiscated land who had been pardoned or those who were eligible and pledged the oath of allegiance could claim their land unless it had already been sold.

The decision led to sudden rushes to claims by the original owners who could meet the requirements, which resulted in the eviction of tens of thousands of black families with twenty thousand evictions in southeastern Virginia.³² In North Carolina, half of the confiscated land and two-thirds of the town property had been restored to the original owners by January 1866 with most of the remainder restored before the term of the bureau expired.³³ The expectation of a future with forty acres and a mule to farm with the self-subsistence to raise a family that had been passed as rumors throughout the freedmen communities was replaced with the fear of having to return to circumstances of the past to be employed as dreaded labor on plantations even though they has been freed.

In addition to confiscating, leasing, and reclaiming land during the year after the war had ended, the bureau provided clothing and food for the freedmen, poor whites, and war refugees. In August of that first year, nearly one hundred fifty thousand persons were served by the "Commissary department" with many freedmen and poor whites seeming "to expect permanent support from this source."³⁴ After "the rejection of all who could support themselves by labor, the number assisted was reduced to seventy-four thousand nine hundred and fifty-one" in the succeeding month.³⁵ Although not included as an order in the first authorization by Congress, the bureau reported that by 1866, benevolent associations of the north had established more than seven hundred schools with more than ninety thousand pupils attending and taught by more than a thousand teachers.³⁶ Most of the transportation for the teachers, school furniture, and opportunities for occupation in buildings had been provided by the bureau.

After authorization ended and one attempt to extend was vetoed, an act to continue and amend legislation that created the Bureau of Freedmen and Refugees was passed by Congress on July 16, 1866 over another veto by President Johnson. The act began the distribution of the provisions for refugees and freedmen again with additional responsibilities of providing medical treatment to the freedmen and refugees and co-operating "with private benevolent associations of citizens in aid of freemen, and with agents and teachers, duly accredited and appointed by them, and shall hire or provide by lease buildings for the purpose of education."³⁷ Most of the activities of the bureau ended in 1869, which had cost thirteen million dollars spent over four years and eight months while serving more than eighteen million provisions, attending to sixty-eight thousand patients who were treated at twenty-one hospitals or the forty-eight dispensaries and outdoor stations, and assisting in the establishment of nearly three thousand schoolhouses where three thousand teachers taught one hundred fifty thousand children and adult freedmen.³⁸

In North Carolina from June 1865 to September 1868, nearly two million provisions were served by the bureau to freedmen and refugees at a cost of somewhat less than one-half of a million dollars.³⁹ Hospitals were established in Wilmington, Raleigh, Beaufort, New Bern, Roanoke Island, Salisbury, Greensboro, and Morganton; more than forty thousand patients were treated in these hospitals from 1865 to 1869.⁴⁰ The establishment of schools for black children in North Carolina during 1865 through 1868 grew from sixty-three schools to three hundred forty-seven, with the number of teachers increasing from eighty-five to three hundred seventy-two, and the pupils increasing from five thousand six hundred to twenty-three thousand four hundred pupils, which was more than in any other state.⁴¹

Although the benefits from provisions, medical treatments, and education to the individuals in all the states were the most important duties during the four-and-one-half years of existence, the bureau also attempted to address a greater challenge of larger proportions with consequences lasting much longer by transforming the system of slave labor into free labor with fair wages by establishing working relationships with signed contracts. The effort had begun on May 15, 1865 with the choice by President Johnson of Brevet Major General O. O. Howard to serve as the commissioner of the Bureau of Refugees, Freedmen, and Abandoned Lands with headquarters in Washington. With authority provided by Congress for locating assistant commissioners within the states in rebellion, Howard appointed Colonel Eliphalet Whittlesey in June to the position in North Carolina.

Whittlesey immediately organized the state into four districts with headquarters at New Bern, Raleigh, Greensboro, and Wilmington and subdistricts within each one of the four districts. Subsequently, in the eastern half of the state where the vast majority of the freemen resided, there were thirty-three subdistricts planned; but, with the lack of military officers willing to serve as agents, only twenty were active

at any one time. About the time of the Whittlesey appointment, an earlier circular was redistributed to the assistant commissioners from Howard that described their four primary duties that included supervision of abandoned lands, co-operation with benevolent organizations “in the work of administering relief,” and affording the utmost facility “to benevolent and religious organizations and State authorities in the maintenance of good schools.”⁴² The fourth duty was more specific calling for the agents to negotiate the details of the labor agreements. Howard described the challenge of this duty to the agents with the statement that:

The demands for labor are sufficient to afford employment to nearly if not quite all the able-bodied refugees and freedmen. It will be the object of all commissioners to introduce practicable systems of compensated labor; and to this end they will endeavor to remove the prejudices of their late masters unwilling to employ their former servants; to correct the false impressions sometimes entertained by the freedmen that they can live without labor, and to overcome that false pride which renders some of the refugees more willing to be supported in idleness than to support themselves. While a generous provision should be made for the aged, infirm, and sick, the able-bodied should be encouraged, and if necessary, compelled to labor for their support.⁴³

On July 5, Whittlesey sent his own Circular No. 2 to the agents in North Carolina advising them “that freedmen should be free to bargain with their prospective employers, and both parties should sign written agreements in the presence of a Bureau official. Freedmen who failed to adhere to signed agreements were subject to forfeit all or part of their wages. Employers who dismissed employees without just cause and failed to pay them were required to either make payment or provisions for laborers and their families for the remainder of the contract. If necessary, requirements were to be enforced by military authorities.”⁴⁴ To enjoy more freedom, crop sharing was popular, but the agents advised the freemen of the high cost for their provisions often charged to those without contracts.

The contracts differed in style and content, but most contained the names of the parties in the agreement, start date and term of employment, location of the farm, and the rate of pay per month with the provisions of “quarters, fuel, substantial and healthy rations, all necessary medical attendance and supplies in case of sickness” for most freedmen.⁴⁵ Usually, based on a portion of the total amount or on a share of the crop raised, wages were paid monthly. For laboring on plantations the wages ranged from nine to fifteen dollars for men and for women from five to ten dollars per month. For comparison, the wages for the labor of agricultural field hands were lower than common labor in the cities who earned fifteen dollars a month with housing and provisions and thirty dollars a month without. With mill hands and

railroad men earning fifteen to twenty dollars a month, skilled labor was paid from two dollars and fifty cents to three dollars a day.⁴⁶

Although they were a fraction of the population of the freedmen, General Howard estimated that in one state no less than fifty thousand labor contracts were completed with the names of the parties and that the total was several hundred thousand for all the states. However, these agreements did not address the actions and results occurring due to conflicts and disagreements between labor and employer concerning working conditions, timely wage payments, leaving before harvest, firing for low productivity, harsh treatment, or violation of the contract by either party. However, the bureau established judicial systems to adjudicate "all difficulties arising between negroes themselves, or between negroes and whites or Indians."⁴⁷

Freedmen courts and boards of arbitration were organized with the assistant commissioner in charge as the authority to preempt and overrule the civil courts if necessary so as to protect and maintain the complete civil liberty of the freedmen. When Governor Worth sent a notice in July 1866 that "there now exists under the laws of this State no discrimination in the administration of justice to the prejudice of free persons of color," the assistant commissioner issued a general order "to officers and agents to refer all cases involving freedmen, with the exception of those concerning labor agreements witnessed or approved by Bureau officials, to the appropriate state or county court."⁴⁸ However, another order directed the agents and officers "to attend trials held by state authorities involving labor contracts not approved by the Bureau, to insure fair treatment of freedmen. Cases determined to be unjust could be resumed under the jurisdiction of the Bureau."⁴⁹

Even though the main purpose of wage labor contracts may have been to establish a fair agreement of supervised employment, the pursuit of the "fruits of one's labor" as a free person encouraged many freemen to seek contracts as sharecropper farmers in part to avoid the gang-based labor of slavery. In addition, debt from the loss of their capital and their labor with the emancipation encouraged some planters to divide their plantations into smaller farms that were leased for direct rent to a tenant or for a share of the cash crop that the owner stipulated under contract to another white or black farmer. From 1870 to 1880, the number of farms in the southern states increased more than seventy percent with almost three-quarters of all the farms cultivated by the owner. For the other one-quarter, the proportion "of farms rented for share of product" was twice as many as those "farms rented for fixed money rental."⁵⁰ The average size of all the farms in the United States was about one hundred thirty acres with the average size of rented farms about the same number of acres.⁵¹

In 1860, states that formed the Confederacy reported nearly eight hundred thousand farmers and planters combined with fewer than two hundred thousand wage earners in the pursuit of agricultural occupations.⁵² A decade later, these same states

reported that the number of occupations as farmers and planters had decreased by more than ten percent even though there were sixfold more wage-earning agricultural laborers.⁵³ Obviously, many of the former slaves were continuing with their knowledge and experience in agriculture for wages.

However, some planters were in debt without the capital that they had lost in emancipation and were encouraged to divide their plantations into smaller farms that they leased to another white or black farmer. Aided by the movement of families into the western states, the total acreage of land farmed in the United States in 1870 increased by about one percent when compared to 1860; however, the total acreage farmed in the eleven states that seceded was reduced by twenty-five percent, which included a reduction of forty percent in the average farm size from nearly four hundred to less than two hundred fifty acres.⁵⁴ Even with the reductions in total acreage and unit size, the number of farms increased in the former Confederate states, but the production actually decreased by one-third in corn,⁵⁵ by two-thirds in tobacco,⁵⁶ and by two-fifths in cotton.⁵⁷

In 1840 North Carolina ranked seventh in population,⁵⁸ fifth in the production of tobacco,⁵⁹ and sixth in the production of corn and cotton.⁶⁰ With less immigration than other states,⁶¹ the rank in population of North Carolina among the states in 1860 was twelfth,⁶² with the crop productions of tobacco remaining fifth,⁶³ cotton dropping to ninth,⁶⁴ and corn to eleventh from sixth.⁶⁵ After the Civil War, the pursuit of prosperity in North Carolina was undergoing the same reorganization of labor and operation of farms as were the other southern states with a reduction of twenty percent in the acres improved for farming and a one-third reduction in the average size of farms.⁶⁶ However, the farmers in North Carolina reported that the number of bales of cotton in 1870 were about equal to that of 1860 with corn almost forty percent less and tobacco one-third of that reported before the war. Improvements in agriculture for most of the farmers in North Carolina were from experience and little education.⁶⁷

Opportunities for Prosperity with Public Education

Eliminating Illiteracy

In 1800, the illiteracy rate among all white Americans has been estimated to have been about twenty-five percent with a higher rate for Southerners than for Northerners, for rural people than for city people, and for women than for men.¹ The low illiteracy rate in Massachusetts in 1860 was achieved mainly by the fact that children attended private or church-sponsored schools before 1830 and the expanding public school system during the subsequent decades. Expecting similar results, New York, Connecticut, Pennsylvania, North Carolina, Virginia, South Carolina, and eventually all the states established systems from public funds to school the poor that included opportunities for the common people to attend. These systems were devoted to low-cost instruction, expansive in attendance, and known as “common schools” where the three Rs of reading, writing, and arithmetic were mastered by rote learning and became the foundation for educating the American citizens throughout the nineteenth century.

In 1894, one-room common schoolhouses were valued on the average at less than two thousand dollars (one hundred seventy-four dollars in North Carolina)² in which an average of fifty-nine students (fifty-four in NC)³ attended during an average term of about one hundred thirty-nine days (sixty-three in NC)⁴ with supervision by one teacher who earned on average about forty dollars a month (twenty-four dollars in NC).⁵ Until 1900, the primary source of funds for common schools in the North Carolina counties came from a local tax that required approval by the voters. For decades, the education tax in the rural districts in North Carolina was among the lowest in the country and limited the days of instruction, the salary of teachers, and improvements in the system of common schools.

Although the funding was controlled by the counties, the Constitution defined the terms as four months and the school laws enacted by the legislature defined the number of school days for the term. Effective teaching required skills for classroom management of students of different ages as well as those at different levels of achievement in subjects. Training for classroom management was provided at Normal schools and at institutes with certification required for the purpose of improving the quality of teaching in the common schools, but those efforts were criticized and ever changing for about a century.

During the nineteenth century, common schools were the foundation of education for tens of millions of white Americans, resulting in a literacy rate of about ninety-four percent in the United States by 1900; but the literacy rate for the white population over the age of ten was just above eighty percent in North Carolina,⁶ and for the black population in all the states over the age of ten, fifty-five percent and in North Carolina fifty-two percent.⁷ Throughout the southern states, schooling all the white children had not been a continuing priority either before the Civil War nor for all the children until almost a century after the Civil War had ended. In North Carolina before the Civil War and during the first effort to establish a system of common schools for white children, the number of illiterate white persons older than twenty decreased by seven percent over a decade.⁸

However, at that time more than half of the free black and nearly all the slaves were illiterate since, by law, they could not attend a school.⁹ Including whites who were illiterate, free blacks, and slaves in 1860, there were more than four hundred thousand or about forty percent of the people living in North Carolina who could not read or write.¹⁰ In 1870, the population of the United States was thirty-eight million citizens¹¹ with more than five million people over the age of ten who were illiterate; sixty percent of them lived in the eleven states that seceded. About two-thirds of those who were illiterate were older than twenty-one and about equally divided between whites and blacks; but there were more females who were illiterate than males.¹²

When these eleven states seceded, there were nearly four million uneducated slaves who were freed after the war¹³ and when combined with the nearly four hundred thousand white illiterate citizens over the age of twenty-one before the war,¹⁴ educating all the citizens of the southern states was an enormous challenge. After decades of considering education as an option to be decided locally, of resisting adequate taxation, and of denying racial equality of access, in 1901 and 1902 Governor Charles Brantley Aycock spoke about his intent to accomplish “universal education”¹⁵ and was joined by forty-two educators in North Carolina who signed a “Declaration Against Illiteracy” when he was sworn into office to confront the fact that more than one in five of white people over the age of ten in North Carolina could not read.¹⁶

In 1880 the illiteracy rate for whites was about thirty percent for all adults and school-aged children and seventy percent for black adults and the school-aged black children.¹⁷ Twenty years after establishing the common school system in North Carolina, illiteracy for whites ten years and older had dropped more than ten percent and, for blacks ten years or older, more than thirty percent.¹⁸

To reduce illiteracy further, the superintendents of public instruction in North Carolina were actively encouraging attendance; but after recommending compulsory education in 1900, a decade went by before an effective school attendance law was passed in 1913.¹⁹ However, the illiteracy rate dropped by another ten percent by 1910²⁰ even though only seventy percent of the school-aged children were attending a school and, of those who were, almost eighty percent enrolled in a one-teacher school.²¹

To reduce illiteracy even further, the General Assembly appropriated funds in 1917 to establish schools for adult illiterates, where ten persons of "more than fourteen years old, who cannot read or write" attended twenty nights of one and one-half hour sessions with the teacher receiving a maximum of twenty dollars.²² By 1920, illiteracy had declined from about eighteen percent in 1910 to thirteen percent with the superintendent expressing his view that the larger part of the illiterates are "adults who did not have the advantage of an education twenty years ago."²³ He continued: "Unless the State gives special aid," the remaining "illiterate adult population will never learn to read and write."²⁴

There were more than four million adult illiterates in the United States or just over seven percent of the population; North Carolina was no longer the most illiterate state by percentage but ranked seventh with nearly seventeen percent illiteracy.²⁵ Although the American common school system was efficient, it was limited in its breadth and depth of subjects. With the foundation provided by the one-teacher schools and with compulsory attendance for school-aged children, eventually free public education became available from graded through high schools to all children and resulted in a decrease in illiteracy in the United States of black persons of fourteen years of age or over from about eighty percent in 1870 to less than two percent in 1979, and for whites from more than eleven percent to less than one percent.²⁶

Public Common School Education

Even though one of the most diverse and prosperous economies among all the states before the Civil War had developed in Pennsylvania, the statewide system of free public schools progressed more like North Carolina than Massachusetts in responding to almost identical articles devoted to education in each of the constitutions. Regarding free public education, the Pennsylvania Constitution as amended

in 1790 prescribed establishment “as soon as conveniently may be, provide, by law,... schools throughout the State, in such manner that the poor may be taught gratis.”²⁷ However, the attempt to create free public schools was challenged with the administrative complexity of the “pauper” system²⁸ and by the concern of inferiority of pauper schools created mainly for the poor.²⁹

Displeased with the lack of progress and the large number of illiterate citizens, the legislature passed the Act to Provide Funds for the Establishment of Free Schools in the State of North Carolina in 1834 that provided an opportunity for school districts to decide by election to continue the pauper or “common schools” as prescribed in 1790 without state aid or to establish free common schools, assess a school tax, and then receive a share of the recently established common school fund.³⁰ In a similar manner, a public school law, enacted by the North Carolina Legislature in 1839, authorized school districts to establish free public common schools, assess a school tax, and receive support from the Literary Fund.

In addition, a system of public schools was created in North Carolina with the appointment of a state superintendent in 1853, which resulted in improvements in attendance, teaching, and content similar to progress in Pennsylvania. Voluntary attendance, the content taught, and terms for instruction were non-uniform throughout both states. Comparing the illiteracy in these states where common school attendance was voluntary; the number of persons over the age of twenty who could not read nor write in 1860, excluding recent immigrants, was thirty-seven thousand with nearly ten thousand free blacks in Pennsylvania, and seventy-one thousand with seven thousand free blacks in North Carolina. The illiteracy rate of white persons including thirty-eight thousand immigrants over twenty years of age was nearly six percent and of free blacks nearly thirty-three percent in Pennsylvania, with the rate approximately twenty-five percent for whites, including one hundred immigrants, and fifty percent for free blacks in North Carolina.³¹

In Pennsylvania, nearly one-half of the male teachers served as soldiers, and schools closed during battles.³² After the war, the legislature approved an act in 1867 that gave eminent domain to the school boards when selecting sites that facilitated the process and encouraged expansion in the number of schoolhouses during the next decade when an additional two hundred thousand students attended classes for a school term of five months.³³ To increase the number and to provide opportunities for improvement in the classroom, legislation required that Teachers’ Institutes, which were summer schools for employed teachers where subject knowledge, school administration, and classroom performance were emphasized, must be established in every county and that the number of Normal schools to train teachers must be expanded from three to ten, resulting in a fourfold growth in the enrollment of teachers from 1865 to 1878.³⁴

In an effort to establish a system of free schools, the districts were induced to join the School Department of Pennsylvania by an offering from the state to pay the salary if they elected a district superintendent, who would “examine teachers... fix grades, arrange classes, plan courses of study, exemplify methods of teaching, and look after admissions and transfers.”³⁵ With every district represented in the state school system by 1874, vigorous pursuit of the “grading of the public schools and the establishment of departments for imparting instruction in the higher branches” resulted in more than five thousand graded schools and numerous high schools in the cities and larger towns by 1881.³⁶

However, as reported in the 1880 Census, the number of pupils attending the Pennsylvania schools remained about three-fourths of the total number of youth in the age group of five to eighteen.³⁷ The students identified as “colored” pupils constituted less than one-half of one percent of the aggregate number of attendees in public schools and about one-half of the “colored” population in the age group of five to eighteen.³⁸ Even with the progress from 1870 to 1880 in expanding the opportunity for attending a common school, more than one hundred forty thousand people could not read, and more than two hundred thousand could not write. The illiteracy included about twelve percent of the population of the state, and about fifteen percent of those who could not write were immigrants.³⁹ In addition, more than eight out of ten of the illiterates were adults over the age of twenty-one.⁴⁰

In an attempt to encourage the youth to attend common schools and thus reduce the illiteracy as adults, a child labor law was enacted in 1887 prohibiting employment of children under the age of twelve to work in factories or mines. With some success derived from the child labor law but flawed in enforcement, a compulsory attendance law was passed in 1895 that required “children between the ages of eight and thirteen to attend school for at least sixteen weeks each year.”⁴¹

When the Civil War ended for the seceded states and slavery was abolished by the Thirteenth Amendment to the United States Constitution; regardless of prior progress in public education, the former Confederate states were challenged to provide adequate access to the existing common schools due to the lack of funding, teachers, and schoolhouses and with concerns about mixed races attending the same school. Even so, during the presidential Reconstruction era from 1865 to 1867—when provisional governments were appointed by Lincoln to take office in a few states during and in others by Johnson after the war—the growing interest in restoring public education resulted in the approval of taxes, in the establishment of state superintendents, in the authorization of school funds, in the education for freed slaves, and in the creation of state systems.⁴²

However, these efforts were not uniformly adopted in the eleven states and in most instances the attendance was reserved for white children. In 1867, radical Reconstruction controlled by Congress required that education in the seceded states

conform to the Fourteenth Amendment, which bestowed citizenship in the United States to the freed slaves, as well as in the states where they resided. Responding to the demands of congressional Reconstruction for readmission to the Union, the Virginia Constitution of 1870 included the establishment of a board of education; the charter for a “uniform system of public free schools”; the authorization to open, “as soon as practicable, normal schools”; the mandate for “uniformity of text-books, and the furnishings of school-houses”; the creation of a “perpetual literary fund... of the state”; and the levying of a “capitation tax provided for... free school.” The reconstruction of public schools began with the election by the General Assembly of a superintendent of instruction who was required to submit to the legislature “within thirty days after his election a plan for a uniform system of free public schools.”⁴³

After his election, the Reverend W. H. Ruffner submitted his plan to the General Assembly, and, even though the plan for public free schools that was adopted by the legislature and signed by the governor on July 11, 1870 essentially implemented the Massachusetts system, the legislation provided for segregated schools.⁴⁴ Beginning five months later, one hundred thirty thousand pupils attended twenty-nine hundred schools with three thousand teachers present. During this first year of free public common schools in Virginia, the attendance included about forty percent of the white and about one-fourth of the black school-aged population.⁴⁵

The original Constitution of the State of South Carolina did not include a provision for schools, but the legislature of 1811 passed a bill intending to establish free elementary schools in each election district of the members of the House of Representatives. While the children of all white citizens were admissible, the poor had preference when the school was oversubscribed. With a population of whites, slaves, and free blacks totaling just over four hundred thousand people, with slaves forbidden to learn to read or to write, with the districts responsible for the cost of the schoolhouse, and with the legislature providing annual support for the school, in 1812, two-thirds of the districts reported that more than four thousand white children attended nearly two hundred schools.⁴⁶

However, expansion in the number of schools grew just over ten percent a year over the next five decades.⁴⁷ This slow growth was due to poor management and to a bias against free schools as a pauper education. When all the districts reported in the 1860 Census, there were almost twenty-one thousand pupils attending more than seven hundred fifty schools with about one in four of the children aged five to fifteen in school.⁴⁸ Although Charleston, SC organized and operated an “excellent system of schools,” other districts were considered “an almost utter failure.”⁴⁹ Even though the school system was not effective in attracting students, the illiteracy rate among the white citizens was about twelve percent, less than one-half of that in North Carolina.⁵⁰

While there was not an attempt to alter the provisions for education during the presidential reconstruction, an article in the South Carolina Constitution of 1868, which was ratified during the congressional reconstruction era, created the office of State Superintendent of Education with the superintendent “elected by the qualified electors of the State” and a state board of education comprised of a school commissioner from each county and chaired by the superintendent.⁵¹ In addition, the constitution required that the General Assembly “provide for a liberal and uniform system of free public schools throughout the State,” for implementing “the division of the State into suitable School Districts,” for ensuring a term of “at least six months in each year” and for providing “compulsory attendance, at either public or private schools, of all children between the ages of six and sixteen years.”⁵² In addition, a levy of “an annual tax on all taxable property throughout the State for the support of public schools... and an annual tax of one dollar on each poll” provided the support for no-tuition education.⁵³ To improve competence in the schoolhouse, a Normal school “shall be open to all persons who may wish to become teachers.”⁵⁴

The most controversial school law decreed that “All the public schools, colleges, and universities of this State, supported in whole or in part by the public funds, shall be free and open to all the children and youths of the State, without regard to race or color.”⁵⁵ With the schools opening under the guidance of the new constitution, the first superintendent reported in January 1870 that out of the school-aged population of almost one hundred seventy thousand, about ten percent, with the number of white and black pupils about equal, attended three hundred eighty schools.⁵⁶ By June 1870, the number of schools and pupils had nearly doubled.⁵⁷ While this growth was short lived as most of the schools closed in 1872 due to the lack of funds from the state,⁵⁸ attendance recovered gradually until 1876 when fifty thousand white and nearly seventy-one thousand black pupils were in school for four to five months a year.⁵⁹

Within ten months after the Civil War ended in North Carolina, the General Assembly abolished the offices of the superintendent of public instruction and the treasurer of the Literary Fund and assigned to the counties the responsibility of deciding as to whether any school would be opened and the discretion to support common or subscription schools by levying local taxes.⁶⁰ In effect, the General Assembly of North Carolina abandoned the public school system for white children of the Wiley era and returned public education to the circumstances that existed two decades before the war. However, as the opportunities for white children to attend school diminished during and after the war, the American Missionary Association, organized in 1846 to “conduct Christian missionary and educational operations,”⁶¹ was sending teachers to New Bern and Roanoke Island as early as 1863 to establish schools for the freedmen who took shelter where the Union troops occupied the communities.⁶²

Shortly after the war ended, there were eight thousand students, mostly black children, attending eighty-six schools, mostly in eastern counties,⁶³ with the added assistance from other benevolent societies including the Association of Friends of Baltimore and Philadelphia⁶⁴ and the American Freeman's and Union Commission, which was a coalition of branches with the objective "to aid and cooperate with the people of the South without distinction of race or color in the improvement of their condition upon the basis of industry, education, freedom, and Christian morality."⁶⁵

In addition, high schools were established by the Missionary Society in Wilmington and in Beaufort.⁶⁶ The desire by the freed slaves to attend school was so great that the demand for new schools exceeded the supply of teachers who were mostly females from northern states. To increase the number of qualified teachers, more than a dozen normal programs were established for blacks, including Saint Augustine Normal School that was incorporated in Raleigh in July 1867 with twenty-six students enrolling when the school opened six months later.⁶⁷ To provide more access to higher education, other education institutions were organizing with the Raleigh Institute, now known as Shaw University, founded in 1865 with the support of the American Baptist Home Mission Society and the Biddle Memorial Institute, known today as Johnson C. Smith University, founded in Charlotte in 1866 under the leadership of the Freedmen Committee of the Presbyterian (old School) church organization.⁶⁸

The 1865 "Act to establish a bureau for the relief of freedmen and refugees," which was signed by President Lincoln and enacted "to continue during the present war of rebellion, and for one year thereafter,"⁶⁹ did not include educating the four million or more people who were recently freed from bondage and mostly illiterate as had been mandated by slave laws in southern states. However, the commissioner of the bureau, General Howard, had concluded that education for the freed people must be a priority among his Reconstruction responsibilities even though Congress had not funded the activities. Recognizing the opportunity provided by supporting the extraordinary efforts of the teachers who were sponsored by benevolent organizations, Howard decided to appoint an officer in each state for the purpose of coordinating the establishment of new schools.⁷⁰

With the implementation of congressional Reconstruction in 1866, federal military jurisdiction in the states, and extension of the authorization for the Freedmen's Bureau for two years,⁷¹ the commissioner was empowered "to seize, hold, use, lease, or sell all buildings, and tenements, and any lands appertaining to the same, or otherwise, formerly held under color of title by the late so-called Confederate States... and to use the same or appropriate the proceeds derived therefrom to the education of the freed people."⁷² In addition, the commissioner was instructed to "co-operate with private benevolent associations of citizens in aid of freedmen, and with agents and teachers...and hire or provide by lease, buildings for purposes of education

whenever such associations shall, without cost to the Government, provide suitable teachers and means of instruction.”⁷³

In his autobiography, General Howard recorded that he was dedicated to an “avowed purpose, as soon as practicable, to close out one after another the original Bureau divisions... while with all the energy I could muster I increased the school work.”⁷⁴ The establishment of schools for black children in North Carolina during the period from 1865 through 1869 grew from sixty schools to three hundred forty-seven with the number of teachers increasing from eighty-five to three hundred seventy-two teaching from five thousand to twenty-three thousand pupils, which was more than in any other state.⁷⁵

Freedmen Establishing Education

By 1869, the Freedmen’s Bureau had discontinued most of their Reconstruction activities in those states that had been “fully restored in its constitutional relations with the United States,” except in some states where the education department continued until adequate education was provided for “the children of the freedmen.”⁷⁶ Even as the bureau withdrew in 1870 and some of the benevolent societies reduced or closed their sponsorships, Howard estimated that as many as “two hundred and fifty thousand colored adults and children have received considerable instruction during the past year.”⁷⁷ In the 1870 report of the bureau superintendent, three hundred seventy schools, four hundred one teachers, and fifteen thousand nine hundred fifty-one pupils were recorded for North Carolina during the previous year,⁷⁸ or about one in ten of the children of the freedmen attending school.⁷⁹

When the convention of elected delegates assembled in Raleigh in 1868 to review and adopt changes so that the amended Constitution of North Carolina, when approved by the voters, would conform with the requirements of congressional reconstruction, the members who were appointed to the “Committee on Education, Common Schools, University and the Means of Their Support” scrapped “Article IX Education” in the North Carolina Constitution of 1776 and drafted a new article that instructed the General Assembly to provide “by taxation or otherwise”⁸⁰ for a “general and uniform system of Public Schools, wherein tuition shall be free of charge to all the children of the State between the ages of six and twenty-one years.”⁸¹ In addition, each county would be divided into school districts with the commissioners required to maintain them “at least four months in every year” or they “shall be liable to indictment.”⁸² As the education article was considered for approval by the full membership of the convention, a delegate recommended that Section 18, which empowered the legislature “to enact that every child... shall attend the Public Schools during the period between the ages of six (6) and eighteen (18)

years, for a term of not less than 16 months,”⁸³ be amended by adding the statement that “The General Assembly should provide separate [*sic*] and distinct schools, for the black children of the State, from those provided white children.”⁸⁴

The chairman of the committee, the Reverend Samuel S. Ashley—who was sponsored by the American Missionary Association during the war when he moved from Massachusetts and located in New Hanover County to teach freed slaves—offered an amendment to the proposal that would add “It being understood that this section is not offered in sincerity, or because this is any necessity [*sic*] for it, and that it is proposed for the sole purpose of breeding prejudice and bring about a political re-enslavement of the colored race.”⁸⁵ The amendment to the amendment was approved, but the amendment to Section 18 failed.⁸⁶ Without clarification in the constitution, the integration of public school attendees was a political issue to be settled by constitutional law in North Carolina with some uncertainty of the outcome when compared to segregation by law in Virginia and constitutionally mandated mixing of the races in South Carolina.

The influence of the Freedmen’s Bureau on the development of education during the Reconstruction in North Carolina has been characterized as “more destructive than the war,”⁸⁷ an “experiment in social policy,”⁸⁸ and the enabler of education for the black children.⁸⁹ However, after Freedmen’s Bureau activities in education officially ended in North Carolina, public education for all children in common schools developed slowly and sporadically during the three decades prior to 1900. The school laws provided for a state board of education, for income from the Literary fund, for a local capitation tax ordered by county commissioners, for a sufficient number of conveniently located schools to accommodate all school-aged children for at least four months a year, and for studying “reading, writing, spelling, arithmetic, geography, and English grammar.”⁹⁰

In addition, Article V of the Constitution, as amended in 1868, instructed the legislature to levy a statewide capitation tax on a fixed value of property set at three hundred dollars for each male over twenty-one and under fifty years of age. While the commissioners were authorized to levy taxes for county purposes “in the like manner with State taxes,” the county tax could not exceed the amount of two times the state capitation tax, “except for a special purpose,” but the sum of the capitation taxes levied by the legislature and the commissioner could “never exceed two dollars on the head.”⁹¹ The first effort to establish a statewide school system after the Civil War, as prescribed by the laws enacted by the legislature, was led by Samuel Ashley when he was elected superintendent of Public Instruction in 1869.

While Ashley personally favored schools with racially mixed enrollment, he organized a segregated system and appointed the Reverend John Wesley Hood—a black man who had been free in Pennsylvania and moved after the war to settle in Cumberland County—as an assistant superintendent in charge of the schools

for black children. In the "Report of the Superintendent of Public Instruction" in 1869, Hood estimated that about fifteen thousand of black children of school age in the population were attending two hundred fifty-seven schools supported in part by their own contributions but mostly by the benevolent associations.⁹² With only one-fourth of the revenue that was collected as a school tax actually allocated to the public schools in 1870, with the legislature reducing salaries by forty percent, and with elimination of the funding for clerks and travel, Ashley and Hood resigned in 1871.⁹³

Even with the support from the Freedmen's Bureau to build schoolhouses, the assistance from benevolent societies in hiring teachers, and the establishment of a new public school system, there were as many as one hundred thousand black children and two hundred thousand white children of school age who were not attending public schools⁹⁴ with many of them adding to the more than three hundred thousand people in North Carolina over the age of ten who could not read nor write.⁹⁵

Concerns about the lack of constitutional authority for segregated schools, about the consequences of inadequate county revenue due in part to the restrictions of a two-dollar limit on capitation taxes, and the paucity of financial support of less than fifty cents per student, which was less than one-tenth of the average for the thirty states and last among them,⁹⁶ contributed to the slow restoration of public education with the total number of common schools, teachers, and pupils attending in the black and white systems in 1870 equal to about one-half the number in the white-only system twenty years earlier.

Although the percentages of school-aged white and black children attending common schools were about equal in 1870,⁹⁷ there were three times as many white illiterates over the age of ten than the number of white pupils and about twenty times as many black illiterates over the age of ten than black pupils attending school.⁹⁸ With the 1868 school laws of North Carolina that were instituted by 1870, about ten percent of the eligible children were in attendance during the first year, which slowly increased at a rate of about five percent each year until Reconstruction officially ended in 1876.⁹⁹

During this period of ambivalence by the legislature and neglect by many citizens concerning the constitutional requirement to educate all the children, the trustees of the Peabody Fund (which was established in 1867 with a donation of more than two million dollars by Massachusetts native George Peabody) offered encouragement by awarding grants to towns and school districts for the purpose of "promotion and encouragement of intellectual, moral, or industrial education among the young of the more destitute portions of the Southern and Southwestern states of our union."¹⁰⁰

The first award in 1868 to North Carolina schools totaled twenty-two thousand dollars, but less than three thousand dollars of appropriations reached the schools

in the first year.¹⁰¹ The State Superintendent of Education was responsible for assuring that the funds supported well-regulated and graded public schools, mainly in the towns and cities, that maintained a term of approximately nine months and a teacher for fifty pupils. The Peabody Fund awarded more than twelve thousand dollars to thirty schools and school districts in North Carolina in 1874, and from 1868 to 1878,¹⁰² the Peabody Fund appropriations totaled more than eighty-seven thousand dollars.¹⁰³

Even though the enrollment increased at a slow pace from forty percent to more than fifty percent of the school-aged children attending a public school during the 1870s, the support from the Peabody Fund, the encouragement from the teacher's association, and the urging by Governor Vance, who declared that "It is impossible to have an effective public-school system without providing for the training of teachers," resulted in the legislature fulfilling their constitutional duty of establishing normal instruction.¹⁰⁴ A Normal school for white teachers opened at the University of North Carolina in July 1877, followed by the "colored" normal in September at Fayetteville, which is now known as Fayetteville State University. By 1878, Trinity College reinstituted a Normal school curriculum that included "English grammar, arithmetic, geography, spelling, reading, writing, history, algebra, Latin, school government and methods of teaching."¹⁰⁵ There were almost seven hundred students enrolled in the three Normal schools by 1879.¹⁰⁶

In 1875, an amendment to the North Carolina Constitution eliminated the possibility of mixed-race attendance by requiring that "the children of the white race and the children of the colored race shall be taught in separate public schools" and that "there shall be no discrimination made in favor of, or to the prejudice of, either race";¹⁰⁷ however, the amendment did not immediately affect enrollment as indicated by the fact that the increase in attendance during the first half of the 1870s before the adoption of separate schools was about twice the amount during the last half after the amendment. But the thirty-percent increase in the school-aged population during the 1870s contributed to a quadrupling of the enrollment and the number of schoolhouses they attended.¹⁰⁸ During this decade of expansion, the average term was modestly lengthened to fifty school days, but the expenditure for each child attending a public school remained about one dollar fifty cents,¹⁰⁹ and the monthly pay to teachers went from \$20.21 in 1870 to \$21.91 in 1880.¹¹⁰

Except for a few city school districts in South Carolina and Virginia, increases in the enrollment and number of schoolhouses, decreases in teachers' pay, and below-average national expenditures for public schools during the 1870s in those states were comparable to the situation in North Carolina. Even though below the national average, Virginia expenditures per student on public education were about three times more than in North Carolina and provided for terms of about one hundred school days, for more than one hundred graded schools, and for higher grades

for black and white students. Even so, the public schools in Pennsylvania were advancing much more rapidly than the accomplishments in North Carolina, Virginia, and South Carolina due in part to the expenditures of more than eight dollars per student enrolled in public schools that enabled the establishment of nearly two hundred school days, about one-fourth of the eighteen thousand schools graded in the two thousand districts, more than two thousand high schools, and instruction in drawing and music.¹¹¹

A major contributor to the attitude and advancements in education in Pennsylvania was derived from an amendment to the constitution, which was approved by popular vote in December 1873, that instructed the General Assembly to “appropriate at least one million dollars each year” to “provide for the maintenance and support of a thorough and efficient system of public schools.”¹¹² North Carolina and other slave states progressed at a measured pace in the development of public schools due in part to the cultural, political, and economic circumstances that developed in each state after the Civil War. In North Carolina, even though the constitution required the county commissioners to operate schools, education was considered by many citizens to be a privilege, not a right, with the decision to establish public schools deferred to the consent of those who would be taxed.

By 1880, the county commissioners had created six thousand three hundred ninety-two school districts within forty-eight thousand five hundred eighty square miles of the state with a population of about one million four hundred thousand people living in the ninety-four counties in which, on average, forty or so school districts were established with seven families and thirty-five children residing in each district.¹¹³

While just one school in each of the districts would have been inconvenient to attend, the large number of school districts challenged any attempt by the state superintendent of Public Instruction to coordinate curricula, to expand the training of teachers, to encourage construction of adequate schoolhouses, to promote more than the required school days, and to advocate for salaries that would attract more qualified teachers.¹¹⁴ In addition, the county commissioners were challenged to provide the revenue to support public schools since the value of the property to be taxed had decreased from 1860 to 1870 by about twenty-five percent in North Carolina and Virginia, and as much as sixty percent in South Carolina.¹¹⁵ Clearly, freeing the slaves decreased the value of taxable property for those who had owned them; but the depreciation of the value of farm land, where soil fertility decreased due to poor farming practices that reduced the yield of crops per acre, contributed even more to the reduction in the revenue for public schools derived from property taxes. In contrast, the value of property in Pennsylvania had increased by one hundred sixty-eight percent as did the average for all the union states during the same decade.¹¹⁶

When the General Assembly met in 1881, John C. Scarborough—who attended a common school in Wake County, enlisted with the 4th Regiment of the Volunteers of North Carolina, graduated from Wake Forest, supervised and taught in a private school in Selma, and served from 1877 to 1885 and from 1893 to 1897 as superintendent of Public Instruction—knew that the public opinion about the old school system of 1876 “was pronounced to be worse than no system; and in truth there was but little *system* about it.”¹¹⁷ Contributing to public discussion about public education, Governor Thomas Jordan Jarvis stated in his address to the legislature that “Money is, and must be, the heart and life of every system. While I hope to see you make the system as perfect as possible, I beg that you will not forget to provide the money. This can be done only by taxation.”¹¹⁸ The legislature responded by revising and consolidating the public school laws,¹¹⁹ by increasing the funding for education with a fifty-percent increase in state and local taxes, by providing financial support for county superintendents, by funding the county Teacher Institutes, and by establishing eight additional Normal schools with four for each race.¹²⁰

The institutes were intended as opportunities for experienced teachers to improve their classroom management and to prepare for the certification exam, but the Normal schools admitted aspiring students and novice teachers who would benefit from instruction in the subjects and in the practice of being a one-teacher school. Although Scarborough had no supervisory authority over them, he was pleased with the support for them and recognized that the county superintendents could improve the public schools in their districts since they were responsible for hiring teachers, maintaining schoolhouses, and recording school days. However, Scarborough was aware that some of the teachers were inept as just “school *keepers*, nothing more”;¹²¹ that some of the others were hired “because of their cheapness, however incompetent”;¹²² that “about one-half of the districts were without houses and with no money to build them”;¹²³ and that petitioning for division of districts would continue with “every man wanting the district school near his residence.”¹²⁴ However, by 1882 Scarborough reported that the “schools under county supervision, have been greatly improved, both in the work of the teacher and the advancement of the pupils.”¹²⁵

Also, the county superintendents realized some success in redistricting “to proper size in territorial limit and the school population to be accommodated.”¹²⁶

Even with the improvements in the system of public common schools, for the next decade the percentage of school-aged children in attendance decreased by eight percent even though the school-aged population increased by ten percent. Although the number of school districts increased to almost eight thousand and schoolhouses to nearly six thousand, the expenditure remained about one dollar per student enrolled.¹²⁷

For decades, the common schools in North Carolina received support from the Peabody Education Fund with Dr. Barnas Sears, the former president of Brown University, serving as the first general agent of the board devoted to “the promotion of primary or common-school education” and the “furtherance of Normal School education.”¹²⁸ For decades the Peabody Fund provided financial assistance to public education in the southern states with varying amounts of funding for different numbers of schools. In 1875, the largest number of grants awarded by the Peabody Fund to North Carolina was forty-one schools for white children and three schools for black children.¹²⁹ However, a decade after the new school laws were enacted and the legislature increased funding for public education, Superintendent Sidney Finger declared that even “with as much emphasis as possible... our schools, except in a few of the cities, are not satisfactory to any class of our citizens.”¹³⁰

Joining in the criticism of the current circumstances, J. L. M. Curry—who was born in Georgia, a graduate of Franklin College (now the University of Georgia), a law graduate from Harvard, elected to serve in the Alabama Legislature, Congress, and Confederate Congress, was president of Richmond College, and appointed the Peabody Fund agent in 1881 after the death of Sears—delivered a speech on January 21, 1891 in which he expressed to the North Carolina Legislators “that education is an inalienable right of every human being, and an imperative governmental obligation.”¹³¹

However, the “schools of North Carolina are unsatisfactory” in the “short sessions, averaging about sixty days” per term and in the modest increase in revenue from taxable property provided to education.¹³² With the average monthly salaries of male and female teachers in North Carolina ranking last or next to last and about one-half of the average for all female and male common school teachers in the country, and with the average number of days in a school term about one-half of the national average and the least in the nation, the taxes collected in the school year of 1893 to 1894 from each taxpayer for the purpose of supporting public common schools in North Carolina were, on average, one dollar twenty eight cents and about one-sixth the average of the amount collected in the forty-eight states and territories, and the least among them.¹³³

When Curry replaced Sears in 1881, the Peabody Trustees had decided that the support for the common schools should be reduced and that funding should be shifted to training teachers. Subsequently, the Peabody Education Fund began to support Teacher Institutes, Normal schools, and colleges. In 1882, John F. Slater created a charitable fund of one million dollars dedicated to “the uplifting of the lately emancipated population of the Southern States”¹³⁴ with special attention to “the training of teachers from among the people requiring to be taught.”¹³⁵

In 1891, the first agent, Slater, retired, and Curry replaced him and remained the agent for Peabody throughout the decade of the 1890s. Curry was influential in the

development of educational institutions for women and for black citizens in the southern states. He often spoke to the legislatures, visited the state school superintendents, and published pamphlets about education in the south. When Curry visited North Carolina, he spoke to the legislature mainly about the value of education to the learner and to the society in which they lived. He reminded the audience that equal education for women was generally accepted, but “not one dollar of the public revenues has ever been appropriated for the higher education of women.”¹³⁶ In addition, education for the Negro should “be treated on broad and far-reaching principles, which shall aim to regenerate personal life, home life, social life, industrial life, political life, and religious life.”¹³⁷ For all people, education should provide benefits that “aids self-help, stimulates individuality, creates self-respect, and increases all kinds of individual enterprise.”¹³⁸

As a description of the value of education, Curry asserted that the “wealth of the world is the product of human labor”¹³⁹ and that “No ignorant people were ever prosperous.”¹⁴⁰ Consequently, the farmers should abandon the “ignorant prejudice against book-farming”¹⁴¹ and pursue the education necessary for adopting scientific practices that improved tillage and “increased fertility or productiveness of the soil.”¹⁴² Addressing the shortsightedness of the legislators, Curry asserted that “To leave laborers in ignorance and thriftlessness is blind folly, is bad economy, is stupidity.”¹⁴³ To support his assertion, Curry declared that it “is a well-established fact that the laborer with a common-school education will, at the end of the year, have produced twenty-five percent more of valuable product than if he had remained uneducated.”¹⁴⁴

At the turn of the century, more than seventy-two percent of the school-aged children in the United States were enrolled in common schools with about two-thirds of the enrollment in attendance on a given day or about one-half of the school-aged children in the country attending a common school for more than one hundred forty days each year for about five years.¹⁴⁵ In contrast, for the segregated system in North Carolina, the percentages for black and for white school-aged children enrolled in common schools were about four percent below the national average for each race with attendance rates more than twenty-five percent below the national average and with the length of a school term for each year and the total number of years attended about one-half the national average.¹⁴⁶ Consequently, on average a child in another state attended a common school, and in some cases they were required to do so, for about four times as many days as a school-aged student in North Carolina.¹⁴⁷ The importance of the common school education for the children of the United States was more often described as a patriotic duty rather than an economic necessity.

In 1887, the commissioner of education of the United States proclaimed that “No other system of education for the masses has been so fruitful of good to the people

of any country. It is a system wisely provided by the people, and if the liberties of the country are to be preserved in their purity, it will be due in a great measure to the intelligence resulting from its adoption and influence.¹⁴⁸ Furthermore, the commissioner stated that "In considering the condition of public education in the Southern States great allowance should be made for the difficulties, both political and social, through which they have passed during the last twenty years; the trials of war, loss of property, and pride and prejudice of race, have all had to be surmounted."¹⁴⁹

Regardless of the location and past conflicts, illiteracy was the result of unschooled children with the rate of change depending on the percentage of school-aged children enrolling, attending, and mastering the common school subjects. In fact, the literacy rate in the age group from ten to fourteen years in each of the Union states that enacted a compulsory school attendance law before 1890 was less than one percent by 1910, with the average of the literacy rates for formerly seceded states where compulsory education legislation was enacted after 1900 being about twenty percent.¹⁵⁰ Although struggling to establish a coherent and effective system, the 1900 illiteracy rate for North Carolina citizens of fifteen years in age and above was about thirty percent, which included blacks and whites, and about the same rate as for whites only in 1860.¹⁵¹

Rural and City Schools

During the last half of the nineteenth century when the expansion of government, commerce, transportation, and communications resulted in an increase in the number of cities and towns and the populations in them, the one-teacher schools were being displaced by graded schools where there were sufficient students in attendance to employ more than one teacher. When comparing the city to the rural school system from about 1880 until 1920, the larger population density, the larger tax base, and the independence of city school districts resulted in about twice the salary for the certified teachers and twice as many school days in a year when compared to the county system, and in higher attendance rates at more convenient public primary and city high schools.

With rural and city districts controlling the establishment and funding of schools and with attendance limited to the district of residence, two public education systems in many of the states, as well as in North Carolina, were operating with disparate educational objectives and occupational opportunities for the children, which depended on where the children lived. As an example, in 1894 the North Carolina superintendent of Public Instruction proposed an eleven-year course of study to be taught in the rural one-teacher schools with common school subjects graded into a curriculum so that a student might advance sequentially for terms of at least four

months in each year for the eleven years.¹⁵² With the tax base to pay the teachers and the number of students to fill the classrooms, the towns and cities essentially doubled the school term to eight months, hired six teachers, graded the content of the curriculum, built multiroom schoolhouses, and established a six-year course of study with subjects comparable to those of the eleven years for the county schools.

With the elementary school instruction for the students completed at an earlier age, eventually the families in the cities were willing to support by taxes the establishment of public schools for secondary instruction that included vocational, industrial education, as well as preparation to enter colleges and universities. In North Carolina, attendance at segregated white and black graded schools was reported as early as 1885 to the state superintendent of Public Instruction by the superintendent of the schools in Raleigh, Wilmington, Charlotte, Greensboro, New Bern, and Winston. In Goldsboro, Durham, Rocky Mount, Wilson, and Salisbury, those superintendents reported that white students were attending graded schools. On the average for those seventeen schools, there were seven grades with more than three hundred students in attendance at each school, taught by nine teachers, for a term of about eight months, at a salary of more than three hundred dollars a year. The graded schools in Charlotte and Greensboro included the first public white and black high schools with secondary instruction at the tenth-grade level.¹⁵³

The development of graded schools in the counties had not progressed by the turn of the century when more than ninety percent of the school-aged children in North Carolina were still attending ungraded, one-teacher public schools in North Carolina.¹⁵⁴

Contributing to the slow rate of growth in educating all the children in North Carolina was the reluctance of equal civil rights for a minority of one-third of the North Carolinians by a majority of the population in the state. However, after the Civil War with the establishment of the Republican Party in 1868 and the Democratic Party in 1876 in North Carolina, black men in the Republican Party were elected to local, state, and federal offices¹⁵⁵ until the elections of 1898 when leaders in the Democrat Party began to characterize voting for the opponents as a continuation of "Negro domination" and pronounced their platform as a return to governing with "white supremacy."¹⁵⁶ With Democrats winning a majority in the General Assembly in 1898, a suffrage amendment to the constitution was enacted by them and approved by the voters in 1900.

The amendment required voters to be twenty-one years of age and that "every person presenting himself for registration shall be able to read and write any section of the Constitution in the English language."¹⁵⁷ In addition, a grandfather clause granted voting rights to all illiterate males who were eligible to vote on January 1, 1867, provided they registered before December 1, 1908. In addition, their subsequent lineage were eligible if they reached the age of twenty-one before December

1, 1908. By design, the amendment disenfranchised all illiterate black males since none of them were eligible to vote before the adoption in 1868 of the amendments to the North Carolina Constitution when voting rights were first granted to “every male person born in the United States, and every male person who has been naturalized, twenty-one years of age” and upward.¹⁵⁸

James Yadkin Joyner and Education

When accepting the offer by the Democrat Party to be their candidate for governor in 1899, Charles B. Aycock—who graduated from the University of North Carolina, practiced law in Goldsboro, served a term as superintendent of the Wayne County Public School System, and was a long-term member of the Board of Trustees of the Goldsboro Public Schools—recounted to the delegates that the foundation of the Fifteenth Amendment demands the “existence of sufficient intelligence, either by ‘inheritance or education,’ as a necessary qualification for voting.”¹⁵⁹

To justify the exclusion of illiterate blacks and the inclusion of illiterate whites in the grandfather clause, Aycock asserted that “the white man has a knowledge by inheritance which the negro has not.”¹⁶⁰ After criticizing the policies and performance of the blacks in general who were elected to public office, Aycock avowed that the “unfitness of the negro to rule and the right of the State to protect itself against his incompetency” justified the ratification of the amendment.¹⁶¹ As Aycock spoke to the people gathered to celebrate his election, he reminded them that “On a hundred platforms, to half the voters of the State, in the late campaign, I pledged the State, its strength, its health, its wealth, to universal education,”¹⁶² which he described as “educating everybody and educating everything.”¹⁶³

While he believed “that no child can attain the true dignity of citizenship without learning at least to read and write” and that alone justified the amendment, Aycock knew that North Carolina was entering “an era of industrial development” where expansion “is dependent upon intelligence—not the intelligence of the few, but all.”¹⁶⁴ After one year in office, Aycock invited forty-two educators in North Carolina from universities, colleges, institutes, private academies, and superintendents from public schools to join him in a campaign described as a “Declaration Against Illiteracy.”¹⁶⁵

The declaration, which was widely circulated, emphasized that voting rights for each male child depended upon attending a common school, that free government must depend on the educated in perpetuating its existence, that the multiplicity of small school districts depending on inadequate local taxes results in inferior schoolhouses, poorly paid teachers, and poorly taught pupils with indifference toward education, that rural school districts should adopt the taxation principles

of city schools, and that “our Educational Governor and the State Superintendent of Public Instruction” must “carry forward the work of local taxation and better schools, to the end that every child within our borders may have the opportunity to fit himself for the duties of citizenship and social service.”¹⁶⁶

By requiring equal funding for each child, the system of universal education proposed by Aycock was consistent with the constitution that stated that “there shall be no discrimination made in favor of or to the prejudice of, either race”;¹⁶⁷ but the plan was opposed by some legislators who supported a constitutional amendment that would require the distribution of local taxes collected for supporting black and white schools to be in proportion to the amount paid by each race.¹⁶⁸ Aycock successfully opposed the amendment after a statement to legislators that his support of the legislation would be a violation of his pledge to the people of North Carolina and, if enacted, he would “resign his office and retire to private life.”¹⁶⁹ Throughout the four-year term as governor and during the rest of his life, Aycock was a prominent speaker within North Carolina and was often invited to speak at meetings of educators in other states.

While addressing a meeting of the Alabama Educational Association in Birmingham on April 4, 1912, Aycock amused the crowd with examples of the meaning of universal education if one included the training of animals and by examples of the societal and cultural benefits to children who are inspired among other educated children. Suddenly, Aycock’s life ended as he spoke before the audience his last words: “When I was Governor I made speeches all over North Carolina. I canvassed the State for four years in behalf of the education of the children of the State, right straight along. Sometimes on Sundays they would ask me down to the churches to talk, and I always talked about education.”¹⁷⁰ On that word, he died. Aycock had gained the support of the citizens, and those they elected in rural communities for their approval of local taxes needed to establish the common schools required for universal education.

With the legislature increasing financial support and with a unified purpose of educating all the children, the establishment of the modern public school system in North Carolina began with the devoted and exceptional guidance from 1902 to 1918 of Superintendent James Yadkin Joyner. He graduated from the University of North Carolina, taught at Winston graded schools in 1884, served as a superintendent of public schools in Lenoir County, practiced law in Greensboro, served as superintendent of graded schools in Wayne County, and was a professor of English at the State Normal and Industrial College in Greensboro before he was selected in 1902 by Governor Aycock to complete the term as the superintendent of Public Instruction vacated by the death of Superintendent Thomas Fentriss Toon.¹⁷¹ Joyner began with a mission to realign the boundaries of the county school districts so that the sum of the per-capita taxes in each district and the number of

school-aged children residing in those districts would adequately support a rural graded-school system.

Although the one-room schoolhouses were in use for years later and his objective to alter the size of most of the rural school districts was as yet unmet, all of the white and black enrollment in 1906 in the city and rural schools in North Carolina was reported as primary students in grades one through seven or secondary instruction in the first through the fourth year in high school even though eight out of ten of the schools were taught by one teacher that year.¹⁷² During the first decade of his seventeen years of service, Superintendent Joyner inspired the rural school districts to construct new schoolhouses "according to approved plans of modern school architecture" at a "pace of building a new schoolhouse for every day in the year."¹⁷³

With his success in the adoption of a graded-school system, in the establishment of rural high schools, and in the new schoolhouses for one-half the districts, Joyner continued to advocate for improvements that included better preparation of the teachers for instruction in the classroom; longer school terms each year; appropriate teachers' salaries to attract the best and keep them; a statewide common examination for teacher certification; a child labor law and a compulsory school attendance law to increase the percentage of school-aged children in the schools; and a reduction in the number of school districts to increase the number of graded elementary and high schools.

During his first year as superintendent and without authority to command, Joyner shared his conviction that education was more than a privilege by declaring that "No child is responsible for coming into the world, nor for his environment when he gets here. Every child has a right to have a chance to develop the power through education to break the iron bonds of the hardest environment by which he finds himself surrounded."¹⁷⁴ Therefore, "It is the civic, moral and religious duty of every State, every community, every individual, to help to give every child this chance, a duty as binding as the duty of self-protection, as the duty of service to God and humanity."¹⁷⁵

Joyner also spoke to the impact of illiteracy and the drop-out rates on the society and economy of the citizens of North Carolina by asserting that "The power of education to create wealth, is read of all men in the history of nations. Call the roll of the nations of the past and present, and almost without exception, the wealth, the material prosperity, the influence of each nation will be found in the direct proportion of its education, its culture, its general intelligence."¹⁷⁶ However, he reminded everyone that "The greatest underdeveloped resources, then, of this State are her underdeveloped intellectual and moral resources."¹⁷⁷

Throughout his thirteen years as superintendent, the legislature responded to many of Joyner's recommendations to address the deficiencies in the system of public education in North Carolina, including the establishment of compulsory

education in 1905, of rural public high schools in 1907, and of summer Normal schools and Teacher Institutes in 1915. However, four of the laws enacted by the legislature just before and after his retirement in 1918 provided the foundation to unify and sustain the efforts to improve public education in North Carolina for decades. In 1917, a state board was established to organize and conduct a statewide common examination for teacher certification every year and for conducting two-week summer Teacher Institutes every other year.¹⁷⁸

In addition, an amendment to the constitution to extend the school term to six months was passed by the legislature and approved by the voters.¹⁷⁹ However, the one major impediment for improvement was not addressed until the year after his retirement. In 1919, the legislature decided that the “apportionment of the state public school fund shall be administered so as to encourage consolidation of districts and the elimination of small schools or small districts” with requirements of a specific number of students in daily attendance to progress from one-teacher schools upward to the number of teachers needed for a high school.¹⁸⁰ Another important law that encouraged unification of efforts was the requirement by the legislature that county boards increase the salaries of the elementary teachers with certificates by at least twenty-five percent and all other certified teachers by at least ten percent for the year of 1919–1920.¹⁸¹

Even with these actions and the authority of the superintendent to assure compliance, the remarkable progress was well short of the improvements needed in the system to provide equal opportunities for students to be taught by certified teachers and prepared to attend high schools. In 1920, about one-half of the teachers did not meet certification requirements,¹⁸² nearly one-half of the schoolhouses were one-teacher schools,¹⁸³ and the average teacher’s pay was about one-half the national average.¹⁸⁴

During the first century of the existence of the United States, the development of the affordable system of one-teacher schools was successful in providing to a sparse population without convenient transportation a course of literacy education for American citizens and for immigrants, before the Industrial Revolution created the machines that required technical schooling and before the scientific discoveries that provided opportunities to pursue prosperity by applying the mind as well as applying manual labor. However, these realities of progress demanded more education than the common school system could provide for the purpose of pursuing a career as a mechanic, engineer, or other knowledge-based, rather than skill-based, occupations. But for decades into the twentieth century, college-educated teachers, attendance at public high schools, and vocational training and education were not available to the majority of Americans.

Even as graded schools were replacing common schools, the transitions to elementary and high school systems were uneven and depended on where the child

lived. Many opportunities to pursue prosperity from the advantages of secondary education or attending college were decided by whether you lived in a city or you could afford the tuition at a private school. Therefore, Joyner's claim that education is a right for every citizen so that they can realize their potential was accepted in principle but unfair in practice. In 1930 there were nearly one hundred fifty thousand one-teacher public schools, fifty thousand by 1950, twenty thousand by 1960, and one thousand by 1980 throughout all the states.¹⁸⁵

Correspondingly, in North Carolina, there were nearly six thousand one-teacher schools in 1890; but by 1930 the number had decreased to just twenty-one hundred with about one thousand of them for white students and with further reduction to a total of three hundred sixty-three with two hundred eighty-four for black children by 1950.¹⁸⁶ Subsequently, the one-teacher in a one-room common schoolhouse system was gradually replaced in North Carolina and throughout the United States by a more efficient and effective graded-school systems that often began with just one teacher in the same schoolroom.

Teacher Training

Training for Common School Teachers

During the nineteenth century, most of the public education systems in the United States began by establishing common schools where teachers, most often hired without experience or training to teach, supervised rote learning to read, to write, and to count; but many of those teachers had not mastered the subjects they taught beyond what they had learned in the common school they attended. The training for the practice of teaching began in Germany in the eighteenth century and migrated to France where the name of Normal school was adopted with the intention that the school be either "the model or rule by which other schools should be organized and instructed, or because their object was to teach the rules and methods of instructing and governing a school."¹⁸⁷

Although the organization and management of schools, classrooms, and curricula to improve education were continually debated with few conclusions among those in control of the schools until the twentieth century, the discussions began in the United States in 1816 when Denison Olmsted—who graduated from Yale and then taught at Union School at New London—returned to Yale as a tutor to continue his education and then delivered a masters oration entitled "The State of Education in Connecticut." His observations during the two years at Union School where he taught both university preparatory subjects and common school courses to the enrolled students led him to conclude that the rudiments of reading, writing,

arithmetic, and spelling were mastered more thoroughly by subsequent inquiry into advanced studies such as “literature... natural sciences, and... mathematics” than by continuous review of the primary subjects.¹⁸⁸

However, to provide subjects beyond the rudiments, qualified teachers must be hired, and ignorant and incompetent schoolmasters replaced. Olmsted proposed the establishment of a “seminary for schoolmasters” with the expectation that better-educated masters would hire more qualified teachers.¹⁸⁹ After Olmsted left Connecticut in 1817 to accept a position at the University of North Carolina and before he returned eight years later to accept a position at Yale, Samuel R. Hall had opened a seminary (a school or curriculum with a defined purpose) to train teachers, which was incorporated by the State of Vermont in 1823 and operated by him for seven years. With experience as his guide, Hall published the first textbook on the management of a classroom in 1829 that he titled *Lectures on School-Keeping*.

After closing his seminary, Hall was hired to be in charge of the seminary at Phillips Academy, where he became the first principal, and later lectured at other schools about the “Necessity of Educating Teachers.”¹⁹⁰ During the years of teaching in the classroom, Hall recognized “that many who are employed to teach our primary schools, are deficient in almost every necessary qualification.”¹⁹¹ To improve the performance of teachers, Hall suggested “that institutions should be established for educating teachers, where they should be taught not only the necessary branches of literature, but, be made acquainted with the science of *teaching* and the mode of *governing* a school with success.”¹⁹²

While Hall was lecturing about “School-Keeping” in 1825, Thomas H. Gallaudet was writing and submitting essays to newspapers on the merits of considering teaching as a profession. The Reverend Gallaudet had attended Hartford Grammar School before entering Yale as a sophomore in 1802 at the age of fifteen. Upon his graduation, he briefly studied law, before returning to Yale in 1808 as a tutor devoted to “English literature and the practice of English composition.”¹⁹³ Three years later Gallaudet entered Andover to study theology and was licensed to preach in 1814 when he was twenty-seven years old. During the period when Gallaudet was a student at Andover and while at his parent’s residence, he was somewhat successful in communicating with a deaf girl using a language of signs. Encouraged with the relationship but without the knowledge to continue, Gallaudet visited London and Paris where he attended lectures and daily classes about methods for teaching deaf students.

In 1817, with Gallaudet as principal and a colleague from Paris as the teacher, the “Connecticut Asylum for the education of deaf and dumb persons” was opened in Hartford. In 1919 it was changed to the American Asylum.¹⁹⁴ With considerable admiration for this noble accomplishment, in 1825 the readers of the *Connecticut Observer* were attracted to an article in the paper with a heading “On Seminaries for

Teachers.”¹⁹⁵ The primary message was delivered by the questions: “Why not make this department of human exertion, *a profession*, as well as those of divinity, law, and medicine? Why not have an *Institution for the training up of Instructors* for their sphere of labor, as well as institutions to prepare young men for the duties of the divine, the lawyer, or the physician?”¹⁹⁶

He argued that the “learned professions” and “the ordinary occupations in life” require learning by studies, experience, or apprenticeship before practicing the profession; therefore the preparatory steps of theory and practice should be required of teachers.¹⁹⁷ These efforts by Hall, Gallaudet, and others to improve education by training teachers for the classroom were essentially ignored for more than two decades in Connecticut until the first public Normal school in the state was opened in 1850 in New Britain.

The first government appropriation of funds for teacher training occurred in 1827 in New York after Governor DeWitt Clinton told the legislature that of the eight thousand teachers employed by the state, “too many are destitute of the requisite qualifications, and perhaps no considerable number are able to reach beyond rudimental instruction.”¹⁹⁸ Legislation was enacted to provide continuing funds for the common schools and to “promote the education of teachers,” but the promotion of teacher education did not occur until 1834 when state funds were provided to the “trustees of academies” with the requirement that the money shall be “expended in educating teachers of common schools.” By 1838, sixteen academies were receiving funding for educating teachers “in such manner and under such regulations as said Regents shall prescribe.”¹⁹⁹

About the same time, there was considerable support in Massachusetts from prominent citizens to establish Normal schools; but the legislature was reluctant to provide funding until a Boston citizen authorized Horace Mann, secretary of the Massachusetts State Board of Education, to inform the legislators that he would provide ten thousand dollars if matched by the State of Massachusetts for qualifying teachers for the common schools. In 1839, the first state Normal school was opened in Lexington.²⁰⁰ The legislation that established “State Normal schools” also included the requirement of a mandatory “course of study” for at least one year of consecutive terms with the mastery of the common school subjects of “orthography, reading, writing, English grammar, geography, and arithmetic.”²⁰¹

For those who desired to attend for more than one year, advanced studies related to common school subjects were available with additional courses that included hygiene, music, natural philosophy, astronomy, and “The science and Art of teaching.”²⁰² In 1844, the New York Legislature followed the lead of Massachusetts by establishing a public Normal school “for the instruction and practice of teachers of Common Schools in the science of education and in the art of teaching” under

the supervision of the superintendent of common schools and the regents of the university.²⁰³

With as few as twenty-eight public Normal schools, with half of them in Massachusetts, New York, Pennsylvania, and Ohio,²⁰⁴ with female enrollment in five New England states more than three times that of the males,²⁰⁵ and without a Normal school in the states soon to secede from the Union; the first annual meeting of the American Normal School Association began in Trenton, New Jersey in 1859 with the president of the association addressing the members by stating “that the great majority of the teachers in the common schools are utterly unfit for their high and responsible duties.”²⁰⁶

In fact, he was claiming that the growing criticism of common school teachers over the past twenty years was because the graduates from the Teachers’ Seminaries at “ordinary literary institutions of our country” have no normal training²⁰⁷ and are “not professional enough to commend themselves to the common sense of our people.” Others were concerned about any “tendency to convert [common schools] into academies or high schools” because the cost of hiring the graduates to teach in Common schools could exceed “the income provided for their support.”²⁰⁸

The president of the association was followed by Professor Alpheus Crosby of the Salem Normal School in Massachusetts whose presentation proposed answers to questions about the purpose, the curricula, and the graduates of a Normal school. Crosby emphasized that institutions of learning were in one of two classes, with the first being “general,” and including the “common school, high school, academy, and college,” and the second class of professional schools including “theological, law, and medical schools, military and naval institutions, and schools of agriculture, commerce, mechanics, mining, the fine arts, etc.”²⁰⁹

The professor considered the Normal schools to be professional because the student must successfully meet the requirements of “special preparation to meet the demands of a particular profession, that of the Teacher.”²¹⁰ Therefore, Crosby was emphatic that a Normal education should not depend only on the knowledge of the subject to be taught but should absolutely depend on the science of teaching. Although most of the representatives of the schools agreed upon the subjects that should be required, they were divided on the necessary time to complete a professional curriculum, which varied and estimated from one to three years.

Although Braxton Craven organized the Normal College for whites in 1850 (a precursor of Duke University), Saint Augustine opened a Normal school for blacks in 1860, and the Baltimore Association of Friends provided Normal instruction during the Reconstruction for the teachers in the forty-four schools that they sponsored in nine of the mid to northeastern counties of North Carolina,²¹¹ it was eight years after the Reconstruction ended and two years after ratification of the Constitution of 1875 before the North Carolina Legislature authorized and subsequently

funded public Normal schools that offered instruction for black students in Fayetteville and for the white students at the University of North Carolina.

About an equal number of males and females, which totaled three hundred thirty-eight, enrolled in the Normal school at the University of North Carolina at Chapel Hill. President Kemp Battle organized the curriculum that included instruction, lectures and class exercises in arithmetic, grammar, geography, reading, history, spelling, phonics, Latin, algebra, physics, vocal music, philology, physiology, and a model Normal class for a period of less than thirty days and some nights during the summer months when those students enrolled in the university were away from campus. About one-half of the enrollment included teachers who had taught more than ten thousand children in common schools during the previous year.²¹²

In contrast, the Normal school at Fayetteville, which shared space with the Howard School that had opened in 1867 and was named for General Howard of the Reconstruction period, began with Principal Robert Harris—who was born in North Carolina and educated at Oberlin College—expressing his concern that “political trickery” by the “enemies of the school... poisoning the minds of colored people... by asserting that it is a ‘Democratic school’” and established “for the purpose of educating colored democrats” has “prevented or discouraged many from coming to school.”²¹³ However, the school attracted attention as the first in North Carolina with Normal instruction for black teachers, with the first three-year curriculum devoted to common school subjects for years rather than weeks at the university, with months of practice teaching and classroom management rather than days, and with the first preparatory department that included a three-year curriculum of common school subjects for those who would benefit before entering the advanced level of instruction.

Although Principal Harris may have been proud of the fact that fourteen students out of the total enrollment of ninety-three in the three-year curriculum completed the senior year classes and were named first-grade teachers in 1879, he knew that the unmet demand for good teachers in common schools for the black children could not be satisfied with the few students of the highest scholarship.²¹⁴

While Principal Harris may have been concerned about the continuing effort by the legislature to define good teaching by an examination, he submitted to the superintendent of Public Instruction of North Carolina his strong conviction that “Skill in teaching, with average scholarship, is more desirable for the common schools than the highest scholarship without aptness to impart knowledge or a practical knowledge of methods. Every good scholar is not a good teacher, and even ‘born’ teachers are improved by training.”²¹⁵

For decades, an applicant had simply met with a committee tasked with the decision of awarding a teacher’s certificate. In 1872, an act was passed requiring a

"County Examiner" to make the decision. In 1877, the county examiner was required to rank the preparedness and to certify those "qualified to teach classes in the higher branches of English" as grade-one teachers, those "qualified to teach only in the ordinary branches of English" as grade two teachers, and those "qualified to teach primary classes, only" as grade-three teachers.²¹⁶ Subsequently, the law was changed so that qualifications for certifications were determined from an examination graded on the mastery of common school subjects. Those who scored a general average on all subjects of ninety percent or more received a grade-one certificate; those who scored a general average of eighty percent or more received a grade-two certificate; and those who scored a general average of seventy percent or more received a grade-three certificate. A grade-three certificate could also be issued if the applicant was "proficient in spelling, reading, writing, and the four fundamentals of arithmetic."²¹⁷

In 1885, the legislature provided a total of eight thousand dollars to be equally divided among black and white schools for the purpose of conducting Normal teacher training during the summer. There were eight schools established for white teachers at a cost of five hundred dollars each, located from Franklin to Elizabeth City. With the multiyear Fayetteville Colored Normal School receiving two thousand dollars, there was enough funding to support four schools for the black teachers to attend Normal summer school that were located from Salisbury to Plymouth.²¹⁸ More than twenty-five hundred students attended these twelve summer Normal schools while an additional twenty-one hundred certified teachers attended Summer Institutes in more than twenty-five counties that were organized by the county superintendents under the authority of the legislature.²¹⁹ Since certification was required to teach and lasted for just one year, the examinations given under the authority of the counties were high priorities at these summer programs. On average, each of the ninety-seven county superintendents had to certify and hire sixty teachers every year with most of them assigned to a one-teacher schoolhouse in which thirty-two students were in attendance for twelve weeks.²²⁰

For some candidates the inconvenience and the cost of attending the summer programs in addition to the year-by-year certification may have deterred their interests; but, with a school term lasting less than three months and a monthly wage of less than twenty-five dollars, any commitment to teaching in common schools as a life-time profession was certainly challenged by the paucity of the income unless other sources were available.²²¹ For comparison, annual earnings by labor in the manufacturing of tobacco products were about two hundred dollars while, on the average, skilled blacksmiths earned about three hundred.²²² According to the 1890 Census, the average annual earnings in North Carolina for all manufacturing occupations were two hundred sixteen dollars, which put it in last place in the nation;

the average annual earnings among the all the states and territories were more than double that of North Carolina.²²³

In a review of "Training of Teachers" in 1887, the Education commissioner reported that "It is evident that the American educational world has been agitated during the year by the question of providing for the improvement of the country school, manual training for the city school, better supervision, better curriculums, and better teachers; the last, above all, since it is only through the teacher that all directly is done."²²⁴ The commissioner suggested that the "condition of country schools" may be due to "political economy" resulting in the "pittance paid to the country school teacher." Regarding the challenge to manage and to train teachers for two systems of rural schools, he cited the fact that "More than one-half of the schools of Pennsylvania are yet ungraded country schools."²²⁵

In addition, the Education superintendent in the State of New York shared another concern that "From cities and towns not having normal schools or classes the cry is persistent for one; the State normal schools are not meeting the demand. And yet; It is idle to think that the time and money involved in pursuing a normal school course will be given to obtain the miserly salary of a country school, with the probability of losing that before a year."²²⁶ By 1887, there were only one hundred seventy-four public and private Normal schools in the United States, mostly public and with fewer than five thousand graduates a year.²²⁷ Expressing a conclusive circumstance for the teaching profession, the president of a Normal school stated that "After fifty years of growth it would appear that the normal school has not taken the rank in this country that its assumed importance would lead us to expect. Either there is, or there is not, a necessity for such schools."²²⁸

For example, in Vermont, eighty percent of the teachers entered the profession from colleges, academies, high schools, and common schools with less than twenty percent attending a Normal school.²²⁹ Consequently, the Teachers Institutes, which were conducted for just a few weeks each year and which were short in opportunities for manual or classroom experience, served as the primary source of professional training for the new teachers as well as for improvements for established teachers. However, the circumstances changed rapidly within a decade as more than eighty thousand students enrolled in more than one thousand institutions that offered professional training for teachers, which resulted in nearly doubling the number of graduates to ten thousand by 1904.²³⁰

The majority of these institutions offering Normal programs were public and private high schools, but only about fifteen percent of the total enrollment attended them. In addition, the two hundred-plus public and private colleges and universities enrolled less than twelve percent. Instead, about three-fourths of the students enrolled in professional teacher training programs attended one of the two hundred

sixty-nine private and public Normal schools, which indicated a preference, if not a necessity, with changes in certification requirements.²³¹

Five years after the university conducted its last summer-long Normal school, the North Carolina Legislature decided in 1889 to abolish the other eight summer Normal schools for whites that were scattered across the state and to reallocate the four thousand dollars to the state board of education for the purpose of holding one-weeklong “county institutes” when certificate examinations for teachers could be also conducted.²³²

At a salary of two thousand dollars per year for each one, the board hired Edwin A. Alderman and Charles D. McIver—who were graduates of the University of North Carolina and experienced educators—to conduct, during the months of July and August, Teacher Institutes in all the counties of the state. Expecting an institute to last a week in each county and realizing the need for additional institute organizers, the board of education sought and obtained additional funding from Dr. J. L. M. Curry, agent of the Peabody Fund, to hire three additional persons.²³³ Although not supervising the institutes, the state superintendent of Public Instruction expected the teachers who were required to attend the weeklong institute to learn at least “how to classify or grade their pupils,” “how to make out a regular daily programme, so that everything shall proceed from day to day uniformly and without loss of time,” and “how to govern their pupils by inspiring them with a thorough interest in their studies.”²³⁴

However, another purpose was the “desire to carry to the people... definite knowledge of the educational work resting upon the public schools; their condition; their necessities; the means feasible and available for their betterment and the fundamental reasons for their existence and for the widening of the area of their influence.”²³⁵ However, two years later, the funding for the institutes was discontinued and transferred to “The Normal and Industrial School” for young women that was established in Greensboro, North Carolina in 1891.²³⁶

Normal and Industrial Schools

Charles D. McIver—who was born in Moore County in the year prior to the onset of the Civil War; taught from 1881 to 1889 in public and private schools in Durham, in public schools in Winston, and in the Peace Institute; and was chairman of the North Carolina Teachers’ Assembly Committee on Education from 1889 to 1892—was elected to become the first president of the State Normal and Industrial College.²³⁷ Funds provided by Greensboro and the Peabody Fund convinced the legislature to provide the funding to build and operate the institute.²³⁸ A statement to the Trustees of the Peabody Fund in 1894 is indicative of the influence that Curry had in the development of practical education in the southern states.

Having been largely instrumental in the establishment of the State Normal and Industrial School at Greensboro', the Trustees must feel the liveliest satisfaction at its great success under its present prudent and able management. As the name indicates, the School combines industrial and normal training, but the latter is the predominating feature, and its aim is to fit women for the profession of teaching, to convert scholars into teachers. To give actual practice in methods, a school of practice and observation has been begun in which the seniors are required to do three hours of work a week, besides attending for observation.²³⁹

The training of teachers at the Normal and Industrial Institute was divided into Normal course, Domestic Science, and Business Departments. Algebra, English, history, civics, foreign language, chemistry, physical geography, botany, drawing, music, and physical culture were required in a curriculum for all students during the freshman and sophomore years. Regardless of their choice of a departmental specialization, during the junior and senior years every student enrolled in psychology and history of education, elocution, and "pedagogics (with practice)."²⁴⁰ For students enrolled in the Commerce Department, courses in stenography, telegraphy, typewriting, and bookkeeping were required to prepare them for teaching these practical subjects. For students enrolled in the Domestic Science Department, subjects in sewing, cooking, household economics, and dressmaking were taught in theory and learned by practice.²⁴¹

Students in the Normal Department enrolled in geometry, plane and spherical trigonometry, and architectural drawing and designing. In addition, there were other advanced courses in English, history, and foreign languages required of all students and in total about twenty-five hours of recitation per week for four years.²⁴² Consequently, the institute could claim to be comparable to "nine-tenths of the normal colleges of this country, and devote itself to establishing a high standard of scholarship and professional life among the teachers of the State."²⁴³

However, with the abolishment of summer Normal schools for whites in 1889, with the abolishment of the state-funded Teacher Institutes in 1891, and with the abolishment of the county school superintendents and school boards of education in 1895;²⁴⁴ the state superintendent of Public Instruction reported that "the school interest has languished, the teachers have failed to make progress, the school districts, left to themselves, have multiplied neighborhood disputes, communities have been hopelessly divided, and confusion reigns in many places for the want of a wise executive officer to settle matters and to urge forward educational sentiment and work, and to put teachers on lines of study and improvement for their responsible work."²⁴⁵

Five years after the first class entered the institute, more than twelve hundred women had enrolled and only seventy-five graduated; but, President McIver stated that “of course many students do not remain at the institution for the four-year course, and a large number of former students who did not graduate are teaching in the public and private schools of the State.”²⁴⁶

The second multiterm public Normal program for whites was established as a department in the Cullowhee High School in Jackson County in the fall of 1893. The two-term curriculum was devoted to subjects such as arithmetic, geography, English, elementary algebra, elementary physics, school management, and the theory and practice of teaching, which were contained in the written examination for teacher certification. The Normal Department opened under the direction of a graduate of the University of North Carolina; but, with his resignation, a graduate of the Peabody Normal College of Nashville, Tennessee assumed the position of teacher in charge of the Normal school.²⁴⁷

After the fall term of the second year, the principal of the Cullowhee High School addressed the Board of Managers of the Normal Department to express his views about the significance of Normal teacher training and to provide a brief statement about enrollment:

One of the strongest arguments for the existence of such an institution as our Normal Department lies in the deplorable lack of qualification in most of our country teachers, and in the consequent imperfect and superficial work done by the average country free school. Nearly all of the young people who come to us are the products of the free schools, and nearly all of them are deficient in the rudiments of the common school branches. Poor teaching, short terms of schools, irregular attendance, are responsible. The only remedy is the establishment and proper maintenance of Normal Schools; for through the cultured and enthusiastic teacher must ultimately come our needed educational reforms.²⁴⁸

To date the department had enrolled twenty-eight students, but they planned to expand the “area of patronage” to other counties near them in the mountains. In the first class in May, twelve students earned a three-year teacher’s certificate.²⁴⁹

Training Schools for Teachers

During the first decade of the twentieth century, to teach the increasing number of students in attendance in the city and the county graded schools, as well as in the one-room schoolhouses in North Carolina, required more qualified teachers. To train these teachers, Summer Institutes were restored, and two additional Normal schools for whites were established. The Appalachian Training School opened

in Boone in the fall of 1903 with the curricula divided into three terms. A public school was incorporated into the Training School that provided the opportunity for classroom experience for the Normal students. After committing to teach in North Carolina for two years, the tuition was waived. More than three hundred students attended one or more terms the first year with about one-half of them already teaching in a public school.²⁵⁰

Four years later, a Normal school was chartered as East Carolina Teachers' Training School in Greenville, with one hundred seventy-two students enrolled into the two-year program in 1909.²⁵¹ The total enrollment in the four Normal schools for whites was more than thirteen hundred students with nearly half of them attending the State Normal and Industrial College in Greensboro.²⁵²

However, with the total number of white teachers employed in the public schools of North Carolina exceeding eight thousand, with three in ten having Normal training, and with one in five having graduated from a college, about one-half of the teachers prepared for the classroom by attending the Summer Teacher Institutes or developed into teachers as they taught.²⁵³ To improve the quality of classroom instruction, a supervisor of teacher training was appointed and immediately developed a plan of study for the teachers who attended the institutes. Most of the lessons were examples for teaching the subjects of "phonetics, reading, language, number, home geography, agriculture, history, writing, and drawing" in elementary classrooms.²⁵⁴

The lesson plans for these subjects were developed as models to be used by those teachers in attendance. In addition, each day the institute program included the organization of the lessons, management of the classroom, and interaction with the students. When the legislature enacted a school law that required teachers to attend the two-week institutes, more than sixty-five hundred teachers from sixty-six counties enrolled in 1909. About one-half of those in attendance had taught in a one-room schoolhouse in a county district for less than four years.²⁵⁵

The legislature enacted a school law in 1917 that established a common statewide examination for teacher certification and required that all teachers be certified at the "standard grade"; when the results of the first examination were evaluated, more than half of the nearly sixteen thousand teachers employed in the state scored a rating of "below standard grade," which meant that they should not be hired as a teacher.²⁵⁶ Instead of two-week institutes, summer schools that lasted six-to-twelve weeks were offered, and in an attempt to certify more, teachers were required to attend these state-sponsored summer schools that were held at Normal and high schools and institutions of higher education. Facing a substantial challenge, the summer school focused primarily on the more than eight thousand public school teachers who were rated "below standard grade," who attended Normal and high schools in state and some out of state.²⁵⁷

The teachers with a standard certificate attended a college or university. Even though the total number of teachers employed in the public schools increased by nearly twenty-five percent in two years, with the required attendance to summer school, the actual number of “below standard grade” teachers decreased by almost forty percent.²⁵⁸ While the school system of North Carolina was experiencing progress in teachers achieving standard grade certificates, the National Education Association was meeting in Salt Lake City in 1921 to discuss “A National Program for Education.” In a report to the association, George Strayer from the Teachers’ College at Columbia University included the declaration that: “It is the crying shame that boys and girls of America today must go to school to teachers who are, as a group, less educated and less well trained professionally than are the teachers of any other civilized country in the whole world.”²⁵⁹ The program he introduced included increasing salaries, establishing a Department of Education, requiring school attendance, and providing federal aid as necessary actions to improve the profession of teachers.²⁶⁰

During the early decades of the twentieth century, the education of a teacher was changing in content and structure. The Normal schools were established primarily to provide training to improve instruction and classroom management in one-teacher schools where a person who had mastered at least the primary subjects of the common school taught about thirty students of all ages. As elementary and high schools replaced the rural common schools, as Normal schools were converting to teachers’ colleges, and as academic standards required of teachers increased, educating the teachers for the classroom involved preparing them for subjects in the grades in elementary or high school or vocational education.

Development of Teachers Colleges

By 1920, the one-teacher schools were rapidly decreasing in enrollment, and the high schools were increasing, which led the editor of the *Journal of Education* to characterize the transition with the question: “What Has Strangled The Normal Schools?” After describing Normal schools as preparers of either “genuine teachers,” professional idealists, or academics, he attributed the decreased enrollment in the Normal schools to the “progress of standardizing the preparation of teachers,”²⁶¹ which had resulted in the establishment of admission standards equal to entry into a college and was followed by the requirement of a college degree to teach in high school that restricted normal graduates to teaching in primary grades.²⁶²

The editor suggested that “The only relief is to take off that strangling grip and make all normal schools real colleges, with the privilege of giving real degrees which shall have full credit in any public school market.”²⁶³ In 1922, the Committee on Teachers Colleges of the National Council of the National Education Association

presented a report to the association at a meeting in Chicago in which they had concluded that the “rapidly growing movement to convert two-year normal schools into four-year teachers’ colleges” was “sound in policy,” and, while “still in the experimental stage,” the movement “should receive encouragement from all friends of public education.” In support of the movement, the committee stated that “The normal schools began as secondary schools with a professional purpose. As public education progressed they advanced to the rank of junior colleges and with the further progress of public education it is perfectly natural that they should develop into professional colleges.” Furthermore, “it is a necessity if we are to have a body of trained teachers with a professional attitude toward their work” who will “find the work offered by the teachers’ colleges during the summer session their greatest single opportunity for academic and professional advancement.”²⁶⁴

While the national education organizations were discussing the development of the teaching profession, the faculty and founding President Robert H. Wright—who was born in Sampson County, attended public and private schools and an institute before teaching at schools in South Carolina and North Carolina and graduating with a BS degree from the University of North Carolina in 1897 and was subsequently awarded a MA from Johns Hopkins in 1902, served as head of the Department of History at Baltimore City College, and as principal of a high school from 1906 to 1909²⁶⁵—were already committed in 1920 “To meet the demands of the State for better trained teachers, and to meet all the requirements of the State Board for the certification of teachers,” by East Carolina Teachers College “now offering in addition to the Two-Year Normal Course a Four-Year Course leading to the bachelor of art degree.”²⁶⁶

In addition, the legislature placed all the Normal and training schools for teachers under the control of the state board of education to prescribe “rules and regulations for the conduct, management, and enlargement” of these institutions with their progression from Normal and training schools to two-year and then four-year teachers colleges somewhat like the development of East Carolina Teachers College for whites.²⁶⁷ Due to the growth in the enrollment in elementary schools and in the number of new high schools, the state superintendent of Public Instruction predicted in his report of 1924 that if the nonstandard certified teachers were to be eliminated from the classrooms in the elementary schools and replaced by teachers with a “minimum of two years training above high school”²⁶⁸ by graduating from the Normal schools, there would be a shortage of more than one thousand teachers.²⁶⁹ The superintendent recommended that “five additional normal schools with a capacity of 400 each” be constructed near the larger cities.²⁷⁰

However, in 1920 there were more than four hundred Normal schools and teachers’ colleges in the United States with more than one hundred eighty thousand students enrolled in Normal courses to become teachers. About thirty percent of the

enrollment was in the forty-five teachers' colleges with a four-year curriculum.²⁷¹ Instead of five additional two-year Normal schools and following the national trend, educating the teacher in North Carolina progressed from existing training schools and Normal colleges to four-year teachers' colleges with the State Normal and Industrial College in 1897 (North Carolina College for Women in 1919), with East Carolina Teachers' College in 1920, with the Winston-Salem Teachers College in 1925, with Cullowhee and Appalachian chartered in 1929, and Elizabeth City, Fayetteville, and Pembroke awarding four-year degrees by 1940.

By 1930, the number of four-year teachers' colleges in the United States had increased to one hundred forty where nearly eighty percent of all the future teachers were enrolled and majoring in Normal courses²⁷² with North Carolina reporting six teachers' colleges and an enrollment of nearly five thousand female and more than two hundred male students.²⁷³ The number of teachers who graduated from a four-year college was increasing, and so was their salary, with the average almost doubling from 1910 to 1920. Still, in 1920 the salary of a teacher was not much different than the average wages of an unskilled laborer. The average annual salary of the teachers in the United States in 1920 was eight hundred seventy-one dollars for one hundred sixty-one days in the classroom, or about eight months, which for comparison with other occupations was a salary of one hundred nine dollars a month.²⁷⁴

The hired farm laborer in North Carolina earned fifty-three dollars a month without board,²⁷⁵ while manufacturing wages for skilled or semi-skilled men in 1920 were about one hundred thirty-three dollars a month.²⁷⁶

Therefore, the income of a teacher would have supported a family with a livelihood between that of a seasonal farm laborer and a factory worker who was employed twelve months. With the increased average salary in 1930 and a decline in the average wages of factory workers,²⁷⁷ the teachers earned about one-third more in eight months than the factory workers earned in twelve months. With the average teachers' salaries in each of the states ranging from a fraction over six hundred dollars in Mississippi to nearly twenty-five hundred dollars in New York, the relatively low average salary in North Carolina of nearly nine hundred dollars was well below the national average of slightly over fourteen hundred dollars.²⁷⁸

With the growing number of high schools and the requirement of a four-year college degree to obtain a certificate to teach in them and with the elimination of one-teacher schools occurring during the same decades, the rates of progress in each state in abandoning the common school system of the nineteenth century and establishing the graded-school system through high school of the twentieth century depended upon the building of classrooms, the availability of teachers, and the salaries necessary to hire them to fill the classrooms. In doing so, the focus on teacher training in the Normal schools and preparing them for a common school was merging into the curriculum of the four-year teachers' colleges where they were

studying the subjects in more detail and preparing to teach in elementary or secondary grades. In 1920, fifty-four percent of the rural elementary schools in North Carolina were taught by one teacher,²⁷⁹ and less than one percent of the sixteen thousand eight-hundred fifty-four teachers taught in high schools.²⁸⁰

Among those teaching in high school, about thirteen percent graduated from four-year colleges, about one-fourth attended a college for one-to-three years, and the majority attended two-to-four years of high school.²⁸¹ By 1930, about forty percent of the elementary schools were still one-teacher schoolhouses, and only about four percent of the twenty-three thousand teachers were in the nearly nine hundred high school classrooms.²⁸² However, the number of teachers who graduated from a four-year college more than doubled while the number of those only graduating from high school decreased by more than two-thirds in the previous decade.²⁸³

By mid-century, with nearly a thousand high schools,²⁸⁴ with fewer than four hundred one-teacher schools,²⁸⁵ with one hundred seventy-eight days' school term,²⁸⁶ with current expenditure of one hundred seventy-seven dollars per pupil, which was ninety percent of the national average of one hundred ninety-seven dollars,²⁸⁷ and with eighty percent of all teachers graduates of a four-year college,²⁸⁸ the average salary for all the public school teachers in North Carolina for the school year of 1949–1950 was two thousand five hundred ninety-five dollars,²⁸⁹ with the national average at three thousand thirteen dollars, and North Carolina ranked twenty-eighth at fourteen percent from the average.²⁹⁰ Among the states, only Arizona, California, Connecticut, New York, and Maryland reported average salaries for teachers that were greater than the annual median of total money income of three thousand five hundred dollars for families in the United States in 1950.²⁹¹

Public High Schools

When the University of North Carolina opened on January 15, 1795, during a severe winter, nearly a month passed before the first student arrived.²⁹² As described by Kemp Battle in *History of the University of North Carolina*, another forty-one students enrolled during the first term and more in the second term, which resulted in nearly one hundred young men admitted in the first class; however, due to the “dearth of good schools in the State... at least one-half of them were unprepared to enter the University classes.”²⁹³ Consequently, professors were assigned the “difficult and unpleasant task of classifying and instructing the unorganized mass of all ages from mature young men to mere boys, some with a smattering of algebra and the classics, others innocent even of arithmetic and grammar”²⁹⁴ until a Preparatory Department was organized in 1796.²⁹⁵

As few as thirty academies had opened in North Carolina during the eighteenth century, with their longevities unpredictable;²⁹⁶ however, with the increasing number of universities in the nineteenth century, even before the Civil War, the number of private academies grew rapidly with many of the university graduates teaching the preparatory courses to those students who enrolled in the university. With the closing of the Preparatory Department in 1819, the University of North Carolina made arrangements with one of the academies, located nearby in Hillsboro, to serve as its preparatory institution.²⁹⁷

The academies were chartered by the states, were private schools, and were the “undisputed leader of secondary education” for more than a century.²⁹⁸ With influence from Benjamin Franklin—who had attended the public Latin School in Boston—incorporating and founding of the first private academy in America occurred in Philadelphia in 1753.²⁹⁹ Over the next century, the number of private academies increased to more than six thousand with nearly three hundred in North Carolina, which ranked sixth behind New York, Pennsylvania, Massachusetts, Kentucky, and Virginia.³⁰⁰ There were two hundred sixty-three thousand ninety-six pupils enrolled in these schools of secondary education, but this number of students represented less than five percent of the school-aged white children.³⁰¹

Over the two centuries from the establishment of the first public school in Boston in 1635 and after the first private academy that was founded in Philadelphia, the curricula at all these secondary “Latin Schools” were organized to provide a classical education. While the requirements in the number of years of attendance and in the breadth of content to graduate may have varied, attending a school with Latin instruction was considered by many young boys as preparation for passing the entrance examination prior to enrolling in a college. After parsing, reading, and translating Latin in the academies, these young boys were connected to ancient literature, history, and poetry as the accepted foundation of knowledge for the educated man. However, while continuing to support the public Latin School of classical studies, the school committee of Boston agreed to establish a public English High School that opened in 1821. The committee justified this new level of public education by stating that: “The studies that are pursued at the English grammar schools are merely elementary and more time than is necessary is devoted to their acquisition... seven years are expended in the acquisition of a degree of knowledge, which with ordinary diligence and a common capacity, may be easily and perfectly acquired in five.”³⁰²

In addition, “the branches of knowledge that are taught at our English grammar schools, are not sufficiently extensive nor otherwise calculated to bring the powers of the mind into operation nor to qualify a youth to fill usefully and respectably many of those stations, both public and private, in which he may be placed.”³⁰³ Consequently, the “parent who wishes to give a child an education that shall fit him for

active life, and shall serve as a foundation for eminence in his profession, whether Mercantile or Mechanical, is under the necessity of giving him a different education from any which our public schools can now furnish.”³⁰⁴ When opened, the first public English high school in America admitted boys “not less than twelve years” of age, who were “well acquainted with reading, writing, English grammar in all its branches, and arithmetic as far as simple proportion” and attended “three classes” with “one year... assigned to the studies of each class.”³⁰⁵ The classes included: composition; literature; reading; geography; arithmetic; algebra; ancient, modern, and United States history; logic; geometry; plane trigonometry; natural, moral, and political philosophy; navigation; surveying; mensuration of superficies and solids; declamation; and exercises in criticism and forensic discussions.³⁰⁶

Before the Civil War, thirty-three public secondary schools had been established among fifteen states with one high school in eleven different towns in Massachusetts, in four cities in each of Pennsylvania and Ohio, in three cities in New York, and in one city each in Maine, Maryland, South Carolina, Louisiana, New Hampshire, Connecticut, Missouri, Illinois, Rhode Island, Michigan, and California.³⁰⁷

For about a century, the classical studies dominated secondary education at Boston Latin and other private academies until the nineteenth century when some of the Latin and Greek courses in the curriculum were replaced by math, science, English, modern languages, geography, and history.³⁰⁸ Contributing to the changes in classical curricula in secondary education, universities began to expand the content of the entrance examinations beyond classical studies to include mathematics, science, and modern languages, which were foundations for the introduction of the bachelor of science degree.

In addition, the public high schools were teaching Latin and modern languages without organizing classical studies, which was adequate for the examination to a growing number of colleges and universities. As these transformations continued during the two decades after the Civil War ended, enrollment in secondary education in the United States gradually increased to one hundred thirty thousand students with about equal numbers in public high schools and private secondary academies. However, just five years later, in 1890 the enrollment in public high schools had almost tripled while the private secondary enrollment remained essentially constant. With public high schools expanding in other states after the Civil War, private academies and institutes, with secondary education taught in some of them, were well established in North Carolina with about one in six of the school-aged children enrolled in them.³⁰⁹

By 1886, the number of private schools in North Carolina with secondary instruction available ranked third in the country behind New York and Georgia with more than one hundred schools and ten thousand students enrolled in them. Slightly less than one-half of the students were enrolled in the “regular academic

courses” with about ten percent preparing for admission to a “college or scientific school,” five percent in the Normal school curriculum, and another five percent in “commercial or business courses.”³¹⁰

When James H. Baker, principal of Denver High School, and later the president of University of Colorado, reported in 1891 “on the general subject of uniformity” in school curricula and the “requirements for admission to college,” a committee of the National Council of Education was authorized “to procure a Conference on the subject,” which was ultimately held in July 1892.³¹¹ Three recommendations were forwarded from the conference to the council with the starting point including conferences of “school and college teachers of each principal subject” in the curricula of secondary schools that enter “into requirements for admission to college.”³¹²

The objective of each subject conference was “to consider the proper limits of its subject, the best methods of instruction, the most desirable allotment of time for the subject, and the best methods of testing the pupils attainments therein, and each conference to represent fairly the different parts of the country.”³¹³ An oversight committee was “appointed with the authority to select the members of these conferences and arrange their meetings, the results of all conferences to be reported to this Committee for such action as it may deem appropriate, and to form the basis of a report to be presented to the Council by this Committee.”³¹⁴ In the third recommendation, four university presidents, one college president, one principal, two head masters, one professor, and the Education commissioner were identified by name to serve as members of the committee.³¹⁵

With Charles W. Elliot, president of Harvard University, serving as chairman, the “Committee of Ten” as it became known was authorized to proceed with organizing the conferences devoted to the “principal subjects” in secondary education. To identify the principal subjects, “forty leading secondary schools in the United States” were selected and a survey sent to them requesting the “total number of recitations, or exercises, allotted to each subject,” taught in school.³¹⁶ After reviewing the responses, it was determined that these schools taught “nearly forty” different subjects.³¹⁷

After eliminating subjects by reason (too few to teach the subject) and by judgment (too much time for the academic value) the number of subject conferences was reduced to nine: Latin; Greek; English; other modern languages; mathematics; physics, astronomy, and chemistry; natural history (biology, including botany, zoology, and physiology); history, civil government, and political science; and geography (physical geography, geology, and meteorology).³¹⁸ Members appointed to the subject conferences were from more than half of the states with twenty-seven members from Massachusetts and New York combined and with one or two from the other states including one from Trinity College in Durham, NC, and one from

the University of North Carolina; the members came from forty-seven colleges and universities and forty-two from high schools or school systems.³¹⁹

After discussions and resolutions of most of the conflicting opinions, the members submitted to the Committee of Ten detailed outlines and examples of organizing and presenting the subjects currently taught in secondary schools with significant changes that included the expectations for specific, additional subjects that would be taught in the primary grades. Although the conferences proposed the “proper” allotted time for teaching the subject in secondary education, the packaging of the subjects into defined periods of time in a given number of days for each semester and the years to be taught was left to the Committee of Ten. After reviewing the recommendations from the conferences and deciding that “all the subjects between which choice is allowed should be approximately equivalent to each other in seriousness, dignity, and efficacy,”³²⁰ the Committee of Ten organized the nine principal courses into twenty weekly classroom periods to create four curricula that they defined as Classical, Latin-Scientific, Modern Languages, and English.³²¹

Each of the courses in the curricula was to be taught by subject teachers as compared to the common schools where all subjects were taught by one teacher. While the four curricula illustrated the flexibility in achieving different objectives with the election of subject-specific courses, it did not answer the question about requirements for admission to college. However, the committee did declare that: “The secondary schools of the United States, taken as a whole, do not exist for the purpose of preparing boys and girls for colleges.”³²² Subsequently, the Bureau of Education printed the report and distributed twenty-seven thousand free copies.³²³

Three months after the Committee of Ten held the first session to begin their review of secondary education, the Department of Superintendence of the National Educational Association adopted a resolution that a “Committee of Ten be appointed... to investigate the organization of school systems, the coordination of studies in primary and grammar schools, and the training of teachers.”³²⁴ In the process of appointing ten members, the Committee on Nominations increased the number to fifteen; therefore, a Committee of Fifteen proceeded in 1893 to organize the investigations. The fifteen members established three subcommittees with each one of them serving on one of the three investigations.³²⁵

With more concern about correlation than content of subjects in primary and grammar schools, the reports from the three investigations provided insight about the unsettled circumstances in the development of public education as a system and about the influence of high schools upon elementary education. In just a few decades, with the number of schools rapidly increasing as cities grew geographically and in population, concerns about political interference in the governance of public schools led one of the subcommittees to recommend that appointed members of a school board should serve as a legislative body, that by appointment the

superintendent of instruction be given a term of five-to-ten years, and that the municipalities should have taxing power.³²⁶

With the requirements of the training of teachers varying from state to state, the subcommittee on the training of teachers recommended that “teachers of elementary schools should have a secondary or high-school education, and that teachers of high schools should have a collegiate education.”³²⁷ However, the subcommittee was evasive about the method of preparing to teach primary subjects by concluding that: “Whether academic studies have any legitimate place in a normal or training school, is a question much debated.”³²⁸ However, the subcommittee reminded the teachers that: “One who is to teach a subject needs to know it as a whole made up of related and subordinate parts, and hence must study it by a method that will give this knowledge.”³²⁹

The proposal by the Committee of Ten that Latin and algebra should be taught in elementary school expanded the effort of the third subcommittee on the Correlation of Studies in Elementary Education to consider a connection through subject content to secondary education. After reviewing the correlation of the primary studies, the subcommittee decided that elementary education should encompass eight years, the seventh and eighth grades should be modified with algebra taught in the seventh, and Latin in the eighth, and that “specialization of teachers’ work should not be attempted before the seventh or eighth year” and then not more than one or two studies.³³⁰

After the Committees of Ten and Fifteen published their reports, a noted educator, John Dewey, characterized the situation as: “The high school is between two fires. More than any other portion of our educational system its work is marked by divided aims, and this through no fault of its own, but through opposed demands made upon it.”³³¹ In 1894, when the presidents, professors, principals, and teachers were recommending uniform curricula for secondary education, the number enrolled in public high schools had increased to almost three hundred thousand students (six hundred seventy-one in NC) who were attending four thousand schools; but in comparison the number of students in public high schools was just three percent (less than one percent in NC) of the thirteen million pupils (three hundred seventy thousand in NC) enrolled in common schools.³³² In addition, less than fifteen percent (about one-third in NC) of the combined enrollment of male and female students in the public high schools was preparing for college with about an equal number in the classical course and the science course (three times as many in classical than scientific in NC) and with the number of females about sixty percent (fifty-five percent in NC) of the total enrollment.³³³

As the Committee of Ten was organizing in 1892 to investigate the uniformity of subjects in secondary education and the requirements to attend college, the School Committee of Boston was opening the Mechanics Arts High School for which they

had planned to include periods in “shop-work, book-work and drawing in about the proportion of ten hours to each of the two former and five hours to the last.”³³⁴ Generally described as manual training, the movement in the United States was encouraged at the Philadelphia Exposition of 1876 when the Imperial Technical School of Russia exhibited the “laboratory method applied to the teaching of the mechanic arts.”³³⁵ John D. Runkel, president of the Massachusetts Institute of Technology, and Calvin M. Woodward, professor of civil engineering at Washington University in Saint Louis, saw the exhibit, and both were inspired to establish similar laboratories.³³⁶

With MIT chosen as a land-grant institution, it was convenient to establish in 1876 the School of Mechanic Arts offering a “Two Years’ Course in Practical Mechanism” for boys “at least fifteen years of age”;³³⁷ however, that school closed in 1888³³⁸ with the Mechanic Arts High School of Boston opening in 1893 with mechanic arts laboratories maintained by MIT for their students.³³⁹ Subsequently, Professor Woodward established the Saint Louis Manual Training School in 1879 with “instruction in mathematics, drawing, and the English branches of a high-school course, and instruction and practice in the use of tools.”³⁴⁰

To enroll and to graduate, a student had to be fifteen years of age, and examination and tuition were required before devoting about equal time to “mental and manual exercises” for three years.³⁴¹ However; the Baltimore Manual Training School was the first free manual training high school that was established in 1883 in Baltimore when the Committee of the Board of School Commissioners concluded that: “A knowledge of some form of industrial labor is as necessary as a knowledge of books; and as the State and city acknowledge their obligations to teach children to read and write, they cannot deny their obligation to teach them to work, as the latter is as essential for the public welfare as the former.”³⁴²

When the Baltimore Manual Training School opened in 1884, the objective of the school was stated as: “Instruction and practice the use of tools, and such instruction as may be deemed necessary in mathematics, drawing, and the English branches of a high school course.”³⁴³ For boys at least fourteen years of age, an admission examination was required in “reading, spelling, writing, geography, English composition, and fundamental operations of arithmetic as applied to integers, common and decimal fractions and denominate numbers. Ability to use the English language correctly is especially desired.”³⁴⁴ The course of study over three years included algebra, English language, history, physical geography, geometry, physics, literature, political economy, civil government, and chemistry to enter colleges, but also included bookkeeping, mechanical drawing, mechanics, and architectural drawing. In addition, there was two hours of training each day divided among shopwork such as forging and welding and machine shopwork such as turning and drilling.³⁴⁵ By employing this concept in educating the children, there was considerable debate

about combining “book-work” and “shop-work,” about training for a trade in high schools and about the possibility of attending college. In the 1893–1894 “Report of the Commissioner of Education,” Professor Woodward included comments from prominent educators about manual training as a component of secondary education. Some of those in opposition stated that: “Any school attempting to put shop-work into general training was, or soon would be, in a ‘morbid condition’”;³⁴⁶ and that “one of the things that the boys and girls ought to learn in those schools is how to get information from books. There is no information stored up in the plow, hoe handle, steam engine; but there is information stored up in books.”³⁴⁷ Some of those in support stated that: “The manual training school educates boys, not to become mechanics, but to become men of intelligence and skill.”³⁴⁸

The superintendent of public schools in Philadelphia stated that: “In the manual training school the work done by the boys in mathematics, literature, and history is, to say the least, in no respect inferior to that of schools of a similar grade in which the whole time is occupied with class-room work.”³⁴⁹ Just five years after the first public manual school opened, seventeen additional schools were reported with three each in Ohio and New York; two each in Illinois, Maryland, and Pennsylvania; and one each in Colorado, Louisiana, Minnesota, Missouri, Nebraska, and Virginia. Manual training branches were also established in twenty-eight city school systems, but training was scattered throughout the grades from primary through high school.³⁵⁰

Business Schools

Six years after the English High School opened in Boston, “An Act to Provide for the Instruction of Youth” was approved in the Commonwealth of Massachusetts in 1827 and required that “book keeping by single entry” be included in studies of all the public high schools.³⁵¹ The addition of bookkeeping was intended as a foundation for a profession in commerce. Most of the commercial education in the early decades of the nineteenth century was provided by private business schools but was considered no more than training for “clerkships.”³⁵² Nearing mid-century, the business schools had “almost wholly disappeared” and were replaced by systems of private business colleges, which for decades expanded in the larger cities.³⁵³

One of the earlier examples began in 1848 when Folsom’s Mercantile College was founded in Cleveland, Ohio with Ezekiel G. Folsom—who was born in Ashtabula, Ohio in 1821 and graduated from Oberlin College in 1847—teaching the rudimentary business skills. Just two young men enrolled in his first class; but those two graduates, H. B. Bryant and H. D. Stratton, returned to purchase the college in 1852 and began to develop a system of Bryant and Stratton Business Schools that grew to

almost fifty by the end of the Civil War. Among the thousands who attended these schools, one of the students in 1850 was John D. Rockefeller, Sr.³⁵⁴ In 1862, Folsom relocated to Albany, New York where he was proprietor, with Bryant and Stratton, of the Albany Business College and “an earnest and successful commercial teacher until 1884.”³⁵⁵ By 1886, about five thousand pupils had attended the Albany Business College where “book-keeping by single and double entry, arithmetic, penmanship, correspondence, business practice, spelling, reading, grammar, stenography, type-writing, telegraphy and commerce law” were taught.³⁵⁶

A decade later, there were more than three hundred private business schools, mostly in the larger cities, with twice as many males as females among the nearly seventy-eight thousand students enrolled and with twenty percent of them attending the “evening course.”³⁵⁷ Due to the expansion in machines for manufacturing, in agricultural production, and in transportation by rail and rivers to markets, the activities in commerce at the major export cities and within the midwestern states resulted in a concentration of commercial and business colleges of thirty-three in Pennsylvania, twenty-nine in New York and in Ohio, and twenty-five in Illinois, with a regional concentration of colleges in the states of seventeen in Indiana, sixteen in Iowa and in Missouri, fifteen in Michigan and in Wisconsin, and fourteen in Minnesota.³⁵⁸ On average, the total number of people who enrolled in each college was more than two hundred students in a year; however, about one-third of the states reported just one or two colleges with the least enrollments in the one college in Arizona and in two colleges in North Carolina where the number of students attending each of the three colleges was less than one-half of the average enrollment for all the colleges.³⁵⁹

One of the first adoptions of instruction in commerce education by a public school occurred after Alexander Dallas Bache—the grandson of Benjamin Franklin, a graduate from the Military Academy at West Point, a professor of natural philosophy and chemistry at the University of Pennsylvania, superintendent of the Office of Coast Survey, a prolific publisher of measures and scientific observations, and the first president of the National Academy of Sciences—returned from a two-year tour of education institutions in a number of European countries and was subsequently appointed as principal of the Central High School of Philadelphia.³⁶⁰ In each country that Bache visited, he recorded the individual attributes of classical, commercial, mechanic arts, primary and secondary schools as well as polytechnics and universities.

Reporting on his visit at the Polytechnic Institute of Vienna, Bache described a department of instruction that was “composed of three schools, a technical, a commercial, and a ‘real school’” with the “real school” serving as a “preparatory school for the others.”³⁶¹ In addition, those who completed the course of study in the preparatory school could select “special instruction” according to their “intended

pursuits” by enrolling in “the courses which he wishe..., not being limited as to the number or character of the branches.”³⁶² The commercial school included business correspondence, science of trade, laws relating to trade and exchange, bookkeeping by single and double entry, account of materials of trade, commercial geography and history of commerce, and was directed by five professors.³⁶³

After Bache was appointed principal of Central High School, he established three departments of study somewhat similar in concept to the Polytechnic of Vienna with a principal course of study “to prepare boys for trade, commerce, and business,” a classical course of study “to prepare for college or for professional studies at a university,” and an elementary course of study for those boys who “could afford but two years of higher education.”³⁶⁴ In time, the two-year program was discontinued due to small enrollments; however, the preparation for business attracted two-thirds of the students to enroll in the principal course of study.³⁶⁵ Although Bache resigned after two years, his successor John S. Hart included drawing, penmanship, phonography, and bookkeeping in the course of study.³⁶⁶

During the two decades after the Civil War, when public high schools were opening in the cities where commerce was expanding with the growth in population, the private business colleges continued to dominate in the number of enrollments of young men and women who were preparing for the available jobs in the expanding “mercantile” economy. However, institutions of higher education began to organize degree-granting programs in commercial education after the Wharton School of Finance and Commerce at the University of Pennsylvania opened in 1881.

While the availability of instruction in commerce was expanding and private business schools were the preference to prepare for a job in the commercial economy, the enrollment in commercial courses in the nearly four thousand public high schools was six percent of the all students in attendance in 1893 and about fifteen percent of the enrollment in private business schools.³⁶⁷

However, a decade later the situation was changing rapidly. Commercial high schools were established, the enrollment in the five hundred private business colleges increased twenty percent, and the enrollment in the commercial public high schools, where “regular business” courses were taught, had almost tripled in number.³⁶⁸ These commercial high schools maintained from two-to-four-year courses of study with a four-year program in New York City requiring courses in English, modern languages, sciences, and math with economics and history required in the fourth year.³⁶⁹ Most of the commercial instruction in both high schools and colleges was by electives and similar to the course of study in the commercial school at the Polytechnic Institute of Vienna.³⁷⁰ In addition, there were a total of nine thousand students enrolled in “business courses below college grade” at one hundred seventy institutions of higher education.³⁷¹

In another decade, the enrollment in commercial courses in public high schools was about equal to the enrollment in private business colleges; however, there were growing concerns about the expectations as compared to the realities of commercial education in a public high school. To clarify the situation, a superintendent stated that commercial education, which was often “spoken of as a separate entity,” had “developed no distinct individuality” and “is in reality quite generally not a distinctive curriculum.”³⁷² In addition the superintendent was not impressed with the “ready-made fashion” of the commercial courses and asserted that they “differ not fundamentally” from courses in general high schools.³⁷³

Labor and Education

Throughout the nineteenth century, the value of education provided by the public common schools was measured by the literacy of the citizens within each state and was considered by many as the foundation for maintaining the freedom as declared in the Declaration of Independence. However, beginning with the opening of the first school in Boston, the value of education provided in public high schools was measured by opportunities for children to pursue a measure of prosperity. Most of the earliest high schools were established in towns and cities with sufficient enrollment to grade the schools and where employment was available in the commerce created by factories, mills, railroads, and waterways. With a population of nearly two thousand citizens, with connections to North Carolina railroads and the Southern Railway, and with cotton mills, furniture manufacturing, and milling companies, Greensborough was the first city in North Carolina to establish graded schools when one hundred white students enrolled in 1875.³⁷⁴

In contrast to the organization of ungraded schools with one teacher and students of all ages in one room, students in graded schools were divided into classes depending on attainment, who then studied the same subjects at the same time. However, the number of grades and the subjects in each grade varied depending on the number of teachers hired and the number of students in attendance. During the next decade, other schools for graded instruction were constructed in Greensborough with the enrollment increasing to more than one thousand white and four hundred black children.³⁷⁵ In addition the General Assembly authorized Raleigh, Salisbury, Goldsboro, Durham, Charlotte, Wilmington, and Winston to establish districts with graded schools that eventually resulted in the organization of public high schools.³⁷⁶

Entering the twentieth century with about two-and-one-half percent of the total population of the country living in the state, the total enrollment in secondary education that included public high schools, private academies, and preparatory

departments in universities, colleges, and Normal schools in North Carolina exceeded eight thousand or about one-and-one-half percent of the total secondary enrollment in the United States.³⁷⁷ With rapid expansion in the number of public high schools throughout the country, the total number of students enrolled in public secondary schools in all the states was three times the number attending private schools; but in North Carolina, the number of students who were enrolled in private institutions was seven times that in public schools.³⁷⁸

When the members of the Southern Educational Association met in Richmond, Virginia in 1900, George T. Winston, the president of the North Carolina College of Agriculture and Mechanic Arts—who attended the University of North Carolina, graduated from Cornell University, attended the Naval Academy, served as a professor and president of the University of North Carolina and the University of Texas—and Charles W. Dabney, president of the University of Tennessee—who earned his doctorate at the University of Gothenburg, was director of Extension at the University of North Carolina and became the president of the University of Cincinnati—delivered addresses regarding the relationship of “Industrial Education and the New South” and of “Education and Production” respectively. Winston began by stating that “The two great forces of modern life are education and machinery.”³⁷⁹

With the advantages in both, “There was no need of Gettysburg or Appomattox. The contest had already been settled by the mills and factories, the railways and steamships, the power looms and spinning jennies, the reapers, binders, threshers, and other machinery of a people leading the world in mechanical invention, in use of machinery, in industrial progress, and in public education.”³⁸⁰ Winston characterized the economy of the South as production of “chiefly raw material, or coarse and cheap fabrics... cheap products, cheap labor, and long hours of work.”³⁸¹ In addition, we should be concerned since depending on “cheaper labor and cheaper products and longer hours” could lead to competing with the abundant and cheaper labor in South America or Asia.³⁸² Therefore, “The safety of the South is in better labor and better products.”³⁸³

Dabney recognized that “The recent agitation for technical education grows directly out of the desire of the people to work up their own resources, their cotton, wood, and iron, and produce more wealth.”³⁸⁴ However, he reminded the attendees that “if we desire to produce more wealth in the South we must begin by building better public schools.”³⁸⁵ In addition to providing the technical education, Dabney spoke about the importance of remaining committed to “universal public education” by “putting manual training and scientific branches in the high schools where all the children can have an opportunity for the broad training.”³⁸⁶ Returning to the message of his address, Dabney stated that “The chief characteristic of the

nineteenth century has been the extension of the benefits of education to the masses of the people.”³⁸⁷

Dabney and Winston were simultaneously engaged in the establishment of the Land Grant Department of Agriculture and Mechanic Arts and the Agricultural Research Station at the University of North Carolina in the 1880s, but they were presidents of other land-grant institutions at the time of the meeting in Richmond. Therefore, their experiences provided insight for them to speak with authority about industrial education. Winston remarked that “The South needs workers, trained and skilled workers, in every department of industry.”³⁸⁸ Consequently, “Our public schools—kindergarten, primary school, grammar school and high school—all should be strengthened with manual training.”³⁸⁹ In addition, “Special industrial schools adapted to the prevailing industry of each district should be established in all industrial centers”; so that “Such schools would supply skilled workmen for every industry—wood workers, metal workers, leather workers, workers in field and forest, in mine and mill and factory, skilled workers, exchanging in the markets of the world finished goods for raw material, skill and knowledge for rude labor.”³⁹⁰

With industrial education taught in the schools, Dabney envisioned an increase in productivity since “the relations between education and productivity are so well understood now that you can measure the wealth-producing power of a people by the school privileges which they have enjoyed.”³⁹¹ Warning those educators in attendance about the challenges ahead for the southern states, Dabney proclaimed that “The time comes, however, in the history of every nation when it must educate its people in science and train them in manufactures and industries or it will go down. This higher scientific education is the forerunner of higher prosperity, and the nation which fails to develop the intellectual faculty for production must degenerate, for it can not stand still.”³⁹² In agreement, Winston stated that “For one hundred years our schools have manufactured orators, statesmen, and universal geniuses. The supply now exceeds the demand, and a change of industrial machinery is necessary. For declamation and dialectics we must substitute the microscope and the laboratory, the drawing board and the machine shop.”³⁹³ In response to the challenge to provide the industrial and commercial training in the public schools, elective courses in shopwork or business were usually introduced into a graded school.

For the first time in 1902, the superintendent of Public Instruction in North Carolina included “statistics from the various Graded Schools in the State” in the biennial report.³⁹⁴ The number of grades of instruction in each of the schools ranged from four to eleven years with twenty-six reporting high school grades from nine to eleven and eight schools reporting grades from four to eight years. In response to an inquiry regarding instruction, Latin was taught in all but one and physics was taught in eighteen schools with manual training included in three and domestic science included in one of the schools. The population of the cities ranged from less

than one thousand in two of the towns to more than ten thousand in five towns in which the tenth and eleventh grades of the schools were located. In North Carolina, Charlotte was second to Wilmington in population with eighteen thousand citizens in 1900³⁹⁵ with the system of public education in the city consisting of two schools with ten grades for the white and one with ten grades for the black children. Latin was taught for four years, and physics was taught for two years with manual training included in the course of study.³⁹⁶

Mechanical Technology Education

Before the Charlotte schools were graded, Daniel Augustus Tompkins—who was born on a plantation in Edgefield, South Carolina before the Civil War, graduated with a degree in civil engineering from Rensselaer Institute, and worked for ten years as a machinist, a draftsman, and a supervisor in the construction of iron works—moved to Charlotte in 1883 and began a career in the installation of engines and the construction of cotton oil mills, electric plants, and cotton mills.³⁹⁷ During the years of traveling to the northern states to hire “workmen” for his enterprises, Tompkins concluded that “the industrial superiority of the North was due to technical skill and knowledge rather than to superior natural resources or superior natural ability.”³⁹⁸ Adding to his assertion, Tompkins stated that “Ohio is not furnishing our Presidents by accident. It is not by accident that I go from Charlotte to the North to buy water wheels, gas engines, etc. It is because of systems of education that qualify the people to be the most competent to do these things.”³⁹⁹ When hiring machinists, patternmakers, molders, draftsmen, and electricians, Tompkins had concluded that “The combination of practical training and teaching makes the best man. It makes a man who knows how things ought to be done and who can do them.”⁴⁰⁰

In 1900 Ohio was ahead of North Carolina in the establishment or enrollment of public high schools, manual training schools, Normal schools, and business colleges.⁴⁰¹ There were more private academies in North Carolina;⁴⁰² but a higher percentage of illiteracy.⁴⁰³ The progress in education began in Ohio when the population located in towns and cities near the Ohio River and the Great Lakes and railways provided travel, commerce, and connections to the industrial hubs of the midwest. Receiving statehood in 1803, by the twentieth century the population in Ohio had increased to more than four million while the population in North Carolina grew to about two million citizens.⁴⁰⁴ By 1900, there were eight cities with a population greater than ten thousand in North Carolina; however, the number in Ohio had increased to twenty-eight with ten percent of the population in the state earning wages while employed in manufacturing.⁴⁰⁵ Seven of the cities in Ohio were

among the one hundred largest in the United States where citizens paid the taxes to establish public city school systems.⁴⁰⁶

The tax base to support the schools was derived from the value of the manufactured products per capita that was more than twice that in North Carolina and the value of the real and personal property in Ohio that was at least ten times that in North Carolina.⁴⁰⁷ Although the comparison by Tompkins about the availability of trained and educated tradesmen was accurate, the circumstances that encouraged the establishment of education in the two states were different. However, the comparison illustrates the challenges in North Carolina to create the wealth to support the establishment of a system of public education where the students who graduate from a public high school were prepared to work in an economy that depended more and more on scientific farming in agriculture and on mechanic arts in manufacturing.

In addition, the circumstance in North Carolina was representative of the other southern states where cheap labor was abundantly available for hiring unskilled workers needed in manufacturing and farming with the few skilled mechanics imported from the northern states. The foundation for the school systems that assisted the growth of the economy in Ohio began with the common schools where the attendance rate was fifty percent higher, the school term twice as long, and the expenditure per pupil five times greater than in North Carolina.⁴⁰⁸ Consequently, the illiteracy rate in Ohio for white people was one sixth and for black people was one-half of that of the total population in North Carolina respectively.⁴⁰⁹

In addition, the public and private Normal schools in Ohio graduated almost five times as many teachers⁴¹⁰ for about twice as many children of school age.⁴¹¹ By 1897, in Ohio there were more than thirty-seven thousand students enrolling in five hundred eighty-four public high schools (with four hundred seventy-two students in twelve schools in North Carolina)⁴¹² where seven thousand students had enrolled in physics (one hundred thirty three in NC), three thousand in chemistry (one hundred in NC), and one thousand in trigonometry (none in NC).⁴¹³

With five thousand students graduating each year from public high schools (two hundred seventeen in North Carolina)⁴¹⁴ and with about seventy-five percent of the graduates (fifty percent in NC)⁴¹⁵ intending to seek employment rather than enrolling in college, the high schools were graduating students who were prepared to pursue the mechanic arts, the scientific farming, or the commercial business opportunities available in the economy in Ohio. In addition to the regular public high school curricula, a carpentry shop was opened in 1885 for manual training of the boys at the Central High School in Cleveland.⁴¹⁶ By 1890, the Cleveland Board of Education had established the West Side Manual Training School with "mechanical drawing, carpentry, wood turning, pattern making, forging, machine shop practice" and other courses that were usually taught in high schools.⁴¹⁷ By 1900, manual

training was included in eight of the public high schools located in the larger cities in Ohio with one reported in Durham, North Carolina.⁴¹⁸

As the economy of Ohio expanded, an “English and Commercial Course” high school was opened in Columbus, Ohio that included physical and commercial geography, phonography, bookkeeping, business methods, and commercial and legal forms with English, foreign languages, math, and social sciences also required.⁴¹⁹ Although varying in the breadth and depth of content, there were sixty-five public high schools in Ohio (three in NC) in which commercial and business courses were taught to more than two thousand students (thirty in NC).⁴²⁰ Combining the schools, colleges, and universities, both public and private, the number of students enrolled in the one hundred twenty-five institutions in which commercial and business courses were taught was in excess of seven thousand in 1899 and more than eight times the number taught in the sixty institutions in North Carolina.⁴²¹

When Governor Aycock appointed James Yarkin Joyner to serve as superintendent of Public Instruction in 1902, he chose a man who knew from experience that there was “Work to Be Done and How to Do It,” which became a theme for his biennial report to the governor. Having served as the superintendent of the Goldsboro graded schools where the fourth public high school in North Carolina opened in 1884, Joyner was convinced that “No course of public instruction is complete or adequate to the demands of this age and of this State that leaves a gap between the public school and the college.”⁴²² In addition to the seventy-eight city school systems reporting in 1905 in which more than half of the districts supported a high school, the county districts reported that many of the more than five thousand of the rural public schools were developing high schools.⁴²³

However, there was just one teacher in more than eighty percent of these rural schools with actual high school subjects taught in less than fifteen percent of the total number.⁴²⁴ Joyner characterized the instruction as “somewhat desultory and needs to be organized into more uniform, definite and connected system, better articulated with the elementary schools on the one hand and the University and the colleges on the other.”⁴²⁵ Citing the advancements in education in the city high schools, Joyner proclaimed that “Surely these children of the rural districts, that constitute eight-tenths of the entire school population of North Carolina, are entitled to as good educational opportunities as the children of the towns and cities. If the power of any free State dwells in the many and not in the few, then it inevitably follows that the State that hopes to reach the fullest development of its power must provide for the fullest development of the many.”⁴²⁶

In 1907, the legislature enacted the “Public High-School Law” that authorized the establishment of rural public high schools with “one or more”⁴²⁷ for each county that “may be maintained not less than five months annually”⁴²⁸ in which no “less than three teachers are employed”⁴²⁹ at a minimum salary of “forty dollars per

school month.”⁴³⁰ With one high school in a sparsely populated county, the opportunity for the many was still limited although wagons and horses were available for the older children. As reported in 1908, there were one hundred forty-five rural public high schools that had opened with an enrollment of nearly four thousand students that included more girls than boys attending in all four years of the high school grades. The majority of the students enrolled in grammar, composition, rhetoric, literature, advanced arithmetic, algebra, history, Latin, and physical geography. Agriculture, modern languages, physics, and geometry were often included in the course of study.⁴³¹

Agriculture and Education

With the state superintendent of Public Instruction reporting information about education in North Carolina to the commissioner of Education of the United States and representing North Carolina at the meetings and as president in 1910 of the National Educational Association, Joyner was aware of the discussions concerning the curricula in public high schools. While his main concern was the establishment of a primary-to-college curriculum, Joyner also expressed his support for “Industrial and Agricultural Education” in a statement that “Every complete educational system must make provision also for that training in the school which will give fitness for the more skillful performance of the multitudinous tasks of the practical work of the world, the pursuit of which is the inevitable lot of the many.”⁴³² However, “It must be remembered that the first essential difference between skilled labor and unskilled labor is a difference of intelligence as well as of special training.”⁴³³

To achieve this objective for the farmers of the future, Joyner believed “it safe and wise to shape the course of study for the country boys and girls more in the direction of special preparation for farm life.”⁴³⁴ With encouragement from the superintendent of Public Instruction, the legislature authorized in 1911 “The Establishment and Maintenance of County Farm-Life Schools and for the Promotion of Agriculture and Home Making,” which included a residential public high school with domestic and farming components.⁴³⁵ By 1911, almost every state had included instruction in agriculture in primary, secondary, or higher education with some organizing agricultural schools similar to the Farm-Life Schools.⁴³⁶ In step with the movement, agricultural schools associated with secondary education opened in North Carolina at Jamestown and Pleasant Garden in 1911 followed by nineteen more over the next six years.⁴³⁷ The farms averaged about fifty acres in size with barns, livestock, school buildings, dormitories, fields for plantings, and about an equal number of boys and girls in attendance. The Farm Life Departments were

under the supervision of a professor at North Carolina State College of Agriculture and Engineering.⁴³⁸

The Commission on National Aid to Vocational Education was created by an act of Congress in 1914 to consider the extent to which there is “a need for vocational educational education in the United States.”⁴³⁹ The members of the committee represented a worker’s union, a Manhattan trade school, the Society for the Promotion of Industrial Education, the Indiana Commission on Industrial Agricultural Education, the Massachusetts Commission on Industrial Education, two senators, and two members of the House of Representatives. Two of the congressmen were from Georgia, Senator Hoke Smith and Representative Dudley M. Hughes. The commission sensed an urgency to proceed and predicted democratization of education with a comprehensive program of “equal opportunity to all to prepare for their life work” in a daylong, part-time, or evening school.⁴⁴⁰ With representatives from “national educational, civic, industrial, and commercial organizations” offering encouragement, the commission reported that as many as twelve million people “have repeatedly gone on record as believing that a system of vocational education was absolutely necessary to the future welfare of the nation.”⁴⁴¹

The commission recommended that the federal government award grants to the states for part of the salaries of the teachers, except for agriculture where directors and supervisors would be included; that the students entering vocational training be at least fourteen years of age; and that all-day pupils will devote the entire day, part-time students may work, and evening schools were for the employed over sixteen years of age. The Smith-Hughes Act three years later was in total “An Act to provide for the promotion of vocational education; to provide for cooperation with the States in the promotion of such education in agriculture and the trades and industries; to provide for cooperation with the states in the preparation of teachers of vocational subjects; and to appropriate money and regulate its expenditure.”⁴⁴²

The commission was appointed on April 17, 1914, and its report was referred to the Committee on Education of the House of Representatives on June 1, 1914. However, the urgency of implementation did not depend on current circumstances but became apparent for the unexpected war rather than the current economy. With a decade of progress, the number of organized high schools in North Carolina had increased from one hundred⁴⁴³ to nearly three hundred with about seventeen thousand students enrolled and equally divided between rural and city schools.⁴⁴⁴

The primary studies in both the city and rural schools were grammar, composition and rhetoric, literature, advanced mathematics, algebra, English, history, spelling, and Latin with three dozen electives including agriculture, manual training, physics, chemistry, bookkeeping, shorthand, and North Carolina history. The pattern of enrollment suggests that rural and city students were selecting courses to address a weakness in prior studies or to pursue practical education for employment.

With a higher percentage of the rural students enrolled in grammar, composition and rhetoric, and in advanced arithmetic than did the city students, they also dominated the enrollment in the courses in the introduction to science, agriculture, and botany. With proportionality, more city students chose Latin and plane geometry and also dominated enrollment in commercial law, bookkeeping, commercial arithmetic, shorthand, and typing. As reported by the superintendent of Public Instruction: "Some of the city graded Schools, notably those of Durham, Asheville, Wilmington, Winston, Greensboro, Charlotte and Raleigh, have introduced manual training and industrial education," which were dominated with enrollment.⁴⁴⁵ Recognizing that "industrial education and technical education training are at present impracticable" in the county schools,⁴⁴⁶ Joyner devoted his attention to instruction in nature study in elementary schools, subjects adapted to farm life in secondary schools and the farm-life residential high schools.

The objectives of the rural schools were complex with the goals of connection to college admission, enriching rural living, increasing productivity in agriculture, and retaining the viability of farming through education that may have been incoherent and obscure to some of the students. However, with the Smith-Lever Act by Congress in 1914, the rural public schools gained a partner when the cooperative extension programs at the land-grant institutions at North Carolina A&T at Greensboro, North Carolina College for Women at Greensboro, and North Carolina College of Agriculture and Engineering at West Raleigh provided "practical demonstrations... in agriculture and home economics" and imparted information "through demonstrations, publications and otherwise."⁴⁴⁷ Three years later, the Smith-Hughes Act, which was passed by the Congress, provided assistance by funding one-half, with the other half to be provided by the state, to establish in "one or more of the state and county rural high schools in each county... a farm life-school or farm-life department of the rural high school for vocational instruction of country boys and girls in agriculture, household economics and other practical subjects pertaining to farming and home-making on the farm."⁴⁴⁸

Vocational Education and War

While the high schools were developing in North Carolina, another commission of the National Education Association began in 1914 to reevaluate the purpose and define "The Cardinal Principles of Secondary Education." Instead of connecting to the principles of the established educators as occurred with the Committee of Ten, this review declared that "Secondary education should be determined by the needs of the society to be served, the character of the individuals to be educated, and the knowledge of the educational theory and practice available. These factors are by

no means static.”⁴⁴⁹ The commission argued in its report released in 1918 that the foundation for achieving and maintaining a democratic society depended on the education of the individual, which should develop his “knowledge, interests, ideals, habits, and powers whereby he will find his place and use that place to shape both himself and society toward ever nobler ends.”⁴⁵⁰

Recognizing that the role of education was connecting more to the reality of living and less to the abstraction in established subjects, the commissioners adopted seven objectives for secondary education: health; command of fundamental processes (“reading, writing, arithmetical computations, and the elements of oral and written expression”);⁴⁵¹ worthy home membership; vocation; civic education; worthy use of leisure; and ethical character.⁴⁵² With concerns about an ineffective system of education, the commissioners reminded the educators that only one in three of those who entered the first year of elementary school reached the fourth year of high school and only one in nine graduated.⁴⁵³ They also recommended that elementary education be reorganized for the needs of pupils of six-to-twelve years of age. Correspondingly, secondary education should span the years from twelve to eighteen and be divided into junior and senior periods.⁴⁵⁴

In the senior high school, each student would pursue a plan of studies that would be organized for their “needs as an individual and as a member of society.”⁴⁵⁵ These curricula were to be differentiated with names such as “agricultural, business, clerical, industrial, fine arts, and household arts” describing the objective.⁴⁵⁶ To acquire the benefits of the vocation curriculum, the commission recommended that “every normal boy and girl will be encouraged to remain in school to the age of 18, on full time if possible, otherwise on part time.”⁴⁵⁷ Although the concept of differentiated curricula to fit one’s needs and aptitudes was democratic and influenced the organization of academic programs, the realities of preparing for admission to college or of mastering the skill of a mechanic art were not democratic processes.

World War I began in 1914, with the majority of Americans opposed to entering the conflict even though Great Britain and France were allied against Germany. However, submarine warfare that sank unarmed U.S. merchant ships resulted in a change in public attitude toward entering the war to defeat the Germans. If the United States was to enter the war, the technology and trades required to manufacture battleships, submarines, airplanes, tanks, rifles, telegraph units, gas masks, and clothing in large quantities gave a sense of urgency to vocational education. Just six weeks after approving the Smith-Hughes Act, on April 6, 1917, the United States declared war against Germany.

To conduct the war, civilians were trained in the trades and the mechanic arts necessary to manufacture and repair the transportation and weapons to wage the war. As the effort began, the army and navy established vocational schools to train the “fighting mechanic”—the soldiers and sailors who served as shipboard and

airplane mechanics, electricians, steam and turbine mechanics, and radio operators. With the financial resources and the instructors and their commitment regardless of the number of students in each class, armed services developed these training programs in just a few months. However, the introduction of manual training and industrial education into the curricula of public schools remained a challenge in most of the high schools even with the encouragement of the Smith-Hughes Act.

At best, instruction in trades and industrial training had been mainly an elective and only offered in the high schools in the larger cities with larger enrollments and where a demand for specific trades and training would justify hiring a teacher and investing in the required tools and machinery. In addition, training in mechanic arts in technical high schools was usually limited to the cities with a population of fifty thousand or more where manufacturing was located and depended on a regular supply of educated and skilled labor. However, for the smaller towns, the requirements for labor in shops or with manual training were limited and often restricted to a specific trade such as carpentry.⁴⁵⁸

After the war had ended, vocational education in forty-two rural schools in North Carolina included production from cultivation and farm animal projects in which five hundred fourteen white and two hundred nineteen black boys actually sold the harvest of the crops or the grown animals at market that earned more in total than the state and federal support provided to teach the vocation of agriculture.⁴⁵⁹ In the second year of offering, twenty-four departments were added to rural and small town high schools. By 1920, seventy-four vocational classes were established in mill towns where seven hundred fifty-five persons enrolled with many of the employees knowing “little arithmetic or were barely able to read and write.”⁴⁶⁰

Establishing a State System of Schools

When Eugene Brooks—who graduated from Trinity College in 1894; was a teacher, a principal, and a superintendent in the public school system; was appointed to head the Department of Education at Trinity in 1907; awarded a doctor of letters from Davidson College in 1918; appointed the state superintendent of Public Instruction in 1919; elected in 1920; and resigned in 1923 to become the president of the North Carolina State College of Agriculture and Engineering—submitted his last report as the superintendent of Public Instruction to Governor Thomas Bickett in 1924, he had collectively dedicated twenty-five years to building education for the people in North Carolina during his role as a teacher, a principal, an editor of *The North Carolina Educator*, and head of the Department of Education at Trinity College where he had graduated with an AB degree.⁴⁶¹

In addition to pursuing his career in education, Brooks published a number of books about a wide range of interests that included history, government, and agriculture as well as education (*Stories of South America; The Story of Corn and Westward Migration; Education for Democracy; The Story of Cotton and the Development of the Cotton States; Woodrow Wilson as President*). In his 1920 report, Brooks described the circumstances concerning the status of public education in North Carolina with positive statements about the statistical progress; however, the title of his report "A State System of Public Schools" portrayed the message inside the covers. Brooks' premise declared that every part of education is connected together with three absolutely essential factors influencing the results: the purpose or goals of the effort, an effective organization to make it possible to achieve the purpose, and the agreement of the cost and revenue.⁴⁶²

As an example, the legislature had created the high schools and the common schools as separate institutions resulting in two independent institutions. Consequently, Brooks was concerned that "A high school cannot live in a community where the elementary schools are maintained for only six months. Such elementary schools cannot give sufficient instruction to raise pupils to the high school level and keep them in the high school long enough to complete a four course."⁴⁶³ Consequently, they need to be coordinated in terms of attendance and in attainment in the curriculum. Without coordinated oversight with a measure of achievement (standards), "In 1920 no standard high schools could be found in the rural districts of eighty-five counties, and thirty counties had no standard high schools whatever, although here and there were schools in which high school subjects were taught. It is easy to see, therefore, that the elementary instruction in these country districts must have been very poor indeed."⁴⁶⁴

Before Brooks resigned to become the president of North Carolina College State College of Agriculture and Engineering, the enrollment at three hundred fifty-five rural high schools, where subjects were taught without standards at most and no coordination at all with the elementary schools, was almost forty-five thousand students with six thousand graduating.⁴⁶⁵ The most popular academic courses selected by the students were literature followed by Latin and algebra with home economics and agriculture chosen as vocational electives. Most of the vocational education opportunities were in the sixty-five Smith-Hughes agriculture schools in which more than two thousand students were enrolled in the day-long programs and the fifty-six evening schools for adults.⁴⁶⁶ There were nearly two thousand students enrolled in home economics training at fifty-three schools with more than five hundred attending evening schools.⁴⁶⁷ However, trade and industrial training was offered only in evening schools or as part-time programs to which twenty-five hundred "working men and women, boys and girls, took advantage of this instruction in the evening part-time classes conducted in" work related to the cotton mill industry, "paper and

pulp manufacturing, carpentry, plumbing, blue-print reading, auto mechanics, and other trade subjects.⁴⁶⁸

Although the concerns expressed by Brooks were important elements of continuing the effort to organize a system of education in North Carolina, coordination of core requirements in elementary and high schools, the length of term to accommodate the demands of the high school curricula, a reasonable method for funding the system, and transportation of students to centralized high schools were also required, but not completely resolved for a decade. In 1920 and 1921, the legislature enacted laws that “vitally affect the high schools of the State” by recognizing the schools as an “integral, organic part of the public school system” with salaries for high school teachers provided as for all other schools, with participation in vocational education, and with one hundred twenty-five thousand dollars for the “establishment and maintenance of standard high schools in the thirty or more counties that have no standard high schools at the present time.”⁴⁶⁹

In addition, the superintendent of Public Instruction issued the statement that four units of English, two units of mathematics, one unit of science, two units of history, and two units of foreign language were required to graduate from a standard school with the admonition that they should enroll in “as many elective subjects as possible..., but students should select electives wisely, in order to prevent smattering.”⁴⁷⁰ Before establishing requirements to graduate, at least two-thirds of the students who enrolled in the high schools in 1921–1922 elected literature, Latin, and algebra with about one-third electing general science, civics, advanced arithmetic, spelling and grammar, and composition and rhetoric. Possibly preparing for an opportunity in the growing economy of the state, about one in four of the students enrolled in all the elective courses in the commercial subjects of bookkeeping, commercial arithmetic, stenography, typewriting, commercial law, or junior business training. Also, twenty percent of the high school students selected vocational education in agriculture and home economics.⁴⁷¹

As early as 1914, transportation to schools by wagons and teams had begun in Ohio, Virginia, Louisiana, and Indiana. With transportation, students from one to seven miles could attend a centralized school, which increased enrollment and resulted in organizing schools with four to ten teachers in graded classes.⁴⁷² The transportation to centralized rural schools began in North Carolina in 1915 when six vehicles transported two hundred fifty students to a few multiple-room schools among the other eight thousand schools located throughout the one hundred counties.⁴⁷³ In 1923 there were two hundred fifty-five accredited public rural high schools for white children to attend and eleven for the black children⁴⁷⁴ to attend classes in one of the total of three hundred two schools at all levels that were organized in five or more rooms.⁴⁷⁵

For the thirty two thousand four hundred fifteen enrolled in the high schools in 1924, two-thirds were transported to and from school in one of the five hundred twenty-eight vehicles.⁴⁷⁶ From 1921 to 1928 the number of rural consolidated schools with five or more classrooms more than tripled, increasing the number of students transported to school and requiring purchase of more motor vehicles.⁴⁷⁷ In addition, the growth in centralized school education increased the capital necessary to support the construction for the larger school buildings, which increased four-fold in six years to more than eleven million dollars in 1926–1927.⁴⁷⁸

In 1926, the total expenditures were thirty-six million one hundred seventeen thousand one hundred twenty-seven dollars, which was the largest amount of annual financial support for public education in North Carolina until 1941.⁴⁷⁹ Even though the expenditures were adequate for organizing and operating the growing school system, the requirement of six-month terms for all schools accelerated the inevitable financial problem of assuring every school received the funds to operate the full term.

The problem began with the disconnection between the authority to construct the system and the delegation of authority to organize and financially support the schools. The Constitution of 1868 instructed the General Assembly to provide “by taxation and otherwise for a general and uniform system of Public Schools, wherein tuition shall be free of charge to all the children of the State between the ages of six to twenty-one years.”⁴⁸⁰ To organize and operate a system, counties “shall be divided into a convenient number of Districts” with commissioners responsible for maintaining schools for “at least four months in every year.”⁴⁸¹ In establishment of the superintendent of Public Instruction, the General Assembly chose otherwise and created structure without funding or authority.

The townships and counties were the authorities with the responsibility for organizing, operating, and funding the schools. If a township voted to establish a school, county commissioners were authorized by the Constitution to “levy a capitation tax on every male inhabitant” of the county “over twenty-one and under fifty years of age, which shall be equal on each, to the tax on property valued at three hundred dollars in cash,”⁴⁸² which “shall be applied to the purposes of education and the support of the poor, but in no one year shall more than twenty-five percent, thereof, be appropriated to the latter purpose”;⁴⁸³ however, “State and county capitation tax combined, shall never exceed two dollars on the head.”⁴⁸⁴

Before 1900, the townships within the counties would consider the sum of poll taxes and other sources of income available and then adjust the tax rate on property so that the total amount of funds collected would support the schools for at least a four-month term. As costs to operate increased and in some instances the values of properties decreased, counties reached the limit in tax rate on property and could not collect the funds to meet the sums required the four-month term. During these

four decades when counties provided the only financial support to public school, the legislators of the State of North Carolina were not interested in providing financial support to public schools until 1899 when one hundred thousand dollars was distributed on a per-capita basis among the counties that could assist some of those counties without sufficient financial support from taxes to operate the schools uniformly for the four-month term.⁴⁸⁵

Equal Funding in Education?

With unmet challenges in providing “general and uniform” education in every county, “An act to appropriate two hundred thousand dollars to the public schools of North Carolina” was ratified in March 1901.⁴⁸⁶ The primary purpose for the appropriation was for providing assistance necessary to meet the constitutional requirement of four months for each term in all school districts in every county in the state. Actually, one hundred thousand dollars was appropriated and subsequently “distributed to the respective counties of the State, per capita as to the school population on the first Monday in January of each year, using the school census of the previous scholastic year as a basis of apportionment.”⁴⁸⁷

If a district predicted insufficient local revenue for operating the required four-month term, the county board of education for the district was required to meet with the state superintendent in January to provide to him prescribed data that would validate their prediction. After all the districts and county boards had provided all the predictions of financial shortages, the state superintendent of Public Instruction and the state board of education met to fully investigate, “fix and determine the amount which must necessarily be appropriated to each of said counties to enable each district therein to have a four months term of public school.”⁴⁸⁸ To obtain the money to fund the necessary insufficiencies, the state board of education was required to deduct from their state appropriations “a fixed percentage for all counties alike” with the total deducted amount distributed so that all the public schools operated for four-month terms.⁴⁸⁹

From 1900 until 1914, the expenditures available to support public education increased on average roughly two hundred fifty thousand dollars a year. Included was the per capita and equalizing appropriation from the state treasury that had increased sixfold to six hundred twenty-seven thousand dollars in 1914.⁴⁹⁰

Over the next five years, the total expenditures to support public education increased on the average of more than one million dollars a year to twelve million dollars in total by 1920.⁴⁹¹ With the cost of public education doubling to more than nine million dollars during these five years, the uncertainty about the value of property after a period of inflation created a period of anxiety about the outcome of a

reevaluation. Commissioners were authorized by the General Assembly to conduct the reevaluation in their counties that resulted in a decreased value in some and an increased value in other counties, which eventually resulted in rates varying as much as four to one among the counties for raising local taxes in support of their public schools.⁴⁹²

As a response to the situation, the legislature created the Equalization Fund in 1919 with objectives of minimizing the increase in the county tax rates while at the same time equalizing the amount of money spent on educating each student. To provide the equalizing support, “The State Public School Fund” was created and received funds annually from a levy “of thirty-two cents on every hundred dollars valuation of taxable property in the state for the maintenance of the public schools of the state.”⁴⁹³ In addition, an appropriation paid “one-half the annual salary of the county superintendent and three months salary of all teachers of all sorts employed in the public schools of the county, including the teachers of city, town, township, and all special charter schools, and one-third the annual salary of city superintendents.”⁴⁹⁴ With financial assistance from the State Treasury, the Board of County Commissioners of any county was instructed to prepare a budget that would be sufficient to operate the schools for six months.

After “deducting the amount to be received from the state public school fund,” the county commissioners levied “annually a special tax on all property, real and personal” and other sources of income for the support of the public schools for in each district for six-month terms.⁴⁹⁵ However, the process also required the commissioners to reduce their tax rate when state apportionment and current taxes expected from the current rate exceeded the projected expenditures. For those who may be short of funds even with the twenty-cent-on-a-dollar rate, additional funds would be provided until all schools in all counties could operate for a six-month term.⁴⁹⁶

Education and the Great Depression

Funding

As World War I was ending, the total expenses to operate all the public schools six months a year in North Carolina were increasing on average about four million dollars per year to nearly forty million dollars from 1920 to 1925.⁴⁹⁷ For the next five years, with the increasing cost of supporting the growth in an inefficient system of education, the continuing variations in county property tax rates to equalize opportunities and costs for children to attend a six-month minimum school term, the growth in the annual appropriation to the Equalization Fund, and the complex and unreliable distribution strategy near abandonment, the General Assembly of

North Carolina agreed in 1931 that the six-month term of schools should be assisted directly from the Treasury of the State of North Carolina.

With the combined state and local financial support for public schools increasing during the school year of 1929–1930, the funding from the state for 1931–1932 was seventy-one percent of the total expenses;⁴⁹⁸ however, there was a sixteen percent reduction of the total that year before the twenty-four percent decline to the bottom of the funding to public education in 1933–1934 during the Great Depression.⁴⁹⁹ This sudden decrease in financial support to education probably encouraged the legislators who agreed to “a change in State policy toward public education,” which the superintendent of Public Instruction in North Carolina reported to have “been in the making for some time.”⁵⁰⁰ The new state laws in 1933 reduced the number of school districts by sixty percent, which resulted in closure of small schools and increased the number of centralized schools with larger enrollments, more teachers, and graded classes.⁵⁰¹ In addition, the city schools were reduced by twenty-eight percent, which resulted in the elimination of thirteen percent of the administrative units.⁵⁰² In addition, one of the new laws established the “consolidated term of eight months for the State.”⁵⁰³

Although the legislature may have reacted to the current circumstances created by the Great Depression, the new laws established unity for the future system of education in North Carolina with the coherent methods of state financing and eight months of instruction for the growth in the high schools. Even with the reductions everywhere during the Depression, during the 1930s the number of white children attending high schools increased by sixty percent with forty additional schools available during the decade; however, with a seventy-three percent increase in the number attending, there was an eighty-eight percent increase in the number of high schools available for the black children.⁵⁰⁴ Although more students were attending high schools, the total enrollment increased less than three percent and the number of teachers increased less than eight percent.⁵⁰⁵ However, the depth of the Depression was a difficult time for the teachers when annual salaries fell in rank to forty-seventh in the nation and salaries of teachers in the “highest bracket and experience” were decreased by as much as fifty percent for teaching eight months.⁵⁰⁶

Education During and After the Great Depression

After the death of Dr. Arch T. Allen in 1934, Clyde A. Erwin was appointed by the governor to serve as the superintendent of Public Instruction for the remaining years of the term. Clyde Erwin was born in 1897 into a family in which the grandfather and father were teachers at some point in their lives for more than a total of three decades, which may have influenced young Clyde to earn the money necessary to attend and graduate from Piedmont High School in Lawndale. Subsequently,

accepting the opportunity at a rural two-teacher school at the age of seventeen, Clyde Erwin became the third generation of teachers in his family. After one year, Erwin had earned and saved money to attend the University of North Carolina in 1915 and 1916. Although Erwin did not earn a degree in two years, the remaining thirty-six years of his life were devoted to education as the principal of a school, superintendent of a county schools, and president of the North Carolina Teacher's Association before the age of thirty-three.⁵⁰⁷

Seventy-four percent of the persons in the United States between the ages of five and twenty were attending school in 1930,⁵⁰⁸ which was three percent more than in North Carolina when Erwin submitted his first biennial report to the governor with almost nine hundred thousand children enrolled in the public schools, an average daily enrollment of eight-five percent,⁵⁰⁹ and one hundred sixty-five thousand eight hundred sixty-four students enrolled in eight hundred nineteen high schools.⁵¹⁰ The high school course of study included core courses for graduation, electives to prepare for college, and vocational subjects. The variety of eighty-five courses was spread over four years of high school with courses in seven subject divisions of English, mathematics, social sciences, foreign languages, art, science, and business education with seventeen courses in vocations and five opportunities for individual participation.

The largest number of enrollments were in the core courses of the subject areas required for graduation with English included as a course for four years; mathematics including arithmetic, three years of algebra, and plane geometry; social science including geography, history (United States, North Carolina, and ancient), civics, sociology, and economics; and science including general science, biology, chemistry, and physics which totaled in excess of five hundred thousand student enrollments in one year; however, only nine thousand enrolled in physics and six thousand in chemistry. Probably interested in preparing for an opportunity to become wage earners after graduation, more than twenty thousand students enrolled in the courses in business education, thirteen thousand in agriculture, and three thousand in industrial vocations with just three hundred enrollments in automobile shop, machine shop, electricity, machine drawing, printing, metal work, carpentry, and brick laying.⁵¹¹ Completing all the requirements from among the core courses, twenty-one thousand students graduated in the school year of 1934–1935 from public high schools in North Carolina.⁵¹²

Although the budget for 1935–1936 was almost thirty percent more than at the bottom of year 1933–1934, the pre-Depression levels of wages for teachers were not restored, nor were the reductions in the number of students in the classrooms; however, Erwin was optimistic about the basics in a trying situation and convinced that “the foundation of a great State system of schools appears to have been laid soundly.”⁵¹³ After positive affirmations about future opportunities expressed in the

report, Erwin began his sixteen years as superintendent by recommending improvements that would require the attention and additional appropriations from the General Assembly with highest priority for enough funding to increase the average salary of teachers in North Carolina to reach the rank of fortieth, which was the average salary ranking among the states before the previous salary reductions.

Included as a recommendation in the report, Erwin began his long term as superintendent with an emphasis on vocational education in "larger type high schools not only to meet the demands in the field of Agriculture, but also in Homemaking subjects, in Trade and Industrial subjects, and in Business Education including distributive occupations."⁵¹⁴ In a time of tight budget the recommendation was appropriate since the vocational teaching members of the high school were faculty but paid by a cooperative agreement between the federal and state governments and the local administrative unit. Those teaching the trades and industrial arts were recruited from industry and trained to become effective teachers. Throughout the Great Depression the enrollment in vocational departments of agriculture, home-making, and in trades and industrial education continued to increase as the high schools grew in number by more than two hundred and nearly reached one thousand in the 1930s.⁵¹⁵

In the depth of the Depression, more than thirteen thousand boys and adults enrolled in day classes or evening part-time short courses on the vocational subject of agriculture with the students participating in supervised farming practices and adults in hundreds of communities engaged in "improving the farm practices and in lifting the level of rural living wherever they have been conducted."⁵¹⁶ More than seven thousand girls and women enrolled in the day and evening classes devoted to homemaking as an enterprise with the responsibility of managing money, time, family affairs, and production of necessities. Although classes for the trades and industrial education were conducted all day, part-time, or evening, the chief emphasis was "placed upon part-time and evening class instruction rather than upon the day-trade school, since the State has no large industrial and urban centers."⁵¹⁷ Nearly six thousand students were enrolled with the mill workers in attendance preferring evening classes with instruction in the "more technical phases of the job he is working at during the day" in "textiles, furniture manufacturing, paper making, and the building trades."⁵¹⁸

Education Response to War

In 1941, the legislature enacted a law that "provided for the extension of the public school system to embrace twelve grades, the cost of the same to 'be paid from the appropriation made for the State eight months' school term in the same manner and

on the same standards.’⁵¹⁹ Superintendent Erwin considered the additional year of classes as a matter of “first-rate significance” to the elementary school so that students can “complete what has heretofore been undertaken” and be better prepared for “the achievements of students on the high school level.”⁵²⁰ However, the event of December 7, 1941 at Pearl Harbor in Hawaii influenced almost everything about the importance of education and about the content of the instruction. With tanks, ships, airplanes, radios, and eventually radar to be manufactured by civilians and operated by soldiers, sailors, and marines on the frontlines, millions of troops were mobilized for battle and civilians were activated and trained to operate, manufacture, assemble, and repair complex machines of war.

As World War II began, State Superintendent Erwin reminded the mathematics teachers that the “representatives of the armed forces of the nation have called attention to the fact that young men drafted for military service were lacking in a knowledge of the fundamentals of arithmetic and other mathematical subjects” and that more young men should take physics in preparation for serving in the armed forces.⁵²¹ In response, algebra, geometry, and trigonometry were added in grades ten, eleven, and twelve for students preparing to enter the military or war industries. In addition, the publication *War-time Program in Mathematics and Physics* was circulated to math teachers and outlined “the essential elements in mathematics needed by young men who will enter the armed forces” with emphasis also for “the use of mathematics in military and industrial activities.”⁵²²

“The National Defense Training Program for Out-Of-School Youth” was assigned to the Vocational Education Department of a high school with the local teacher of agriculture responsible for a program for youth between the ages of seventeen and twenty-five. The purpose of the program was to train youth to serve as a back-up work force in “National Defense industrial employment” or in mechanized agriculture.⁵²³ The training included auto mechanics, metal working, woodworking, and elementary electricity. The courses were one hundred and twenty hours in total class time and eight weeks in attendance.⁵²⁴ In the three hundred eighty-three Vocation Education Departments in North Carolina in which the program was organized, there were more than eighteen thousand youth enrolled in almost fourteen hundred classes.⁵²⁵

In addition to the National Defense Program, the Smith-Hughes Department of Agriculture program enrolled more than thirty thousand pupils who attended classes to be “more efficient in their life work” on the farm.⁵²⁶ In preparation for the uncertainties of war, more than thirty thousand girls attended classes in home economics that emphasized the wisdom of producing and conserving “food, clothing and equipment, to prepare foods that insure strong healthy bodies, and to be prepared to care for the sick in the home.”⁵²⁷ The Trade and Industrial Education Department shared space with the National Defense Program; yet fifty of the largest

units enrolled more than one thousand students who participated in a program with technical instruction in the school and shop experience in the industry.⁵²⁸ In addition there were more than eleven thousand employed workers who enrolled in more than six hundred classes in technical subjects to become eligible for a promotion.⁵²⁹

A program for adults with many of the already employed and somewhat outside the main instructional curriculum of the high schools was "Vocational Training for War Production Workers." The shops and classrooms of the high schools provided the space, and an act of Congress provided the funding. The training program focused on skills for pre-employment, supplementary to a current job, preparing for a supervisory position and a military branch of government. The industries included shipbuilders, airplane manufacturers, textile mills, and communication companies with two hundred fifty instructors recruited from those companies who were woodworkers, metal workers, welders, mechanics, blacksmiths, patternmaking, fitters, and machine tool operator trades. After two years, there were three thousand persons who had enrolled with about eight weeks required for each trade class.⁵³⁰

A program in distributive education to provide training in merchandising began in 1939 with vocational training in the senior year. With work experience and pay throughout the year, the enrollment grew rapidly from one class to fifteen and enrollment of three hundred students in just two years.⁵³¹ The number of enrollments in the twenty business education elective courses exceeded fifty thousand with most of the enrollments in less than half of the high schools.⁵³² With the recovery of jobs from the collapse of the economy during the Great Depression and the build-up to wage war, the training for employment was expanding in the public high schools, and the State Department of Public Instruction created "An Occupational Informational and Guidance Service" to develop literature, meet with civic groups, promote and train occupational guidance counselors, and evaluate and develop programs for improving the services of the guidance programs.⁵³³

During World War II, the General Assembly increased the funding to the public schools by more than forty percent,⁵³⁴ which resulted in more than a fifty percent increase in the salaries of the high school teachers; but it was a salary of only about one percent more than they were paid in 1930.⁵³⁵ Although authorized by the General Assembly in 1941, the enrollment in the twelfth grade was seventy-five percent less than the eleventh grade due in part to seventeen- and eighteen-year-old boys entering the military.⁵³⁶ World War II also awakened a new era in education in America. The decisions of the past leaders who doubted the urgent values earned in education were challenged by the outcomes for the children who attended the public schools in North Carolina.

By 1950 there were nearly eleven thousand school buses transporting more than seven hundred thousand students to twenty-five hundred schools in North Carolina.⁵³⁷ However, there were nearly one thousand elementary schools with fewer

than three teachers, and two-thirds of them were teaching black children.⁵³⁸ In addition, about one-third of the high school students were taught all their courses throughout all the grades by fewer than five teachers employed, and almost all of those students were black.⁵³⁹

The average expense per pupil in North Carolina was sixty percent of the national average and ranked eighth from the bottom. However, the teachers' salaries had improved to eighty percent of the national average and ranked thirty-seventh among the fifty states.⁵⁴⁰ Superintendent Erwin was certainly proud of this achievement; but unfortunately he died in 1952 at the early age of fifty-three. Before 1950, more than one in four of the employed workers in North Carolina were unskilled with an average of about seven-and-one-half years of education for persons over the age of twenty-five, which was the fifth from the bottom when compared to all the states.⁵⁴¹

However, the years of education for the rural and black population were at the bottom or next to last by a year or more when compared to the appropriate cohorts.⁵⁴² Although vocational education contributed to the livelihood of choice for many of the children who selected agriculture and home economics, less than one in five enrolled in classes devoted to trades and industrial instruction.⁵⁴³ Consequently, North Carolina was tenth from the bottom in the country in the percentage of skilled labor among the population; about one-half of the percentage in Ohio where Tompkins sought skilled labor at the turn of the century and decried the shortage in North Carolina and the inability to attract higher-wage jobs to the state.⁵⁴⁴

Education for Black Students

Establishing the Schools

Although, with financial support, student attendance, class room instruction, school houses, and local administration steadily improved the education in the public schools of North Carolina during the first half of the twentieth century, many of the unmet challenges in educating black children were embedded in lingering racial prejudices that influenced the societal, political, and cultural reactions of the white people toward the black people. During the four decades after the Civil War, the controversies among the citizens of North Carolina resulted in an uncertain beginning in free education for black as well as for white children. In addition, school districts were formed only by a vote of citizens who were willing to tax themselves for the purpose of free education for all the school-aged children.

With every voter wanting the school next door, the primary challenge in establishing effective and efficient free public education was the difficulty in the location, the geographic size, and the number of students associated with each school district, unless you were a black child. The school districts were established by the white and black voters; but the black community was always at a disadvantage since their population density was on the average about one-third that of the white voters. After some consolidation of districts before 1908, the average size of a black school district was about twenty-one square miles as compared to nine for the white children with an average of eighty-two and seventy-six students in the corresponding school districts.¹

If white and black children had attended the same schools, the average size of the school district for an enrollment of seventy students and a one-or two-teacher school would have been reduced to about six square miles. Even with the establishment of schools that depended on local taxes and with the disadvantage of the

larger commuting distances, nearly forty percent of those students who attended a public common school in North Carolina in 1881–1882 were black children.² That same year, more than fifteen hundred students were training to become teachers at the ten state-aided Normal schools (including locations in Chapel Hill, Fayetteville, Elizabeth City, Franklin, Newton, Franklinton, New Bern, Salisbury, Graham, and Raleigh), at the four private schools (Whitin in Lumberton, Tileston in Wilmington, Wilmington, and Kinston), and at Shaw University.³

For the next two decades, while attendance was voluntary in the rural schools, a higher percentage of black children than white children between the ages of six and twenty-one enrolled in the rural public common schools in North Carolina.⁴ Subsequently, the percentage increase in literacy among black children was greater than among white children, with about an equal number of black and white persons between the ages of six and twenty-one who could not read nor write and together about five percent for the entire group.⁵

To educate these children of the former slaves required something the southern states had outlawed, school teachers for black children. An unexpected reversal of the circumstances occurred after the Civil War ended. Colonel Samuel Chapman Armstrong had commanded the Ninth Regiment United States Colored Troops.⁶ Experiences as commander of the regiment influenced the direction of life for a young man who was born in Hawaii in 1839, graduated from Williams College in 1862,⁷ joined the Union army at age twenty-three,⁸ and earned a promotion to major at the Battle at Gettysburg.⁹ Subsequently, he was promoted to brigadier general by brevet after the war ended. In 1866, General Armstrong joined the Freedmen's Bureau in the Tidewater area of Virginia to work with the former slaves as they adjusted to the freedom and responsibility of citizenship.¹⁰

Recognizing a need and an opportunity and with assistance from the American Missionary Association, General Armstrong established the Hampton Normal and Agricultural Institute in 1868 at the age of twenty-nine with two objectives in mind for the students: "One is the training of the intellect, storing it with the largest amount of knowledge, producing the brightest examples of culture; the other is the more difficult one of attempting to educate in the original and broadest sense of the word, to draw out a complete manhood."¹¹ The institute was organized as a "non-sectarian, but strongly Christian" private corporation under the control of a board of seventeen trustees.¹²

Designated for land-grant education by the State of Virginia, Hampton Institute received "interest on one-third of the Land Scrip Fund" that was "appropriated to the school toward the agriculture and military training of its students."¹³ Hampton was coeducational, devoted to labor and study, "opposed instruction in the dead languages, favoring an elementary course with certain disciplinary studies, on the

ground that 'vital knowledge cannot be got from books; it comes from insight, and we attain it by earnest study and thought under wise direction'.¹⁴

In 1872, a young black man who was born a slave was working in a coal mine in West Virginia when he heard two coworkers talking about a school located in Virginia where black students were attending. Inspired by the opportunity, he left the coal mines and traveled five hundred miles to enroll in Hampton Normal and Agricultural Institute.¹⁵ Booker T. Washington graduated in 1875 and taught at other schools until 1881 when he took charge of a Normal school in Tuskegee, Alabama.¹⁶ The founding features of the curriculum, the character, and the energy of the institute were driven by Washington, who often reminded students "that it was not a disgrace to labour."¹⁷ Furthermore, Washington challenged the students' character to learn to "love labour, not alone for its financial value, but for labour's own sake and for the independence and self-reliance which the ability to do something which the world wants done brings."¹⁸

The Tuskegee Normal School was chartered by the Alabama Legislature in 1880 and opened to thirty students in 1881. As general information, the students were reminded that: "Work is required of all the students for purposes of discipline and instruction and of teaching the dignity of labor."¹⁹

As black children were enrolling at Hampton Normal and Agricultural Institute in Virginia for instruction in a course of study in normal and manual education, the Peabody Fund was supporting common and Normal schools for black and white children in the southern states; but the fund was mostly concerned about convincing the voters to support, by taxes, free education for all children. Continuing their support in 1875, forty-seven (the largest per state) common schools in North Carolina received a grant from the Peabody Fund totaling more than sixteen thousand dollars, which included three common schools for black children.²⁰ At the February 1880 meeting of the Peabody Board, Agent Barnas Sears spoke positively about the progress in the creation of free public common school systems in all the southern states, which had been his aspiration for more than a decade. Sears considered the remaining obstacle for free common schools to be "not so much in the apathy of the people, as in their inability to provide the means for their support."²¹

Sears was pleased with the "coincidence that, at the time when this Board is turning its chief attention to the improvement of the education given in the public schools, a wide-spread opinion is simultaneously springing up that the greatest want now existing in the several States is that of well-trained teachers."²² Sears became ill in March and died in July 1880; at the next meeting in February 1881, the board elected Dr. J. L. M. Curry as the second general agent of the Fund.²³ In his first report to the board, Curry embraced the "instruction of the Board to apply the greater portion of the income of the Fund hereafter to the education of teachers for public schools."²⁴ However, he continued by reminding the trustees that "error and

prejudice linger in the public mind in reference to the art of teaching.”²⁵ With the current circumstances, Curry described teaching as “too often a mechanical routine, and is resorted to as a mere temporary make-shift.”²⁶

The “locomotive Normal Schools,” better known as the Teachers’ Institutes, when conducted properly, can “bring to the teachers the ripe experience and the best methods of their most advanced and successful collaborators.”²⁷ Even so, “Thorough and scientific teaching, while supplying a need, will elevate the profession, raise the standard of public schools, popularize our educational systems, and conduce to the working out, more perfectly, of the *science of education*.... The establishment of Normal Schools for white and colored teachers has been earnestly advised, and aid has been promised to States which may establish them, so as to ensure permanency and efficiency.”²⁸

The following year a charitable trust was established by John F. Slater to assist in “the uplifting of the lately emancipated population of the Southern States, and their posterity, by conferring on them the blessings of Christian education.”²⁹ In addition Slater suggested that, with the current circumstances, the “training of teachers from among the people requiring to be taught” should be preferred.³⁰ In addition, the trustees confined the financial aid to schools “which give instruction in trades and other manual occupations, that will enable colored youths to make a living, and to become useful citizens.”³¹

After Atticus G. Haygood, who had been president of Emory College, accepted the offer as the general agent for the Slater Fund, he informed the trustees that few “higher grade schools for colored youth have made any experiments in connecting handicraft training with instruction in books.”³² In addition, Haygood told the trustees that many of the experienced educators in Normal schools saw no “wisdom” in the addition of industrial training. With his responsibility to introduce lathes, forges, brickmaking, handicraft, homemaking, and farm work into the higher grades in the schools for educating the black youth, Haygood admitted that “I find a growing conviction of the utility—not to say necessity—of industrial training.”³³

In 1883, twenty-eight educational institutions in the southern states were awarded grants, including Scotia Seminary in Concord and Shaw University and Leonard Medical School in Raleigh, North Carolina. Of the twenty-eight, only three high schools and one university identified the normal courses of study in the name of the institution; however the normal study was included in a diversity of institutions that included two high schools, seventeen universities, two seminaries, three colleges, and two institutes that reflected the uncertainty as to the level of instruction and the relationship of the training of teachers to the pedagogy and to the mastery of the subjects they were expected to teach at different levels in public schools.³⁴ With most of the original recipients of Slater funds included in 1890, the

number of institutions receiving support increased to thirty-six with the sum of the apportionments at forty-three thousand dollars and two institutions from North Carolina—Biddle University in Charlotte and Livingston College in Salisbury—added to the list.³⁵

After eight years of encouragement, Dr. Haygood concluded that “As to Industrial training, so far as schools for negroes are concerned, the discussion is now at an end.... An important result of the Slater work in the South (and how important and far-reaching it were hard to say) is this: the industrial training, introduced and fostered by the Slater Fund, has made the cause of negro education more friends among Southern white men than all speeches and writings put together.”³⁶

In 1890, Haygood resigned as agent to accept the position as bishop of the Methodist Episcopal Church of the South. After establishing an education committee, with the chairman reporting for that committee to the board, Dr. J. L. M. Curry, without dissent from the Peabody Fund, was elected as a member of the Board of Trustees and chairman of the Education Committee.³⁷

Not to be considered of lesser importance, the Peabody Fund continued the appointment of Curry as their general agent and elected him to serve as an honorary trustee. As a member of both funds devoted to training teachers and in charge of their education agendas, Curry was influential in the development of Normal schools in the southern states during the last decade of the nineteenth century. In his first report to the trustees, Chairman Curry proposed policies to the trustees regarding the priorities of the apportionment to ensure that the fund “cannot undertake distinctively religious work,” or “waste... money and energy” where “States and Municipalities are making ‘adequate and public provision of education’” and “must search for fields of operations where it will be most efficacious.”³⁸ Curry suggested that the fund could provide “relief of State Normal Schools,” if restricted in numbers, but “Manual or industrial training has been a first principle with the Trustees. It may now be regarded as a fixed policy.”³⁹

Curry was concerned about the aid to so many schools but recognized that, although concentrating the awarding of funds on fewer institutions would result in “complaint and criticism,” there is the “promise of better and more enduring results.”⁴⁰ To begin the process, Curry developed a plan based upon his belief that “boys and girls, when they leave school, are fit for no occupation,” except for those who become teachers, preachers, and physicians, and that “Negroes are not the propertied classes and must earn a living from productive employments.”⁴¹ The plan for teacher training that guided the Slater Fund was described by: “What is needed, along with a common school education, is some practical knowledge, some mechanical or manual skill, which will be immediately available in wage earning, or for ‘bread and butter’. Manual training, thorough and varied, becomes essential

to dignify labor and show its indispensableness and impart habits of steady and intelligent industry.”⁴²

Curry reminded the trustees that “We are too apt to ignore or underestimate the influence of women on home-life, on religious and social life, on civilization.... A race cannot be improved except by ennobling the women.”⁴³ “All agree that the negro needs a special training to meet his deficiencies, whether they be racial or the result of environments. Industrial training, next to religious, is probably the most important factor in the proper education.”⁴⁴ In 1891–1892, the United States commissioner of Education reported that thirty-five hundred black students were enrolled in thirty-nine institutions with instructions in a course of study in a Normal school.⁴⁵

Tuskegee Normal School admitted its first students about the time that the Slater Fund was seeking opportunities to support institutions that had established programs to train teachers. Initially, the Slater Fund supported more private than public institutions, but Tuskegee was uniquely private with management by a board of trustees and supported in part by the State of Alabama. With the initial decisions to emphasize the correlation of industrial instruction with Normal academic studies, Tuskegee and Hampton Institutes always received the largest grants from the Slater Fund. However, Tuskegee developed in a manner more industrial than a Normal institute. With his experience at Hampton and Tuskegee, Booker T. Washington believed that “It has been necessary for the Negro to learn the difference between being worked and working—to learn that being worked meant degradation, while working means civilization; that all forms of labor are honorable, and all forms of idleness disgraceful.”⁴⁶

In fact, Washington expressed his concern that: “Many seem to think that industrial education is meant to make the Negro work as he worked in the days of slavery”;⁴⁷ consequently, many young black men and women avoid preparing to earn wages in the trades and manual labor because their parents were worked with the same labor, and now these young people are “educated in literature, in mathematics and in the sciences”⁴⁸ instead of “the forces of nature—air, steam, water, horsepower and electricity,” which “work for him.”⁴⁹

Our knowledge must be harnessed to the things of real life. I would encourage the Negro to secure all the mental strength, all the mental culture—whether gleaned from science, mathematics, history, language or literature that his circumstances will allow, but I believe most earnestly that for years to come the education of the people of my race should be so directed that the greatest proportion of the mental strength of the masses will be brought to bear upon the every-day practical things of life, upon something that is needed to be done, and something which they will be permitted to do in the community in which

they reside. And just the same with the professional class which the race needs and must have, I would say give the men and women of that class, too, the training which will best fit them to perform in the most successful manner the service which the race demands.⁵⁰

Therefore Washington aggressively defended his belief that “Some manual labor is required of all, for the purposes of discipline and instruction, and of teaching the dignity of labor.”⁵¹

By 1897, nearly three thousand students had attended Tuskegee Normal School with about three hundred graduating and entering the classroom as teachers in the public schools in Alabama and other southern states.⁵² Although not a public school, the “Tuition is free, being provided by the State and generous individuals.”⁵³ All applicants were required to be at least fourteen years of age when entering directly into the classes of the preparatory subjects of a Normal education in four years of study or into classes of adequate preparation for Normal school subjects.⁵⁴

The academic requirements for the Normal program began with “arithmetic as far as common fractions, grammar, geography as far as the study of the United States, reading, spelling, music, and drawing.”⁵⁵ During the second year, all the subjects required as Normal preparation were continued with arithmetic extended to percentages, and United States history began. In the third year, the students were divided with one class finishing arithmetic, beginning algebra, finishing history, and adding civics and physiology. The other class finished algebra and began geometry, bookkeeping, geology, physics, and chemistry.⁵⁶

Normal courses of study in the senior year included “psychology, rhetoric, English and American Classics, ethics, pedagogy, and a review of the English studies of the previous year.”⁵⁷ In addition the academic curricula for the Normal school was concurrent with the instruction and application of thirty trades, from which the students who enrolled in the Industrial Department selected work in carpentry, blacksmithing, printing, brick masonry, brick making, mechanical and architectural drawing, electrical and steam engineering, sewing, dressmaking, cooking, nursing, agriculture, dairying, and horticulture. Washington knew that all his graduates would not farm nor work in industry, but he did want their studies to be “more than the mere performance of mental gymnastics.”⁵⁸

Education for Black Children

During the decades after the Civil War when the southern states were struggling to establish segregated public school systems, a young black boy, William Edward Burghardt Du Bois, was attending schools in Great Barrington, Massachusetts where he was born in 1868. Du Bois came south to attend Fisk University at

Nashville, Tennessee in 1885 and graduated in 1888 with a BA degree. Subsequently, he enrolled at Harvard as a junior, graduated with a bachelor's degree in 1890, and continued until earning the MA in 1891 and the PhD in history in 1895. Du Bois taught for two years at Wilberforce University before spending a year at the University of Pennsylvania and then beginning a twelve-year career as a professor at Atlanta University where he taught history, economics, and organized the Department of Sociology. Shortly after Du Bois arrived, his popular literary statement about the racial divide in America and the effort to achieve freedom, justice, and opportunity as described in the *The Souls of Black Folk* brought additional attention to his academic accomplishments.

In 1896, the first in a series of annual meetings that were entitled the "Conference for the Study of the Negro Problem" was held at Atlanta University, with a subsequent report edited by Du Bois as the corresponding secretary. As the editor, Du Bois prepared a number of questions for each conference that were sent to participants and potential contributors to gather opinions and facts about topics of concern. In the fifth conference in 1900, the study was devoted to "The College-Bred Negro" with questions about occupations, benefits, teaching experiences, and the future of higher education for them.⁵⁹

The editor admitted that the "charges brought against the higher training of Negroes in the past, have much of truth in them. The defects, however, lay in the application of the principle, not in the principle; in poor teaching and studying rather than in lack of need for college-trained men. Courses need to be changed and improved, teachers need to be better equipped, students need more careful sifting. With such reform there can be no reasonable doubt of the continued and growing need for a training of Negro youth, the chief aim of which is culture rather than bread-winning."⁶⁰ Du Bois wrote to college and university presidents and asked them: "Is the college training of Negroes necessary?"⁶¹

In general, the responses were similar to the one from President David Starr Jordan of Leland Stanford Junior University: "I believe fully in the higher education of every man and woman whose character and ability is such as to make such training possible. There are relatively fewer of such persons among the Negroes than among the Anglo-Saxons, but for all of these the higher training is just as necessary and just as effective as for any one else. For the great body of the Negroes the industrial and moral training already so well given in certain schools seems to me to offer the greatest hope for the future."⁶²

As a follow-up about the importance of education, the 1901 conference was a study of "The Negro Common School," which ended with the editor declaring that "The Negro race in the South needs teachers today above all else."⁶³ Furthermore, he reported that contrary to popular opinion among the black community, there is not an oversupply of teachers; instead, the "mass of so-called 'normal' schools for the

Negro are simply doing elementary, common school work, or at most, high school work with a little instruction in methods.”⁶⁴ Du Bois declared that “The Negro colleges and the post-graduate courses at a few other institutions are the only agencies for the broader and more careful training of the teachers.”⁶⁵ Moreover, there “are today less than 2,750 living Negro college graduates in the United States; and less than 1,000 Negroes in college.”⁶⁶

To further add to the concern about teachers, in the “164 schools for Negroes, 95 percent of their students are doing elementary and secondary work, work which should be done in the public schools.”⁶⁷ To illustrate this concern, Du Bois stated that “The truth of this has been strikingly shown in the marked improvement of white teachers in the South. Twenty years ago they were not as good as the Negro teachers. But they, by scholarships and good salaries, have been encouraged to thorough normal and collegiate preparation, while the Negro teachers have been discouraged by starvation wages and the idea that any training will do for a teacher.”⁶⁸ In his essay, “The Talented Tenth,” Du Bois noted that in the United States there were “thirty-four institutions giving something above high school training to Negroes and designed especially for this race.... As a matter of fact six institutions—Atlanta, Fisk, Howard, Shaw, Wilberforce and Leland, are the important Negro colleges so far as actual work and number of students are concerned.”⁶⁹ There were seven hundred fifty students enrolled in these schools where the content of the curricula was “about a year behind the smaller New England colleges.”⁷⁰ Du Bois concluded the report of the Sixth Conference for the “Study of Negro Problems” by stating, “We need Negro teachers for the Negro common schools, and we need first-class normal schools and colleges to train them. This is the work of higher Negro education and it must be done.”⁷¹

In a speech at Trinity Church in Boston, Charles W. Elliot, president of Harvard College, said, “If any expect that the Negro teachers of the South can be adequately educated in primary schools or grammar schools or industrial schools pure and simple, I can only say in reply that that is more than we can do at the North with the white race. The only way to have good primary schools and grammar schools in Massachusetts is to have high and normal school and colleges, in which the higher teachers are trained. It must be so throughout the South: the Negro race needs absolutely these higher facilities of education.”⁷²

Although Du Bois was convinced that the “Talented Tenth” of black men, who were prepared by experience and education, would “guide and lead the millions of this struggling race along paths of intelligent and helpful co-operation,” he was not opposed to industrial training if higher education was not neglected as an essential partner in training teachers.⁷³ To investigate a measure of the importance of industrial training, “The Seventh Conference for the Study of Negro Problems” developed almost “at once a continuation... in both economic and educational”

advancement and a “study of skilled work and the training of black boys for it.”⁷⁴ “The Negro Artisan” was really a study of the opinions of the trade unions, the industrial schools, and the educators’ responses to questionnaires from the Conference Committee about racial prejudice among the members of the trades, memberships in unions, wage discrimination, performance of graduates working in the trades, skills taught at the schools, and preferences in achieving the required skills.

The responders encouraged training for young black men although “only in exceptional cases were they first-class mechanics.”⁷⁵ Racial prejudice was evident with just three percent union members black men; however, the skilled labor of a black man was recognized as becoming more efficient.⁷⁶ For preparation in a trade, there were ninety-eight education institutions in which more than twelve thousand black students were trained in one or more of twelve “industrial branches” with the vast majority enrolled in agriculture, carpentry, sewing, and cooking.⁷⁷ With industrial training expanding throughout the institutions of all academic levels from high school to university, Du Bois recalled that Dr. Haygood was “entirely convinced, that we cannot make industrial training self-sustaining, without sinking, to a hurtful degree, the educative part of the work in the effort to secure ‘profits.’”⁷⁸ Therefore, “Two distinct ideas must more and more become clearly differentiated in such a school: a) the education of youth and b) the teaching of trades.”⁷⁹

Therefore, Du Bois concluded that:

To some small extent, or for short periods of time, these objects may be combined, but in the long run, and in any permanent educational system, they must be clearly seen as differing, and to an extent, incapable of complete combination. The so-called industrial schools will, therefore, in the next decade in all probability divide into two distinct parts: a department of common and grammar school training with perhaps higher courses, in which manual training, as an educative process, will play a pronounced part; and a department of Trade instruction to which only youth of a certain age and advancement will be admitted and which will turn out thorough, practical artisans.⁸⁰

Du Bois had learned that the “Negro evinces considerable mechanical ingenuity,” however he was concerned that the opportunity could be muddled “by half trained men and guided by selfish and sordid interests and all the evils of industrial history may easily be repeated in the South. ‘Wisdom’ then ‘*is the principal thing; therefore, get wisdom, and with all thy getting, get understanding.*’”⁸¹

While the system of free public education for black children was expanding in North Carolina, many of the common schoolteachers were trained in a course of study at a private academy, seminary, college, or university that had been established after the Civil War with donations from northern churches. Four years after the first state-supported Normal school for blacks was organized in North Carolina at

Fayetteville in 1877, and at the same time that five Normal schools were established for training white teachers, additional public Normal schools for training black teachers were organized at New Bern, Plymouth, Franklinton, and Salisbury. After reviewing four years of training teachers at the ten Normal schools, Superintendent Finger reported in 1885 that "A very common idea is, that a knowledge of subjects is the main if not the only necessary qualification, while very little importance is attached to the science of education or art of teaching"; but the progress in teaching and school government has resulted in new methods in education, which "in many respects, are as superior to the old as the locomotive train is to the stage coach."⁸²

Therefore, if colleges and universities, male and female, would require for graduation "some knowledge of the science and history of education, the art of imparting instruction and of school government... the standard of qualification of all teachers would soon be very much raised."⁸³ The superintendent agreed with the importance of higher education by stating that: "If the colleges would give attention to the principles underlying good teaching in a more substantial way, these principles would be more fully appreciated and would be specially reflected from the best educated people, the collegians, down through the high schools to the free public schools, and teachers would soon be held in higher estimation."⁸⁴

Without expressing a reason for racial discrimination, Finger stated the need to establish "a regular Normal School for white teachers, in which persons who have elsewhere acquired a fair knowledge of the branches usually taught in the public schools may get the best possible instruction in the science and history of education and in methods."⁸⁵ The course of study at the "regular Normal School" would be supervised by professors and include instruction at the level of higher education when appropriate. Without describing the importance of the academic program with criticism or recommendations, Finger simply ended his evaluation of the Normal schools by expressing a concern that the five hundred dollars per annum for the Colored Normal Schools was "to each, a sum entirely inadequate to support them."⁸⁶

In addition to reporting the authorization by the legislature to establish the State Normal and Industrial School in Greensboro for young white women, Superintendent Finger included in his biennial report to the governor for the scholastic years 1891 and 1892 that "The Normal Schools for the colored people and the Croatan have been so successful that I have no recommendation to make as to any changes."⁸⁷ However, the principal from Fayetteville reported the loss of "one-fourth of its funds during the year";⁸⁸ the principal from Franklinton reported the loss of all the state support;⁸⁹ the principal from Plymouth reported the "best session in the history of the school" while graduating only six young men and one young lady;⁹⁰ the principal from Elizabeth City reported the effort to raise enough money to repair a building;⁹¹ the principal from Goldsboro reported the disappointment in the

delay of industrial instruction in carpentry while only two in a senior class of five in the Normal school received diplomas;⁹² the principal from Salisbury reported the difficulty in finding “comfortable” homes for students;⁹³ and the principal at Croatan reported only that the school opened and closed with one teacher each term.⁹⁴ Collectively, the Colored Normal Schools reported an enrollment in excess of eight-hundred students; but only thirteen seniors graduated.⁹⁵

After elected to replace Finger as superintendent of Public Instruction of North Carolina, C. B. Mebane reviewed the Colored Normal Schools and reported that he had found “that a great deal of the work done is not thorough and is not practical.... I find great haste to get away from arithmetic, geography, spelling, and English grammar, in order to study Latin, algebra, and other higher studies, for which the most of the colored teachers will never have any practical use, none whatever, especially those who teach the public schools.”⁹⁶ Mebane would have been in favor of more challenging studies for the students enrolled in the Normal schools if the “lower studies are mastered first”; because the object of these “so-called Normal Schools” was to teach the pupils the studies that are required in public schools so that as teachers they “know how to impart this knowledge to their pupils.”⁹⁷

The establishment of a State Normal and Industrial School for young white women in Greensboro was the first step in state-owned and -supported institutions devoted entirely for the purpose of training teachers. At that time the tuition at the State Normal and Industrial School was waived for those who graduated and taught in North Carolina public schools for two years. The course of study was arranged in two semesters for each of four years and taught on a residential campus so that students could attend from anywhere in the state. The major studies that included subjects, methods, and history for educating and training teachers in the normal department were required for those students enrolled in the Domestic Science Department and Commerce Department. As the “regular white normal school” was graduating teachers for the white public schools, the colored Normal schools were about to be rearranged when Mebane recommended reducing the number of Colored Normal Schools to Elizabeth City, Fayetteville, and Winston, which he defended by declaring that “we are now spending the money and are not producing a class of strong teachers.”⁹⁸

After learning about the recommendation, Curry stated that “Normal Schools are frequently only so in name, and hence are deceptive and injurious. Three real Normal Schools for the training of colored teachers, properly located and supported, with *competent* and *faithful* instructors, would accomplish a vast good. We need to get rid of incompetence in both white and colored schools, to divorce from politics and mere local selfishness, and give children the benefit of men and women who know how and what to teach.”⁹⁹ For decades, the primary support for Normal training for teachers in public common schools depended on the shame of illiteracy

and the right to vote; however, the public support for high schools was not focused on pride or suffrage. Beyond literacy, public secondary education for the poor and average black person was a necessity for the preparation to enter a university. From 1850 to 1950, the continuing development of machines, transportation, commerce, and communications were influencing the culture, society, and economy of communities in the United States with an education in public high schools rewarding in wages the more educated workers.

When Governor Aycock endorsed white supremacy and successfully convinced the legislature to substantially increase funding for education, he vowed to resign if the black schools did not receive their rightful share of the new funding. After he appointed his friend John Joyner to fill the vacancy as superintendent of Public Instruction due to the death of the elected superintendent, Joyner reminded the governor that "the apportionment of the school fund in each county is practically placed absolutely under the control of the County Board of Education, the only restriction laid upon the Board therein being that the funds shall be apportioned among the schools of each township in such a way as to give equal length of term as nearly as possible, having due regard to the grade of work to be done, the qualifications of the teachers, etc. The Constitution directs that in the distribution of the fund no discrimination shall be made in favor of either race."¹⁰⁰ Aware that white voters were claiming that they were paying for some of the costs for the education of the black children, Joyner included an accounting of the 1904 total expenditures in education that illustrated that one-fifth of the funds supported schools attended by black children who were one-third of the school population and that four-fifths of the funds supported schools attended by white children who were two-thirds of the school population.¹⁰¹

After addressing the taxation apportionment concerns of the white voters, Joyner provided statements about the status of education for black children in North Carolina that must have been disappointing to the black voters. "Their teachers are not so well qualified and have not spent so much money on their education, their expenses of living are much less and, therefore, they do not need and ought not to have as much per capita for the education of their children."¹⁰² In addition, "we need not be entertaining many hopes of giving the negro much helpful industrial education yet, for everybody ought to know that this amount is not sufficient to give this number of children thorough instruction in the mere rudiments of reading, writing, and arithmetic, so essential to civilized living and intelligent, efficient service in the humblest calling of life."¹⁰³

Shaw University was the only institution in North Carolina that continually received a grant from the John F. Slater Fund from the beginning when the support from the fund required that Normal schools include industrial training for all students who enrolled in teacher training.¹⁰⁴ The State Colored Normal School

at Franklinton had been the only public Normal school in North Carolina to receive a grant from the Slater Fund until a "Public Law" was passed in 1895 that required "the Board of Education to establish a Normal School at or near Winston or Salem... for the teaching and training of teachers of the colored race."¹⁰⁵

In 1892, the Slater Industrial Academy was located in Winston. With the efforts of Dr. Simon G. Atkins—who was born a slave in 1863, educated in village schools and at Saint Augustine Normal and Collegiate Institute, joined the faculty of Livingston College, was involved in organizing and served as president of the North Carolina Teacher's Association, chosen as principal of the Graded Schools in Winston, North Carolina—embarked on the successful effort to convince the John F. Slater Fund to financially support the establishment of an industrial academy for black girls and boys that opened as a one-room schoolhouse with one teacher and twenty-five students.¹⁰⁶ Opening in the fall of 1895 with Atkins serving as the first principal, the State Normal School was funded in part by the Slater Fund to pay for the costs of the land and construction to house the Slater Industrial School.¹⁰⁷

With a public institution sharing the building, an act by the legislature provided funding to the state board of education for the benefit of the Industrial School that was limited to that raised annually by the "trustees and officers of the Slater Industrial School," but no more than one thousand dollars in any one year.¹⁰⁸ The report of the first year of the Normal school for 1895–1896 indicated that organizing the subjects, classes, and expectations with the student enrollment resulted in seventy-six students representing seven counties assigned to the grammar school.¹⁰⁹ These students were to be enrolled in the Normal course the next year with emphasis on the English course "leading to a thorough knowledge of the common school branches, including reading and spelling, grammar, arithmetic, geography, history (United States and North Carolina), physiology and hygiene, civil government, Bible, music and penmanship."¹¹⁰

With the state board of education reducing the number of state-supported Normal schools from seven to the Croatan Normal School in Robeson County and the three black Normal schools at Fayetteville, Winston-Salem, and Elizabeth City in 1904; Charles Lee Coon—who attended a one-room school, graduated from Concordia College in Conover, North Carolina, taught in Charlotte graded schools, authored the *Declaration against Illiteracy*, and served as superintendent of the Salisbury graded-school system—was appointed by Joyner as the first superintendent of the North Carolina State Colored Normal Schools and given a mandate to organize the courses of study for "giving thorough instruction in the common school branches required by law to be taught in the public schools."¹¹¹ Apparently Superintendent Joyner was less than optimistic about the breadth and depth of the appropriate education for black children when he explained that his "experience and observation in this work and my larger acquaintance with the people of the

State and their feeling, has deepened my conviction that the only hope in education beyond the point of mastery of the rudiments of learning for the negro race is to be found in agricultural and industrial training—largely in agricultural training.”¹¹²

In the “First Annual Catalogue” describing the activities of the Colored Normal Schools, Superintendent Coon recalled the beginning in 1877 “when the first of these normal schools was established at Fayetteville, they had no permanent home, no buildings and equipment which belonged to the State. For that and other reasons, the progress of these schools has been unsatisfactory in many respects, their development has been hindered and their influence in making the Negro common school better has been necessarily limited.”¹¹³ With the purchase of land and construction of buildings, the communities in which the Normal schools were located contributed funds to buy more property and gave furniture for the buildings with the students working in the summers to obtain the money to attend another term. Certain support from the community and the committed attitude of the students were considered as progress in the establishment of Normal education for black teachers by Charles L. Coon with the reactions encouraged by the apparent permanency of location, the desire from both races for better schools to train teachers of black children, and “the hope that after thirty years of precarious and uncertain existence in rented and inadequate quarters, the State might see the wisdom of aiding in placing these schools in creditable homes of their own.”¹¹⁴

With his primary focus on establishing Normal schools to increase the number of teachers for the classrooms of black children, Charles Coon was also concerned about the effect on hiring teachers, attendance of students, and studies in the rough-hewn environment of the classrooms in the rural schools in 1905 where a graduate would be employed to teach in one of the two thousand schoolhouses with each one valued at one hundred twenty-four dollars with benches instead of desks in forty percent of the classrooms. With eighty school days on the average in a term, teaching was a part-time occupation. With one teacher in one classroom, fifty-four or two-thirds of the school-aged children in a district were enrolled; however, the number of students in attendance each day was about one-half the number enrolled. Therefore, education throughout a district of black children was sparsely engaged with one-third of black children not attending school at all and the other two-thirds attending about forty days a term.¹¹⁵

With the average salary for the teachers decreasing one dollar from twenty-three dollars and thirty cents in 1885¹¹⁶ and the wretched conditions of the schools, Coon thought that it should be “apparent to any one that, whatever else these schools may be doing, they are not training the vast army of 192,720 country children.”¹¹⁷ To the critics of slow progress in social civility and organizing education in the black communities over the last thirty-six years, Coon responded with a clear statement that

in their current condition the schools “cannot train children to be efficient, neither can they lessen the number of crimes.”¹¹⁸

In fact, according to Coon: “The State is now simply suffering from the lack of what these schools ought to do, but cannot do. And, furthermore, in view of the facts I have tried to set forth, would it not be fairer to determine whether real negro education is worth while or not, instead of trying to hold the so-called education we have been grudgingly doling out to the black man responsible for that man’s sins of omission or commission, whatever these may be?”¹¹⁹ For most white people, the cost of educating the black children was derived from taxes paid by the white population. Coon went to great lengths in detailing the sources of the funds in the State Treasury available for education with the conclusion that the rural white schools were deprived of nine cents per student “a sum which is far too insignificant, it seems to me, to warrant the selfishness which would make a division of school opportunity based on the size of the bank account and of the color of the skin of those parents who are fortunate enough to have children to be educated.”¹²⁰

A grant from the John F. Slater Fund was awarded to the North Carolina Department of Education in 1907, which was designated “for teachers’ salaries in colored normal schools at Winston-Salem, Elizabeth City and Fayetteville.”¹²¹ With coordination, Joyner thought that the normal course of study and the agricultural and industrial instruction when required in teacher training at the three Normal schools and at the A&M College in Greensboro could be the “nuclei for eventually working out a successful plan of agricultural and industrial education for the negro race by training at these institutions teachers for this sort of education.”¹²²

Also, the plan included the establishment of at least one school in each county where agriculture and industrial training would be included with the subjects required for graduation. For decades, Elizabeth City and Fayetteville Colored Normal Schools had operated without owing land, a building, or equipment. With local gifts, state appropriations, and Slater funds, these Normal schools established permanence by acquiring eighteen acres of land in Elizabeth City and twenty-six acres of land in Fayetteville to join with Winston-Salem ownership in ownership of land and building.¹²³ The establishment of equipped schools in permanent structures attracted almost one thousand students across the three schools with about two-thirds of them females who enrolled in cooking and sewing in addition to those students in either the Elementary or Secondary Academic Department. Carpentry and blacksmithing were available at Fayetteville; however, almost all the male students enrolled in the course in agriculture.¹²⁴

Even with a promising start, Joyner was concerned that the “annual appropriation... is barely sufficient to pay the current annual expenses, and is altogether insufficient to provide for the necessary plants and equipment and for the enlargement

of the work of the schools and for the development of the necessary departments of domestic science and industrial and agricultural training.”¹²⁵ He noted:

It will be well to remember, also, that industrial education is the most expensive sort of education on account of the equipment necessary for it and the character of the teachers required for it. Teachers prepared for successful instruction in this sort of education must of course be in some sense specialists in their line and always command good salaries. For the majority of the public schools of the State, therefore, with one-room school-houses without special equipment and with one teacher without special training on an average salary of \$30.74 per month, with barely money enough for a four months' term and for instruction in the common school branches, with more daily recitations already than can be successfully conducted, industrial education and technical training is at present impracticable.¹²⁶

However, the superintendent had also asserted that “If the great masses of our people are to be limited in their education to the elementary branches only, we cannot hope for any material improvement in their intelligence and power and any material increase in their earning capacity.”¹²⁷

When the legislature passed the School Law of 1907 that permitted the county commissioners to arrange for a vote “to ascertain the will of the people” with regard to levying an annual tax “of not less than ten cents nor more than thirty cents on the one hundred dollars valuation of property and not less than thirty cents nor more than ninety cents on each poll, in addition to all other taxes levied for all other purposes, to be used for the establishment of a central high school or high schools in said township, in case such special tax is voted”,¹²⁸ the final link in coordinating public education for white children in North Carolina was cast with one hundred forty-five high schools opening the first year to almost four thousand students and fifty-five percent of them female.¹²⁹

Although black men had to pay the “High School Tax” in the county in which they were eligible to vote and owned property if the majority of the voters approved the taxes,¹³⁰ the apportionment to support education based on race could not have built a high school for black children because there were no black teachers who were certified to teach in the high schools. An applicant for a term certificate as a teacher in a high school was required to present a transcript from a college showing credit for two years' college work beyond a four-year high school in each subject for which they were applying to teach.¹³¹ In his last report, Superintendent Joyner lamented that: “The education of the negroes [*sic*] for citizenship and efficient service is one of the serious and important problems, burdens and duties of the state. We cannot and ought not to leave them uneducated. Ignorance is a menace to civilization whether wrapt in a white skin or a black skin. If the state fails to perform its duty in the

proper education of its negro [*sic*] citizens, the white race as well as the black race will pay the penalty. The proper and wise direction of the education of the negroes [*sic*] is largely in the hands of the negro teachers."¹³² However, ten years after the high school law was passed by the legislature, the superintendent of State Colored Normal Schools and the Cherokee Normal School reported that it was "next to impossible to secure a suitable and adequate teaching force with the meager appropriations made to these schools."¹³³

However, there were about fourteen hundred students enrolled in the three Normal schools to become teachers in a common school; but they must attend a city high school, a private college, or a private university to become a high school teacher.¹³⁴ In the scholastic year of 1917–1918, "The Biennial Survey of Education of the United States" reported that black pupils were enrolled in high schools in the District of Columbia, Florida, Georgia, Kentucky, South Carolina, Texas, and West Virginia with none reported by the state superintendent of Public Instruction in North Carolina.¹³⁵ However, in just ten years there were twelve thousand seven hundred eighty-eight white children attending two hundred forty-six rural public high schools in North Carolina being taught by six hundred thirty-nine certified teachers.¹³⁶

Black and White Teachers

When Eugene C. Brooks was appointed as the superintendent of Public Instruction in 1919 by Governor Bickett, the legislature had already created the State Educational Commission in 1917 to conduct a "study of the school laws of the state, a careful survey of existing educational conditions, and a comparative study and investigation of the educational systems of other states."¹³⁷ The commission submitted a report in 1921 that recommended changes in the administration of the education system, in the training of teachers, and in the organization of high schools. Among the numerous school laws enacted by the legislature in 1921 was the establishment of a "Division of Negro Education" within the North Carolina Board of Education that was "given charge of all normal schools, training schools, high schools, elementary schools, and teacher training departments for Negroes."¹³⁸

In addition, white institutions of higher education and Normal schools were selected to establish programs in which the preparation for the positions of administrators and teachers in elementary or high schools was affirmed for the system of white education and accurately described for the system of black education. For the white educators, the schools of education at the University of North Carolina, North Carolina College for Women, and the East Carolina Training School were enlarged to train "city and county superintendents, the supervisors, the elementary

and high school principals, and the high school teachers needed in the schools of the state¹³⁹ with Appalachian Training School and the Cullowhee Normal and Industrial School “devoted entirely to training elementary teachers.”¹⁴⁰ Regarding the black Normal schools, the study concluded that much had to be done before the school at Winston-Salem “will be a real normal school, while the work of the Elizabeth City and Fayetteville schools should be completely reorganized and redirected.”¹⁴¹

While needing further investments in the facilities of the black schools, also “the efforts of the state Normal schools should be centered on the training of colored elementary teachers.”¹⁴² In addition the commission recommended that the “colored students desiring a high school education should enter the colored high schools of the cities, or the county training schools, or one of the many private colored schools.”¹⁴³ In response to the challenge of improving the system of education for the black children, the Division of Negro Education published the comparison of city and rural schools for black and white students and the fact that the investment in white school buildings was four times larger than the investment in school buildings for black children.¹⁴⁴

Illustrating progress for both races, the division reported that forty-seven percent more of the black teachers in the city schools held a “Grammar Grade Class C” teaching certificate, compared to thirty-four percent of the white teachers in rural schools.¹⁴⁵ However, after seventeen years of opportunity, in 1923–1924, there were only fifty-eight public high schools for black children in North Carolina¹⁴⁶ with four thousand seven hundred fifteen students enrolled¹⁴⁷ and taught by two hundred twelve certified teachers.¹⁴⁸ In contrast, the white schools had increased to five hundred fifty with more than fifty-eight thousand seven hundred eighty-four students¹⁴⁹ attending classes taught by two thousand seven hundred twenty certified teachers.¹⁵⁰

In the “Biennial Report of the Superintendent of Public Instruction for the Scholastic Years 1924–1925 and 1925–1926”, two of the objectives in “Negro Education” were entitled as “The Beginning of High School Instruction” and “The Beginning of Teacher Training.”¹⁵¹ In 1920, there were eleven accredited high schools associated with institutions of higher education with fifteen hundred students enrolled. Employing certified teachers who had attended the private institutions of higher education and beginning with twenty-one schools in 1924, the number of accredited public high schools for black children tripled by 1930 and tripled again by 1935 to one hundred thirty with one four-year public accredited high school “in each of seventy of the one hundred counties of the State” with a total enrollment of twenty-eight thousand students.¹⁵²

With the success of the system for educating white children from elementary through higher education, the deficiencies in the black school system were obvious.

The quantity and quality of certified teachers at every level in every classroom does matter for a successful system of public education from elementary through high schools; however, the black teachers graduating from the existing public Normal schools were certified for elementary schools. In 1921, the legislature provided "fifteen thousand dollars annually" so that N. C. Newbold, director of Negro Education, could contract with each of the institutions of Livingstone College, Albion Academy, Brick School, Saint Augustine's School, Shaw University, Bennett College, Kittrell College, Mary Potter School, Biddle University, and Scotia Seminary to employ "well trained directors of education to work in each of the private colleges, to organize and teach classes in education, in organization, management, and teaching in the public Negro schools of the State."¹⁵³

After four thousand teachers attended the first summer schools in 1921, testing for their average index of educational achievement indicated less than high school graduation. By 1935, the average index of educational achievement for the six thousand teachers attending the programs at the private colleges had risen to approximately two-and-one-half years of college education.¹⁵⁴ As these dedicated teachers progressed in the classrooms of the private colleges and universities, the system of schools and colleges for training public school teachers for elementary and high schools for black children in North Carolina was organized and began operation with essentially the same arrangement for educating the teachers as was the situation in the white school system.

With well-trained faculty in the Normal schools, Fayetteville State, Elizabeth City Normal Schools were devoted to training elementary school teachers. In addition Winston-Salem Teachers College was organized to offer a four-year program for those who wished to prepare for the administrative positions of elementary school principal or supervisor.¹⁵⁵ Providing access to public higher education and courses of study for the preparation of teachers and principals of secondary schools, the North Carolina Legislature acquired the Durham State Normal School in 1923, and was renamed the North Carolina College for Negroes in 1925 and was the "first state-supported liberal arts college for African American students."¹⁵⁶ From 1922 to 1932, six thousand two hundred fifty-eight students in total graduated from five state Normal institutions.¹⁵⁷

The 1930 Census reported that the rural black population was about one in four of the total rural population in North Carolina and that the number of black children who were attending all the rural schools were about sixty percent of the number of the rural black school-aged children with the attendance rate for all the rural school-aged children of all races at sixty-four percent.¹⁵⁸ By the mid-1930s, almost nine hundred thousand students that included all races and grades were enrolled in the public city and county schools combined in North Carolina with black children accounting for thirty percent of the total enrollment and about the same percentage

of black children enrolled in just the county schools.¹⁵⁹ The total enrollment in county high schools had surpassed one hundred thousand students with assistance from the recent expansion of high schools for black children.

After a decade of training thousands of teachers who attended colleges and universities in a part-time capacity; the creation of a system of higher education at all levels similar to the one for white children that had been effective and efficient, the construction and opening of high schools, and the organization of academic curricula for thousands of high school students, were extraordinary achievements that resulted in increases in the enrollment in the high schools for black children to thirty-one thousand seven hundred forty-seven, which was about eighteen percent of the total enrollment in the state's high schools.¹⁶⁰ While the default in the pledge from Governor Aycock had occurred decades before, some progress was realized with much left to go to equalize the funding to the schools for black children.

Although the average of the academic achievement index was less than ten percent higher for white teachers than for black teachers¹⁶¹ and the number of pupils taught per teacher was ten percent higher for black teachers than for white teachers,¹⁶² the salary for the black teachers was thirty percent less on the average.¹⁶³ In addition, over the three decades the capital expenditures on school buildings and equipment were three and one-half times greater per pupil for white school children than for the black school children.¹⁶⁴ Although North Carolina Legislature had begun to enact school laws to operate one public school system, there were, in terms of funding, facilities and teacher preparation, four systems, the city black and white in addition to county black and white schools.

At mid-century, the support for public education in North Carolina passed the one hundred million dollar mark¹⁶⁵ with thirty percent spent supporting the education for black students.¹⁶⁶ About twenty-seven percent of the teachers were employed in schools for black students with an average salary slightly higher than the average of the teachers in schools for white children.¹⁶⁷ There were one thousand ninety-one elementary schools for black children and one thousand three hundred ninety-two for white children, while there were seven hundred seventeen public high schools for white children and two hundred thirty-two public high schools for black children.¹⁶⁸

The enrollment in the entire school system of the state was nine hundred fourteen thousand two hundred sixty-nine pupils with thirty percent attending the schools for black children.¹⁶⁹ The attendance for white and black students was about the same at about ninety-three percent for the term with the average daily attendance per teacher employed higher for the black students.¹⁷⁰ During the twenty years before mid-century, the black community and their educators established a system of public education that operated in a manner equal to the white system. However, the important measure in both systems was the development of the students as they

were challenged by high school teachers to read, compose, explain, explore, analyze, compute, prepare, and achieve in core subjects and were encouraged to pursue their talents, interests, occupations and preparation for college or professions.

The results belong to the individuals who know best of their achievement measured against their desire and effort; however, everyone has potential for achievement that is often measured in grades but is equally apparent in talents and interests without grades. There were around one hundred subjects available to the students in grades nine through twelve that included about thirty courses in the core subject areas of English, mathematics, social sciences, and science. Most likely to prepare for college, these examples of academic subjects of interest to a few in the two systems were similar, with eight percent of the black students and seven percent of the white students enrolled in plane geometry and economics and with four percent of the black students and three percent of the white students enrolled in physics in 1951 to 1952. The percentages of black and white students interested in agriculture were about the same for each year in the progression through high school as were the percentages in home economics.¹⁷¹

The major differences in the interests in vocational subjects were the dominances in the percentage electing auto mechanics and the trades such as bricklaying and carpentry even though the number was less than three percent of the of black students enrolled. In addition, as many as forty percent of the white students dominated in electing the business subjects of typing, shorthand, and bookkeeping. In an overall comparison, a few percent more of black students were interested in vocational subjects than white students; however, the enrollment of white students was about three times that of the black students.¹⁷² These decisions by the young people in high schools may have been influenced more by the segregation of opportunities based upon color rather than the school systems based upon race.

Education in North Carolina faced the inevitability of an integrated system during the decade of the 1850s. The segregation of opportunities had been embedded for centuries in a culture of progression of white males who had owned property; however, one system to educate both black and white children in North Carolina began the integration of children, teachers, parents, experiences, societies, cultures, and communities for the one purpose of educating their sons and daughters, which was one important step forward in establishing equal opportunity in the pursuit of prosperity for all children.

Labor, Prejudice, and the Search for Prosperity

Progress but with Prejudice

About forty-four percent of the total population in the United States over the age of ten reported to the 1870 Census that they were employed for wages in one of three hundred thirty-eight occupations.¹ Each of the reported employments was enumerated in one of four occupation groups that resulted in forty-seven percent in agricultural occupations, twenty-two percent in professional and personal services occupations, ten percent in trade and transportation occupations, and twenty-one percent in manufacturers, mechanical, and mining industries occupations.²

With forty-six percent of the total population over the age of ten in North Carolina reporting that they were wage earners, the enumeration by the census resulted in seventy-six percent employed in agriculture, fifteen percent employed in services, three percent employed in trades and transportation, and six percent employed in industries. For the males alone in North Carolina, eighty percent over the age of ten were employed with eighty-two percent of them in agriculture, six percent in services, three percent in trades and transportation, and five percent in industries.³

The twenty-one percent employed in the industries of the country compared to the six percent for North Carolina was an indicator as to the opportunities for providing gainful employment for the increasing population in North Carolina. For the country at large as the population increased, the transfer of labor from farming to manufacturing was evident even though about one-half of the people were gainfully employed as agricultural laborer, unspecified laborer or farmer; about one-half of the occupations were in the manufacturing, mechanical, and mining industries.⁴

The development of society, culture, and governance of the country from colonial to the United States was constructed on the values of property, agriculture, and self-reliance. From the very beginning as a Colonial, ownership of enough land was

a source of status, livelihood, and prosperity. From the subsistence to the yeomen and the cash crops of the planters, availability of labor controlled the operation of farms. However, large numbers of slave laborers on plantations with hundreds to thousands of acres of cash crops were essentially isolated from the experience and operation of most farmers in the country.

In 1860, there were about three farmers for each available farm laborer in the states without slave labor, which dictated the crops and acreage of the plantings.⁵ For all the slave states, the number of farm laborers available for wages was about three-fourths the number of farmers without slaves. In North Carolina, forty-one percent of the farmers owned at least one slave with the number of farmers who owned no slaves two-and-one-half times the number of available agricultural wage laborers.⁶ Although innovations in labor-saving machinery for agriculture increased the productivity in planting and harvesting crops, landowners in all sections of the country, in addition to the planters, were agreeing to contracts for tenants to farm a section of their land under a variety of arrangements from the planting to the harvest of a variety of crops.

During the remainder of the nineteenth century, tenancy in farming influenced the role of labor and the operation of farms that developed in the production of agriculture throughout the first half of the twentieth century. The different operations included farm laborers who were paid wages at the end of the year varying from sixty to eighty dollars. Tenant contracts contained a variety of conditions including: rental by paying cash to use the whole farm, sharecash by paying rent with a share of the crop, and cash and sharecroppers by paying with either crops, livestock, or some of both.⁷

The croppers, who brought nothing but their labor and became the most popular arrangement, were under the supervision of the landlord with a contract of sharing in the risk of the production and the market. With an increase by 1880 in the number of farms,⁸ one-half of the persons over ten years of age in North Carolina were engaged in gainful employment with three-fourths of them engaged in agricultural occupations.⁹ Two-thirds of the farms were operated by the owners, eight percent by sharecash arrangements, and seventeen percent by sharecrop tenants.¹⁰

Over the three decades after the Civil War ended, the society and the economy in North Carolina were not significantly influenced by immigration, growth in urban centers, or connections to westward commerce that accelerated growth in most of the northern and western states; however, there were continuing efforts to improve the productivity in agriculture and expand manufacturing even though politics interfered. As the population in North Carolina grew by approximately eight percent over the three decades, in 1880 seventy-five percent of the persons employed in occupations for gain were engaged in farming with another eleven percent in the combination of domestic services and unspecified laboring.¹¹

In addition, there were twenty-five occupations with more than one thousand persons employed in each one that included turpentine farmers, employees of railroad companies, cotton mill operatives, mechanics, lumber sawing, and planning and tobacco operatives.¹² However, the total number of persons employed in all of the one hundred and thirty-six manufacturing, mechanical, and mining industrial occupations was just seven percent of those gainfully employed in North Carolina compared to the national average of twenty-two percent.¹³

There was a wide range of salaries in the occupations that depended on the skill, the industry, and the location. In Ohio, common labor in bridge-building earned one dollar and twenty-five cents a day,¹⁴ while an establishment that manufactured smoking tobacco in North Carolina paid “colored... boys and girls” twenty-five cents a day for their work as laborers.¹⁵ A machinist in Pennsylvania earned two dollars and ten cents a day¹⁶ with the black plugmaker earning two dollars a day in a tobacco establishment in North Carolina.¹⁷

From 1880 to 1900 the percentage of all the employed persons who were engaged in agricultural pursuits in North Carolina decreased by eleven percent with corresponding increases of eight percent in manufacturing and mechanical pursuits, two percent in trade and transportation, and three percent in domestic and personal services.¹⁸ There were more than forty thousand children between the ages of ten and fourteen employed in North Carolina in 1890, and the number more than doubled by 1900.¹⁹ Those children employed in agricultural occupations increased from seventy-five to seventy-seven percent of all the gainful employments of children.²⁰

Much of the success in the pursuit of prosperity in North Carolina depended on the harvest of the cotton cash crop in forty-one counties with one to ten thousand bales produced in eleven and with ten to thirty thousand bales produced in thirty counties.²¹ From the rolling hills of the Piedmont to the sandy farms of eastern North Carolina, the return on these plantings depended on the cooperation of labor, soil, fertilizer, climate, weather, and drainage with the risk that some or all of those components of farming may detrimentally influence the harvest beyond the control of the farmer at any given time. Providing insight about various soils, drainage, and other components, W. C. Kerr—state geologist serving as a special census agent—submitted a “Report on the Cotton Production of the State of North Carolina” in 1883 in which each of the counties with significant cotton production was assigned to one of three regions.

With nineteen counties in the seaboard region, twenty-two in the long-leaf pine, and thirty-seven in the oak uplands, Kerr described each county and region in some detail that included the geological structure, characteristics of the soils, and the per-acre production of cotton. The cotton production in the seaboard region did not reach ten thousand bales in any one of the nineteen counties even though the average yield per acre was higher than for the oak uplands where production in four

of the counties exceeded ten thousand bales with production of thirty thousand bales in Wake that was the largest amount among all the counties.²²

Among the twenty-two counties in the long-leaf pine group, cotton production exceeded ten thousand bales with all the counties combined producing more than half of the cotton harvested in the entire state.²³ In addition to information for each county and region, forty-eight questions were sent to farmers in each of the counties within the three regions for the purpose of gathering the details about the culture that was developing on the farms associated with the new labor agreements and costs in cotton production in North Carolina.²⁴ Without accounting for variations in the number of laborers and the size of the farm, the cost of laborers ranged from thirty to fifty cents for the day or eighty to one hundred dollars a year.²⁵

In some counties, most of the laborers were white with blacks predominant in twenty-seven counties and evenly divided in others. The responders estimated that as many as ninety percent, one in four, one in eight, or a few of the black persons owned land or houses in the counties from Dare to Mecklenburg. In addition, the share system was "in general practice throughout the cotton counties," except for Alexander, Pasquotank, and Guilford, and in a few others to some extent. If the owner provided the necessary supplies, except food, and one-half the fertilizer, the harvest was equally divided between the laborer and the owner. If the contract was a rent only, the owner received one-third of the corn and one-fourth of the cotton.²⁶

The cost of the rent was between two to five dollars an acre with the profit in Cabarrus County in 1878–1879 of twenty-one dollars and sixty-five cents per acre of cotton.²⁷ Except for Wake County "where planting was chiefly done," the respondents reported that a system of mixed farming of planting and livestock was practiced on farm sizes ranging from twenty to a few hundred acres with some exceptions of plantation size acreages;²⁸ however, the priority for the cash from cotton had resulted in importing as much as one-half of the supplies needed to be self-sufficient at home.²⁹

The average of the annual market price of cotton after the Civil War ranged from forty-three cents per pound in 1866 to fifteen cents per pound in 1875 with an average of the annual price over this time of about twenty-four cents.³⁰ From 1877 until 1890 the average annual price of cotton was eleven cents followed by another decrease in price to less than eight cents per pound from 1891 until 1903 when the price increased to an average of twelve cents for the following decade.³¹

When cotton prices were relatively high during the decade from 1870 to 1880, the number of farms in the southern states increased in number by more than seventy percent with two-thirds of all the farms cultivated by the owner. The other one-third was divided in the proportion of twice as many "of farms rented for share of product" as those "for fixed money rental." The average size of the rented farms was about the same as the average size of the owner-operated farms of one hundred

thirty acres.³² Consequently, the number of farmers and planters in the southern states increased during the decade of the 1870s by forty-one percent; however, just fifteen percent more of the employments were available as agriculture laborers.³³

With the production at harvest of the cash crops of tobacco and cotton ten percent more than before the Civil War, the 1880 Census also reported that the production of corn from all the farms in the United States was twice the number of bushels as harvested in 1860. Although the productions of corn and cotton by the southern states were near or above their prewar amounts, the production of tobacco in Virginia, North Carolina, and Tennessee was lagging the amounts harvested before the war.³⁴

However, the price of cotton, which would fluctuate between forty and six cents for nearly three decades, made “production itself much more of a speculative venture than is the case with grain growing, stock raising, or almost any other form of farming.”³⁵ From 1875 until 1900, cotton production increased from four million three hundred two thousand eight hundred eighteen to ten million two hundred sixty-six thousand five hundred twenty-seven five-hundred pound bales, gross weight.³⁶ Various organizations blamed overproduction by the farmers, undercapitalization by the owners, and federal monetary policy of the government for the continuing agricultural depression.

Addressing the United States Senate Committee on Agriculture and Forestry in April 1890, Leonidas L. Polk—who had led the effort in North Carolina to establish the Agricultural and Mechanic Arts College—emphasized that the lingering depression in agriculture was resulting in declining values in farm land and staple crops coupled with growing mortgage indebtedness and disproportionate amount of taxes as the causes for the decline in wealth. To address the financial difficulties, Polk suggested that restoring silver “as a money metal, with all the rights of coinage and all the qualities of legal tender,” issuing “sufficient amounts of currency direct to the people, at a low rate of interest, to meet the legitimate demands of the business of the country, and which shall be legal tender for all debts, public and private” could provide the basis for the government to lend the “farmers of the country money on short time at 1 percent on evidences of wealth.”³⁷

The “Report of the Industrial Commission” also focused on the economic situation. The commissioners reviewed the impact on the southern states from the “phenomenal fall in the price of cotton imposed upon their agriculture”³⁸ and concluded that: “Capital within the area of production where cotton is the primary crop has until quite recently at least been peculiarly scarce. This is so much the case that even the planting, the cultivation, and the gathering of the crop have to be done largely on borrowed capital. Under these circumstances credit is low, interest is high and the risk reduces still more the amount of capital that the producer can command

per unit of product obtained. Under the circumstances it can not be otherwise than that farming should be a declining business.”³⁹

In an environment where the capital investments in the primary cash crops were at risk for so many years, prosperity from farming was a challenge of owning or renting enough land, hiring enough labor, purchasing fertilizer, and buying equipment for planting, harvesting, and transporting crops for sale. Although most of the wealth invested in agriculture was controlled by the white males, one-fourth of those in agricultural occupations were women, children, and black people who were employed for prosperity as well as subsistence.

During the development of the postwar economy in the southern states, a growing number of the members of the Freedmen families were engaged in the pursuit of prosperity through ownership and occupations that provided more than subsistence income from their labor. At the turn of the century, the Bureau of the Census included a bulletin on “Negroes in the United States” in which Du Bois reported on “The Negro Farmer” by describing the circumstances on more than seven hundred thousand farms in the United States operated by blacks with twenty-one percent of the farms “owned entirely, and an additional 4.2 percent owned in part, by the farmers operating them; in other words, forty years after emancipation 25.2 percent or about one fourth of all negro farmers had become landholders.”⁴⁰

The black farmers operated almost one in four of all the farms in North Carolina by 1900, with ownership of about seventeen thousand of the fifty-four thousand farms managed by them.⁴¹ In addition to the owned farms, nearly twenty percent of the fifty-four thousand farms were rented land, and fifty percent of the farmers were croppers.⁴² About forty percent of all the black farmers depended on the cash crop of cotton, eleven percent on tobacco, nearly sixteen percent relied on hay and grain, and twenty-seven percent planted miscellaneous crops with the values realized from these harvests often dedicated to pay rent or lien to a merchant or owner.⁴³

For the harvest of 1900 in North Carolina, more than twenty-four million pounds of tobacco was grown on nearly eleven thousand farms by black farmers. About twelve percent was grown on farms with black owners, four percent on farms where the black farmer was a part owner, less than one percent on farms with an owner and tenant or a manager, thirteen percent on farms with cash tenants, and seventy percent on farms where the black farmer was a share tenant.⁴⁴ However, in less than four decades some former slaves and free blacks born before the war along with their sons, daughters, and grandchildren were among those four million free black people who reported in 1900 that they were engaged in gainful employment with more than ten thousand black persons in twenty-seven occupations that included railroad employees, miners, teachers, nurses, iron and steel workers, and engineers as well as the agricultural pursuits.⁴⁵

Any progress in race relations for the purpose of sharing the benefits of the developing economy in North Carolina was challenged as the political parties prepared for the last election in the nineteenth and the first of the twentieth century. Before his death in 1892, Leonidas L. Polk, the leader of the agrarian movement, founded the Populist Party with members consisting mostly of farmers from the western region of the state, other men who tended toward being Unionists before the War, and those who owned slaves.⁴⁶ Consequently, members of the newly created Populist Party met with leaders of the established Republican Party, which included black and white men who had served in federal, state, and local government offices, for the purpose of joining together with one ticket of candidates that they both could support as Fusionists in the 1894 election to challenge and defeat the reign of the Democratic Party.⁴⁷

One of the objectives of the campaign was to repeal the authority of the state legislators to appoint all local government officials that had operated from 1877 to 1895 after a Constitutional Amendment of 1876 that provided control for the white legislators in Raleigh over the number of black men serving in local public offices in counties where blacks heavily populated the voters. Subsequently, the Fusionists won the election and passed legislation in 1895 to fulfill this campaign pledge, which ultimately resulted in the local elections and appointments of some black government officials.⁴⁸

Consequently, in all these counties that had concerned the Democrat Party, one black man was elected to serve in Congress, ten to the state legislature, and a total of dozen or so in local offices in four counties where black voters were heavily represented.⁴⁹ In Wilmington, North Carolina, the population shifted from fifty-six percent black in 1890 to about an equal number of persons of each color in 1900.⁵⁰ With some local control exercised, five by election and five appointments of aldermen in 1897 resulted in four black and six white men serving in public office.⁵¹ With similar success of black men in other areas where there was a large black voting population, some members of the Democratic Party adopted a message for the campaign of 1898 to abolish "Negro domination" and install their objective of the "rule of white men of the State."⁵²

The political objectives concerning "Negro domination" in local government representation became a matter of class domination over the cultural and social relationships between white and black people as "white supremacy" was establishing a political advantage.⁵³ With anger about an article considered an insult to white women that was published in the *The Wilmington Record* in response to the views of women's rights advocate Rebecca Felton about sexual relations between the races, a committee of Democrats in Wilmington known as the "secret nine" issued a "Declaration of White Independence" one day after the elections on November 10, 1898 that included mandates that a large part of the employment "heretofore given to

Negroes" would be given to the white men so that the white families could thrive from more opportunities for the employment of the different members of their families, that the newspaper *The Record* be closed, that Charles Manly, the black editor, be banished from the community within twenty-four hours, that the press be removed from the city, and that a response was expected in twelve hours.⁵⁴

The black men who gathered to develop a response from the community included two physicians, two financiers, a caterer, an alderman, a merchant, two coal and wood suppliers, a jailer, a post office clerk, a contractor, two lawyers, an 1897 state legislator, the newly elected Hanover County coroner, a wheelwright, a minister, a barber, a magistrate, a mortician, an architect, and the manager of the James Sprunt Cotton Press factory where eight hundred black persons were employed.⁵⁵ The response was not confrontational and sought a peaceful solution; however, the mailed letter did not meet the deadline, which apparently ignited a riot. Black men were killed, structures burned, and Fusionists left their local offices before their term ended.⁵⁶

After the Democratic Party candidate Charles Brantley Aycock was elected governor in 1900, the people of the State of North Carolina began the century with a promise of equal funding for segregated education, with a constitutional grandfather literacy clause that disenfranchised black male voters, with about one million nine hundred thousand persons living in the state, and with the census reporting that more than seven hundred thousand persons over the age of ten were employed in gainful occupations with sixty-nine percent of the males and forty-six percent of the females engaged in agricultural pursuits.⁵⁷ Although a few years later the legislature passed a law to limit the employment of children, fifty-five percent of the males and twenty-four percent of the females between ten and fifteen years of age were employed in 1900⁵⁸ with eighty-one percent of the employed males and sixty-one percent of the employed females engaged in agricultural pursuits.⁵⁹

In 1900, North Carolina ranked fifth in population among the thirteen founding states as the number of persons living in the United States had tripled since 1850; however, the population of the state had only doubled to become fifteenth among the forty-eight states with two percent of total persons in the United States living in North Carolina.⁶⁰ Although the growth rate of the population in North Carolina did not keep pace with the entire country over the five decades, there had been a fivefold increase in the number of opportunities for gainful employments with a ranking of sixteenth in the number in 1900,⁶¹ a fourfold increase in the production of bales of cotton by the farmers with their production in 1900 ranking eleventh, and a tenfold increase in harvested tobacco with a rank of second to Kentucky in 1899.⁶²

In addition, the number of establishments for manufacturing cotton goods expanded sixfold during the five decades, with North Carolina even with

Massachusetts by 1900, when North Carolina also ranked third to Massachusetts and South Carolina in the consumption of bales of cotton which resulted in a thirtyfold increase in the value of the manufactured cotton goods.⁶⁵ Even with the increasing production by the farmers in the harvests of the cash crops and by the laborers in operating the cottons mills over these five decades, the capital, commerce, and labor of the economy that had been established primarily by the planters in North Carolina were not effective in distributing to the wage earners enough of the wealth that was created in part by them to provide substantial gains for them to live beyond mere subsistence.⁶⁴

With the gainful employment of males and females, white and black, over the age of ten in 1900, the census reported for North Carolina that fifty-two percent of the wage earners were white males, twenty-five percent black males, twelve percent black females, and ten percent white females.⁶⁵ In 1900, North Carolina ranked fifth among the forty-eight states with sixty-nine percent of the wage earners of men, women, and children employed in the agricultural pursuits.⁶⁶ The growth in the number of cotton mills contributed to the employment in manufacturing and mechanical occupations which almost doubled over the past two decades to twelve percent of the occupations by 1900.⁶⁷ From 1880 to 1890, half of the growth in manufacturing establishments in the United States occurred in the one hundred principal cities where population growth exceeded that of the country; however, in the same cities the expansion was ten percent during the next decade.⁶⁸

The manufacturing establishments did increase by eighty percent in the United States during the decade; however, the growth in manufacturing was shifting to the towns and smaller cities of the states where about forty percent of the establishments were locating. About sixty percent of the five hundred thousand establishments who employed men, women, and children in the category of manufacturing and mechanical pursuits were located in thirteen hundred cities, towns, and villages by 1900.⁶⁹ Correspondingly, that year eighty percent of the capital and wage earners were creating eighty percent of the value of the manufactured products.⁷⁰

In addition, the average annual wages for the average number of wage earners among all the three hundred thousand manufacturers was five hundred sixteen dollars for males, two hundred seventy-eight dollars for females, and one hundred sixty-one dollars for children. The remaining two hundred thousand manufacturers were located in rural areas where circumstances often favored the needs of production. In many ways the nature of the production in forty percent of the manufacturers that were in rural communities resulted in these establishments on the average operating with about twenty percent less capital invested, labor employed, and value of the production. In addition, average salaries for the average number of men and women employed were lower by eighteen percent and the twenty-two percent lower for children than in urban centers.⁷¹

The nine urban centers of manufacturing in North Carolina were Asheville, Charlotte, Concord, Durham, Fayetteville, Goldsboro, Greensboro, High Point, New Bern, Raleigh, Reidsville, Salisbury, Winston-Salem, Wilmington, and Winston with just fifteen percent of the manufacturing establishments located in these towns. With just one-sixth of the establishments, one-third of the capital invested, and one-third of wage earners hired, forty percent of the total value of production in the state in 1900 was manufactured in these urban towns.⁷²

Although there were seven thousand two hundred twenty-six manufacturing establishments in total in the state, there were only four thousand seventy-one establishments within the state's ten leading industries; of those industries, the manufacturers of the flour and grist products and the lumber and timber products made up about half.⁷³ The average wages for the average number employed in the urban establishments was two hundred fifteen dollars a year with wages thirteen percent less in the rural establishments.⁷⁴ In 1850, the wages for common labor were the lowest among the states. In 1899, the average earnings for all the industries in North Carolina was sixty percent less than the average of four hundred forty-six dollars for all the states combined and last in amount among the forty-nine states.⁷⁵

Labor Looking for Prosperity

After serving the previous six years as the commissioner of the North Carolina Bureau of Labor and Printing, B. R. Lacy announced his retirement in 1900 in the bureau's fourteenth annual report.⁷⁶ During his service as commissioner, the majority of the men, women, and children working as common laborers or in semi-skilled occupations were employed in the industries of agriculture and manufacturing with their wages among the lowest in the country, which created uncertainty about opportunities for any progress in the state. Prior to issuing the report, Lacy contacted farmers, tradesmen, and mill men to obtain their views and recommendations about improvements in the conditions of their laborers and value of the wages earned.⁷⁷

From a questionnaire sent to representatives in ninety-seven counties, the content and context of the answers to thirty-three questions from three hundred sixty-nine farmers indicates that these men had seen an "Improved... Mode of Living";⁷⁸ however, a majority thought the cost of living was increasing.⁷⁹ In addition, they agreed that there was a tendency to have smaller farms that may have been influenced by their experiences that labor was scarce for the majority of responders, with moving and employment for public work contributing to the problem. However, the farmers were split on paying more or less in wages to labor with farmers from just eight counties considering "Negro Labor Reliable."⁸⁰ In addition to responding to

questions, one hundred thirteen farmers wrote letters to Lacy in which they expressed their concerns about the challenges and opportunities for achieving progress in North Carolina. In general the farmers were concerned about the future of the industry of agriculture, the uncertainty in the labor system, the situation of the black people, and the benefits or detriments of compulsory education.

As a farmer in Halifax County, Henry N. Clark from Airlie, NC, wrote: "I do not really think our county is what it should be; our people are demoralized, and the negro laborers are leaving here for the North (I think them the best laborers for the South naturally). Our lands are deteriorating, owing to bad farming, selling all off the land (cotton seed, etc.) and retaining but little. We should use less fertilizer (commercial, I mean), plow deeper, harrow more, plant more peas and clover, use lime and salt."⁸¹ W. C. Ray from Buck Forest wrote that: "One of the greatest needs of the farmers of this county is public works, cotton mills or other machinery, to give employment and to give us a market; we have the waterpower and good location for such. There are many other things that would benefit us. We need more money, longer schools, better teachers, better roads and a better system of farming."⁸² Joseph W. Terry of the Caldwell Institute wrote that: "As regards hired labor, there is very little done; where the farmer has any assistance it is tenants or croppers."⁸³ J. G. Brickhouse of Columbia wrote that: "We need the farmers to be better educated, so they will take more interest in education and all other public work and business, especially in the education of their children."⁸⁴ Joe Humphrey of Clark, NC, wrote that "The negro cares only for the present and has proved his worthlessness as an accumulator of property. The laborer in this county has many opportunities to improve his condition. A large percent of the cash paid out goes to the laborer, and if he would provide work for his wife and children more of his wages could be invested in betterments."⁸⁵

J. B. Whitehurst of Aurora, NC, wrote that: "I think we should have school six months. I have no trouble with labor. The negro, in my opinion, is the best labor we can get, they work as cheap and can be controlled as well as any labor I have ever used."⁸⁶ C. A. Hall from Hall's Ferry NC, wrote that:

What we need most to become successful is labor that landlords can depend upon. There is plenty of labor in the county, but it is not reliable. There are very few negroes on the farms in this county; they have drifted to towns and factories. The tenant system has been in operation almost exclusively since 1870. There are many objections to it, and in some respects it is a failure. My opinion is that farms are too large. If our farms consisted of one hundred acres, and that well cultivated, we could treble our yield. As to the needs of wage-earners, education, character, reliability, and when they have the above and take an

interest in their employer's affairs, they will receive better wages and better treatment.⁸⁷

W. H. Hunter of Alexander, NC, expressed his opinion about the complexity of pursuing prosperity with wages when he wrote: "Realizing as I do the great importance of the capital and labor question to this nation, it is exceedingly hard for me to give a satisfactory solution of the same even to myself. Never while the greed for gain continues to dominate the human family will we be able to get an equilibrium between the two. Only a moral and religious education will be able to bring about the desired results, and from the present indications this is like the cat in the well which comes up three feet and falls back four."⁸⁸

Commissioner Lacy reported that as many as thirty thousand mechanics were located across the state among the sixty categories of tradesmen to whom he inquired about the status and the requirements to achieve improvements in each trade.⁸⁹ The questions sent to members of the trades included several devoted to wages, working conditions, cost of living, educational level, and one simple yes or no to: "Member Labor Union?"

Fifteen percent of the responses were a yes, which were spread among the trades.⁹⁰ In addition to the simple answer, W. O. Wolfe in Asheville wrote that: "The condition of the wage-earner in this town has been bettered materially within the past six months through the instrumentality of trade unions. Every branch of the building trades are organized, and together with the clerk's union have formed a Central Labor Union, where the common grievances of the workers may be discussed. All this has caused an advance of from fifty to seventy-five percent in their wages, and a decrease of one hour per day in their day's work, making a day's work consist of nine hours."⁹¹

Another fourteen of the tradesmen expressed opinions about organized labor including Fillmore Whitley from Albemarle, NC, who wrote that: "I wish you would have a labor union established here in North Carolina, we never can obtain better wages until something of the kind is done."⁹² Other tradesmen were concerned about the quality of the work, the control of apprenticeship, and competition from black tradesmen, including R. S. Day from Mount Airy, NC, who wrote that "I do think that negroes should be excluded from all trades, especially brick-laying, as they tend to cause a strife between employers and employes [*sic*], and tend to lower a white man's wages until he can not live by his trade."⁹³

Also, T. J. Utley of Durham, NC, wrote that: "As for the wage earner the only thing hindering the advance is incompetent labor. All branches of mechanism should be protected by an indentured apprenticeship, and when a man offers his services as a workman in any of the branches of mechanism he should present a certificate of apprenticeship before being accepted as a mechanic. This would protect

the experienced laborer of our country, and turn down those who offer themselves as mechanics.”⁹⁴

One-fourth of the ninety-eight letters addressed to the commissioner were about shortening the work week for labor to ten hours or less. S. A. Massey from Elon College, NC, wrote that: “I think the work day in most of the cotton mills too long, twelve and thirteen hours for women and little children to stand and work. They ought to have the same pay for ten hours.”⁹⁵ C. D. Story from Burlington, NC, wrote that: “In the State of North Carolina there are hundreds and thousands of children who toil from eleven to fourteen long hours every day, which just crushes the very life out of them. Such should cease to be the case, our State will never make the progress she ought to make while such things exist. I think there ought to be a law prohibiting any man hiring a child under the age of fourteen years old on public work.”⁹⁶

The owners and managers of two hundred twenty-four cotton and woolen mills reported thirty-eight thousand six hundred thirty-seven employees that included forty-one percent women, thirty-nine percent men, and twenty percent children under the age of fourteen, with fifty-three percent of those children being girls.⁹⁷ The number of hours worked each day ranged from ten to twelve with the highest wages per day for men about one-dollar and seventy-five cents, the lowest for men fifty-one cents, the highest and lowest for women about one-half the wages for the men, and children paid the lowest at thirty-two cents.⁹⁸ In the time between Lacy’s questionnaire and the publication of his report, dozens of new mills had opened, bringing the total to two hundred sixty-one.⁹⁹ Spread among these mills in forty counties, two thousand machines were powered by steam and water except for the Willard Bag and Manufacturing Company in Wilmington, which was powered by electricity. These machines operated almost one-and-one-half million spindles and more than thirty-three thousand looms divided among the mills in production in the counties.¹⁰⁰ During the growth in the number of establishments, seven or more had located in one-third of the forty counties in which all the cotton mills were operating; however, most of the mills were in the smaller towns like Saxapahaw and Stubbs even though eleven were in Charlotte, nine in Burlington, seven in Rockingham, and six in each of the cities of Greensboro, Lincolnton, and Raleigh.¹⁰¹

Twenty-three cotton mills were located in Gaston County with establishments of cotton mills manufacturing warps, yarns, plaid cloth, and material for shirts and sheets.¹⁰² In Alamance County there were nineteen cotton mills, one woolen, and one knitting mill with a number of different manufactured goods that added gingham, chevots, jeans, blankets, and hosiery to the variety of production from the mills in the state.¹⁰³ In Mecklenburg County there were fourteen cotton mills, a knitting mill, and a jute mill with the production including white goods and

towels that also added to the growing assortment of North Carolina manufactured products.¹⁰⁴

From the letters sent to the commissioner from mill men who employed the wage earners, twenty were selected to appear in the report which provided another perspective about the laborers, working hours per week, hiring of children, and government regulations in the manufacturing industries. For fairness about opinions in the “minds of many wage earners,” P. H. Pellitier from New Bern wrote that: “I notice in my mill that the lazy, shiftless and worthless ones are those who are constantly ‘kicking’. They do nothing, and yet they seem to think they ought to receive as much for nothing as some one else who has worked faithfully.”¹⁰⁵

W. H. Williamson from Raleigh seemed concerned when he wrote that: “The large number of new mills going up has caused some increase in wages, but the help is not as good and steady and contented. They are continually running from mill to mill and we find the class of help less worthy than others.”¹⁰⁶ Regarding the working hours, L. Acree from Jonesboro, NC, wrote to declare that: “I am opposed to night work for cotton mills; think it would be best for employe [*sic*] and employer if all night work could be stopped.”¹⁰⁷

However, Osborne Brown from Long Island, NC, did not agree: “We think the hours of labor should be left alone, for if you begin agitating this question, it will encourage complaint on grounds that are less justified. If you restrict the hours of labor and organize the operatives into unions, we will be approaching the condition in which the New England manufacturer finds himself.”¹⁰⁸ Eighty-two percent of the adults and sixty-eight percent of the children employed in the mills could read and write;¹⁰⁹ however, some mill men agreed with D. W. Aderholdt from Cherryville, NC, when he wrote that: “Mills, as a rule, have free schools very convenient, and to our knowledge we know of no mill that would refuse to allow the children to go to school.”¹¹⁰

Education was unfortunately not a matter of the convenience of free schools; it was compulsion for the children’s attendance versus the family income.¹¹¹ Attitudes concerning legislative intervention was clearly described by J. H. Webb from Edenton, NC, who wrote: “We are opposed to any legislation directed to cotton mill labor, as the relations between mill owners and their employees are now mutually satisfactory, and could be so easily changed by scheming legislators.”¹¹² In addition, W. S. Mallory from Charlotte wrote: “Let our Legislators let the labor question alone and leave it to the mill owners and employees to make their own arrangements.”¹¹³

When the Constitutional Convention convened in Philadelphia in 1787, the members in attendance from North Carolina were certainly influenced in their deliberations by the dominant culture in their state that was created by a self-reliant population that declared themselves to be among the founders of the United States

of America, by the pride in the society and economy of rural families in North Carolina who were gainfully engaged in domestic manufacturing and agriculture, and by their state legislators who owned land and probably slaves. Except for the Bill of Rights to protect each citizen, most of the articles that the delegates adopted were about the structure and operation of the new government. However, Article 1, Section 8 claimed the power to “lay and collect Taxes, Duties, Imposts and Excises, to pay Debts” and to “regulate Commerce with foreign Nations, and among the several States, and with Indian Tribes.”¹⁴

If all the members of the convention had read *The Wealth of Nations* published by Adam Smith a decade earlier, the delegates may have given more attention to the chapter in the book “Of Restraints upon the Importation from Foreign Countries of such Goods as can be Produced at Home” that warns about monopolies of the home market that encourage employment and stock in a particular industry which may not be advantageous to the general industry. The Congress of the United States would meet after the Constitution was ratified by the states and began enacting laws concerning commerce; subsequently a market-driven economy as described by Adam Smith with little or no government intervention into capital, labor, or trading activities developed without legislative encouragement and without legislation similar to the ideals for controlling the power of government expressed in the Bill of Rights.

Without regard for the eventual enactment of federal laws, the states enacted their own regulations concerning access to capital, conditions for labor agreements, and taxes in internal commerce. However, without legislative interference or assistance from the governments throughout the nineteenth century, a form of American capitalism was created by aggressive men who formed corporations, monopolized competitors, defeated union strikes, and created enormous wealth. From the perspective of a capitalist in America, the creation of wealth from manufacturing during the three decades before the Civil War for the planters from agriculture in the South and for the mill owners in the North was a period of prosperity.

The Advent of Land Grants for Education

Education in Pursuit of Prosperity in Agriculture, Mechanic Arts, and Engineering

During the first half of the nineteenth century, the owners of farmland created most of the commerce and prosperity; however, only a part of the population was exporting their crops from ports in the United States to foreign countries. Those who owned a few acres were mostly subsistence farmers with returns on their crops from labor within the family.

Throughout the southern states the primary pursuits of prosperity were from agriculture, which included the productions and exports of cotton and tobacco that depended mostly on organized labor of slaves. In addition, the prosperity for inland plantations often required improvements of transportations by rivers and canals to reach markets at deep-water ports. Eventually a developing network of railroads created a connection of depots where manufacturing was often located.

As the midwestern states developed prosperity from crops of corn and grains, the innovations of labor-saving implements in planting and harvesting the crops improved the productivity of family and wage labor. In addition, a vast array of connections of rivers and canals to the Erie Canal, Great Lakes, and Mississippi River established commerce among towns developing along the waterways.

Most of the commerce from importing and exporting articles manufactured within the United States or abroad usually passed through towns and cities in the northeastern states near a deep-water port connected with internal canals. A growing number and variety of articles that included threads, shoes, and clothing were manufactured within those towns and cities by wage labor and machines. Most of the pursuits of prosperity depended on the capital required to establish the mills, with water-wheel power increasing the productivity of the employees.

The technologies that increased prosperity in the United States before 1850 were innovations in labor-saving implements, fertilizing in agriculture, machines and water wheels in manufacturing, and steamboats and railroads in transportation. To employ, improve, and maintain these innovations required persons trained in the trades of mechanic arts and applied sciences of engineering. With most of the technology devoted to prosperity from crops in agriculture, the farmers in the United States began to support the establishment of institutions with primary subjects taught to improve productivity in agriculture.

By 1850 there were efforts underway in agriculture societies within a number of states devoted to increasing productivity of crops using recent discoveries in the sciences of biology and chemistry. Farmers with skills in the mechanic arts were inventing labor-saving implements and machines that influenced the practice of farming. In addition, a few universities and colleges included courses of some of the known sciences at work in agriculture. Yale College and the University of North Carolina were also organizing those sciences into studies in the subject of agriculture. However, a larger effort to establish schools of agriculture in all the states began with an election to the United States House of Representatives.

The Whig candidate who won a seat in the House of Representatives from the State of Vermont in 1854 had served in public office only as justice of the peace during his forty-four years of living in New England. However, he would serve in Congress until he was eighty-eight years old with his name indelibly associated with the land-grant colleges. The Morrill family settled in Strafford, Vermont, where Justin's grandfather and father were productive blacksmiths who used trip-hammers powered by a mountain stream to forge farm tools and equipment.

Although Justin Smith Morrill had attended a primary school and an academy, his desire to learn by reading provided him with a self-taught education. Rejecting his thoughts about attending a college and instead of following the family history of blacksmithing, Morrill worked as a clerk in Strafford and then in Portland, Maine for two years before returning to Strafford where he was successful as a merchant and eventually as a partner in the ownership of four general stores.¹

At the age of thirty-eight, Morrill retired to be a "gentleman farmer" with plans to become an experimental horticulturist.² When members of the Whig Party approached him about his interests in running for Congress, he was at first reluctant but finally agreed to become a candidate. After serving his first term in Congress, Morrill joined the Republican Party movement and served five more terms in the House of Representatives until he was elected to the Senate in 1866 where he served until his death in 1898.³

As an experienced farmer and a subscriber to journals like *The Horticulturist*, Morrill was aware of the rapid decrease in soil fertility in the old states as compared to the results with scientific farming in Europe.⁴ With just one year in Congress,

Morrill recommended to the Committee on Agriculture that they consider establishing a "Board of Agriculture" and "one or more national agricultural schools upon the basis of the naval and military academies."⁵

No action was taken until nearly two years later on December 17, 1857. While serving on the Committee of Agriculture, Morrill introduced the "Bill Granting Lands for Agriculture Colleges."⁶ Advised of the opposition, Morrill took to the floor of the House and delivered compelling reasons about the urgency of action and the consequences of inaction. He focused upon the nearly fifty percent decline in productivity for some crops in the United States and upon the fact that the United States is greater in size but needed to import from smaller countries "\$100 million dollars in agricultural products the previous year."⁷

Describing his concept of the agricultural colleges, Morrill claimed that they would not compete with existing colleges and universities and assured the congressmen that these institutions would appropriately educate the farmers with the knowledge of fertilizers for improving soil fertility, of the proper grasses as feed to improve livestock, and methods in farming that increased productivity. So that the tuition could be free, each state would be given twenty thousand acres of land for each of their representatives and senator in Congress, with the income from sales or rentals to be placed in a trust and the interest from the endowment used to operate the schools.⁸

Although the bill passed in the House and the Senate, President Buchanan vetoed it.⁹ In 1861, without some congressmen whose states seceded and who opposed the earlier bill, Morrill submitted a revised bill that included expanding the curricula, adding military training, and increasing the acres for each congressman to thirty thousand acres.¹⁰ With a three-to-one margin in the House and Senate, the "College Land Bill" was passed and sent to President Lincoln who signed it on July 2, 1862.¹¹ The "Morrill Act of 1862," as currently known, was entitled "An Act Donating Public Lands to the Several States and Territories Which May Provide Colleges for the Benefit of Agriculture and Mechanic Arts"¹² and included eight sections that described in some detail the terms, constraints, and expectations placed before the states, including a definition of the agriculture and mechanics (A&M) College.

The section quoted most often included the statement that for "each State which may take and claim benefit of this act, to the endowment, support, and maintenance of at least one college where the leading object shall be, without excluding other scientific and classical studies, and including military tactics, to teach such branches of learning as are related to agriculture and the mechanic arts, in such manner as the legislatures of the States may respectively prescribe, in order to promote the liberal and practical education of the industrial classes in the several pursuits and professions of life."¹³ Each state had two years from July 2, 1862 to accept the grant.

None of the funds could be used for buildings, and, within five years of the claim, the state had to report on the progress of at least one college. Additionally, no state in rebellion was entitled to the land grant.¹⁴

Even though the funds obtained from the sale had to be endowed and earnings were restricted to paying for the annual operating expenses of the agriculture and mechanical arts colleges, there was competition among existing educational institutions to obtain the land grant in some states and disagreements about the value and location within other states. Once the grant was awarded, the academic requirements to become a land-grant college were both simple and complicated.

The development of curricula so that “the leading object shall be, without excluding other scientific and classical studies, and including military tactics, to teach such branches of learning as are related to agriculture and the mechanic arts” was a relatively straightforward exercise for educators experienced in higher education. However, “to teach... in such a manner as the legislatures of the States may respectively prescribe, in order to promote the liberal and practical education of the industrial classes in the several pursuits and professions of life” was complicated with pressure on the agricultural colleges from politicians and members of professional societies of the professions to respond to their perceived or real unmet needs for improving productivity in industry without clearly defined objectives and without the financial support to achieve them.

Additional complexity often arose with the courses of study, with the admission requirements, and with the enrollment and graduation associated with the sciences of agriculture and mechanics that varied depending on the organization of the institution to which the land grant was awarded. The two common organizations of the course of study in agriculture and in mechanic arts before 1870 were at public state agricultural and mechanics colleges and at public state and private universities. In general, the land grant was an add-on department to the state and private universities where the culture was provided by classical studies; whereas, the land-grant department was the culture of the agricultural and mechanics college.

First State to Accept Land Grant

In 1840, the Territory of Iowa received a land grant from the federal government “for the purpose of establishing a University when the Territory became a State.”¹⁵ Seven years later when the State of Iowa joined the Union, the First General Assembly provided for the State University of Iowa and a board of trustees of fifteen members to organize and establish the institution.¹⁶ For a decade, the trustees were engaged in choosing an acceptable site, hiring a president, agreeing on the course of study, and equipping the building until the university was finally organized with a

course of study in classical education that included intellectual and moral philosophy and rhetoric, history and political economy, ancient and modern languages, mathematics, chemistry and natural philosophy, and natural history.¹⁷

Admission required examinations in “mental and written arithmetic, geography, English grammar, history of the United States, elements of algebra and natural philosophy, the usual preparatory Latin and Greek grammar and reader and the *Anabasis*.”¹⁸ While the trustees were organizing the state university under the terms of the first grant of land, the State Agricultural Society of Iowa was established and became active in reminding the General Assembly about the circumstances in the industry of agriculture and the need to charter “an agricultural college and experimental farm for the promotion of scientific and practical agriculture.”¹⁹

Subsequently, the General Assembly approved the establishment of the Agricultural College of Iowa and required that “the course of instruction therein should include such branches as natural philosophy, chemistry, botany, horticulture, fruit growing, forestry, animal and vegetable anatomy, geology, mineralogy, meteorology, entomology, zoology, the veterinary art, plane mensuration, leveling, surveying, book-keeping, and such mechanic arts as are directly connected with agriculture.”²⁰

Tuition was free for residents over the age of fourteen, and the admission requirements included the ability to “read and write the English language with ease and correctness, and also to pass a satisfactory examination in the fundamental rules of arithmetic.”²¹ Construction was underway on the farm but interrupted by the Civil War; however, when the Morrill Act was passed by Congress, the Iowa General Assembly was first to accept the land grant in 1862, which reactivated their interest in the existing Agricultural College and Farm and meeting the requirements placed upon them after accepting the land grant.²²

Although a committee of the General Assembly, which visited the farm in 1864, was “fully impressed with the belief that it answers the requirements of the law, as completely as any selection that could be made,”²³ there was an attempt in the General Assembly to attach the Agricultural College to the Iowa State University. Immediately, there was a reaction to the proposal by the supporters of the Agricultural College that maintained that Iowa State University and the Agriculture College were established to educate a different class of children for different pursuits of employment or professions.

The supporters of the Agricultural College stated that “The University is intended to be a higher grade school” in which students from “seminaries, academies, and colleges” may enroll and “complete an education in the highest branches taught.”²⁴ In contrast the Agricultural College was intended for the “want of a high school or college for the sons of working men, where they could, at a trifling expense, acquire a thorough practical education, adapted to the industrial pursuits they desire to follow through life.”²⁵

The General Assembly continued to support the construction of the Agricultural College of Iowa, which admitted students on October 19, 1868.²⁶ In the first term, the total enrollment was one hundred seventy-three students with twenty-one percent women in attendance.²⁷ The courses of study offered in agriculture and mechanic arts were four years of study with two terms in the first year and the first term in the second year in common for all students.²⁸

During the second term of the second year and the third and fourth years, the students in the Department of Agriculture were enrolled in the subjects as mandated by legislation while the students in the Department of Mechanic Arts were enrolled in analytic geometry; descriptive geometry; mechanics of engineering; shades, shadows, and perspective; differential and integral calculus; machine drawing; history and principles of architecture; architecture drawing; carpentry and masonry; and civil engineering.²⁹ The applicants were classified for admission with proficiency "in local geography, arithmetic, English grammar, reading, and spelling" determined by written examinations.³⁰

First Land-Grant College Admitting Students

The land-grant college provisions were accepted by the Kansas Legislature in February 1863. Bluemont Central College in Manhattan transferred its building, library, apparatus, and land to the State of Kansas for the establishment of Kansas State Agricultural College, which became the first Morrill land-grant college on June 10, 1863.³¹ In addition, the president and faculty also transferred with the agreement and proceeded to organize the Departments of Science, Literature, Mechanic Arts, Agriculture, and Military Tactics for the opening of Kansas State Agricultural College.³²

Fourteen students were listed as enrolled in departments of the college in the first catalogue;³³ almost a decade later, in 1871, there were only fourteen students enrolled in the Literary Department and ten in the agricultural and scientific courses, though there were more than one hundred students in the Preparatory Department.³⁴ One challenge for the college was the "scarcity of properly trained and experienced instructors in the sciences."³⁵ However, with most of the faculty and the president accustomed to classical studies and some opposed to industrial educational and manual training, agricultural science and practical education were developing in isolation and grew slowly in enrollment until the reorganization in 1873 when the president resigned, faculty resigned, and Kansas State Agriculture College was transformed.³⁶

The new president, John Anderson, published the reasons for changing the old system, writing: "Whatever else may yet need to be tried, there is no use in repeating

the experiment of flying a literary kite with an agricultural tail, so often made in various quarters.”³⁷ Reinforcing support for practical education, Anderson declared that: “The farmer and mechanic should be as completely educated as the lawyer and minister; but the information that is essential to the one class is often comparatively useless to the other; and it is therefore unjust to compel all classes to pursue the same course of study.”³⁸

In addition, he wrote: “Ninety-seven percent of the people of Kansas are in the various industrial vocations, and only three percent are in the learned professions; yet prominence is given to the studies that are most useful to the professionals instead of those that are most useful to the industrial pursuits.”³⁹ In response to Anderson’s aggressive leadership, the board of regents abolished the school of literature and terminated the preparatory course. The “teaching of Butler’s Analogy, Latin, German, and French [were] discontinued, and the requirements for admission lowered so as to connect the institution directly with the better grade of public schools.”⁴⁰ There was reaction to the changes, especially, the abolishment of Latin.⁴¹

The reorganization of the college resulted in separate six-year courses of study for farmers and women and a four-year course of study for mechanics.⁴² While most of the classroom courses in science or liberal arts were not unique and were more practical than theoretical, the school made the uncommon inclusion of an industrial course in every term in every year, which required students to enroll in courses with manual labor and trades, such as working on a farm or horticultural grounds; in a carpenter, wagon, blacksmith, paint, turning, scroll sawing, carving or engraving shop; or in stenography, photography, sewing, printing, or telegraphy.⁴³

In comparison to other agriculture colleges, Anderson pledged to graduate “a capable farmer” while some graduate “agricultural experts, who shall act as missionaries to working farmers.”⁴⁴ Some “seek to graduate master builders or superintendents of machine shops”; while “we seek to graduate intelligent and skillful carpenters, masons or blacksmiths.”⁴⁵ In general, the objective as stated by President Anderson was to provide a practical education for “those who desire to follow industrial vocations.”⁴⁶ Admission to the college required the applicant to be “fourteen years of age and pass a satisfactory examination in reading; arithmetic, through decimal fractions; English grammar, to syntax; and in descriptive geography.”⁴⁷

Land Grant at an Industrial University

From the acceptance by the legislature in 1863 to the opening of an agricultural and mechanic arts college four years later and for years after graduating students, the implementation of the land grant in the State of Illinois illustrates most of the challenges in the establishment of the original land-grant institutions in America.

Even before the land grant had been accepted by the legislature, two existing private colleges presented to the State Senate a proposal for two add-on agricultural colleges at their institutions in northern and southern Illinois.⁴⁸

Subsequently, the agricultural society retorted that "there should be a single, new institution entirely separate from any existing college."⁴⁹ In addition, some citizens proposed that one-half of the land grant should be used by agricultural interests with the other half used "by the mechanics to found a college in Chicago."⁵⁰ In 1867, the House and the Senate passed and the governor signed "an act to provide for the organization, endowment and maintenance of the Illinois university."⁵¹

However, the location for the state university involved another round of competition when "four counties had presented petitions including offers of money, bonds, and lands."⁵²

When Illinois Industrial University admitted students in 1868 at the Urbana campus in Champaign County, there were six departments under development, including Civil, Mining, Mechanical, and Metallurgical Engineering in the Polytechnic Department, and with Ancient and Modern Languages and Literature of Classical Studies in the General Science and Literature Department. These departments were well defined in terms of courses and content. However, the Military Department, the Department of Chemistry and Natural Science, and the Department of Trade and Commerce were simply outlined. However, as with most of the public land-grant colleges, the Agricultural Department was a work in progress: "The course in agriculture proper may embrace the study of common tillage, arboriculture, fruit growing, cattle and sheep husbandry, veterinary art, agricultural chemistry, and rural engineering and architecture."⁵³

With the easy part of establishing Illinois Industrial University accomplished, complications arose within about seven months after admitting the first students. A trustee, M. L. Dunlap, who was a correspondent for the *Chicago Tribune*, began to write articles that the "new science as advocated by... the agriculturalists was sadly needed in Illinois to enable the farmers to meet new conditions," but the faculty was unfamiliar with the peculiarities of the region.⁵⁴ In addition to his concern that the first faculty members were not from Illinois, he was worried that they were "but classical and theological," not practical.⁵⁵

However, with most of the land-grant colleges, the main complaint leading to complications was the priority for establishing the Agriculture College. The incorporation by the founders of Illinois Industrial University had set as objectives the establishment of a Normal School Department, an Agricultural School Department, and a Mechanical Department in that order. Since the Normal College had been organized in another institution, by the founders' priorities, the Agricultural College was first and mechanic arts were second "without excluding other scientific and classical studies."⁵⁶

However, President John Milton Gregory had placed the establishment of scientific and classical studies as equal to agriculture and mechanic arts. In addition, the trustee, Jonathan Baldwin Turner, who was also a founder, was also irritated when the president proposed a curriculum of studies with "Latin and Greek as the corner stones of the contemplated new structure and also when it developed that every student was 'advised' by the president to take Latin as one of his basic studies."⁵⁷ However, the complication eased in 1870, when among the total of two hundred eight students, about sixty percent of the nearly six hundred course enrollments were in agriculture, horticulture, mechanics, civil engineering, chemistry, comparative anatomy, mathematics, and military tactics; twenty-three percent were in the Commercial Department and English Literature; and eighteen percent were in German, French, and Latin; with no enrollments in Greek.⁵⁸ In 1872, the commissioner of Education reported that nearly four hundred students were enrolled in the mining, agriculture, and mechanics courses of study at the Illinois Industrial University, ranking it number-one in the country by student population, with MIT second.⁵⁹

Land Grant Inside a State University

When the dire circumstances for two institutions of higher education in California were relieved with their merger, the University of California could be established and receive the land grant from the state. In the first attempt to accept one hundred fifty thousand acres of public land, the California Legislature approved the organization of the Agricultural, Mining, and Mechanical Arts College to comply with the requirements of the Morrill Act. However, the action by the legislature violated the California State Constitution and did not provide any assurance of funding.

The shortcomings of the Agricultural, Mining, and Mechanical Arts College could be solved if they accepted an unexpected opportunity offered by a financially deficient private institution named the College of California, which agreed to go out of business and transfer to the state one hundred sixty acres of land at Berkeley in Alameda County and other valuable property, if the rank of the proposed institution was a university.⁶⁰ The two institutions joined together with the official opening of the University of California on September 23, 1869.⁶¹

The California Senate and General Assembly enacted procedures for the new university that required that "The College of Agriculture shall be first established; but in selecting the professors and instructors for the said College of Agriculture the Regents shall, so far as in their power, select such persons as shall possess those special requirements in their several vocations as shall enable them to discharge the duties of Professors in the Colleges of Mechanic Arts, of Mines and of Civil Engineering, and in such other Colleges as my [*sic*] be hereafter established."⁶² The

College of Mechanic Arts was second with the Colleges of Mines and Civil Engineering third in priority.⁶³ In 1870, the number of students enrolled was about fifty as reported in 1870 by the commissioner of Education.⁶⁴ Most of the students were enrolled in the College of Arts and the College of Letters, which led to awarding three bachelor of arts degrees and a master of arts degree in 1870.⁶⁵

Although the enrollment had increased to one hundred forty-seven students in 1871, "there was not a sufficient number of high schools or other proper institutions of learning in the State, to prepare students for admission into the University."⁶⁶ Therefore, a "Fifth Class" with admission requirements "reduced much below those necessary to enter the University proper" was established to encourage enrollment.⁶⁷ Subsequently, seventy students applied and fifty-five were chosen to enter the "Fifth Class" with all but one eventually earning full admission.⁶⁸

To encourage more enrollment, the board of regents approved "Fifth Class" instruction in English grammar, arithmetic, geography, and history of the United States at locations around the state, if they were organized by the local board of education.⁶⁹

With the enrollment increasing, the preferences were for the same colleges as the year before with five bachelor of arts degrees and seven master of arts awarded.⁷⁰ Due to the land grant, the "College of Mechanic Arts" was an "organic" department of the university and "ample provision was made by the Regents for the instruction of those who might enter it, extending through a full four years course necessary for graduation, and though rare advantages were offered to those who might prefer or who might be compelled by straitened circumstances to take a 'special course,' and for a limited time in industrial mechanics and auxiliary sciences, it was found, after a year's experience, that no students had entered, and few or none were likely to enter this college, free though it was and is to all applicants."⁷¹ The course of study in mechanics included four years of German (language and reading prose), one year of English (rhetoric, writing, grammar, and composition), geometry, conic sections, trigonometry, chemistry, analytic geometry, one year of differential calculus, inorganic chemistry, analytical qualitative chemistry, one year of integral calculus, botany, zoology, mineralogy, and physics.⁷²

The trained mechanics may not have had time to complete that demanding list of subjects, but the regents recognized the opportunity to engage working mechanics by establishing a branch of the Mechanic Arts College in San Francisco where evening lectures were given by the professors of the university. In 1871, "University Lectures" were held in the hall of the Mechanics' Institute in San Francisco, which had a seating capacity of five hundred but was not large enough to admit all who had subscribed to attend.⁷³ When the first year ended, three hundred fifty persons registered as regular attendants for the 1872 lectures, with the number of registered visitors again exceeding the capacity of the Mechanics Hall.⁷⁴

With additional space provided for the visitors, it was reported that “the whole number of students receiving instruction from the University during the present term is eight hundred and fifty-five.”⁷⁵ Even though the university lectures were not offered as part of a four-year degree granting program, with book knowledge provided by the professors and with practical art provided by the mechanics, a learning environment was created with the opportunity for the mechanic to connect theory to practice and outcome to reason. Mechanics who had learned only from experience may not have appreciated book knowledge until their art was unreliable or new materials were required. The university lectures served the purpose of improving the knowledge of mechanics concerning the skill they had developed and helped to advance the technology that they depend upon for a living.

The Agricultural College was organized so that students did not have to enroll in a four-year program to take special courses. Correspondingly, the student could choose from the branches of agriculture that were listed as agricultural chemistry, mechanics, horticulture, analytical chemistry, geology, botany, physics, veterinary science, rural economy, diseases of animals and plants, and forestry. However, just as in Mechanic Arts, “no students applied for admission to this college.”⁷⁶ Consequently, the regents resolved

that in order to extend the advantages of the Agricultural College of the University to the largest possible number of citizens, and especially to persons practically interested in farming, fruit culture, wine making, wool growing, and stock raising, the Professor of Agriculture, Agricultural Chemistry, and Horticulture should [*sic*] visit, as far as possible, all the agricultural counties and centres [*sic*] of population in the State, and in every convenient neighborhood where accommodations can be obtained deliver one or more lectures, illustrated when practicable, upon subjects connected with agriculture likely to be of most value and interest to the people of the locality.⁷⁷

The professors were instructed by the regents to “disseminate such information derived from study, from observation, from correspondence, and from general experience as will be of use to farmers, fruit growers, and stock raisers of the State.”⁷⁸ In addition, the “best mode of culture” for new crops adapted to the soil and climate of California should be considered and discussed with the farmers for the purpose of increasing “the productive resources of the State.”⁷⁹ Also, the professor of agriculture was instructed to examine the current crops and to share with the growers any influence that improves or harms them and to include the results in his lectures. In addition, the professor was required to collect data and publish statistics about crops, flocks, and herds of the state while communicating with local agricultural societies.⁸⁰

From 1870 to 1880, the courses of study, the admission requirements, the student enrollment, and the activities of faculty that were developing with the founding of the University of California as a land-grant institution were consistent with the universities in Europe and the United States before the Civil War. The general admission required “very fairly the subjects thought necessary to a reasonably good secondary education” including Latin requirements “identical for the classical and the literary courses,”⁸¹ and while requirements for admission to the college of science, “though differing somewhat in detail from those of the Sheffield Science School of Yale College, are fairly equivalent to them, and higher than those of the Institute of Technology in Boston.”⁸²

In preparing to attend a college of science in the University of California, many students attended an academy; whereas students planning to enroll in a classical department could attend a preparatory school instead of attending an academy. Except for including English and German languages in the course of study, the departments of science were organized independently of classical and literary subjects in the fashion of the professional schools with physics and geology included with the classical education which was consistent with most colleges and universities of the nineteenth century.

The sciences in the four-year course of study in agriculture included elementary chemistry, botany, physics, comparative zoology, agricultural chemistry, mineralogy for two semesters, geology for two semesters, analytical chemistry for four semesters, and organic chemistry for two semesters.⁸³ Clearly the emphasis was on the sciences of agriculture rather than the practice of agriculture; however, the professor of agriculture expressed his conviction that “trained intellect and science” is needed in the industry of farming rather than increasing enrollment.⁸⁴

While there were fewer students, the faculty was engaged in research and extension that provided value in California because the “great diversity of climates and soils, and their adaptation to a great variety of cultures, yielding high returns on small areas, fruit, and especially grape culture, with the use of irrigated lands, impart a character of permanence to agricultural investment that is not usual in States as young as this”; therefore, to maintain the value of the land and to improve the value of the product demands greater agricultural science “than in most States west of the Alleghany range.”⁸⁵

Private-Public Land-Grant University

The founding of the land-grant institution in New York involved trials and failures before Ezra Cornell stepped forward to offer a solution. Cornell was born in 1807 and lived in Westchester County, New York, until the family moved to Madison

County. His father was a potter by trade and a teacher in the district school. Cornell was often involved in useful work such as carpentry. In 1826, he moved to Cortland County, where he was employed in the building of wool-carding machines. Two years later, he was working in the machine shop of a cotton factory in Ithaca and in charge of a flour mill in another twelve months. Cornell reconstructed and enlarged the mill so that one man could “turn out four hundred barrels of flour per day in the busiest season.”⁸⁶ After eight years at the mill, he and his brother engaged in lumber and farming businesses in Maine and Georgia.

While in Maine, Cornell called upon a man named F. O. J. Smith, who told Cornell about Congress funding Samuel Morse to connect Baltimore and Washington by the telegraph cable. Smith had signed a contract to lay the cable underground and shared with Cornell his concern that the price of one hundred dollars per mile to which he had agreed would not cover the cost of the project.⁸⁷ Cornell developed a labor-saving pipe machine that was successful. After laying about ten miles of pipe, Morse discovered that the insulation that he had chosen for the wire was inferior, and as a favor to help Morse save face, Cornell halted the project by wrecking the pipe machine so that Morse could consider alternatives.⁸⁸

Cornell was appointed assistant superintendent of the project and decided to use poles instead of pipes to reduce the cost of the project. During the 1840s, Cornell superintended and constructed lines from New York City to Philadelphia, New York to Albany, and Troy, NY to Montreal.⁸⁹ He expanded his efforts by organizing the Erie and Michigan Telegraph Company with connections from Buffalo to Milwaukee and the southern region of the State of New York.⁹⁰

In 1855, the owners of these distributed telegraph lines consolidated to form the Western Union Telegraph Company. Cornell was an active director and the largest stockholder for more than a decade.⁹¹ In 1866, he used his wealth to present Ithaca with a library, which represented an expenditure of approximately seventy thousand dollars.⁹² Cornell served in the New York State Assembly for two years and in the State Senate for four years. He was serving as a state senator when the acceptance of the Morrill Land Grant by the State of New York occurred and when the land-grant institution was founded by the New York State Assembly.

Public discussion about agriculture education probably began in New York with the organization of the New York Society for the Promotion of Agriculture in 1791.⁹³ At the first meeting of the State Agriculture Society in 1832, a committee was formed to develop a plan for an agriculture school. A charter for the school with a budget included was developed as the basis for an act to incorporate the New York State School of Agriculture in 1836. However, the Charter was not granted until 1853 to “consist of not less than three hundred acres” and instruction “shall embrace the following branches of knowledge: practical and scientific agriculture, chemistry and its manipulations so far as it may be usefully connected with agriculture,

mathematics and mechanics, surveying and engineering, geology and botany, the practical management of the farm, of the dairy, and of the various kinds of live stock; also such other branches of knowledge as may seem useful and proper.”⁹⁴ The president, trustees, and location were chosen; however, the school project ended without leadership.

Two years later, the State Agriculture College was transferred to Ovid, New York. The school opened in 1860 with twenty-seven students, but the school could not remain open during the Civil War.⁹⁵ With unpaid debt on the mortgages and foreclosures, the buildings and property were unavailable for an opportunity for the school to reopen with the land grant funds.⁹⁶

Almost parallel with the agriculture interest, the mechanic interests were also at work, though in 1837, the meeting of the Mechanics Mutual Protection was more concerned about the economy.⁹⁷ A society was formed in Buffalo in 1843 “to diffuse a more general knowledge of the scientific principles underlying trades, to protect mechanics and artisans from the encroachment of capitalists and to enable them to secure remunerative wages.”⁹⁸ In 1848, the association advocated technical schools, and as many as seventy subordinate societies formed in the State of New York. The groups advocated that if “education is to be universal it must be practical.”⁹⁹ A movement to establish a People’s College resulted in the passage of an act of incorporation in April of 1853 “for the purpose of promoting literature, science, arts and agriculture.”¹⁰⁰

The college was located in Havana, dependent on a public subscription to obtain the funds to erect buildings, open, and operate the institution. Due to a financial crisis of 1857 and a failure of public support, the trustees turned to the land grant as a source of funds. The legislature agreed to a contingent assignment of the land grant that depended on the development of accommodations for students, faculty, library, and laboratories. The period of time for improvement was three years before any money from the land grant would be available if the conditions were met.¹⁰¹

Ezra Cornell did not have confidence that the People’s College would reach their requirements; therefore, he offered five hundred thousand dollars to an institution that was founded by the legislature and the beneficiary of the land grant. When the People’s College defaulted, a land-grant institution in New York was created in Ithaca as Cornell University with an act in 1865: “The leading object of the corporation hereby created shall be to teach such branches of learning as are related to agriculture and the mechanic arts, including military tactics; in order to promote the liberal and practical education of the industrial classes in the several pursuits and profession of life.”¹⁰²

Courses of study in agriculture, mechanic arts, military science, architecture, civil engineering, mining engineering, and freehand drawing provided the practical studies. The liberal studies included Mathematics and Astronomy, Chemistry

and Physics, Natural History, Languages, Literature, Moral and Intellectual Philosophy, History, and Political Science Departments. There were two levels of admission with one required for everyone and another for special departments. The general admission was adequate for the practical courses of study that avoided the classical languages and literature required for others.¹⁰³

The course requirements for the first and second years for the practical courses of study were similar with the courses of the practice increasing in the third and fourth years. For example, the four-year course of study leading to a bachelor of civil engineering was taught on the quarter system of Fall, Winter, and Spring terms with mathematics including algebra, trigonometry, descriptive geometry, analytical geometry and calculus; science including botany, chemistry, physics, metallurgy, mineralogy, hydraulics, and spherical astronomy; languages including rhetoric, French or German; and the knowledge required to engage in the practice of civil engineering such as surveying, bridge stresses, hydrographic surveying, colored topography, and railroad surveying.¹⁰⁴

The degree of civil engineer was awarded after a fifth year, which included subjects such as contracts, river and harbor improvements, and sanitary engineering with projects, designs, and specifications. The students paid no tuition for the fifth year with all the privileges of all the resident graduates.¹⁰⁵

By 1882, there was a well-equipped mechanical laboratory in the Department of Mechanic Arts with an iron and brass foundry, blacksmith shop, lathes, and equipment to test steam gauges, strength of materials, and other equipment to be used in the shopwork every term for the four years for those enrolled in mechanic arts. The other required courses in mechanic arts were in math and science and about the same as for civil engineering, but with the mechanic arts course of study, a bachelor of mechanical engineering was awarded. There was also a one-year graduate course.¹⁰⁶

Mechanic Arts and Engineering within a Land-Grant Institution

For centuries the word “engineer” has identified persons who applied existing scientific and mathematical knowledge to alter the gifts of nature into producing, transporting, communicating, building, creating, improving, and defending the development of communities where prosperity occurs. Until the twentieth century, many of the engineers were prepared for their contributions by serving as an apprentice to a master of their interests.

As the United States was developing as a nation in the nineteenth century, experienced engineers supervised the building of canals, bridges, highways, ports, and railways required for transporting to markets the production from farms and

manufacturing establishments. In addition, the operation of steamboats, locomotives, telegraphs, telephones, and electricity required some knowledge about establishing, repairing, and maintaining the system. The labor for productions from agriculture and manufacturing were assisted by innovations of technologies derived from knowledge in math, chemistry, and physics.

The Morrill Act required the states to establish colleges of agriculture, mechanic arts, and military training that encouraged practical education for the “industrial classes.” However, the act did not outline a course of study, did not require degrees, did not define mechanic arts, did not define engineering subjects, nor describe theoretical or practical agriculture. Nevertheless, the act provided the opportunity for the legislators, agricultural associations, mechanic arts institutes, farmer’s societies, tradesmen, and the existing education institutions to influence the organization of the agricultural and mechanic arts colleges as the manufacturing and agriculture industries were developing at a different pace in each state.

Beginning in the nineteenth century and continuing into the twenty-first century, encouragement and financial support from state and national societies, commissioners, and legislators sponsored the development of agriculture education at all levels in schools and in colleges where undergraduate bachelor of science degrees were granted in a variety of departments in almost all land-grant state institutions. In addition, federal and state financial support of facilities and research projects created graduate degree programs that in turn established a partnership with agricultural, industrial, state, and federal laboratories that led to discoveries and innovations that developed agricultural science at the molecular level.

Consequently, productivity increased with mechanized farming and with scientific knowledge that improved seeds, soils, breeding, or feeding that motivated “book-farming” with rewards on investments. Surely Justin Morrill would be proud of the advancements provided by agricultural colleges. However, he might ask: “What happened to the mechanic arts colleges? We also needed them for our industrial classes.” Unfortunately, the answer is a bit obscure, but in the end, equally as impressive as the success of the agriculture colleges.

The main factor that influenced the way mechanic arts colleges progressed was the infusion of mechanic workshop practices into undergraduate courses of study in engineering and as the laboratory of necessity in industrial schools, trade schools, and vocational schools. Although there were numerous examples of that infusion at agricultural and mechanic arts colleges, the most prominent circumstance occurred with the awarding of the land grant to the Massachusetts Institute of Technology (MIT) as a mechanic arts institution.

The founding of MIT has been described in detail by Julius A. Stratton and Loretta Mannix in *Mind and Hand: The Birth of MIT* in which the organizing of the institute was dated to the year 1865. However, the conception of an institute

of technology by William and Henry Rogers, who were the sons of a professor at the College of William and Mary, began in Williamsburg, Virginia decades earlier. Each young man in the Rogers family was educated in mathematics and the sciences of physics, chemistry, and geology and engaged in teaching and research at an early age.

In 1827, William, at the age of twenty-three, began to lecture on scientific principles associated with practical applications that he demonstrated in the classrooms at the Maryland Institute for the Promotion of Mechanic Arts.¹⁰⁷ In the evenings, he attracted a crowd to hear and observe his explanation of astronomical events, which engendered public admiration and eventually a request for him to plan, organize, and direct a technical high school, which was then named “an English and Mathematical School.”¹⁰⁸ In the plan, Rogers defined the principal “aim of the school” to be teaching “such knowledge... most beneficial to youth engaging in mechanical and mercantile employments.”¹⁰⁹

The primary subject was to be mathematics with the advanced courses in “algebra, geometry, mensuration, surveying, navigation, perspective, etc.”¹¹⁰ Although William proposed that “Classical studies are not within the scope of the school,” reading, writing, grammar and geography were included in the courses of study.¹¹¹ In addition to his duties at the school, William began to give public lectures in the evenings about “the technical aspects of construction and machinery” of the railroads that must have been a wonder of science and engineering to the people in Maryland.¹¹²

After leaving the school to replace his father as the professor of natural philosophy and chemistry at the College of William and Mary, and then resigning after seven years to accept a similar position at the University of Virginia, William corresponded with Henry about developing a plan to establish a polytechnic institute that was an expansion of their experiences in teaching at the Maryland Institute and at the English and Mathematics School. The plan was unique in that the relationships between the fundamental principles of science and the various practices of engineering, the applications of mechanic arts, and other useful arts were to be taught in class and then demonstrated in a laboratory.

Satisfied with their efforts, the Rogers brothers met with the Pennsylvania Legislature and proposed to establish a polytechnic institute in that state; but their excitement became a rejection.¹¹³ In 1848 to 1849, before moving to Boston in 1853, William shared his series of lectures, the “Application of Science to the Useful Arts,” at the Lowell Institute at Harvard, but could not obtain a commitment.¹¹⁴ Apparently William abandoned the idea of a polytechnic institute until he became involved in a community project in Boston in 1860 that was actually the development of proposals to the legislators requesting the transfer of public land to accommodate a building site for the Natural History and Horticultural Societies.¹¹⁵

With accommodation already provided for those societies, eventually William Rogers took charge of seeking the land transfer by preparing a pamphlet describing the creation of a corporation in the “Objects and Plan of an Institute of Technology” with thousands of copies printed to be distributed across the state and to other states. There were three components to the corporation that was designated as the Massachusetts Institute of Technology—a Society of Arts, a Museum or Conservatory of Arts, and a School of Industrial Science and Art.¹¹⁶ The Society of the Arts served as the forum where discussion of “new mechanical inventions, products and processes; by written and oral communications” provided the opportunity to measure “the condition of the various departments of industry, the progress of practical discovery in each, and the bearings of the scientific and other questions which are found to be associated with their advancement.”¹¹⁷

The twelve “Committees of the Arts” were: Mineral Materials; Organic Materials; Tools and Instruments; Machinery and Motive Powers; Textile Manufacturing; Manufacturing of Wood, Leather, Paper, India Rubber; Manufacturing of Pottery, Glass, and Precious Metals; Chemical Products and Processes; Household Economy, including Warming, Illumination, Water-Supply, Ventilation, and the Preparation and Preservation of Food; Engineering and Architecture; Commerce, Navigation, and Inland Transport; and Graphic and Fine Arts.¹¹⁸

A Museum of Industrial Art was included to accept, preserve, and display a collection of objects related to the Society of the Arts. The third component of the plan was the School of Industrial Science and Art that included Schools of Design, Mathematics, Physics, Chemistry and Geology.¹¹⁹ Rogers concluded with the claim that due to “the peculiar character and objects” of the institute, “that it could not interfere with the interests of the established schools,” since the aim was “to supply the industrial classes with a knowledge and training of which they are specially in need.”¹²⁰

On April 10, 1861, the Massachusetts Institute of Technology corporation was given a charter with the requirement that one hundred thousand dollars be “subscribed, or otherwise guaranteed” within one year for the institute to have the “perpetual right to hold, occupy and control” the property for the “purpose of instituting and maintaining a society of arts, a museum of arts, and a school of industrial science, and aiding generally, by suitable means, the advancement, development, and practical applications of science in connection with arts, agriculture, manufacturers and commerce.” There were twenty members of the corporation that included William Rogers and Marshall Wilder who had led the efforts to establish an Agriculture College a decade earlier.¹²¹

Just a few days short of one year later, Rogers claimed the financial challenge had been met with pledges from one major donor interpreted most favorably and smaller endowments that proved to be unfulfilled expectations.¹²² On April 21, 1861,

the cannons fired at Fort Sumter, SC, and four days later the organization of the institute began. The scope of the Massachusetts Institute of Technology Corporation challenged Rogers to set priorities of necessity that did not begin with opening the institute. However, on July 21, 1862 a unique opportunity began to arise with the passage of the Morrill Act; the General Court of Massachusetts accepted the act's requirements on April 18, 1863.¹²³

Without delay, the parties interested in the expansion of Lawrence Scientific School at Harvard, in the establishment of the agricultural college (which had been denied in 1856), and in organizing the Massachusetts Institute of Technology were searching for arrangements to favor their institution in a way for them to receive the land grant.¹²⁴ Although Harvard already had the faculty with endowment, a farm, and a reputation, the desire for an agriculture school combined with the leadership of Marshall Wilder resulted in locating the Massachusetts Agricultural College at Amherst, with this college receiving two-thirds of the interest on the land-grant fund each year.¹²⁵ With Rogers dedicating the Institute of Technology to fulfilling the responsibilities of a land-grant mechanic arts college and receiving one-third of the interest, Massachusetts had the only land grant that was split between two unrelated institutions.

When MIT opened in 1865, there were six four-year courses of study with common subjects required during the first two years.¹²⁶ These two years were devoted to about one-half mathematics through integral calculus with applications in descriptive geometry, surveying and mechanical drawing, and about one-half devoted to experimental physics focused on the "phenomena and laws" of heat, light, magnetism and electricity,¹²⁷ qualitative "analysis by laboratory practice" in chemistry,¹²⁸ English, and modern languages.¹²⁹

In the third and fourth years, the subjects were mostly devoted to one of the six courses of study: mechanical engineering, civil and topographical engineering, practical chemistry, practical geology and mining, building and architecture, and science and literature. The courses in mechanical and civil engineering included theoretical as well as applications of science and mathematics to the construction of machines, and to the design of structures such as wood for framing, trusses, girders, arches, roofs, and bridges.

In addition to the subjects in engineering, general studies in the third and fourth years included lectures in history, political economy, science of government, philosophy, logic, rhetoric, history of English literature, zoology, physiology, and botany.¹³⁰ The students were engaged in an "extended study of French and German," which prepared them to read the scientific literature of the nineteenth century.¹³¹

To be admitted to the institute, students had to be at least sixteen years of age and "give satisfactory evidence... of a competent training in arithmetic, algebra, geometry, English grammar, geography, and the rudiments of French."¹³² For those

students who had attended all the courses and satisfactorily completed every assignment and exam given by the faculty, there remained passing an examination “on the whole course of studies and exercises prescribed in his department” and preparing a dissertation on “some subject included in the course of study” before a degree was awarded in the name of the course of study.¹³³

In the 1866 school year there were seventy-two students enrolled who paid one hundred dollars in fees for the first year of enrollment, one hundred twenty-five dollars for the second, and one hundred fifty dollars for each of the last two years.¹³⁴ Some of this fee provided access to unique laboratories that had been developed by the faculty at MIT. So when John Daniel Runkle replaced William Rogers as president in 1870, MIT had already devoted resources to the development of laboratories in chemistry, architecture, physics, mining, metallurgical, and in “teaching the nature and use of steam.”¹³⁵

With pride in their accomplishments within the last decade, the president, professors, and students attended the International Centennial Exhibition at Philadelphia that included a visit to the “exhibit made by the Imperial Technical Schools of St. Petersburg and Moscow.”¹³⁶ They were amazed with the “collections of tools, and samples of shop-work by students,” which illustrated the “magnificent results possible” with a system of instruction and practice in the mechanic arts.¹³⁷ Upon his return from Philadelphia, Runkle reminded the faculty of their obligation to the mechanics arts as a land-grant institution and characterized the establishment of the shops for mechanic arts as a sequel to the experimental farms for agriculture schools.¹³⁸

The skills of practical education acquired in the mechanic arts curriculum included “the arts of chipping, filing, etc.” in the vise shop,¹³⁹ working hot metal of irregular shapes into a given shape in the forging shop with plans to add shaping metals in the lathe shop or the planer shop, and a foundry to practice the art of preparing a mould.¹⁴⁰ In 1877, the School of Mechanic Arts was added to the other schools at MIT. However, this school was unlike the others with admission at a lower age and with less preparation required to enroll. In addition, the course of study was shorter without an opportunity to earn a degree.¹⁴¹ Nevertheless, by 1902 more modern machine tools, a foundry, and woodworking shops had been added with the enrollment in the “Mechanical Laboratories” of the Mechanic Arts School increasing to three hundred forty-seven students, too many for the seats available.¹⁴²

Land Grants within Established Colleges or Universities

By 1872, thirty-seven states reported a claim for the Morrill Land Grant with the intention of organizing forty-one schools of agriculture and mechanic arts.¹⁴³ The

responsibility to organize a school or college as required by the land grant was assigned mostly as add-on programs to twenty-one existing or evolving public state colleges or universities already offering classical education that included the University of North Carolina.

There were another sixteen public institutions that were organized with curricula devoted primarily to the practical education of agriculture and mechanic arts. In addition, the scientific schools of the colonial colleges of Yale, Rutgers, Brown, and Dartmouth represented the states of their location with Cornell University and Massachusetts Institute of Technology establishing unique arrangements as private land-grant institutions. By 1870, the total enrollment, as reported by fifteen of the land-grant colleges to the commissioner of Education, was more than fourteen hundred students with half of enrollment at the four institutions of Sheffield Scientific College of Yale University, Iowa State Agricultural College and Farm, Kansas State Agricultural College, and Agricultural and Mechanical Department of the University of Kentucky.¹⁴⁴

The development of the agricultural and mechanic arts in colleges and universities depended on the organization of the institution. University of California professor Joseph Le Conte described a university as “a collection of the highest professional schools gathered about and united to a system of highest general culture.”¹⁴⁵ The colonial colleges and the state universities established before the Civil War adopted this style with a few exceptions occurring toward mid-century with a bachelor of science degree under special circumstances.

Yale, Brown, Dartmouth, Rutgers, North Carolina, and the University of Mississippi accepted the responsibility of the land grant, which they implemented while preserving the classical style of the university. However, the land grant was eventually transferred from these institutions to either an agricultural college or an agricultural and mechanic arts college. A primary example was Yale College accepting the land grant for the State of Connecticut with no other institutions requesting consideration. In fact, Yale was fully prepared in every manner to accept the responsibility of establishing the agricultural and mechanic arts college. For more than a decade, professors in the applied sciences had been gathering in number and reputation at Yale and the then-named Sheffield Scientific School that was separated by academic program but connected by the reputation of Yale College.¹⁴⁶

The degrees were “conferred by the Corporation of Yale College” on students who had satisfactorily passed the examinations and were recommended by the appropriate academic authority.¹⁴⁷ The course of study was for three years with the subjects of math, English, German, chemistry, physics and botany in common in the first year and subjects of specific interests in the second and third years. The degree of bachelor of philosophy (science) was conferred “at the termination of three years’ study in any one of the several sections of the school.”¹⁴⁸ Entrants must be at

least sixteen, and “sustain an examination in the following” subjects: arithmetic, algebra, geometry, plane trigonometry, the elements of natural philosophy, English grammar, geography, history of the United States, and Latin is recommended.¹⁴⁹

The Sheffield School provided courses of study in the Departments of Chemistry, Engineering, Industrial Mechanics, Mining and Metallurgy, and Agriculture. The subjects were devoted to the applications of science with very few devoted to the practice of farming or of mechanics. For example, the course in industrial mechanics and mechanical engineering included spherical trigonometry, analytical geometry, calculus, descriptive geometry, drawing plans and elevations; shading and tinting, theoretical mechanics, physics, French, German, analytical mechanics, mechanical drawing, and “in the Theory and Construction of Machines, Mill work, visits to machine shops and manufactories, with reports of Machines and Engines, Designs of Machines and practice in use of tools and in the construction of Machinery.”¹⁵⁰ Since there was “no shop connected with the School” the reports on paper with a pen substituted for the tools in the practice of the mechanic arts.¹⁵¹

Seventeen years after Yale had received the land grant, the Board of Agriculture of Connecticut was meeting in New Britain when the vice chairman announced that Augustus and Charles Storrs were offering land and money to establish a school of agriculture.¹⁵² Subsequently, the “Act Establishing the Storrs Agricultural School” in 1881 was “for the education of boys... in such branches of scientific knowledge as shall tend to increase their proficiency in the business of agriculture.”¹⁵³

Within the same year the school opened to twelve young men who had to be at least fifteen years in age and were “subjected to an examination in reading, spelling, writing, arithmetic, English, grammar, geography, American history, and practical agriculture.”¹⁵⁴ The school began with courses of study to “teach practical and scientific agriculture and horticulture” for three terms during each of the two years of a full course.¹⁵⁵

The subjects in the practice of agriculture included improvement of soil, culture, and handling of crops and orchards, use and repair of tools, breeding and rearing of livestock, business, management of farming, and history of agriculture. In the science of agriculture the content was divided into agricultural chemistry, agricultural physics, agricultural mechanics, agricultural botany, and agricultural zoology.¹⁵⁶ As an example, the instruction in mechanics involved the “laws of motion and friction,” and “principles of the construction of farm tools and machines.”¹⁵⁷

As the enrollment at the Agricultural School increased and the funding for expansion became a political discussion, the agriculture organizations increased their public discourse about their dissatisfaction with the agricultural program at Sheffield Scientific School at Yale.

Apparently the Connecticut Grange, an agricultural society for farmers and their families that advocated for rural and agricultural issues, or its advocates were

the source of public discontent about the land grant course of study of agriculture at Yale after their second annual meeting in 1886 when a presentation revealed that just seven students had graduated from the agricultural course in the last twenty-four years at a "cost of \$180,000, or \$25,700 each."¹⁵⁸ Furthermore, the members of the Grange were concerned that the entrance requirements of a thorough knowledge of Latin, in addition to algebra, arithmetic, geometry and trigonometry, were excluding "ninety-nine out of every hundred who expected to be farmers, for whose benefit the fund was intended."¹⁵⁹

They were referring to the fund created by the land grant that was awarded by contract to Yale from the State of Connecticut; however, the Hatch Act in 1887 encouraged supporters of the Storrs Agricultural School to try to obtain a portion of that funding. The successful opportunity arose with the land grant of 1892. On April 21, 1893, the General Assembly awarded the land grants of 1862 and the Morrill Act of 1890 to Storrs Agriculture College.¹⁶⁰ However, Yale exercised its rights to claim a breach of the contract with the state. The matter of dissolving the relationship remained in the courts for three years until Yale was awarded damages "in the sum of \$154,604."¹⁶¹

Once organized, the Storrs Agricultural College course of study reflected the interest of the Grange with first-year common school subjects of arithmetic, grammar, physical geography, United States history, penmanship, elocution, music, military, sewing, and physical culture followed by agriculture, horticulture, botany, cooking, sewing, and chemistry in each of the three remaining years. In addition, English, math, physics, zoology, veterinary, and other subjects related to agriculture were included.¹⁶² In retrospect, the program at Yale had been very successful with enrollments in mechanic arts, but the new land-grant college did not establish a course of study in mechanic arts with any concern for those who could no longer afford to attend Yale.¹⁶³

Development of the Technology Economy

Technology and Engineering with Education and Training

Rensselaer with twenty civil engineering graduates and Stevens Institute with fifteen mechanical engineering graduates were leading in 1881 in the number of engineering degrees awarded.¹ The 1900 Census reported that forty-three thousand persons were engaged as engineers with almost half occupied as civil engineers.² The economy was expanding by the growth in production of iron and steel, in labor-saving power, in transportation by railroads, and in connections for communications.

In the 1900 Census, patents associated with various identified improvements were gathered into three categories of engineering, electricity, and transportation. In traditional engineering there were one thousand fifty-nine patents in the class of construction of bridges, two thousand seven hundred eight in excavation and dredging, one thousand five hundred eighty-five in hydraulics and pneumatics, nine hundred fourteen in construction of iron buildings, one thousand one hundred eleven in reinforced masonry construction, one thousand seven hundred ninety-six in conveying and hoisting, one thousand three hundred fourteen in clutching and gears, two thousand two hundred seventeen in elevators, and one thousand one hundred twenty-two in storage areas for rapid distribution.³

The development of electricity included patents in generation, heating, lighting, motive power, railways, telegraphy, and telephony. The connection by railways and roads included patents of bicycles, electric and railway breaks, motor vehicles, pneumatic tires, air and gas engines, and pumps. The construction, improvement, repairs, and operation of various inventions required persons trained in the mechanic arts and educated in mechanical and electrical engineering with development of communication and transportation throughout the country.⁴ Before 1900 the variety and number of bachelor degrees grew at a modest pace; however, in the first

half of the twentieth century both increased with manufacturing for growing the commerce and wars.

The value of the products manufactured by the industries in the United States increased by forty percent from 1870 to 1880 to \$5,369,579,191 with \$947,953,795 paid in wages at an average of \$346 annually to the 2,732,595 employees and the cost of materials and wages on average sixty percent the value of the products. After nearly doubling in the value of production over the last decade and an important component in the growth in the economy, on the average each employee in 253,852 establishments created a value of \$1,939 in product.⁵

Iron and steel production was an important component of these industries with production nearly doubling in ten years. During this decade, the furnaces and mills in Pennsylvania produced forty-six percent of the entire steel products with the wage paid to a laborer of \$393.51 a year on the average.⁶ The highest average daily wage for a skilled worker in steel production was four dollars a day, and for the unskilled laborer it was two dollars, both in the Wyoming Territory. The lowest average daily wage for the skilled worker was one dollar and twenty-five cents and, for the unskilled laborer, fifty-four cents, both in North Carolina.⁷

With labor-saving machinery available, the steam and waterpower used in manufacturing increased by forty-five percent from 1870 to 1880 with an eighty percent increase in steam-driven horsepower alone.⁸ Nearly half of the forty-five percent increase occurred in Massachusetts, New York, Pennsylvania, Ohio, Michigan, and Illinois.⁹ The industries using the most steam and waterpower produced cotton goods, flour and grist-mill products, iron and steel, sawed lumber, and paper.¹⁰

To transport the products, railroads invested to increase their transportation facilities with 17,412 locomotives, 12,330 passenger cars, 4,475 mail baggage cars, and 375,312 freight cars that hauled more than 200,897,395 tons of cargo, which was mainly grain, flour, cotton, live-stock, lumber, coal, railroad iron, and manufactured products.¹¹ With growth the railroads were profiting from the commerce that resulted in stationmen, trainmen, shipment, and trackmen earning thirty-seven dollars a month and the general officers and clerks earning a salary of eighty-four dollars.¹² However, there were more than eight thousand accidents during the year of 1880 with twenty-one percent resulting in a death and more than half of the accidents happening to employees.¹³

Communication industries were expanding with seventy-six telegraph companies competing with Western Union, which had handled more than ninety percent of all telegraph messages;¹⁴ however, the development of telephone communications was beginning to connect the businesses and the citizens of the United States with 148 companies owning 34,305 miles of wire and employing 3,338 workers; half of those companies operated seventy-eight percent of the wires.¹⁵

From 1850 to 1900, the total value of manufacturing products increased from one billion to thirteen billion dollars. In addition, the number of wage earners increased from less than a million to more than five million with an average of more than a forty percent increase each decade. The increase in the value of manufactured products per annum ranged from twenty-six to more than one hundred twenty percent with an average of eighty percent for the decades.¹⁶ During the six decades, growth in manufacturing was in part responding to innovations such as electricity and discoveries such as oil that were dramatically altering the economy, society, and culture of the United States.

With the value of manufactured “food and kindred products” first with more than two billion dollars, the second and third were iron products for transportation and construction and textiles for production of cloth and clothing products.¹⁷ In addition, petroleum, gas, and chemical products were challenging traditional leaders of the value of manufactured products of flour, grist, liquors, lumber, and implements for agriculture.

The manufacturing processes that added value to the cost of the materials required to manufacture the products were becoming more complex and involved dependencies on chemicals as well as mechanical knowledge. During the period of developing chemical and allied products, the Department of Chemical Engineering was being established at MIT in 1888 with the objective of not graduating a chemist but a “mechanical engineer who has given special attention to the problems of the chemical manufacture.”¹⁸

With the growth in the number of buildings requiring “specific chemical operations” to manufacture a product, factories would “best be built, or can only can only be built, by engineers having a knowledge of the chemical processes involved.”¹⁹ In addition to the development of other departments of irrigation, metallurgical, marine, sanitary, naval, textile, and railway engineering to provide graduates with specific practical knowledge, graduates with an undergraduate degree were also enrolling in graduate departments to increase their knowledge in specific areas of science or the arts.

The first graduate department offering a degree in the United States was established in 1847 when the Yale Corporation created the Department of Philosophy and Arts, which admitted students who had completed a four-year degree program. The first PhD in the United States was awarded in 1861 after completing the requirements of the faculty of the department.²⁰

While graduate degrees were awarded to students who had enrolled in advanced studies and attended university lectures, the academic council of Harvard established the Graduate Department of Harvard College in 1871 to implement the requirement “that an examination would be held annually for the award” of the

master of arts.²¹ In addition, the doctor of philosophy (Ph.D.) and the doctor of science (S.D.) were established with the first Ph.D. degree awarded in 1872.²²

The enrollment of graduate students increased to more than eight hundred by 1884–1885 with one hundred seventy-four at Johns Hopkins, eighty at Harvard, sixty-six at Princeton, thirty-seven at Yale, twenty-nine at Cornell, twenty-nine at Vanderbilt, twenty-three at Columbia College, twenty at Boston University, seventeen at Lehigh University, fifteen at Michigan, and fifteen at the University of Minnesota.²³

Responses from more than four thousand living graduates of fourteen land-grant institutions and from nearly two thousand graduates of eight technology schools to an inquiry in 1891 about their occupations provide some insight into the concept that practical higher education would prepare graduates for work related to their course of study. For those graduating from the land-grant institutions, two hundred thirty-three were professors in land-grant institutions, three hundred nineteen were farmers, and five hundred sixty-seven were engineers. An additional one hundred fifty-nine graduates were in occupations related to agriculture, including gardening, planters, stock-raisers, veterinary physicians, and chemists. In addition, two hundred nine graduates held occupations related to engineering including architecture, mechanics, electricians, draftsmen, surveyors, and assayers.²⁴ There were one thousand nine hundred twenty-three graduates engaged in growing the communities of the country in occupations such as superintendents and managers, professors in colleges, editors, physicians, clergymen, students, teachers, lawyers, businessmen, druggists, clerks, and salesmen.²⁵

For the graduates of the polytechnics, there were nine farmers, forty-nine chemists, and ten in related occupations. About twenty-five percent (four hundred ninety-one) of the graduates were engineers with two hundred forty in related occupations. There were six hundred thirty-seven persons in the occupations that one would expect of educated persons in the towns and cities of the United States.²⁶

Although ten percent of the graduates' occupations were unknown, the result of surveying the eighty percent who were included and had graduated from the land-grant and polytechnic institutions during a thirty-year period of time indicated that courses of study at these institutions prepared these students for employment in the occupations of primary purposes for which the institutions were founded as well as professions and other careers of their choice.²⁷

In the United States at the turn of the century, there were ninety-seven thousand one hundred men and women enrolled in the universities, colleges, and technical institutes with about ten percent of the total in the courses of study designated as mechanical, civil, electrical, and mining engineering. There were thirty-eight different degrees conferred by these institutions with half of those different degrees

designated for undergraduate and graduate students enrolled in engineering departments.²⁸

The American Society of Civil Engineers (ASCE) organized in 1852, the American Society of Mechanical Engineers (ASME) in 1880, the American Institute of Electrical Engineers (AIEE) in 1884, and the Society for the Promotion of Engineering Education (SPEE) in 1893. The civil, mechanical, and electrical engineering societies were founded “to provide a setting for engineers to discuss the concerns brought by the rise of industrialization and mechanization” as expressed by the ASME.²⁹ With an increasing number of employments for engineering graduates of polytechnics, colleges, and universities and with the growing number of students enrolling in the engineering programs in the United States, student societies were established.

Formal meetings were attended by members where they read papers and discussed the theory and the practice of engineering. With failing bridges, exploding boilers, and transformer fires, the members of the societies formed committees that published standards for the safety of use and performance of the evolving technology that they were employing in their profession. Although student chapters of the societies were established at most institutions, the development of the standards of engineering education was primarily addressed by the Society for the Promotion of Engineering Education. When the society met in 1895, the membership was one hundred eighty-eight teachers and professors from eighty-six institutions.³⁰

The report of the meeting declared that

in the last quarter of the century, it is doubtful if progress in any direction had been more marked, more rapid, or more substantial, than progress in Engineering Education. If still more perfect and substantial results are to be secured in future, there is need that attention should be given to educational methods, and to better organized and more systematic effort, and to this end the Society for the Promotion of Engineering Education is in position to perform an important function. It hopes to receive the moral support of institutions as well as of the individuals who represent them.³¹

Most of the attendees thought of engineering education as a course of study to prepare the graduate to enter the practice of engineering.

The presenters at the meeting asked questions about engineering education that have been asked and answered for more than a century. A professor from Rensselaer asked: “What should a young man know, to entitle him to be called an engineer?”³² Another professor from Pennsylvania State College raised the always prevailing concern about how much time should be spent in the study of “composition, literature, history, political science, etc.”³³ A professor from Columbia College concluded that: “graduate study in engineering courses does not possess material value as an

integral part of a course of engineering study leading to a professional degree, but it is of essential value as a supplement to such a course of study in certain exceptional instances, where unusual proficiency in special branches of engineering knowledge is required.”³⁴ The president of the society made his position clear about the objective he supported by stating, “that in *engineering education*, the important—the controlling—factor is *education*, not *engineering*; and if we wish to attain the truest success, we should seek to make ourselves first of all teachers, then engineers or practitioners to as great an extent as circumstances will permit; not primary practitioners and secondary teachers.”³⁵

Polytechnic Institute Cooper Union for the Advancement of Science and Art

The education at polytechnic institutions was a counterpart to the land-grant institutions. The land grants were devoted mainly to increasing productivity in agriculture by theory and practice to improving crops in farming. Correspondingly, the education in polytechnics was devoted mainly to increasing productivity in manufacturing by theory and practice in education for the purpose of improving the energy from mining, the labor saving and transportation from mechanical ingenuity, and communication and energy from the electron. Daniel Coit Gilman, the first president of Johns Hopkins University, observed that with interest as early as the 1860s, innovative and ambitious men “showed a desire for an advanced education on some other basis than the literature of Greece and Rome. They showed the willingness of rich men to give to scientific colleges; they showed the popular craving for what was vaguely termed... *a practical education*”[emphasis added].³⁶ Consequently, a man with little education, but a keen sense of pursuing business opportunities during the development of iron, steel, and telegraphic industries in America, founded Cooper Union for the advancement of science and art in New York City in 1859. Born in New York during the first term of George Washington, Peter Cooper apprenticed himself at the age of seventeen for four years to become a coach-builder.³⁷ Instead of setting up in the business of coach-building, he relocated to Hempstead, Long Island where he “obtained work at \$1.50 a day (then regarded as high wages) in a factory making machines for shearing cloth.”³⁸

Cooper exhibited his innovations in his earlier years without financial rewards, but the patent rights for his invention of a new shearing machine resulted in a prosperous business until the end of the War of 1812 interrupted the market for cloth.³⁹ However, Cooper was also the owner of a glue factory, partner in a number of iron works, and established the largest rolling mill in the United States. In addition, Cooper was an investor and the president of the New York, Newfoundland, and

London Telegraph Company that was organized with the purpose of connecting England to the Americas with a telegraphic cable lying on the bottom of the ocean.⁴⁰

While Cooper was active in his business ventures, he began in 1854 to construct a building valued at more than six hundred thousand dollars,⁴¹ which led to the founding in 1859 of the Cooper Union for the Advancement of Science and Art by the charter that established “regular courses of instruction, at night, free to all who shall attend the same, under the general regulations of the trustees.”⁴² There was to be a free reading room, galleries of art, and scientific collections. In addition, a school was to be maintained “for the instruction of respectable females in the arts of design, and, in the discretion of the board of trustees, to afford to respectable females instruction in such other art or trade as will tend to furnish them suitable employment.”⁴³

When the funds at their disposal warranted such expenditure, the trustees were to establish and maintain a thorough polytechnic school.⁴⁴ The departments of instruction were mathematics, which included “algebra, geometry and trigonometry, with the applications to practical science; mechanical philosophy”;⁴⁵ chemistry, which included the “principles of Light, Heat, Electricity and Chemistry, with especial reference to their application to the Arts”;⁴⁶ architectural drawing including mechanical and freehand drawing; mechanical philosophy, and vocal music.⁴⁷ Without cost to the student, one hundred five attended classes in mechanical philosophy in the evening.⁴⁸

Stevens Polytechnic Institute

Edwin Augustus Stevens, one of four sons of John Stevens who pioneered in the feasibility of steam boilers that powered the locomotive, grew up in a New Jersey family of wealth and worked with his brothers as builders of railroads and steamboats. Edwin also invented important systems for the steamboats and worked with engineers who designed, built, and operated the fleet they owned.⁴⁹ After Stevens died in 1868, his will “bearing the date April 15, 1867,” provided instructions for establishing a foundation, for appointing trustees, and for transferring ownership of real estate and bonds in his name to the foundation.⁵⁰

Also, the trustees were encouraged that within two years of Stevens’s death they should “erect, of some substantial by economical material, as substantial and economical as trap rock, a plain building or buildings, suitable for the uses of an institution of learning” and within three years of his death the building should be occupied by the institution.⁵¹ Stevens included in his will that the “tuition is not to be wholly free unless to such youth as trustee or trustees shall direct, nor is it my

intention that the cost of tuition of any youth shall be wholly paid by him or her." The proportion of cost of tuition was left to the trustees.⁵²

When the executors defined the intent of "Institution of Education," they decided that Stevens's "personal interest always manifested... in the development of the mechanic arts."⁵³ Therefore, the primary Department of Mechanical Engineering within the Stevens Institute of Technology was opened in 1870 in Hoboken, New Jersey. There was as much as six hundred fifty thousand dollars available in the will of Stevens to establish the institute.⁵⁴ The four-year course of study at the Stevens Institute of Technology included, in addition to subjects in math, physics, and engineering, the French and German languages, "since they are of incalculable value to the engineer and man of science."⁵⁵ To round out the course of study: "A department of Belles—Lettres will also be included and will furnish the means of acquiring that cultivation of literary taste and the facility of graceful use of language, both in speaking and writing, which is as desirable in the engineer and man of science as in the classical student."⁵⁶

In the Department of Mechanical Engineering, primary attention was devoted to the property of materials to be used in a variety of applications and the machinery used to shape and fit the materials to be used in mills, boilers, or hydraulics. "While studying heat engines, the Steam Engine is made a subject of special and extended investigation in its principles, and in the details of design, construction, cost and management, according to the best and most recent practice."⁵⁷

Worcester Free Institute

In Worcester, Massachusetts, two men who had prospered in their respective businesses became connected in the establishment of a school for young boys that would prepare them to succeed in the changing economy of the communities of New England. Born in New Hampshire in 1791, uneducated, and snubbed socially, John Boynton was prepared to contribute one hundred thousand dollars from his fortune that he had accumulated from manufacturing tin-ware, which was sold by peddlers.

Although he did not want to be involved in organizing the school, he was certain that completing a course of study at a school of applied science would raise the social status of young men who were preparing for a position of mechanic or manufacturer in the expansion of industries in New England. Unaware of the interests of John Boynton to establish a school, Ichabod Washburn, who apprenticed as a blacksmith at the age of sixteen and attended an academy before beginning his successful business, which became the world's largest wire mill, had come to a similar conclusion as early as 1857 when he met with President Sears of Brown University to discuss his vision for a school.

Washburn was interested mainly in the opportunities provided for young boys who had developed the knowledge and skills from attending a vocational school for mechanics. A pastor respected by both of the men, convinced Boynton, Washburn, and the community of Worcester that a scientific school should be established "upon the condition that our citizens shall furnish the necessary land and buildings." As many as two hundred citizens of Worcester and workers at the factories contributed to the construction of the first building.⁵⁸

The institute was organized in 1868 as a system for "training boys for the duties of an active life 'broader and brighter than the popular method of learning a trade and more simple and direct than the so called liberal education.'"⁵⁹ Through the beneficence of "gentlemen of wealth in the central part of the State... the Worcester Free Institute was founded and enabled to offer an education based on mathematics, living languages, physical sciences, and drawing, and a training for some mechanical pursuit."⁶⁰ The courses in the departments of mathematics included algebra, geometry, trigonometry, calculus and mechanics; the sciences included chemistry, physics and geology, and the living language most studied was French.

The commissioner of Education's report claimed that the "distinguishing feature of the institute was the method and amount of practice in a machine shop."⁶¹ Each student was "obliged to work a fixed number of hours weekly.... Each student must commence work at 7 in the morning, daily."⁶² However the schedule for practical work could be arranged for those students who were specializing in "either mechanical engineering, civil engineering, drawing, physics, or chemistry, students of mechanical engineering being required to serve an apprenticeship of six months previous to entering the regular three years' course."⁶³

Rose Polytechnic Institute

Chauncey Rose was born in Connecticut and briefly attended common schools. He settled as a young man of twenty-four in Terre Haute, Indiana in 1818, when there were just two cabins in the township, which was to become the crossroads of commerce by railway connections with Evansville, Indianapolis, Crawfordsville, and Danville, Virginia. Rose was a successful merchant who acquired land before becoming involved in building railroads for his community.⁶⁴

With age, fortune, and advice about the developments in education, Rose decided to endow a polytechnic institute that "would blend the industrial sciences with the branches of knowledge usually taught in the schools and colleges, so that pupils should not only become scholars in the ordinary sense, but should be enabled to follow the mechanical, professional, and industrial pursuits with intelligence and skill."⁶⁵ The Terre Haute School of Industrial Science was founded in 1874; but the

name was changed, with “protest from the venerable founder,” to Rose Polytechnic Institute in 1875.⁶⁶

Although Rose’s gifts to the institute exceeded three hundred thousand dollars,⁶⁷ the institute did not admit students until 1883 so that enough interest income would accumulate to equip expensive laboratories and workshops. When the institute admitted the first class of students, they were informed in the First Catalogue that “In accordance with the directions of the founder, the Institute offers a good education based on the mathematics, physical sciences, living languages and drawing, and familiarity with some form of applied science handicraft. The course of study is so planned that every student spends a fixed portion of his time in learning the elements of the business or profession that he designs to pursue after graduation; this part of his work is called practice.”⁶⁸ The four-year course of study included mathematics, chemistry, physics, theoretical mechanics, German, French, and English.⁶⁹

The options of mechanics, civil engineering, chemistry, physics, drawing, and design were practiced under the advice and supervision of faculty. However, the shopwork course “of three and a half years, working 800 hours the first half year and 500 hours a year thereafter” was required of everyone as the cornerstone of the program.⁷⁰

In 1971, Anton and Mary Hulman, who had been patrons of the institute for years, bestowed the assets (at least eleven million dollars) of their family foundation to the institute. Subsequently, the name was changed to Rose-Hulman Institute of Technology.⁷¹

Throop Polytechnic Institute

At the age of sixty-nine, Amos G. Throop relocated to California from Chicago where he had been successful as a businessman in real estate and active in politics when he served on the city council of Chicago. Throop was born in 1811 and lived on a farm in New York until he moved to Michigan at the age of twenty-one to pursue his fortune in the lumber business.

When Throop moved to California, he eventually located to Pasadena and became involved with Universalist organizations as an adherent to that philosophy. In 1891, he donated two hundred thousand dollars to establish the coeducational Throop University that was organized by the trustees who were mostly Universalists in number. The departments of the university were to be “a preparatory school, liberal arts college, law school, art school, and technical school.”⁷²

In 1893, the name was changed to Throop Polytechnic Institute with more emphasis on manual training, workshops, and laboratories. The course of study consisted of general education including English language and literature; history, civics

and economics; mathematics including bookkeeping, algebra, geometry and trigonometry; science including biology, physics, chemistry, and electricity; and tool instruction including “carpentry, wood-turning, molding, brazing, forging, soldering, bench and machine work in metals, special work in electrical appliances.”⁷³

In addition there was instruction in drawing and in “Domestic Economy, including clay-modelling [*sic*], light wood-work and carving, sewing, cutting, and fitting of garments, home decoration, etc.”⁷⁴ After the name was changed to Throop Polytechnic Institute in 1893 and Amos Throop had died in 1894, the institute was described as a manual training school where “The primary idea in the work is educational rather than preparatory for higher technical study. It chanced, however, that a large number of students come to us and after taking our work for two or three years go out to labor successfully as tradesmen and mechanics. To that extent the school is incidentally a successful teacher of some trades. None of our manual training is obligatory, although more than 280 of the 313 students take some manual training.”⁷⁵

With the institute devoted mostly to training, George Ellery Hale, the first director in 1907 of the Mount Wilson Observatory, became a member of the Board of Trustees of the Throop Polytechnic Institute. Under the leadership of Hale, the institute was transformed in name and purpose as the California Institute of Technology.

While on the board of trustees, Hale encouraged abandoning the trades and high school to establish a college with applied sciences usually in schools of engineering. The new president of Throop Polytechnic Institute enticed Arthur A. Noyes, the former president of MIT and prominent chemist, to join the Throop Institute of Technology in 1919. In addition, Robert A. Millikan, world-renowned physicist, was appointed as director of research one year after the name had been changed to California Institute of Technology and two years before he received the Nobel Prize.⁷⁶

In 1910, there were twenty-one undergraduates enrolled with sixteen staff members employed.⁷⁷ Over the next two decades, the number of undergraduates enrolled increased sixteenfold by 1920 with a forty percent increase from 1920 to 1930. The number of graduate students increased from nine in 1920 to one hundred thirty-eight in 1930. The number of faculty increased threefold from sixty in 1920.⁷⁸ During two world wars and through the achievement of sending men into space, the staff and students at the California Institute of Technology developed it into a prominent research institution as well as an academic institute of technology.

Carnegie Institute of Technology

During the first year of the twentieth century, one of the richest men in the United States decided to sell his business and begin a period of philanthropy in his life. Andrew Carnegie was born in Scotland in 1835 and attended little formal education in his childhood before his family immigrated to America and settled in Allegheny, Pennsylvania in 1848.⁷⁹ The family would struggle to establish themselves in America with Andrew working at the age of thirteen for two dollars per week in a bobbin factory,⁸⁰ a messenger of telegraphs at a salary of thirteen and one-half dollars a month,⁸¹ and a telegraph operator at the age of seventeen at twenty-five dollars a month.⁸²

Throughout these years, Carnegie was an obsessive reader over a wide range of interests that assisted in his rapid rise with the Pennsylvania Railroad Company. The superintendent in Pittsburgh hired the eighteen-years-old Carnegie to be the clerk and telegraph operator in the superintendent's office. At the age of twenty-four, Carnegie was appointed as manager of the Pittsburgh Division just six years later at a salary of fifteen hundred dollars a year.⁸³ At this point in his life he made his first investment in innovation and began to create companies that were successful with the advantages of technology and organization he observed.

In 1865, Carnegie established the Keystone Bridge Works that excited his growing attention to expand his business interests in the steel industry and his accumulation of wealth. In 1889, Carnegie published a document titled *The Gospel of Wealth* in which he defends capitalism and the accumulation of wealth by individuals; however, he concludes that "The man who dies thus rich dies disgraced."⁸⁴ Carnegie believed that the rich people should redistribute their wealth while they are alive so "the surplus wealth of the few will become, in the best sense the property of the many" if administered by a few rather than "in small sums to the people themselves."⁸⁵

Beginning in 1881, with a two hundred fifty thousand dollar donation for a free library to be constructed in Pittsburgh, until the last gifts in 1918, the wealth distributed by Andrew Carnegie was approximately two hundred eighty million dollars.⁸⁶ The gifts ranged from more than forty million for public libraries in every state in America to five hundred thousand dollars for the Engineering Building in New York City.⁸⁷

In November 1900, Carnegie wrote to the mayor of Pittsburgh to tell him of his support for the founding of a technical school in Pittsburgh by agreeing to "provide the money for such a school, taking care to provide room for additions to the buildings, to meet the growth of Pittsburgh"⁸⁸ if the city of Pittsburgh furnished the site with enough acreage for future expansion. The initial pledge was one million

dollars; however, Carnegie Institute of Technology actually received more than thirteen million dollars.⁸⁹

The Carnegie Technical Schools opened in October of 1905 with students attending the School of Applied Science, the School of Applied Design, the School of Apprentices and Journeymen, and the Margaret Morrison Carnegie School for Women. "The School of Applied Science offers technical courses of instruction for the education and training of students in engineering practice."⁹⁰ There were day and night students who enrolled "during the first year in those studies which are essential to a technical education; the elements of the curriculum are mathematics, physics, chemistry, drawing and shop practice."⁹¹

Students could complete the courses offered in the Departments of Chemical Practice (metallurgy, industrial chemistry and electrochemistry); Civil Practice (structural design, railroad construction, and municipal engineering); Electrical Practice (generation and transmission of electricity and testing and designing of electrical apparatus); Mechanical Practice (machine design, design of prime movers and iron and steel manufacture); and Mining Practice (location and operation of mines and quarries, smelting, and refining).⁹²

Georgia School of Technology with Mechanic Arts and Engineering

As a colony and then the State of Georgia, the name and location of the capital was often debated and changed until after the Civil War had ended. Among those capitals during the two decades before the war, Atlanta became the crossroad for transportation by railroads that developed as the location for battles that contributed to ending the war.

In 1860, the largest cities in Georgia were Savannah with a population of twenty-two thousand two hundred ninety-two; Augusta, with a population of twelve thousand four hundred ninety-three; and Atlanta with a population of nine thousand five hundred fifty-four.⁹³ In Georgia during the decade from 1850 to 1860 the harvests of cotton increased forty percent in the number of bales.⁹⁴ Also, in 1860 there were more cotton goods manufactured in Georgia than any of the other southern states.⁹⁵

As harvested crops and manufactured goods of cotton increased throughout the state, the travel to markets was improving with the mileage of railroads more than doubling during the decade before the Civil War. Although there were seventeen independent railway companies, they were connected east to west across the state from Augusta to Chattanooga, Tennessee, passing through Atlanta. Also there were major spurs from Washington, Athens, and Macon connected to those tracks along the way.⁹⁶

During the Civil War the transportations by railroads across the state from Tennessee to South Carolina became vital connections to supply ammunition and food to the Confederate armies. Consequently, the population in Atlanta increased as they manufactured, stored, and then delivered supplies to armies engaged in battles. Although the siege on Atlanta destroyed most of the build-up for war, the population grew more than eightfold from 1850 to 1870 with the number of blacks living in Atlanta increasing from twenty to forty-five percent of the population.⁹⁷

From 1870 to 1890, the population of Atlanta grew from twenty thousand to almost ninety thousand with about forty percent black citizens adding to labor available in the city.⁹⁸ During those two decades, steam-powered machines were replacing labor in manufacturing throughout the United States with steam power increasing forty-five percent.⁹⁹

In 1882, Nathaniel Edwin Harris, a Macon lawyer with many industrial clients, and also a legislator, joined with John Fletcher Hanson, the current president of a textile company and editor of the *Macon Telegraph*, to encourage the establishment of industrial manufacturing to grow the economy and overcome the destruction from the war. As veterans they believed that the superior technology and manufacturing of the North contributed to the defeat of the southern armies.¹⁰⁰

Just after election to the Georgia Legislature, Harris introduced a bill to establish a technical school in the state. A committee was formed to review existing schools of technology, and it proposed the establishment of a school in Georgia. After visiting schools in the northern states, the committee concluded that there were “two divergent educational philosophies: the shop culture, exemplified by schools such as the Worcester Free Institute in Massachusetts, and the school culture, as practiced by such as the Massachusetts Institute of Technology.”¹⁰¹

The committee recommended that the program at a school of technology in Georgia be devoted about equally in “practical apprenticeship and academic pursuits.” M. P. Higgins, first shop foreman of the school in Georgia, asserted that “Now the time is at hand when a mechanical engineer, a manufacturer, has every need and every inducement and every facility for obtaining all that makes any man worthy of the esteem of his fellows, viz: Education, in its truest sense.”¹⁰²

In 1890, about one-half of the population of persons over the age of ten throughout the country was engaged in gainful occupations. Almost one-fourth of the employments were in manufacturing. In Georgia more than half of the population over the age of ten was engaged in gainful occupations; however, less than five percent of those persons were employed in manufacturing.¹⁰³

In Atlanta there were four hundred manufacturing establishments with an aggregate of eight thousand six hundred eighty-four employees, or about thirteen percent of the population in the city. About half were employed in the five industries

of brick and tile, carpentering, flour and grist mills, foundry and machine-shop products, patent medicines and compounds, and printing and publishing.¹⁰⁴

Civil engineering in the United States developed as a profession with innovations and inventions in design, construction, and operation of thousands of miles of canals before 1850, and more than fifty thousand miles of railroad tracks from coast to coast before 1880 that improved transportation throughout the country. Before 1900 the profession of mechanical engineers was developing from innovations and inventions in the design and production of labor-saving machinery often powered with steam engines, water wheels, and operators.

Many of the innovations were complex machines with metal molded parts connected for movements and rotation designed by knowledge and experience of an engineer. To create steamboats and locomotives in transportation; harvesters, mowers and reapers in agriculture; machines for thread, cloth, and sewing in textiles; and industrial machinery in manufacturing depended on the knowledge from experience until education assisted in the development of a mechanical engineering profession.

Although there were a few dozen engineers in Atlanta¹⁰⁵ in addition to mechanics from the land-grant institutions located at Athens and Thomasville, which were mostly for improvements in agriculture,¹⁰⁶ in 1885 the governor of Georgia signed a bill to appropriate sixty-five thousand dollars to establish a technical school for improving manufacturing somewhere in the state. In 1886, Atlanta was chosen as the location of the Georgia School of Technology. Two years later the Georgia School of Technology opened with an academic program in mechanical engineering leading to a bachelor of science degree.¹⁰⁷

The School of Technology opened in 1888 with faculty for classes in mathematics, chemistry, English, and mechanical engineering. In addition, shops were included, with a superintendent on loan from Worcester Free Institute. The initial enrollment was ninety-five students¹⁰⁸ with two graduating in 1890.¹⁰⁹ The course of study in the mechanical engineering degree program included instruction in theoretical applied mechanics, thermodynamics, and practice in shops.¹¹⁰

The objective of practice was blending labor with hand tools and machines since "machinery is to have a constantly increasing share in the conversion of matter into a useful form." The practice in shops included design, construction, and assembly of parts of a machine "as well as how to finish its product." With practice in the shops, a decision by a future engineer based "upon general grounds, the best form and material for a machine, and to calculate its parts, is vastly increased by blending with it the skill of the craftsman in manipulating the material."¹¹¹

During the school's first decade, enrollment increased fivefold with the addition of degrees in civil and electrical engineering.¹¹² With encouragement from industry, the Schools of Textile and Chemical Engineering were established entering the

second decade. After the flight of the Wright brothers in 1904, airline travel in 1914, and bombing during World War I, the Georgia School of Technology was among the institutions receiving a Guggenheim Grant of three hundred thousand dollars to establish a School of Aeronautics in 1930.¹¹³

Somewhat unique among the states in developing technology institutions, the General Assembly of Georgia authorized the establishment of an engineering experiment station. In 1934 the State Engineering Experiment Station was ready to accept projects that later became the Georgia Tech Research Institute. The early experiments were devoted to improving processes in manufacturing textiles and ceramics.¹¹⁴ In 1948, the School of Technology became the Georgia Institute of Technology.

Innovation Encourages Engineering Education Nationwide and in North Carolina

THE WORD *ENGINEER* APPEARS either as a noun to identify a professional person or as a verb to describe the effort of an activity. For centuries the profession of an engineer developed by experience as an apprentice. Organizing efforts and achieving objectives defined the process that is often referred to as *engineering the results*. The division that defines the nouns of the profession began with engineers trained in the military and those with an apprenticeship to serve the civilians as engineers.

For centuries engineers were trained to build roads, bridges, churches, and public edifices. In addition, engineers designed and supervised the construction of waterways, viaducts, and ships for wars and trade. As examples, the structures of Great Walls of China, Egyptian pyramids, the Greek Parthenon, and the Roman Coliseum were constructed with the experience of the engineers and the talent of tradesmen in ancient times.

Before 1850, most of the engineers in the United States who designed and supervised the construction of canals and bridges connecting the ports along the Atlantic to the inland rivers and lakes achieved their status in England. However, the roads and railroads built in the United States were built mostly by graduates from the recently established Military Academy at West Point, New York. Throughout the last half of the nineteenth century, improvements in transportation, agriculture, communication, and manufacturing were inventions and innovations that developed machinery that was powered with various sources of energy to operate labor-saving equipment.

As military and civil engineers were connecting the country with mileage of railroads, the growth in the number of establishments for industrial manufacturing in the United States required other knowledge and experience to design and construct safe machines powered by water wheels, steam engines, and electric motors. While civil engineers were active throughout the country, these engineers were usually located near the location of the innovations and inventions, which resulted in the establishment of industries in their states.

Engineers were also involved with the mechanics, materials, and processes required to construct labor-saving machines in agriculture and machines to manufacture cotton goods. With just four schools of college grade establishing curricula by 1860, the concept of engineering had been defined by practitioners protecting the integrity of their profession and by their experiences that continually influenced their description of an engineer.¹

From 1860 through 1870, the number of manufacturing establishments increased almost eighty percent with the annual value of manufactured products per establishment increasing nearly ninety percent and the total value of products manufactured in all the states doubling with one hundred fifty percent more hands employed. Over three decades, the annual value of the manufactured products increased fourfold; however, more than half of the establishments were in Illinois, Indiana, Massachusetts, Missouri, New Jersey, New York, Ohio, and Pennsylvania.²

In 1870, there were twelve million persons enumerated into more than three hundred thirty-eight occupations.³ Although the economies of the eleven states of the recent Confederacy were adjusting to the wage labor of freed slaves and to the controls by the federal government during the Reconstruction in 1870, there were on average forty-three professional civil engineers per southern state with only twenty-seven in total in North Carolina. However, in Illinois, Massachusetts, Missouri, New Jersey, New York, Pennsylvania, and Ohio, there were on average three hundred seventy-one professional civil engineers.⁴

With ten percent employed in the manufacturing, mechanical, and mining industries, there were only thirty-four thousand two hundred thirty-three locomotive engineers and firemen scattered through the country, an average of nine hundred per state though there were just one hundred forty-four serving in the role in North Carolina. However, three-fourths of the engineers employed in manufacturing, mechanical manufacturing, and mining industries were located in California, Illinois, Indiana, Massachusetts, Michigan, Missouri, New Jersey, New York, Ohio, and Pennsylvania.⁵

In the eleven southern states of the Confederacy, the total number of engineers employed in manufacturing, mechanical, and mining industries was less than three thousand with an average of two hundred forty-two per state. Forty percent of the engineers in the country were located in Louisiana and Tennessee. One hundred forty-four engineers were employed in North Carolina with fewer in South Carolina, Arkansas, Georgia, and Florida.⁶

By 1872, there were forty land-grant and thirty-two other institutions that had established departments of science that were awarded either as bachelor of science or engineering or both degrees. Eight of the land-grant institutions awarded fifty-one degrees for civil engineering with seventeen from Cornell. Eight of the

institutions without land grants awarded fifty-one degrees for civil engineering with Rensselaer awarding seventeen, University of Michigan awarding ten, School of the Mines-Columbia College awarding nine, and Washington and Lee awarding eight.⁷

However the land grants required the states to establish an institution with curricula of higher education that included agriculture, mechanic arts, and military training. In a few states, institutes of technology were established with courses and laboratories for four-year degrees in engineering in addition to a separate two-year program in mechanic arts. However, before the Civil War, the course of study for the AB degree had dominated higher education with just a few four-year institutions of education offering a course of study leading to the BS in applied science.

During the last half of the nineteenth century, practical education in courses of study devoted to engineering, pedagogy, business, and other special courses grew to almost the equal number awarded in classical courses.⁸

Enrollment of students in engineering was the smallest in number of the three courses of practical education; however, the number of academies, universities, colleges, and polytechnic institutions grew from four in 1860 to eighty-five by 1880 with a total of eight hundred sixty-six engineers graduating prior to 1870 and two thousand two-hundred fifty-nine from 1870 to 1880.⁹

In 1881, the commissioner of Education reported that half of the three hundred six institutions had awarded at least one degree of bachelor of science. Six percent of those institutions awarded ten or more bachelor of science degrees. Some of those institutions did not define the engineering degree such as MIT and Worcester Free Institute. However, there were one hundred twenty-seven degrees reported in engineering by the six schools of the University of the State of Missouri, the University of Michigan, Cornell University, Columbia College, Pennsylvania Military Academy, and Rensselaer Polytechnic Institute, with the majority of the degrees designated as civil engineering and bachelor of civil engineering. There were another fifty-nine degrees awarded by nine institutions with Stevens Institute, Columbia College, and the University of Wisconsin awarding seventy percent of the degrees designated as a bachelor of mechanical engineering.¹⁰

Civil Engineering

Although the number of persons reported as engineers more than doubled, there were some differences in the meaning of the word *engineer* with or without a modifier. Civil engineering was considered a profession with organized apprenticeships required before acquiring the responsibility for constructing roads, railroads, dams, harbors, and buildings. In 1852, twelve founders agreed to incorporate the

American Society of Civil Engineers and Architects with a purpose that “civil engineers are creative, people-serving and problem-solving leaders who make our lives easier to live from one day to the next.”¹¹

While a growing number of land-grant colleges and universities were including engineering subjects in an undergraduate course of study as well as mastering mechanic arts in laboratories, other institutions were convinced that the appropriate approach to educate an engineer was to completely separate the course of study from the undergraduate college. Before the Civil War, Harvard, Yale, Brown, and the University of North Carolina had established courses of study in civil engineering that were two and three years in length and included subjects in advanced math, chemistry, and some of the theoretical applications of the math and applied science of engineering education to the design and construction of roads, canals, dams, structures, and bridges.¹²

Within these institutions, engineering was considered a post-undergraduate program, somewhat like the professional studies, but not a graduate degree course of study. While the courses of study were different in content among these four institutions, their objectives were in common with attention to the theory applied to the practice of civil engineering. For example, at the University of North Carolina, analytical and descriptive geometry, differential and integral calculus, and mechanics and engineering provided the theory, while courses on roads and railroads, geodesy and earth works, and various constructive arts in civil engineering described in theory the practice.¹³ The fundamental difference between the undergraduate and the post-undergraduate approach in educating the engineers was not in the math, science, and theory, but in the classical, liberal arts, or other studies included in the course of study for a degree program.

After the Civil War ended, the desire for education at all levels led to increases in the number of schools, colleges, universities, and technical institutes with scientific departments included in nearly one-fourth of the new institutions. In 1872, the commissioner of Education reported a total of almost three hundred colleges, universities, and institutes in the country with forty-one land-grant and thirty-two non-land-grant institutions in the total of the reporting schools or departments of science.¹⁴

For both the land-grant and non-land-grant institutions, about half of each group reported a course of study in engineering education; therefore, there was a total of at least thirty-six universities, colleges, or institutes involved in the development of engineering just seven years after the Civil War during a time of uncertainty about faculty, books, equipment, cost, and demand for graduates.¹⁵ In 1874, twenty-five schools reported that they had awarded one hundred thirty degrees in engineering with the University of Michigan, Cornell University, Union University, Rensselaer

Polytechnic Institute, and Lafayette College accounting for more than half of the degrees awarded.¹⁶

The primary interests in organizing civil engineering as practical education were in response to the need for some young men who could apply their training in engineering to the conduct of war and for some others who could apply their knowledge of math, science, and the useful arts in the building of the infrastructure of railroads and canals in the growing economy of America. In 1905, Andrew Carnegie wrote that: "The history of the world has no parallel to the change effected by the inventions of these three men."¹⁷ Carnegie was referring to the invention of the steam engine by James Watt in 1782, the steamship by Robert Fulton in 1801, and the locomotive by Englishman George Stephenson in 1814, which together had created the need for the canals and railroads and had encouraged the organization of a course of study of mechanical engineering.¹⁸

Mechanical Engineering

Mechanical engineering is the most diverse and one of the oldest professions gained sometimes by an apprenticeship. For thousands of years, people have developed labor-saving tools in agriculture and various metal instruments. In *A History of Mechanical Engineering*, Aubrey Burstall, a professor of mechanical engineering at the University of Newcastle upon Tyne, has described the development of tools, machines, and transportation throughout several past millennia.¹⁹ In addition, the Industrial Revolution in England and the United States during the nineteenth century depended in part on the scientists in Europe. However, the innovations of mechanical engineers in designing, manufacturing, repairing, and operating complex labor-saving mechanical systems, creating instruments with precision, and developing industrial machinery changed the lives of people located in those prosperous countries. From inventions of textile machinery in England in the mid-eighteenth century, the cotton gin decades later, the ingenuity in constructing machines and devices powered by steam engines in the United States throughout the nineteenth century, and the flight at Kitty Hawk, NC, entering the twentieth century thousands of mechanical devices were designed and developed that improved transportation for commerce and productivity of common labor.

When the University College of London was founded in 1826 as one of the new secular universities in England, a professor of engineering was appointed, which became civil engineering in 1841, with mechanical engineering then added in 1847. As the United States Navy began to construct steam-powered ships, steam engineers were trained to maintain, repair, and to regulate the boiler in a manner to prevent corrosion, abnormally high temperatures, cracks, and other characteristics

that might lead to explosions. In addition, steamboats built by mechanics were connecting towns along the Ohio and Mississippi Rivers to the harbor in New Orleans for transporting grains and cotton exported to foreign ports. From 1816 to 1871, nearly one hundred boiler explosions on steamboats resulted in the death of almost four thousand persons on board.²⁰

In the early years of the 1860s, the establishment of mechanical engineering as a course in higher education progressed among institutes of technology, with two in Massachusetts acting at about the same time but in two directions. The program at the Worcester Free Institute was “founded and enabled to offer an education based on mathematics, living languages, physical sciences, and drawing, and training a for some mechanical pursuit.”²¹

The development in method and amount of practice in a machine shop became essentially a factory producing marketable products. However, students who enrolled in mechanical engineering were required to add chemistry or physics in addition to serving a six-month apprenticeship.²²

The second course of study in mechanical engineering was listed in the first annual catalogue at MIT with more science than practice. The science included analytic mechanics; applied mechanics, which included comprehending strength of materials, dynamics of solids, hydrostatics, hydrodynamics, and thermodynamics; construction of machines, which included hydraulic motors, turbines, and water pressure engines, power and strength of boilers, steam engines of stationary, locomotive, marine, air and gas engines; and descriptive geometry applied to masonry, carpentry, and machinery.²³ However, the curriculum included visits to shops for observation and practice in mechanic arts.²⁴

Subsequently, Illinois Industrial University, Cornell University, Polytechnic Institute of Washington University, University of Minnesota, Maine State College of Agriculture, University of Pennsylvania, and Lehigh University organized courses of studies in mechanical engineering with a bachelor's degree awarded in at least two institutions from 1870 to 1873. By 1873, MIT had added transmission and production of power, kinematics of machines, combustion of fuels, steam generators and steam engines, machine design, metallurgy, theory of elasticity, steam engineering laboratories in the course of study with foundry work, carpentry, blacksmithing, chipping and filing, and engine lathe work in the shops.²⁵

Mining Engineering

In the decades of the 1850s, 1860s, and 1870s, there were seventeen accidents in which more than five men were killed, totaling three hundred sixty-one fatalities. The deadliest accident occurred at the Avondale Mine in Plymouth, Pennsylvania

where one hundred seventy-nine miners died in a mine fire.²⁶ In 1863, Columbia College established the first School of Mines in the United States with the declaration that “The Object of the School of Mines and Metallurgy is to furnish to the student the means of acquiring a thorough scientific and practical knowledge of those branches of science which relate to mining and the working up of the mineral resources of this country, and to supply those engaged in mining and metallurgical operations, persons competent to take charge of new or old works and conduct them on thoroughly scientific principles.”²⁷

The course of study was three years of lectures delivered on the subjects of analytic chemistry, metallurgy, mineralogy, geology, paleontology, machines, mining, and mining legislation. Instruction was provided in languages, machine drawing, shades, and shadows.²⁸ When MIT opened two years later, the course of study in practical geology and mining included lectures and laboratories in quantitative chemical analysis, descriptive and determinative mineralogy, lectures on combustion and fuel, warming, ventilating and lighting, historical geology and paleontology, special geology of coal, iron, copper, salt, plaster, and an account of important mines, lectures on mining, mining machinery and motors, quarrying and open mining, and drawing details from topographical maps to section of mines.²⁹

By 1893, there were seventeen colleges and universities in the United States with organized courses of study in mining engineering; however, there were considerable differences in the subjects included as the relevant sciences, as the important applications to the industry of mining and in the organization of the various courses of study.³⁰ The first two years at the University of California were devoted to linguistics followed by studies in chemistry, physics, mathematics, analytical mechanics, strength of materials and hydraulics before experimental chemistry, laboratory work, metallurgy and assaying, reduction of the ores of lead, gold, silver, copper, and mercury prepared the senior to write a thesis as a candidate for a bachelor of science degree.³¹

To achieve the degree of mining engineer, the candidate was required to pass an examination on the subjects of mining, ore-dressing, petrography, economic geology, thermodynamics, drawing, and construction of mining machinery, blowpipe assaying, and political economy. With “at least one year of actual practical in the field in the course chosen,” the candidate must show by “an original memoir” the power he has upon this profession. However, the degree of mining engineer was not awarded until three years after graduation.³²

The School of Mining and Practical Geology at Harvard was organized in the Lawrence Scientific School where the first three years were the same as the requirements for bachelor of science in civil engineering that included math through calculus, chemistry, physics, geology, mineralogy, and all applied math required for civil engineering with courses in French and German. The required subjects in the

fourth year in mining engineering were economical geology and the phenomena of veins, mining machinery and the explosion of mines, general and practical metallurgy, assaying, working up, plotting, and writing out notes of summer excursion.³³ The bachelor of science degree was awarded for those students who “sustained the necessary examinations.”³⁴

In contrast, the three-year course of study at the Michigan Mining School in Houghton, Michigan included more practical subjects such as surveying, mineralogy and lithology, chemical and mineralogical laboratories in the first year. Continuing in the second year, metallurgy, petrography, mining, mining surveying, stratigraphical geology and paleontology, and chemical laboratory were required. However, the traditional math and science courses in the civil engineering course of study were included in the first two years for mine engineering. In the third year, all students were required to enroll in graphical statics, quantitative analysis, metallurgy, ore-dressing, mechanics of materials, mechanical engineering, electrical engineering, physical geology, metallurgical analysis, practical geology, mining engineering and mine accounts, hydraulic and structural engineering, economic geology, and chemical laboratory.³⁵

As the twentieth century arrived, the Industrial Revolution was expanding the economy of the United States with coal production of more than two-hundred fifty million tons in a year.³⁶ However, hundreds of workers were killed in mine explosions and fires each year, with nearly fifteen hundred men killed in 1900.³⁷ In addition, two other sources of energy, electricity and oil, had been developing as practical alternatives in many circumstances.

Electrical Engineering

For at least a century before 1827, scientists in foreign laboratories were discovering the fundamental properties of electric current. However, during 1827 Joseph Henry, who taught at Albany Academy in New York State before a professorship at Princeton, developed powerful electromagnets in his laboratory with electrical current passing through an insulated, tightly wound coil of wire wrapped around a ferrous core.

Michael Faraday, a member of the Royal Institution in England, published his discovery of electromagnetic induction in 1831. He also discovered that one of these special coils could induce current in another similar coil. The discoveries by Faraday and Henry were the foundations for generating and controlling the energy in electricity.

In 1844, Samuel Morse conducted point-to-point communication with his invention of simple devices to control currents of electricity. The innovation that

created the telegraph relied on batteries that had been discovered by Alessandro Volta in 1800. The battery provided a source of electrical currents for sending messages by dots and dashes of the current sent along insulated wire. In addition, the electromagnet inductions discovered by Henry and Faraday activated by induction an apparatus that printed dots and dashes on paper.

In less than a decade, at least sixty-seven telegraph companies were established that resulted in eighty-nine point-to-point connections of more than twenty-three thousand miles of insulated iron or copper wires.³⁸ The cost of construction was about one hundred fifty dollars a mile.³⁹ The cost of a message of ten words or less ranged from twenty cents to two dollars and thirty cents.⁴⁰

In 1876, there were seventy-seven patents awarded in the category of telegraphs with eight improvements in the name of T. E. Edison.⁴¹ Four of the eight patents awarded to Edison were improvements to send multiple messages on one wire at the same time. One of the patents was awarded to A. G. Bell for telegraphy of voice.⁴² The device for sending and receiving voice by telephone was similar to dots and dashes with the same kind of wire and electromagnetic induction creating current flow. However, the induction of current was the conversion of sound energy to electrical energy. The transduction occurred due to bits of iron scattered on the surface of a thin diaphragm vibrating from waves of the sound and close to a coil of wire of electrical current.

With three decades of telegraph communications, the 1880 Census reported that there were seventy-seven telegraph companies and a total of twelve thousand stations and offices, nearly three hundred thousand miles of wire, and thirty million messages transmitted. Thomas Edison was employed by the Western Union, which operated more than seventy percent of the entire telegraph enterprise.⁴³

With one decade of telephone communication, the 1880 Census reported that one hundred forty-eight telephone companies had located in cities within thirty-five states. There were more than forty-eight thousand subscribers and one hundred thousand telephones connecting to thirty-four thousand miles of wire.⁴⁴ By 1890, mergers resulted in one-third of the number telephone companies but with nearly seven times more miles of wire, more than five times the number of subscribers, and more than four hundred million conversations by telephones.⁴⁵

After more than one hundred inventions that included telegraph and telephone communications, Thomas Edison was awarded his first patent for the electrographic vote-recorder in 1869. During the next thirty-three years, more than half of the one thousand ninety-three patents awarded to Edison were for batteries, electric lights, and power.⁴⁶ In 1892, the General Electric Company was established to organize the manufacturing, distribution, and operation required to deliver electricity for a variety of applications in addition to incandescent lighting.

The energy that created electricity flowing through a network of insulated copper wires was a direct current from a battery or dynamo-electric machine. As with telegraph and telephone, the strength of the current flow depended on electrical resistance. Even though Nikola Tesla developed an alternating current with less resistance to flow, Edison insisted on a battery or dynamo and direct current.

In 1888 George Westinghouse, the head of the Westinghouse Electric Company in Pittsburgh, bought the rights to Tesla patents and began to develop networks of electricity. With the innovations of Tesla and ingenuity of Westinghouse, in 1895 the development of generators and transformers to efficiently carry alternating currents had established a grid of electrical power created from waterpower in Niagara Falls to an electrical grid in Buffalo.⁴⁷

In 1898, the commissioner of Patents expressed his claim that “American electrical appliances command the world’s markets.”⁴⁸ In addition, he wrote, “Let us not forget that it is the American inventors who by their inventions and discoveries have made the last fifty years of the nineteenth century the most remarkable of recorded time and at the same time have laid the civilized world under tribute to American manufactures.”⁴⁹

In that year there were three hundred thirty patents awarded that included electric or electro apparatus, machines, or labor-saving equipment.⁵⁰ However the commissioner reminded the reader that “the United States can only become dominant in the markets of the world through labor-saving inventions which will enable it to compete with the lower wages paid to the so-called working classes in other countries.... In labor-saving machinery and in the intelligence of the labor employed, the United States today is in advantage of the world.”⁵¹

The inventions and innovations of Morse, Edison, Bell, Westinghouse, and Tesla over five decades were the foundations for communication and energy by electricity. Among the five, Tesla, Bell, Westinghouse and Morse attended a college or university while Edison was self-educated. Although none were educated electrical engineers, all five proceeded with their experience to innovate, construct, operate, and manufacture the electrical components of their invention.

The Massachusetts Institute of Technology had opened in 1865 and offered degrees in mechanical and civil engineering. However, Dr. Charles Cross, a professor of physics at MIT, became interested in the engineering as well as the unknown electricity.⁵² In the 1881–1882 annual catalogue, the Physics Department advertised that “on alternate years a course of lectures will be given upon the scientific principles involved in the more recent applications of Electricity including the Telegraph, the Telephone, Electric Lighting, and the transmission of power by electricity.”⁵³

The courses about electricity, including general physics of electricity, were taught in the Physics Department to third- and fourth-year students in 1882 and 1883,

which was the same time that Edison was awarded patents for the apparatus of transmission of power and system of underground cables.

The first degree program for electrical engineering in the country was established at MIT in 1883–1884, with about three-fourths of the courses from the mechanical engineering degree program. In addition, one-third of the courses in electricity were the history, general, and advances in physics. The other third were laboratories of testing and technical applications of electricity.⁵⁴

In 1882, “the trustees of Cornell University began to receive students desiring to fit themselves to enter this new and constantly extending field. While the general studies of the new course are mainly those of the departments of Civil and Mechanical Engineering, the special studies of the course embrace the theory of electricity, the construction and testing of telegraph lines, cables and instruments, and dynamo-machines, and the methods of electrical measurements, electrical lighting, and the electrical transmission of power.”⁵⁵

Mechanic Arts and Engineering in North Carolina

Among the eleven states that seceded from the United States during the Civil War, each reestablished constitutional government before they were awarded a land grant. The award by the General Assembly of each state seems to have been one of three courses to establish today’s land-grant institutions. The majority of the grants were initially awarded to the seven states exiting or evolving as the State University of Arkansas, Georgia, Florida, Louisiana, Mississippi, North Carolina, South Carolina, and Tennessee.

Among the eleven states, eventually there were as many as five agricultural with mechanic arts institutions with two of those colleges with those in Georgia subordinate to the University of Georgia at Athens and supported by land-grant funds. In contrast, three states awarded the land grant directly to separate public state institutions in Texas, Alabama, and Virginia to establish colleges for education in agricultural and mechanic arts. Among the eleven institutions, the universities in North Carolina, Mississippi, and South Carolina eventually transferred the land grant to establish another institution that was organized specifically for instruction in agriculture and mechanic arts.

In North Carolina, the introduction of scientific agricultural before and after the land grant spanned a period of forty years without success in continuous enrollment or public support. A decade before the land grant was awarded, the trustees at the University of North Carolina demanded, and the faculty developed, courses of study in agricultural chemistry, analytical chemistry, and civil engineering for the School for the Application of Science to the Arts, which opened in 1854;

and in 1856, forty-four students were enrolled.⁵⁶ However, during the Civil War, total enrollment in the university declined to just seventy-three students with ten professors.⁵⁷

Coping financially with the aftermath of the Civil War was difficult for the university as the school had incurred a debt of more than one hundred thousand dollars by 1866 and had only worthless bank stock and Confederate securities.⁵⁸ One source of income was fifty dollars in tuition from each of the one hundred twenty-eight students enrolled in 1866–1867.⁵⁹ Some hope for keeping the university open was provided with a one-time appropriation by the General Assembly of seven thousand dollars, and then with the assignment in February 1867 of the Morrill Land Grant to the university.⁶⁰

University president Swain quickly responded to the opportunity by traveling to Washington to persuade President Johnson to order the transfer of the land scrip, even though Congress refused to recognize states that had seceded. After arranging the futures for price and payments, the university received a down payment of five thousand dollars.⁶¹ Despite the short-term assistance, the longer-term circumstances were obvious by the facts that “the endowment was lost... a large debt for which all its property was mortgaged... tuition fees would not pay adequate salaries” and the university would “perish unless efficient measures for preserving its existence be taken.”⁶²

In an effort to encourage enrollment, which would increase income, and to solicit public support, the faculty proposed a reorganization of the university. In addition, the faculty and the president resigned in 1867 so the trustees could decide without embarrassment about the appropriate measures to save the university from closure.⁶³ Subsequently, the board of trustees approved a new curriculum and reappointed the president and the faculty.⁶⁴

However, adding to the financial crisis and threatening the existence of the university, the ratified Constitution of 1868 redefined the university as an institution of the State connected with the public school system and under the control of the board of education.⁶⁵ While the Constitution of 1776 simply provided that “all useful [*sic*] learning shall be duly encouraged, and promoted, in one or more universities”⁶⁶ without any detail of organization or tuition, the often quoted added section of the Constitution of 1868 prescribed that “The General Assembly shall provide that the benefits of the University, as far as practicable, be extended to the youth of the State free of expense for tuition.”⁶⁷

In addition, the selection of trustees by the board itself was constitutionally changed, and the board of trustees was replaced with members of the board of education, the president of the university, and one person from each county, with the governor serving as chairman of the board and of the executive committee.⁶⁸ The newly appointed board of trustees met in July 1868 and accepted the resignation of

the president and the faculty. President Swain thought it was a formality where he would be reappointed by the new trustees; however, that did not happen, and a new president and new faculty were appointed to reorganize the courses of study of the university.⁶⁹

When the new board of trustees met for the first time, North Carolina had been readmitted to the Union, which provided the opportunity for completing the sale of the land scrip as planned by previous trustees and President Swain. The value of the sale was one hundred twenty-five thousand dollars, which was invested in special tax bonds of the State that ended up paying no interest.⁷⁰ Therefore, without tuition and interest, the university remained in a financial crisis.

The committee that worked on the school's curriculum recommended that the university be organized with nine departments in which instruction would be by lectures, where students would have free choice of studies, and could graduate from any college of the university.⁷¹ To satisfy the requirements in the Constitution of 1868, the complete plan included a College of Agriculture and the Mechanic Arts along with five other colleges and two professional schools.⁷² In the "President's Annual Report," which he read to the trustees on November 15, 1870, thirty-six "young gentlemen" were listed who had "received instruction in the Junior, Sophomore, Freshman and Preparatory classes of the institution."⁷³ However, it appeared most of the students were in the preparatory classes, as the commencement of 1871 was not held and the treasurer reported no income from tuition for the year.⁷⁴

In August 1873, Section 6 of Article IX of the Constitution was amended so that "The General Assembly shall have power to provide for the election of Trustees of the University of North Carolina, in whom, when chosen, shall be vested all the privileges, rights, franchises and endowments thereof, in anywise granted to or conferred upon the Trustees of said University."⁷⁵ Subsequently, the General Assembly elected sixty-four trustees in 1874, who met to take charge of the seal of the university, the books of the libraries, the historical papers, and the bonds from the sale of the land scrip.⁷⁶ At the time, "the Campus was in a state of total neglect."⁷⁷

After considerable political debate about restructuring the debt, and the General Assembly agreeing to pay \$7,500 annual interest on the value of the land scrip, the University of North Carolina planned to open to students in September 1875.⁷⁸ The reorganization of the university included courses of study provided by seven professors and awarding a certificate for one or two years of study, a diploma for three years of study, or a degree for additional years of extended study.⁷⁹

As prescribed by the Constitution, there was a College of Agriculture, but it did not include mechanic arts; however, a College of Engineering included some elements of the practice of civil engineering with instruction of three or four hours a week for three years.⁸⁰ The College of Agriculture included a School of Natural History with instruction given in "Vegetable Physiology, Botany, Practical

Agriculture, Meteorology, Entomology, Zoology, Horticulture, Stock and Dairy Farming, Human Physiology, History, Feeding and Care of Domestic Animals, Physical Geography.”⁸¹

The degree of bachelor of agriculture was to be awarded to those who completed a three-year course of study in agricultural chemistry; however, more was promised “as soon as the means at the command of the Trustees will admit, arrangements will be made to give the students in this department efficient practical instruction in all matters pertaining to the farm.”⁸² The students entering the agriculture course of study were examined on “English and Mathematics except Algebra.”⁸³

There were seventy students who enrolled in the reopening of the university with seven in agriculture, twenty-five in scientific, thirty in classical, and eight in the optional or elective program.⁸⁴ While some students enrolled in courses without recognition or obtained certificates, there were no bachelor of agriculture diplomas awarded with the opportunity lasting just one year.⁸⁵

Kemp Battle, the author of *The History of North Carolina* who was selected president in 1876, provided some insight into the way he and others who were committed to a classical education interpreted the Morrill Act as an add-on and how that interpretation influenced the courses of study and the students’ interests. Battle concluded that the Morrill Act simply required that the “leading object of the University was to teach, not agriculture and mechanics arts, but the branches of learning relating thereto. Greek and Latin were likewise to be taught, and the students were to have a liberal as well as a practical education.”⁸⁶

In 1876, the State Grange, an agricultural society that advocated for rural and agricultural issues, inquired about the university’s commitment to the practice of agriculture and mechanic arts. The reply from the university included the courses taught in the “branches relating to Agriculture and Mechanic Arts” with descriptions of content important to agricultural education such as “Chemistry, including the composition and analysis of soils, manure, etc.; Botany, Zoology, including domestic animals and their foes; Geology, including character of soils; Mineralogy, especially the minerals of our State; Mechanics, including agricultural implements; Physics, light and heat as influencing plant life; also Meteorology; Engineering, including road making, land surveying, etc; Mathematics necessary for Mechanics, Engineering, etc. All this is in addition to the English Language and Literature, Political Economy, Constitutional and International Law, and the Greek and Latin and the German and French languages needed to make our students intelligent citizens.”⁸⁷

President Battle continued to express his pleasure with the faculty’s application of science to the practice of agriculture and mechanics and to blame the lack of laboratories and equipment on the fact that funding had not been provided for a farm and machinery. However, Battle did encourage the General Assembly to establish

an Agricultural Experiment Station, which was initially located in Chapel Hill and later moved to Raleigh in 1881.⁸⁸ In 1880, the faculty revised the studies related to agriculture and mechanic arts and added surveying, quantitative analysis, physics, a laboratory for natural history, and two electives in the senior year. Battle acknowledged “it is very desirable to show the good faith of the University in regard” to the Morrill Act.⁸⁹

A decade after reopening and embracing the land grant, the College of Agriculture and the Mechanic Arts was “established in connection with the University in obedience to the act of the General Assembly of North Carolina of March, 1867.”⁹⁰ It was expected that the endowment of the land grant would provide “support and maintenance of at least one college, where the leading object shall be, without excluding other scientific and classical studies, and including military tactics, to teach such branches of learning as are related to agriculture and the mechanic arts, in such manner as the legislatures of the States may respectively prescribe, in order to promote the liberal and practical education of the industrial classes in the several pursuits and professions of life.”⁹¹

In 1885, four-year courses were organized for a bachelor of science degree in agriculture as well as in civil engineering and mining.⁹² However, the studies for mechanics and agriculture were more theory than practice. The opportunity for a degree in the College of Agriculture lasted three years, but four degrees in bachelor of science in engineering were awarded in 1891, two in 1892, and one in 1893.⁹³ The primary reason for ending the degrees was the transfer of the land grant.

Land Grant and Industrial School Established in Raleigh

Just twenty-five miles to the southeast of Chapel Hill, in Raleigh a group of twenty-four young men, all under the age of thirty, had been meeting “to encourage free discussion and to promote the educational, agricultural, and industrial interests of the State.”⁹⁴ The group met as the Watauga Club and decided rather quickly to establish a committee to consider the establishment of an “industrial school” in North Carolina.

The members of the committee included Walter H. Page, publisher of the *State Chronicle*; William J. Poole, a lawyer; and Arthur Winslow, who had graduated from the land grant MIT with a four-year degree in engineering, plus mechanic arts. These three members prepared a memorial to the General Assembly that described “The Need of an Industrial School in North Carolina.” Although the ultimate objective may have been to organize an institute of technology, the proposed industrial school would include laboratory periods devoted to the mechanic arts of manual labor in a “carpenter’s and joiner’s shop,” in a “wood turning and pattern

shop," in a "forging shop," in a "foundry," in a "chipping and filing shop," and in a "machine shop."⁹⁵

The committee recommended that the shops be installed in the "Old West Building" or in the "New East Building" of the University of North Carolina where there were vacant spaces. With an estimated cost to equip the shops of seven thousand dollars, the Watauga Club reported that "President Battle expressed himself entirely in favor of the movement."⁹⁶

In support of the memorial submitted by the Watauga Club, Augustus Leazar introduced legislation that was ratified on March 11, 1885 and entitled "An Act to Establish and Maintain an Industrial School" that provided the opportunity for cities and towns across North Carolina to send proposals to the board of agriculture with the industrial school to be located where the largest inducements were offered.⁹⁷ Serving on the board of agriculture, Kemp Battle was a member of the group who evaluated the proposals and recalled in *The History of the University of North Carolina* his involvement in the "Industrial School Controversy." In assessing the proposed arrangement for a school, Battle seemed to be concerned about the governance and annual share of the cost for operating the school.

After evaluating the first round of proposals from Charlotte, Kinston, and Raleigh, two-thirds of the Board, including Battle, "voted that the act had not been complied with, that neither of the three towns had offered an amount 'adequate to the establishment of the school.'⁹⁸ However, three months later, a majority of the committee accepted an alteration by Raleigh and voted its proposal to be "adequate to the establishment of the school."⁹⁹

With the City of Raleigh busily purchasing a site and planning to erect a building for the industrial school, another advocate for practical education was engaging in a public dialogue about the status of agricultural education. In the May 19, 1886 edition of the *Progressive Farmer*, Leonidus L. Polk, the editor who started the journal in Winston, North Carolina on February 10, 1886, wrote an article that expressed his surprise about the unexpected attention given the university about the College of Agriculture and Mechanic Arts. Polk described the sudden rise to distinction of the "so-called 'agricultural' college" in the "Catalogue of the Trustees, Faculty and Students" of 1885–1886 as "a sham, a mere pretense, a thing which has a mere technical existence, under cover of which the University continues to appropriate and to use the annual interest on \$125,000 which belongs to the agricultural and mechanical classes of the state, and which should be used for their benefit only."¹⁰⁰

In the journal published on August 25, 1886, Polk continued his attack on the "so-called agricultural college" by declaring that "The people of North Carolina should never rest until she has an industrial school for the education of her youth." To accomplish the task, "We need progressive and aggressive men, those who are

not afraid of criticism but having at heart the interest of the whole State will have the courage to stand by their convictions.”¹⁰¹

In a previous journal, Polk had asked that the land grant “fund of \$125,000 be placed in our Treasury to the credit of the industrial classes, to whom, by the law, it only and rightfully belongs.” Furthermore, he suggested the interest on the fund be applied to the establishment of “schools for the training of the industrial classes.”¹⁰²

With the legislature composed mainly of farmers, Polk met with his friends in the General Assembly in January of 1887 to discuss and to obtain their support and then the board of agriculture to pass legislation that would transfer the land grant at the university into the industrial school that had been approved for establishment in Raleigh. However, Polk demanded assurances that agriculture would be primary and not secondary to the mechanic arts. Work was halted on the industrial school project while the Watauga Club joined with Polk to obtain the land grant and then join in establishing another institution.¹⁰³

On March 7, 1887, the General Assembly passed legislation that changed the name of the industrial school to “The North Carolina College of Agriculture and Mechanic Arts,” created a board of trustees, transferred the interest on the land scrip fund from the university in Chapel Hill to the college in Raleigh, and instructed the State Penitentiary to provide bricks, labor, and construct the buildings. The legislation also required the college to provide free tuition for at least one hundred twenty students and an apportionment of “the same to the different counties applying, according to their relative number of members in the house of representatives of North Carolina,” with every student required “to take a course of manual training or labor, together with the other courses of study and exercise.”¹⁰⁴

Second Land Grant in North Carolina

Over four decades the North Carolina College of Agriculture and Mechanic Arts developed as a public institution with trustees selecting five presidents involved in the expansion of the college. Beginning in 1889, Alexander Quarles Holladay—who had attended the University of Virginia, served in the Virginia General Assembly, fought in the Civil War, practiced law, taught English literature at the Florida Agriculture College, and been named its president in 1885—was elected as first president of the North Carolina College of Agriculture and Mechanic Arts.¹⁰⁵

The fall term of the college began on the first Thursday in September 1889 with the enrollment of seventy-two boys who had to be at least fourteen years in age. The estimated cost for the year was between one hundred and one hundred thirty dollars.¹⁰⁶ In addition, the applicant “must be able to read and write ordinary English intelligently, and must be familiar with simple arithmetic, including the practical rules of the same, through fractions, and have a fair knowledge of geography and

State history.”¹⁰⁷ Slightly more than a quarter of the students were from families in Wake County with the other students traveling from thirty-six other counties of the state and one from South Carolina.¹⁰⁸

The land grant had been transferred from the University of North Carolina to the North Carolina College of Agriculture and Mechanic Arts to establish education in agriculture and mechanics, but not in engineering. However, a bachelor of science in engineering was awarded, with a curriculum that included courses of steam engines, surveying, applied mechanics, and building materials. About twelve percent of the curriculum was engineering, with about sixty percent shopworks of mechanic arts. The remainder was courses in mathematics, English, chemistry, physics, and history.¹⁰⁹

All of the freshmen were enrolled in the same courses during the first year of their four years to graduation. Over three semesters in the first year, there were a total of fourteen hours each week of recitations among the courses of mathematics, English, chemistry, and history. In addition, there were nine hours a week of practicing agriculture or horticulture, shopwork, and drawing.¹¹⁰

For comparison with an earlier opportunity in 1887, at the University in Chapel Hill, the sixty-three first-year students at the university were at least sixteen years of age, with the cost of attendance, including room and board, between two to three hundred dollars.¹¹¹ The enrollment in the bachelor of science degree in the scientific course, which included a certificate in agriculture, required examinations in mathematics and English for admission. The mathematics included arithmetic and algebra. English included grammar, rhetoric, and composition.¹¹²

For the first two years, courses of study were the same for all the students enrolled for a bachelor of science degree. Those courses of study included math, English, history, entomology, physiography, physiology, and a language of German, French, or Latin for the first and second terms. In addition, hygiene and practical morals were in the first term, with zoology and botany in the second term.¹¹³

In the third and fourth years, the courses were about evenly divided with subjects related to agriculture and a wide array of subjects related to physics, chemistry, geology, mechanics, and surveying. Even though a large number of students pursued the scientific course, there was no indication that any first-year students were enrolled in agriculture or engineering.¹¹⁴

One year after the establishment of the College of Agriculture and Engineering at Chapel Hill, the first annual catalogue of the College of Agriculture and Mechanic Arts in Raleigh for academic year of 1889–1890 included an “Object and Aim of the College,” that was “to foster a higher appreciation of the value and dignity of intelligent labor and the worth and respectability of laboring men.”¹¹⁵ The statement continued: “The College is intended, not to produce theorists, but practical young men, who will become intelligent farmers, horticulturists, cattle and

stock raisers, dairymen—men who will be interested in their work, and who will make their work profitable. The State also has need of good mechanics, carpenters, architects, draughtsmen, contractors and manufacturers, and the College will help to make them.”¹¹⁶

Although the land grants in 1862 and 1890 supported the establishment of agriculture, mechanic arts, and military in institutes, colleges, and universities, a variety of other academic programs existed or were added. In either circumstance the number of courses for a degree and the research for improvements rapidly increased, in each, the establishment of practical and theoretical courses of study in agriculture. The important shops of the trades in mechanic arts eventually joined with the applied sciences to establish engineering in the classroom. The research and development of degrees in engineering were often influenced by the inventions, innovations, and manufacturing in each state.

By the sixth academic year, ten Departments of Instruction were established that included Agriculture, Horticulture, Arboriculture and Botany, Chemistry, Physics, and Mechanics.¹¹⁷ In addition, applied mathematics, mathematics, English, bookkeeping, history, and military science and tactics were required classes for a bachelor of science in the four-year course of study in agriculture. Also, a bachelor of engineering was awarded for a four-year course of study, which included physics, mechanics, and applied mathematics. In the class of 1894 two bachelor of science and six bachelor of engineering degrees were awarded.¹¹⁸

During the decade from academic years of 1890–1891 through 1899–1900, the enrollment of students increased about fourfold, and the number of faculty increased about threefold, with a ten percent increase in the expenses for the student.¹¹⁹ On average, sixteen degrees were awarded each year, with fifty-two percent bachelor of science in engineering, thirty-two percent bachelor of science in agriculture, and fifteen percent advanced degrees of masters of science, masters of engineering, and masters of civil engineering.¹²⁰

In 1899, George Tayloe Winston was appointed as the second president of North Carolina College of Agriculture and Mechanic Arts. He had attended the University of North Carolina as a student until closure in 1868, the U.S. Naval Academy until acute seasickness, Cornell until graduation, and was professor and president at UNC and the president of the University of Texas.¹²¹ In the academic year of 1899–1900, there were three full four-year courses of study in agriculture, engineering, and textile industry. Also there were two-year short manual courses of mechanical arts, and three-month special courses of practical mechanics work.¹²²

In addition, masters degrees were awarded to those who completed a two-year course along special lines.¹²³ Although there was just one four-year course of study leading to a bachelor in agriculture, there were four courses of studies in mechanic arts, with bachelor degrees in civil, mechanical, electrical, or chemical engineering,

and a fourth course of study for a bachelor degree in engineering added for the textile industry. A bachelor of engineering was awarded for courses of studies of cotton manufacturing and dyeing.¹²⁴ In the class of 1900, twenty-two students graduated with thirteen bachelor degrees of engineering and nine bachelors of science in agriculture.¹²⁵

The mechanic arts had developed into a two-year course of study. However, the mechanic arts were prominent in the curricula of the four-year courses of study for a bachelor degree in chemistry, civil, electrical, and mechanical engineering. For the textile industry there were two four-year and one two-year courses of study. For agriculture there were eight four-year courses that included agronomy, animal husbandry, dairying, agriculture chemistry, horticulture, vocational education, poultry science, veterinary, and biology. Also, there was a one-year course of study in general agriculture and a special course in general agriculture for farmers.¹²⁶

The catalogue asserted that "These [four-year] courses offer a combination of practical and theoretical work, about half of the time being devoted to lectures and recitations and the other half to work in the shops, laboratories, drawing-rooms, greenhouses, dairies, fields, and mills. They are intended to furnish both technical and liberal education. The degree of Bachelor of Science is conferred upon a graduate in the four-year course in Agriculture, in Chemistry, and in Dyeing, and the degree Bachelor of Engineering upon a graduate of either of the other four-year courses" (Engineering or Textiles).¹²⁷

President Winston retired in 1908. During his tenure the number of faculty had almost doubled to forty-three.¹²⁸ Almost three times more bachelor degrees were awarded in 1908 than in 1889, with fifty-three awarded in 1908. In addition, as in 1900, more than half of the bachelor degrees were in engineering.¹²⁹ Daniel Harvey Hill, Jr. was selected by the board of trustees to be the third president of the North Carolina College of Agriculture and Mechanic Arts.

Hill was born in 1859 at Davidson College where his father taught mathematics. After serving as a general in the war, Hill Senior served as president at an industrial university and at a military and agriculture college. Hill Junior attended a preparatory and military school and graduated in 1880 with a bachelor of arts degree. At the age of twenty-one, he accepted a professorship in English at the Georgia Military and Agricultural College. Nine years later, he was hired by President Holladay to join him in the development of the North Carolina College of Agriculture and Mechanic Arts. During his tenure of twenty-nine years, Professor Hill taught English and bookkeeping. In addition, he served as the secretary of faculty, librarian, bursar, and vice president before he was selected president by the trustees.¹³⁰

During the tenure of President Hill from 1908 until 1916, the number of faculty increased almost forty percent to sixty members. The number of conferred four-year bachelor degrees increased to eighty students with seventy percent in engineering.¹³¹

In addition, “[t]he short courses include nearly all of the practical work of the four-year courses with less theoretical instruction. They are intended for the students who desire chiefly manual training. They do not lead to a degree.”¹³²

In 1916, Wallace Carl Riddick, who had joined the faculty in 1892 as professor of mechanics and applied mathematics, was selected president after Hill resigned. Riddick was born in Wake County where he attended Wake Forest College for two years before transferring to the University of North Carolina for two years before earning a BA degree in 1885. As a student, Riddick studied the course of civil engineering at Lehigh University, earning a CE degree in 1890, followed by two years of practice in Wake County. Three years after he joined the faculty at North Carolina College of Agriculture and Mechanic Arts, the Civil Engineering Department was established.¹³³

In addition to serving as professor of civil engineering for forty-two years, Riddick served as head of department, vice president, president, and dean of engineering. During his tenure as president from 1916 to 1923, the number of students enrolled in four-year course of studies, two-year course of study, and short courses nearly doubled, with a forty percent increase in four courses of study in engineering.¹³⁴ As Riddick began his term as president in 1917, the name was changed to North Carolina State College of Agriculture and Engineering.

The number of four-year degrees also doubled to more than one hundred fifty with sixty percent in engineering. About one-fourth were in agriculture with fifteen percent in textiles. In 1923, the trustees adopted a recommendation for organizing the courses of study into separate schools. President Riddick requested and became the dean of engineering. Before he retired in 1937, the enrollment in the School of Engineering had increased the number of students to almost eight hundred enrolled in nine engineering curricula for degrees in architecture, ceramic, chemical, civil, electrical, geological, industrial, mechanical, and mining.¹³⁵

The Third Land Grant Institution in North Carolina

On August 30, 1890, a bill was enacted by the Senate and House of the United States to appropriate money from the sale of public lands to each state and territory “for the more complete endowment and maintenance of colleges for the benefit of agriculture and the mechanic arts now established.”¹³⁶ However, there were no appropriations to the North Carolina College of Agriculture and Mechanic Arts until the State of North Carolina established a similar institution for blacks.

In 1890, to immediately access their funds from the second land grant, the Board of Trustees of the existing North Carolina College of Agriculture and Mechanic Arts in Raleigh arranged for Shaw University to begin the study of agriculture and mechanics for black students in North Carolina, with four teachers and thirty-seven

students with instructions in agriculture, English, horticulture, and mathematics. On March 9, 1891, the General Assembly of North Carolina established the Agricultural and Mechanical College for the Colored Race.¹³⁷

The Board of Trustees of the Agricultural and Mechanical College for the Colored Race met in June 1891. Less than a year later, the trustees selected Greensboro for the school's location, rather than Durham, Mebane, Raleigh, Wilmington, or Winston. In May, John Oliver Crosby was elected as the first president of the college.¹³⁸ Crosby was born a slave, apprenticed to a carpenter, assisted his master during the war, and as a free man attended Biddle University and graduated from Shaw University in Raleigh. Before serving as president of the A&M College, Crosby was a minister, served as a delegate to the Constitution Convention of 1875, was principal of a State Colored Normal School, and was editor of the *Baptist Journal*.¹³⁹

To establish the Agricultural and Mechanical College for the Colored Race, fourteen acres of land and eleven thousand dollars was donated by the people of Greensboro for construction of the first building that opened in the fall of 1893. During the next two years a large dormitory was built for students and another building erected for the shops of mechanic arts. A greenhouse was added for agriculture, with a barn, dairy, and silo planned.¹⁴⁰

Even with progress of the main and mechanical buildings and the dormitory by 1895, with continuous disagreements with faculty, Crosby was replaced by Dr. James B. Dudley. Dudley was born to slaved parents in 1859 whose master was Edward B. Dudley, governor of North Carolina from 1836 to 1841. Dudley assisted his father in the carpentry trade before attending the Wilmington Normal School, sponsored by the Freedman Bureau where he was taught Latin grammar. Also, he took classes at Fannie L. Coppin's Institute for Colored Youth in Philadelphia to master the higher branches of learning. After schooling Dudley attended and graduated from Shaw University majoring in elementary education.¹⁴¹

At the age of twenty-one, Dudley was a first-grade teacher in Sampson County. The next year he was appointed as the principal of the Peabody Graded Normal School in Wilmington, which lasted for fifteen years. During his career, Livingstone College in Salisbury awarded him a degree in master of arts. In addition, Wilberforce University awarded him a doctor of letters degree.¹⁴²

In 1895, Dudley was a new member of the Board of Trustees of the Agricultural and Mechanical College for the Colored Race, when elected secretary that year and president of the college in 1896. Therefore, he understood the challenge for organizing the faculty to achieve progress in educating the students and growing the college.¹⁴³

When Dudley began as president, the requirements for admission were similar to those of the A&M College in Raleigh, with students at least the age of fourteen, in good health, understanding "fairly well the forms and rules of the English

language," familiar with arithmetic through fractions, and possessing a fair knowledge of geography and history of at least North Carolina. Those who were short of the requirements could join the subfreshman class to prepare them to pass the requirements.¹⁴⁴

There were two courses of study leading to a degree, with the freshman year offering the same subjects for both. English, algebra, chemistry, history, civics, trigonometry, and geology were in each of the two courses of study with some continuing for more than one year. There were, on average, seven subjects each trimester of the four years. The theoretical subjects for agriculture included botany, horticulture, zoology, veterinary science, entomology, and agricultural chemistry. The practical subjects in agriculture included farm work, stock breeding, dairy practice, horticulture, and landscape gardening. The theoretical subjects for mechanical education were mainly physics, chemistry, geometry, and trigonometry. In addition, practical subjects included shopwork, surveying, architecture, steam engineering, electric motors, and projects in the mechanical laboratory.¹⁴⁵

With pride from accomplishments and growing expectations from President Dudley, the board of trustees invited "the careful consideration of the colored people of North Carolina, particularly the educators among them, and leaders of thought, to the grand opportunities offered by the State and aided by the United States, to the colored youth to thoroughly equip themselves for the battle of life and prepare themselves to successfully work their way as 'breadwinners,' and secure honorable independence, carrying with it the highest type of American citizenship. Brain and hands are here educated together."¹⁴⁶

With the observation that "eighty percent of the colored people in this State live in the country, and subsist on agriculture," the trustees asserted that the "future of the colored race in the South depends upon the ownership of farm lands and their intelligent and skillful treatment by colored farmers. This field will be free from competition and race feeling. Owners of large tracts of land now yielding nothing will be only too glad to rent them to the skilled farmer who graduates from an agricultural college, and also provide him with stock and implements of husbandry."¹⁴⁷

With a degree from an A&M college, "capital will be looking for him to place him in charge of lands and stock; to handle machinery and direct unskilled labor... The College, broad in its purposes, practical in its work, elevating in its influences, is intended to assist and strengthen the colored people in *all* their efforts for industrial and intellectual advancement."¹⁴⁸

During the next thirty years, the number of buildings grew from two to thirteen.¹⁴⁹ The student body for all education grew from fifty-seven¹⁵⁰ to four hundred seventy-eight students.¹⁵¹ Consequently, the number of faculty and officers expanded from eight to thirty-four.¹⁵² The opportunities of theory and practice grew

to seven Academic Departments: Agriculture, Commercial, Trade and Industrial Education, High School, Music, Mechanic Arts, and Military.

The development of these seven departments resulted in a relatively unique, but an important institution among North Carolina universities and colleges as well as others that were available to black persons in the southern states. Even though A&T offered many courses of study, the reality of white supremacy by most Southern whites resulted in the division and unfair support of public education for blacks, restrictions in commerce, and rejections in employment. However, the Academic Department provided "general college training which especially prepares for teaching, for business and for other study." The four-year course of study in the Academic Department included "Mathematics, Modern Languages, Sociology, Psychology, English, Economics, History and Education, Chemistry, Physics and Biology."¹⁵³

The Agriculture Department provided a one-year course in applied agriculture for students desired a practical training "in general farming, with special training and practice along the lines of poultry production, gardening and field crop production.... The course aims primarily to increase one's earning capacity on the farm and is not preparatory to any course."¹⁵⁴

The four-year college course of study in agriculture was divided into twelve trimesters. There were five or six subjects each trimester, depending on electives. In one example, over four years, forty four percent of the subjects were in agriculture, twenty-three percent in sciences, eighteen percent in humanities, eighteen percent electives, and fifteen percent profession subjects.¹⁵⁵

The Department of Mechanic Arts included training for the trade of auto mechanics, blacksmithing, bricklaying, broommaking, carpentry, lighting, plumbing machine shop practice, photography, shoemaking, and tailoring. The courses were for three months, two years, or one year and industrial courses at the trade school.¹⁵⁶

With the addition of courses of study for awarding degrees of bachelor of science in architectural engineering, mechanical engineering, and electrical engineering, the name of the Agricultural and Mechanical College for the Colored Race was changed to the Negro Agricultural and Technical College, or A&T.

More Engineering Education for North Carolina

Attempts by the University of North of Carolina to establish a course of studies for degrees in engineering occurred before the Civil War and two times with the land grant. The first course of study was a successful response to a requirement from the trustees that lasted until the war. The second was a response to the land grant that failed with closure of the university. The third time was related to criticism that eventually resulted in the transfer of the land grant.

In 1901, the University of North Carolina established a School of Mining with courses of instruction that included mathematics, physics, chemistry, metallurgy, assaying, geology, and principles and practice of mining. Mines of various minerals and ores were visited in addition to working in the field and laboratories. Admission was by examination or with certification from a school principal. The expenses were the same as students in the Academic Department.¹⁵⁷

In 1904, the University of North Carolina established the Department of Applied Sciences with a bachelor of science degree. "Special courses of study are offered in this department, extended over four years, and combining instruction in certain Sciences and their applications to the arts with other general studies deemed essential to a liberal education."¹⁵⁸

Courses were "designed to furnish the fundamental instruction and to prepare students to pursue the technical professions to which they lead."¹⁵⁹ There were four separate courses of study that included chemistry, electricity, civil engineering, and mining and metallurgy.¹⁶⁰

The admission to the School of Applied Science required candidates to "present certificates of work accomplished at preparatory schools or colleges" or to complete examinations.¹⁶¹ The examination was five or six of eight subjects, which included questions and translations of Greek, translation from English to Latin, of English in grammar, rhetoric, and literature, of history of the United States, Greece, or Rome, of mathematics of arithmetic, algebra and plane geometry, of German language translation, of French in ordinary prose, and physics of at least nine months.¹⁶² Obviously, the admission to the University of North Carolina required more preparation than the North Carolina College of Agriculture and Mechanic Arts.

In 1922, the School of Engineering was authorized, with departments with majors of civil, electrical, and mechanical engineering and a chemical engineering curriculum.¹⁶³ As the school was developing, it was recognized that "the material and industrial growth of the South is proceeding at such a rate as to require increasing numbers of men trained in design, construction, and administration relating to control of the great forces of nature for the use and convenience of man."¹⁶⁴

The catalogue noted: "The great highway systems springing into being throughout the South; the new sky-scrapers, office buildings and hotels; the municipal systems of water supply, sewerage and paving; the public health and agricultural aspects of drainage; the utilization of rivers for navigation and water power; the generation, transmission, distribution, and utilization of electric energy—all these are making unprecedented demands upon technically trained men, not only for designing and constructing, but also for operation and administration."¹⁶⁵

For centuries engineers developed as a junior to a master. "For the past twenty years or more a great amount of time and thought has been devoted to engineering by engineering teachers and the profession at large with the idea in mind of

adopting some method in engineering education that would develop the observation and initiative of the students and bring them in touch with outside things during their theoretical training.”¹⁶⁶

However, “laboratory instruction is recognized as an important element of an engineering education, and with the excellent laboratory facilities the students study the fundamental laws of engineering.”¹⁶⁷ Some of the equipment was dangerous, large, and expensive.

Following the leadership of the University of Cincinnati, MIT, University of Pittsburgh, and New York University, a system was adopted where students leave the university for a junior semester while cooperating for work, mostly with at a company. One reason for cooperating was to see and work with engineers in a variety of assignments. The outcome may be special interests when returning to campus.

During the 1920s, students worked at the State Highway Commission, the City of Charlotte, Southern Power Company, Carolina Power and Light Company, Duke Power Company, R. H. Bouligny, Tidewater Power Company, Southern Public Utility Company, Asheville Mica Company, Caldwell Power Company, Western Electric Company at Charlotte, and Southern Railway Company.¹⁶⁸

Engineering Education at Duke University

The School of Engineering at Duke University began in an academy, which in 1851 had developed into a Normal College in Randolph County. In the first year of study, the college offered subjects related to engineering and agriculture. In subsequent years, students studied surveying, agricultural chemistry, architecture, and engineering, similar to those at the University of North Carolina.¹⁶⁹

However, the Normal Department was needed most in North Carolina, with an average of four thousand teachers employed each year. Less than half of them were sufficiently educated.¹⁷⁰ Although the teachers may have the knowledge, they also should be “instructed in the proper method of teaching the different branches, the manner of conducting a school, the proper principles of school government, and everything that tends to make them efficient and useful teachers.”¹⁷¹

The name Normal College was changed to Trinity College in 1859. However, the college was not altering education, just a relationship with religion. From 1853 to 1867, engineering was a subject in the School of Mathematics and required for a degree of bachelor of science or offered through practical instruction.¹⁷²

Few colleges were developing textbooks directed for educating engineers. “The principles of engineering are a part of college course, but special instruction is given in-Drawing-topographical, outline, shaded and tinted; Surveying-with operations in the field, locating roads, &c. Mechanics-applied to building materials and machinery; Construction-of railroads, bridges, canals, &c.”¹⁷³

In the 1876–1877 academic year, courses of instruction were organized into eleven Schools of “Latin, Greek, Mathematics, English Literature, Natural Science, Mental and Moral Philosophy, Modern Languages, Theology, Engineering and Architecture, Analytical Chemistry, and Law. The studies of any school or any special school or any special study may be pursued exclusively, if so desired.”¹⁷⁴ The subjects available in the School of Engineering and Architecture included learning about instruments for surveying, measuring for roads and railroads, constructing roads and railroads, operating machinery, mining, foundries, building bridges, tunnels, irrigations, and public buildings.¹⁷⁵ However, the only degree was a “Bachelor of Science, conferred for approved examination upon all the studies in the Schools of Mathematics, Natural Sciences, Engineering and Architecture, and Analytical Chemistry.”¹⁷⁶

In the 1883–1884 academic year, the eleven schools were reduced to nine. Engineering and architecture were subjects again in the School of Mathematics.¹⁷⁷ However, in 1888 the college was divided into two distinct Academic and Scientific Departments, with courses for two years in length and “together constituting a four (4) years’ College course.”¹⁷⁸ Civil and mining engineering were two of the fifteen schools.

The civil engineering courses were one to three hours for each of the subjects of analytical geometry, surveying roads, rational mechanics, calculus, applied mechanics, surveying railroads, and four hours each for mathematical astronomy and a thesis.¹⁷⁹ The Academic Department, or the first two years of college, was organized because it was “believed that to train the mind to be ready to do the best work wherever and whenever its task may be found is the first essential of a liberal education. During these two years, therefore, the thorough discipline of the mental powers is the chief object in view.”¹⁸⁰

By 1891, the School of Civil Engineering awarded a degree with four years of subjects that included classes for four terms that met two to four hours a week. The five classes in the first term of the first year were pure and applied mathematics, English, and drawing for two hundred twenty-four hours. The second term was applied mathematics, English, and drawing for three hundred forty hours in classes.¹⁸¹

The final year included two-and-three hour courses on bridges, strength and elasticity of materials, city drainage and sewage, map construction, and chemistry for two hundred twenty-four hours. In the final term, hydraulics and a thesis were added to drainage and sewage, maps, and chemistry for three hundred twenty hours in classes.¹⁸²

The development of the School of Civil Engineering was organized “for the purpose of training young men for practical and professional engineering. The necessity for development of various kinds in the State, requiring engineering skill, suggested the School.”¹⁸³

"To secure practical results, four hours in the field are given on Saturday. The students are required to connect Trinity with some of the neighboring towns. Consequently, preliminary surveys in which the contour of the country is the base of operation are made and carefully compared. Every detail of work is economically considered."¹⁸⁴

In addition to School of Civil Engineering, electrical engineering was established "as a special course to members of the Senior Class. As the School has been in existence only one year, the whole course was not given."¹⁸⁵ The one course was fourteen weeks of electricity and magnets with electrical measurements and met three times a week.¹⁸⁶ "The subjects treated are... General principles of Electricity, static Electricity, magnetism, dynamic Electricity, electro-magnetism, heating, lightning and mechanical effects of Electricity, inductions, etc.; mathematical theory of Electricity; theory of electrical measurements; electrical laws; electrical units; theory of dynamo and electric motor; electric lamps, arc and incandescent; telegraph, single needle, Morse, duplex, and printing; telephone transmitters and receivers; electric batteries, primary and secondary."¹⁸⁷

In 1892, Trinity College moved to the Trinity College Park in Durham, North Carolina. They had considered Raleigh. However, the location of property and wealth of a few men in Durham influenced the positive decision for Durham. The buildings of the Main College, Technological College, College Inn, gymnasium, and seven residences opened in the fall. The Technological Building was to retain the Schools of Physics, Engineering, and Civil, Mechanical, and Electrical Engineering.¹⁸⁸

The organization of the college during the year of 1893–1894 consisted of the Department of Philosophy and Letters, the Department of History, Political, and Social Sciences, the Scientific Department, and the Commercial Department.¹⁸⁹ The Technological Building could contain only the Schools of Chemistry, Physics, and, Biology, laboratories, lecture rooms, shops, and museums.¹⁹⁰ For two decades the scientific courses relating to engineering were provided through applied mathematics and physics within the degree bachelor of arts.¹⁹¹

In the academic year of 1909–1910, the Department of Engineering awarded the bachelor of arts to "students who wish to study Electrical, Mechanical, or Civil Engineering."¹⁹² For the first and second year, courses of mathematics, English, French or German, physics, mechanics, chemistry, drawing, and the Bible were repeated in each semester. The third year included studies in mathematics, surveying, drawing, electrical engineering, electives, and the Bible. The senior year added mechanical engineering.¹⁹³

In 1924, Trinity College was renamed Duke University to honor the many financial gifts of William Duke and his family. With additional financial gifts, in the decade of 1924 to 1934, the undergraduate campus for men of Trinity College was

built from stone nearby. The Women's College opened on East Campus. The medical school and hospital opened in 1931. The Divinity School was founded in 1926, and the first PhD degrees were awarded in 1928.

Instead of engineering being awarded as a bachelor of arts degree, the courses of engineering were separated into a number of bachelor of science degrees in 1927.¹⁹⁴ In 1939, Duke College of Engineering was established with departments offering a bachelor of science in civil, electrical, and mechanical engineering.¹⁹⁵ Ironically, about the same time, the School of Engineering at the University of North Carolina was transferred to North Carolina State College of Agriculture and Engineering.

Consolidation Eliminates One Engineering School

With the Great Depression beginning in 1929, eventually the funding for public education in North Carolina would be reduced. With declining revenue, it was the responsibility of the governor and the General Assembly to define ways to keep the doors open for students and teachers in the classrooms at all levels of publicly funded education.

During the Great Depression from 1929–1930 through 1933–1934, the total annual expenditures declined more than thirty-three percent at the University of North Carolina, more than thirty-three percent at the North Carolina State College of Agriculture and Engineering, and more than forty-seven percent at the North Carolina College for Women.¹⁹⁶ The appropriation from the state declined nearly fifty percent for the University of North Carolina, fifty-five percent for the College of Agriculture and Engineering, and sixty-one percent for the College for Women.¹⁹⁷

As the Depression era began, Oliver Maxwell Gardner was elected governor. He had graduated with a bachelor of science in 1903 at the North Carolina State College of Agriculture and Mechanic Arts. Also, he was an instructor in chemistry for two years before attending law school at the University of North Carolina. Gardner had served in the State Senate from 1911 to 1916, followed by a term as lieutenant governor. In addition, he served from 1907 until 1929 as a trustee of the North Carolina State College of Agriculture and Engineering.¹⁹⁸

After a loss for governor in 1920, Gardner became active in manufacturing until 1928, when he ran for governor again and won. With experience as a trustee, senator, and governor, Gardner introduced a need for consolidation of degrees that developed among the University of North Carolina, the North Carolina State College of Agriculture and Engineering, and North Carolina College for Women.¹⁹⁹

On January 9, 1931, Gardner addressed the General Assembly of North Carolina concerning the cost of developments in public education. He provided the cost of government compared to public education. "In the twelve-year period from 1918 to

1930 the total cost of government in North Carolina increased from \$23,500,000 a year to the present total of \$100,000,000. As late as 1913 the cost of public education was only \$5,500,000. Today the cost of public education amounts to \$28,000,000 a year.²⁰⁰

The reaction from the General Assembly was legislation to consolidate and merge schools and departments that existed in more than one among the three institutions. Their names would be the North Carolina State College of Agriculture and Engineering of the University of North Carolina and the Women's College of the University of North Carolina. A commission of thirteen was formed to develop plans for unification after consolidation.²⁰¹

With an array of suggestions for consolidation from a subcommittee, educators, and conferences, the Commission on University Consolidation reported that the University of North Carolina should be three units with "one president, one controller, one administrative council, one director of summer schools, one director of extension work and one director of graduate studies."²⁰² In addition, the three existing boards of trustees were replaced by consolidation to one board of one hundred named by the General Assembly.

After the board of trustees had appointed him, Dr. Frank Porter Graham was established on November 14, 1932 as the first president of the consolidated University of North Carolina. Graham was born in Fayetteville, North Carolina in 1886. He received an AB degree at the University of North Carolina in 1909. He also studied law there and received his license in 1913, though he never practiced law. Subsequently, Graham attended Columbia University and received the AM degree, and he engaged in graduate studies at the University of Chicago and the University of London.²⁰³

On the same day, President Graham appointed two of three vice presidents. Then-current president E. C. Brooks was appointed as vice president of the North Carolina State College of Agriculture and Engineering of the University of North Carolina. The other appointment was J. I. Foust for the Women's College. The third position of vice president at the University of North Carolina was vacant until 1934.²⁰⁴

One of the important decisions was the consolidation of the engineering schools in Raleigh and Chapel Hill. During the fall of 1933, President Graham appointed a committee of eleven who would answer eight questions. Four members were consulting engineers, two were chief engineers, one was president and general manager of a fiber company, one was a professor of highway engineering, two were engineering deans, and one was a dean for liberal arts.²⁰⁵

The members of the committee sought answers to important questions about enough equipment, about nontransferable and scrabble equipment, about advantages and disadvantages of consolidating of all engineering, about advantages and

disadvantages of undergraduate and graduate engineering degrees at Raleigh and Chapel Hill, and the advantages and disadvantages of the four-year degree at Raleigh and the six-year professional degree in Chapel Hill. The committee was to directly answer whether there should be one or two engineering schools. If one, where? If two, how would the separate schools be differentiated, and would they be coordinated?²⁰⁶

After three years of discussions, committees, and recommendations, on June 10, 1935 Graham summarized his sixteen steps to consolidation. Instead of three, there would be one board of trustees, one executive committee of the board, one president, one controller, and one administrative council of representatives of the three institutions and their faculties. In addition, the three schools of education were transformed into departments. Also, there was no more registration in the business school at Raleigh or elementary education in the collage at Chapel Hill. Graham originally announced that the library school at the Women's College would be discontinued, but he later made a recommendation for two library courses for teachers in the Department of Education at the Women's College. However, no males could attend the college.²⁰⁷

In 1935, the final decisions about consolidations, included "no new registrations in the school of engineering or for any curricula in the of school of engineering of the University at Chapel Hill and no new registration in the school or for any curricula in the school of science and business of the State College of Agriculture and Engineering of the University at Raleigh."²⁰⁸ The plan also included "The establishment at State College of a general college of two years of basic courses in the humanities, natural and exact sciences, and the social sciences as the foundation of the schools of agriculture and forestry, textiles and engineering."²⁰⁹ The cost of engineering education was about one thousand dollars per graduate at Chapel Hill and less than six hundred dollars per graduate at Raleigh.²¹⁰

Advances in Agriculture and Manufacturing in North Carolina

Inventions and Productivity

Although Adam Smith had defined his capitalism and Alexander Hamilton had encouraged expansions in manufacturing of the current seventeen industries, during the first century as the United States of America, the development of the economy depended mostly on trade of crops grown in fertile soils and products gathered from a number of natural resources while the population grew more than fifteenfold into a total of forty-four states. As colonies, the products of manufacture had been restricted to the artisans while agriculture was rewarded by the Parliament of Great Britain.

However, by 1790 a total of thirty-three patents for manufacturing products had been awarded within six of the colonies of New York with one, Pennsylvania with two, Massachusetts with four, Maryland with five, New Hampshire with nine, and Connecticut with twelve. The terms of the patents awarded by the colonies ranged from three to twenty years. The innovations included a steamboat, a carding and spinning machine, elevators, a scythe, a printing press, various foods from the crops, and uses of natural products from the forests.¹

The value of United States patents in manufacturing for all the states included the right to exclude others from making, using, or offering for sale the product during as many as twenty years. Consequently, the holder had time to establish the manufacturing of the product without the pressure of competition. During the first year as the United States, only three patents were awarded. But over the first decade an average of forty per year were awarded. Over the next three decades more than five thousand were awarded with nearly seventy percent in Connecticut, Massachusetts, New York, and Pennsylvania.²

Before the Civil War, the economy of the United States had expanded throughout the country with the assistance of power from steam replacing rowing and wind and machines for labor. The richer farmers and governments built canals, steamboats, railways, and steam engines that provided transportations for trade abroad and between the states. During that time the number of hands per acre planting and harvesting grains decreased with inventions of agriculture implements. Also the cotton gin increased productivity by removing the cotton seed from the fiber with a machine.

Some extraordinary patents were awarded to manufacture products before 1860. The holders of the American sewing machine patents were competing with manufacturing different inventions. Although it was unknown science to most people who sent messages, communication by electricity on a wire was developing with the manufacturing of miles and miles of special wire for connection and thousands of Morse keys to send and receive dots and dashes of Morse code.

After almost a century as a nation, the value of farm products had increased to about two-and-a-half trillion dollars by 1880.³ To increase prosperity, associations were formed in the states to share advances in agricultural sciences. Discoveries in sciences and inventions of farming implements were shared among farmers. Eventually, schools, colleges, and universities were established at all levels of education to cooperatively advance the prosperities in agriculture.

Agriculture Developing for Prosperity

An increase in the per capita wealth of North Carolina from agriculture would depend upon the productivity realized from labor, crops planted and their yield, operating costs including fertilizer, and prices at the market. Some of these factors involved a decision by the farmer and thus were under his control, but the effects of weather upon yield during the growing season and ultimately the market price were beyond the farmer's control.

At the beginning of the twentieth century, there were about two hundred twenty-five thousand farmers, with one-fourth of them being black, who planted and harvested nearly twenty-three million acres of improved land. Two-thirds of the white farmers were owners, and one-third were tenants with eighty percent of them sharecroppers, with the reverse percentage of about one-third of the black farmers owning and two-thirds as sharecroppers. In total, fifty percent of farmers owned the improved land that they cultivated. The other half of the farmers cultivated the land within the terms of a contract of rental or tenancy.⁴

The details of the contracts for tenancy varied; however, sharecropping usually included the tenant providing labor and half the fertilizer with the landlord providing

land, housing, fuel, tools, working animals and their food, seed, and their share of the fertilizer for a fifty-fifty split of the harvested crop. The average yearly income for the labor of a sharecropper was estimated to be three hundred thirty-three dollars.⁵

By 1920, the number of blacks who owned and operated farms had increased by almost forty percent. However, seventy percent of blacks who operated farms were tenants, and more than three-quarters of those were sharecroppers who usually moved from farm to farm hoping for a significant increase in the value of the harvest.⁶

Consequently, nearly thirty percent of all the farms in North Carolina were operated by black people. Although concerned about the future of agriculture in the State of North Carolina, Leonidas L Polk was speaking only on behalf of white men when the land grant was transferred from Chapel Hill to Raleigh. However, the acceptance of the second land grant in 1890 required the State of North Carolina to build and support a second institution to provide education for black men who were interested in farming.

A decade before the courses and laboratories in the numerous aspects of agriculture at the two land-grant institutions were available, the North Carolina Agricultural Experiment Station had been established in 1877 where field crops were grown under varying soil conditions and chemical contents of fertilizers were evaluated for their promises. To expand the direct assistance to the farmers, the Hatch Act in 1887 supported the Agricultural Experiment Station, and the Smith-Lever Act of 1914 created an organization of extension agents at the county, state, and federal levels who delivered "instruction and practical demonstrations in agriculture and home economics to persons not attending college."⁷

By 1920, young black and white male farmers had graduated, and others had attended demonstrations arranged for the purpose of improving the practices in planting and harvesting the crops and operating the farms. One measure of the value from the influence of education in various forms on the practice of farming is a comparison of the yield of the four major harvests over a span of forty years with these harvests accounting for about eighty percent of the value of the production of all crops of agriculture. Before the two institutions were founded, the per-acre production of the harvests in 1880 was twelve bushels of corn, four-tenths of a bale of cotton, five bushels of wheat, and four hundred seventy-one pounds of tobacco.⁸

With the harvests forty years later, the average yield had increased in the production of corn by forty-seven percent, of cotton by forty-three percent, of wheat by fifty-two percent, and tobacco by seventy percent.⁹ The value of the harvests from all the crops planted on one hundred sixty thousand farms in 1880 was estimated to be as much as fifty-two million dollars, which was on the average about three hundred twenty-eight dollars per farm.¹⁰ With the tenfold increase in the value of the harvested crops, a six percent increase in the number of farms and an eleven

percent decrease in the improved acres for farming, the average value of the crop production in 1920 was one-thousand eight-hundred sixty-five dollars per farm, which amounted to about eighty percent of the average for all the farms in the forty-eight states.¹¹

Also, the harvests of cash crops of cotton and tobacco accounted for sixty percent, and the average per farm of the value of all the crops harvested ranked twenty-ninth among the forty-eight states.¹² With a twenty percent increase in the number of farms and farmers and a thirty-three percent decrease in the number of agricultural laborers employed, the increased productivity in planting and harvesting the crops was accomplished with less than one agricultural laborer available per farm, which cost on the average about eighty dollars for an entire year.¹³ Among the eleven states of the former Confederacy where cotton or tobacco were substantial components in the value of the annual harvest, North Carolina ranked third behind Georgia in second and Texas in first. Texas had a value per farm of about three thousand dollars, while North Carolina's value per farm was twenty-three hundred dollars.¹⁴

For more than a century, the industry of agriculture provided most of the employment opportunities in gainful occupations for white people in North Carolina, continuing in the production of cash crops in agriculture and the cotton goods in manufacturing. However, the "separate but equal" dogma created a biased division of opportunities in cotton mills. Of those employed in the semiskilled occupations, one percent of those at the higher end of the wage scale were black males, while, of those at the bottom end of the wage scale, seventeen percent were black males.¹⁵

In the total of all forty-eight states in 1900, eighty percent of persons between the ages of ten and fourteen were attending school. However, in North Carolina, only sixty-three percent of persons between the ages of ten and fourteen attended school, ranking North Carolina thirty-ninth among the states in the percent in attendance.¹⁶ In addition, the illiteracy rate was twenty-nine percent for the persons over the age of ten living in North Carolina, which ranked fortieth in percentage of illiteracy among the states and second in the number of illiterate persons;¹⁷ however, the rate for persons between the ages of ten and fourteen was seventeen percent, fourth highest among the states, for those white persons of native parentage, and thirty-one percent, seventh highest among the states, for the black persons.¹⁸

In addition, the 1900 "Report of the Commissioner of Patents" included the fact that:

during the first sixty years of the last century our manufactures steadily and rapidly increased in kind and in extent, but our population increased even more rapidly, so that we consumed what we manufactured and were still largely dependent upon the import of manufactured articles. But in the last few years a great reversal not only in sentiment, but in conditions, has occurred; the

commercial relations of the United States with the great trading nations of the world have rapidly changed, so that the excess of imports of manufactured articles has turned into an excess of exports of such articles. One need not look far for the cause of this. It lies in the economy of manufacture arising from the use of labor-saving devices, mainly the invention of our own people, which has enabled us to compete in many lines of manufacture, notwithstanding the higher scale of wages paid in this country, with similar articles manufactured by any or all nations. To employ these devices to the best advantage requires the intelligence of the American workmen, and the result is due to the combination of witty inventions and thinking men.¹⁹

From 1836 to 1900, more than six hundred thousand patents for inventions were awarded. They included black and white women and men who were foreign or citizen. However, the statistics of manufactures before 1850 were too imperfect to report about industrial growth. But, the Twelfth Census could compare the development of manufacturing over the last six decades of the century. "In comparison with the figures of the census of 1850, the statistics of manufactures in 1900 show an increase in capital invested approximating seventeenfold; in the average number of wage-earners the increase was about four and one-half fold; in amount of wages paid about ninefold; and in gross value of products about twelve fold. The population of the country has in the same period has increased two and one-quarter fold and the products of agriculture... less than twofold. These comparisons are an approximate measure of the relative development of manufactures during the half century just completed."²⁰

Patents for Manufacturing

According to the 1900 Census, "Not until the decade between 1860 and 1870 did it become apparent that the complete supply of staple products for the home market was within the capacity of domestic manufacturing. During the Civil War, the great demand for manufactured supplies of every description, and the high protective duties on imports, necessitated by the revenue requirements of the Government, stimulated enterprise and production to an extent not known before and since."²¹

The increase from 1880 to 1890 was larger than in any preceding decade. The figures of the Census of 1890 indicate a period of unprecedented industrial prosperity. The full effect of labor-saving devices had begun to be felt; great progress had been made in the utilization of the agricultural and mineral resources of the country.²²

Also, the invention of the steam engine "rapidly withdrew manufacturing industries from the household and the shop, and concentrated them in the factory, where large bodies of men and women worked for stipulated wages under skilled

direction.”²³ From 1880 to 1900, the number of persons engaged in mechanical pursuits was about one-fourth of gainful occupations; more than one-third of the persons engaged in gainful employment were in agriculture.²⁴ A comparative summary from 1880, 1890, and 1900 of the number of establishments, capital, and value of products of various industries indicated the development in manufacturing.

In the 1900 Census, Story B. Ladd described an inventor as the “discoverer of new products of value in the arts and the inventor of new processes or improved machines, adds to the public wealth, and his right to the product of his brain is now recognized by the laws of all civilized nations.”²⁵ Also, he provided another insight into the development of manufacturing by comparing the rankings of the states by growth of population, of the number of patents awarded, and of the value of products manufactured during each decade from 1850 to 1900.²⁶

With the ratios of the population divided by the numbers of patents awarded in each of the six decades, the states were ranked by the ratio number of each state that ranged from hundreds to thousands of persons per patent in the states. In each of the census years, the total number of persons divided by the number of patents awarded steadily decreased from almost twenty-four thousand persons per patent in 1850 to three thousand three hundred in 1900, indicating a growth in innovations among the population of the United States.²⁷

With states ranked from the lowest number in ratio to the highest number during the sixty years of 1850, 1860, 1870, 1880, 1890, and 1900 census data, Connecticut, Massachusetts, Rhode Island, New York, New Jersey, New Hampshire, and Pennsylvania were always ranked among the first ten lowest ratios of the number of population to patents each year. With few patents and a large population, North Carolina ranked among the last four ratios in four of the six years.²⁸

Similar to the ratios of persons to patents, the gross value of the per capita value of the manufactured products for the entire country increased from forty-four dollars in 1850 to nearly one hundred seventy-one dollars in 1900. The same seven states’ rankings for patents per capita were among the first ten ratios of the value of manufactured products per person of each state. The number one state in per capita value of manufactured products in 1900 was Rhode Island with nearly four hundred thirty dollars per person. The value of manufactured products per capita in North Carolina ranged from ten dollars in 1850 to fifty dollars in 1900.²⁹

The increase in the number of patents awarded per year ranged from two thousand in 1850 to twenty-four thousand in 1900.³⁰ In addition the available capital was millions in 1850 and increased to almost ten billion by 1900.³¹

The “Patent Growth of the Industrial Arts: 1870 to 1900” in the 1900 Census is a lengthy description of the development of manufactured products. The connections between patents and manufactured products were identified as classes and subclasses of agriculture, including farming and farm products, chemistry,

dentistry, engineering, conveying and hoisting, electricity, hydraulics, transportation, air and gas engines, ordnance, arms, explosives, refrigeration, steam engines, stoves and furnaces, artesian and oil wells, garments, gas, glass, pottery and plastics, leather and leather working—shoes, metallurgy, metal working, minerals, packing and storing, printing, sewing machines, stationery, textiles, wood working, instruments of precision, music, fine art, optical instruments, navigation, safes and locks, and static appliances and surgery.³²

The 1900 Census provided more insight about manufacturing agriculture implements for farming when the number of establishments decreased by about one-half from 1850 to 1900 with almost a fourfold increase in the capital invested and almost sixteenfold value of manufactured products.³³ “This steady increase in the average capital and value of products per establishment excellently illustrates the fact that certain important phases of the development of the factory system from manual work find abundant expression in this industry.”³⁴ “The manufacture of plows is more widely distributed and is carried on by a larger number of establishments than that of any other agricultural implement, being reported by 211 establishments. Harrows and cultivators are next in importance as regards the diffusion of their manufacture throughout the states and the number of establishments reporting.”³⁵

Most of the patents awarded for agriculture instruments were reissues or improvements. However, there were almost twelve thousand patents of plows and cultivators awarded from 1873 to 1900. In 1873, one of the patents for a plow was for Deere & Company. John Deere was born in Vermont and grew up as a blacksmith before moving to Moline, Illinois where he established a company that prospered.³⁶ In 1900, there were more than a million plows manufactured in twenty-eight states with more than half of them made in Illinois, Indiana, and Ohio. Less than one percent of plows were manufactured in North Carolina.³⁷

The classes and patents of engineering and transportation were established industries before 1900. Most of the patents awarded in engineering were inventions that included improvements in building of bridges; in the excavating and dredging of clay, gravel, and earth; in the hydraulic and pneumatic engineering for balance of locks in canals; in the construction of tall iron buildings; in the metal-reinforced concrete; and in replacement of the wooden ties with rails. The number of patents in each class ranged from 914 in iron buildings to 11,387 with railways.³⁸

The primary patents in the classes of transportation included nearly six thousand improvements in bicycles, nearly four thousand patents in automatic air-brake systems, more than six thousand patents in automatic couplers of railway cars, and one thousand in pneumatic tires.³⁹ Although he had not created a class, in 1905 Henry Ford was awarded a patent for an automobile drive gear. In 1906, the Wright brothers were awarded a patent for flying machines. These patents were the beginning of transportation around the world.

Before 1900 the manufactured products for most of the classes of electricity were in development, including generation, electric lighting, motive power, electric railways, electric signaling, telegraphy, and telephony. The number of patents of each class ranged from five thousand eight hundred for lights to one thousand six hundred for electric signal lights.⁴⁰ From 1880 to 1900 the development of the apparatus and supplies in electrical industries resulted in an increase from seventy-six to five hundred eighty establishments over the three decades. Consequently, the capital increased more than fiftyfold with an increased value of products of thirty-fourfold.⁴¹

The 1900 Census reported that "electrical inventors are at the head of the list of those who had taken out more than 100 patents during the years 1871–1895, inclusive, Thomas A. Edison being credited with 711 and Elihu Thomas with 394, these two leading the list of the 25 most prolific inventors in all fields."⁴² Between 1871 and 1895, both included, there were twenty-five inventors who were awarded more than one hundred patents.⁴³ "It would appear from the later records of patents issued in more specific electrical classes that during the four and a half years from 1896 to June 30, 1900, no fewer than 6,796 patents were issued, evidencing a great rise in the activity with which electrical inventors were still prosecuting their endeavors in these newer fields of discovery and application."⁴⁴

Prosperity with Inventions

With the growing number of inventions and innovations resulting in a large number of manufacturing and commerce establishments throughout the country and with a variety and uneven distribution of the industries, the values in production, occupations, and wages varied from state to state. During the two decades that ended the nineteenth century, the landscape of wooden constructed buildings and the day-to-day life of Americans in a few of the larger cities were altered by the construction of taller buildings due to the innovation for producing Bessemer steel by Cornell; by being connected with affordable and convenient networks of communications, transportation, and energy from the inventions of the telephone by Bell; from the electric motors and electrical energy systems by Edison, Tesla, and Westinghouse; from the industries refining oil into kerosene and gasoline owned by John D. Rockefeller; and from the efficiency in transportation with consolidation of railways by Cornelius Vanderbilt. Beginning as amenities and becoming necessities, technology that humans consider beneficial to their existence transformed the culture, society, and economy of Americans and created great wealth for industries, individuals, and the country with many of the fortunes shared with the public through their foundations and trusts that have built or supported schools, universities, public parks, museums, hospitals, churches, performing arts centers,

and many other cultural and societal institutions and establishments that public funding from taxes rarely endows.

The pursuit of prosperity in North Carolina depended to a large part on the productivity of common labor that harvested cash crops and manufactured textile goods as different forms of labor were creating wealth after James Clark Maxwell, J. J. Thompson, and Thomas Edison published their understandings of the fundamental science and technology that inspired a century of discoveries and applications using electromagnetic fields, the electron, and electricity that resulted in the establishment of entertainment industries, radios, movies, and television and the creation of employment opportunities, usually near the place of invention or where capital was available.

In addition, a complex mechanical system was invented for transportation when Karl Benz engineered the first gasoline engine-driven car; however, Henry Ford was committed to manufacturing the first car for the Americans. During the first decade of the twentieth century, the citizens of the United States heard about and some saw the Wright brothers flying above Kill Devil Hills in North Carolina while others bought a Model T Ford for eight hundred twenty-five dollars from a factory in Michigan.

During the last years of the second decade, American men fought a war in Europe with the help of women in various duties including the factories back home that further encouraged congressional approval of the Nineteenth Amendment to the Constitution with ratification achieved by the Tennessee Legislature in August 1920. During the Roaring Twenties, black and white sons and daughters of farmers began to settle in the urban centers where occupations as clerks, merchants, services, trades, and professions were available and in the larger cities where commercial flights from airports to foreign countries were departing as radios entertained those who could afford to buy one and were located near enough within the electromagnetic field of the radiating antenna of stations broadcasting news, weather, and crop prices at markets.

For almost all of those innovations, a source of energy was required to operate and to enjoy the purpose for which the product was intended. As the twentieth century began, the revolution in the requirements from human labor in many of the employment opportunities was underway with electric motors replacing muscle and literacy required to operate machinery. Before coal was discovered in northeastern Pennsylvania in 1762, human labor, water wheels, wood, and charcoal provided the energy directly or indirectly for manufacturing. However, labor-saving machines powered by steam engines with boilers heated by coal burners that were invented and patented by James Watt in 1769 became an integral part of the Industrial Revolution in England, which began in the eighteenth century and was introduced in the United States in the nineteenth century.

After the first successful drilling of an oil well in Pennsylvania in 1859, derivatives of kerosene and gasoline were available for lamps and combustion engines before the twentieth century when Edison, aided by Tesla and Westinghouse, competed for the distribution of electricity from large coal-fired, steam-powered generators through wires to the motors and light bulbs available before 1900. Most of these achievements began with the innovations of a few men who demonstrated a wonder to the public, but relied on the capital of investors to mass-produce the quantity for sale at an affordable price. In each instance, the production required the employment of labor that sometimes was limited to persons with skills or education related to the manufacturing process. Most of this powering of America that required more skill than common laborers possessed was underway in urban cities and towns by 1900, but not available to most of rural North Carolina for decades.

As opportunities for wages and wealth in North Carolina were developing in the mill villages, timber establishments, and factories producing furniture and tobacco products in 1900, the total investment per capita in manufacturing in the state was less than one-third of the average per capita investment for the entire country, which resulted in a value of the production also less than one-third the national average. Consequently, the manufacturing establishments in North Carolina were creating one employment opportunity for every twenty-seven persons in the population, about one-half the national average of one for every fourteen in the population of the country.⁴⁵ Relying on the four major industries in the state, the manufacturers of cotton textiles, tobacco, furniture, and lumber products accounted for about two-thirds of the value of the manufactured products and seventy percent of the wage earners employed in manufacturing with sex and age of thirty percent females, fifty-three percent males, and seventeen percent children under the age of sixteen in the gainful occupations of the industries.⁴⁶

The average expenditure of wages for the average number of male earners ranged from one hundred sixty-six dollars a year in the tobacco chewing, smoking, and snuff industries to two hundred twenty-two dollars in the furniture factories.⁴⁷ The sex and age of wage earners in the cotton mills were forty-two percent males, thirty-four percent females, and twenty-four percent children under the age of sixteen. The average wages in each category of earners in the cotton mills was one hundred fifty-seven dollars a year for the females, two hundred sixteen for the males, and one hundred two for the children.⁴⁸ At the turn of the century, there were two hundred six cotton mills in towns from Asheville to Wilmington employing thirty thousand persons who operated one million four hundred twenty-four thousand five hundred eighty-one spindles and thirty-four thousand nine hundred forty-two looms for a wage of about one hundred sixty-nine dollars a year.⁴⁹

In addition, forty-four furniture factories were located near the center of the state and employed almost eighteen hundred persons earning average wages of

almost one hundred ninety dollars a year.⁵⁰ Some products were used in manufacturing furniture; however, the lumber and timber industry consisted of one thousand seven hundred seventy companies that employed more than eleven thousand persons at average earnings of two hundred twelve dollars a year.⁵¹ There were eighty tobacco industries that provided chewing, smoking, and snuff products that employed more than six thousand persons at average annual earnings of one hundred thirty six dollars.⁵² The estimated average of yearly earnings of all industries combined in the forty-eight states in 1899 was four hundred forty-five dollars with the average for North Carolina the lowest at one hundred eighty-three dollars and last among the states.⁵³

With the combination of low wages in the primary industries and no wages for the labor of a growing number of croppers in agriculture, another indicator of the challenges evident in 1900 for the economy to provide adequate gainful occupations to pursue prosperity in North Carolina was the per capita values of production in manufacturing and agriculture that were almost the same amount but less than one hundred dollars when combined.⁵⁴ Even though each production ranked near the middle in value when compared to those of the other forty-seven states, the combination of the two values for North Carolina was less than one-half the average for all the states, with the state values ranging from eighty-one to four hundred forty-five dollars, and North Carolina seventh from the last, ranking ahead of South Carolina, Georgia, Alabama, Mississippi, Arkansas, and New Mexico.⁵⁵

Patents and Progress

Prosperity with Technology, Inventions, and Patents in Metropolitan Areas of North Carolina

After the Revolutionary War, the development of various patents occurred mostly in the northeastern states of the United States. Technologies were derived from inventions and pursuit of useful knowledge related to patents for manufacturing. From 1790 to 1850, more than one hundred patents were awarded each year to people living in those states. In 1850 there were seven hundred eighty-four patents awarded in Massachusetts, eight hundred thirty-nine in Pennsylvania, one thousand eight hundred thirty-nine in New York, and thirty in North Carolina.¹

There were twenty-two classes of patents awarded with one hundred twenty-two in agriculture, including instruments; one hundred six in metallurgy and manufacture of metals and instruments; seventy-nine manufactures of fibrous and textile substance; thirty-two chemical processes, manufactures, and compounds; seventy-five calorific, comprising lamps, fire place, stoves, grates, furnaces for heating; forty-eight steam and gas engines; forty-six navigation and maritime implements; ninety-nine civil engineering and architecture comprising works on rail, common roads, bridges, canals, docks, rivers, and dams; thirty-nine hydraulics and pneumatics including water-wheels, windmills, and other implements; twenty-four lever screw and other mechanical power; sixty-nine lumber machines and tools for manufacturing; five for stone and manufactures; twenty-five of leather including manufactures of boot and shoes; thirty-nine household furniture, machines, and implements for domestic purposes; thirty-three of arts, polite, and ornamental music, painting including and others; twenty-four firearms with implements of war; twenty-six of surgical and medical instruments; and twenty-four of wearing apparel; and miscellaneous patents.²

Although few of the patented products were produced in a factory for sale in a store, the number and diversity of patents indicates the progress in manufacturing since freedom from England. The fact there were only thirty patents awarded to persons in North Carolina indicates that the state remained mostly home production and agricultural in commerce.³ Over a century from 1850 to 1950, the economy in North Carolina grew in manufacturing developed around the five cities of Asheville, Charlotte, Greensboro, Winston-Salem, Durham, and Raleigh.⁴

The number of professional, technical, and kindred workers in the five cities was between twelve hundred at Asheville to twenty-four hundred at Raleigh. Among those workers, there were civil, electrical, mechanical, and other engineers. The number of engineers ranged from twenty mechanical engineers in Asheville to one hundred fifty electrical engineers in Raleigh.⁵

In the "Report of the Commissioner of Patents" for the year 1950, twenty-nine patents were awarded in Charlotte, twelve in Winston-Salem, twelve in Greensboro, ten in High Point, nine in Enka, nine in Asheville, eight in Durham, seven in Raleigh, and four in Burlington. The reminder was awarded in three or less patents. In addition, forty-one patents were awarded to companies that were already established. Some of the patents were also improvements in machines used in textiles.⁶

The distribution and number of 1950 patents indicated that there was little growth in the development of existing establishments and few manufacturing establishments from recent innovations. "Historically, the state's economy had relied almost exclusively on three traditional industries: furniture, textiles and tobacco." However, those industries were relocating out of state or facing foreign competition and automation.⁷

Also:

North Carolina's per capita income has long been one of the lowest in the Nation, and the decline in its traditional industries made it even more difficult for the state to employ its own college graduates. During the early 1950s, the academic community was becoming increasingly concerned about the out migration of its better college graduates and began a dialogue with the state's economic development leaders about ways to attract new industries to North Carolina. The idea of using the three triangle universities to attract research companies into a park area central to the universities quickly emerged from the dialogue.⁸

Cooperation among leaders of three universities, a governor, a builder, banker, and a company president ensued. In May 1959 the Chemstrand Corporation announced that they would move from Decatur, Alabama to the Research Triangle Park; and in April 1965, it was announced that IBM would locate there also. From 1957 to 1996, one hundred research companies moved to the Research Triangle Park.⁹

The driving force for location in the Research Triangle Park was the innovations, inventions, and patents that were derived from the research and development of educated professionals. The importance of patents was the connection with Intellectual Property. At the Research Triangle Park in 2017, forty-five percent of the industries were biotech and life sciences, seventeen percent were information technology, and seven percent were instruments and materials.¹⁰ The value of patents was the time to manufacture and market the product without competition. Sometimes the value is a startup company. Sometimes in manufacturing the patents require special education and training that results in higher wages.

From 1995 through 1999, more than two thousand seven hundred patents were awarded to seventy-four organizations in the metropolitan area of Raleigh, Durham, and Chapel Hill. Over five years, each of six organizations was awarded more than one hundred patents. Four hundred ninety-five patents were awarded to IBM. Ericsson was second with three hundred twenty-five patents. Becton, Dickinson and Company, and the University of North Carolina tied for third with one hundred twenty-eight patents. Duke University was fifth with one hundred twenty-seven patents. North Carolina State University was sixth with one hundred twenty-four patents.¹¹

On March 13, 2000, *The News & Observer* published "The Triangle's Top Technology Companies." There were at least one hundred ten employees in each of the top one hundred companies.¹² Between 2000 and 2015, the number of organizations receiving utility patents increased to five hundred fifty-seven in the areas of Raleigh-Cary and Durham-Chapel Hill. The total patents awarded in this region ranked eighteenth in the country. Twenty-two of the organizations received a total of more than one hundred patents over fifteen years.¹³

There were five thousand three hundred seventy-seven patents awarded to IBM, eight hundred twenty-five awarded to Ericsson, and seven hundred eleven to Cisco as extensions of a home company. However, seven of these organizations were established in the areas of Raleigh-Cary and Durham-Chapel Hill. There were eight hundred fifty patents awarded to Cree Incorporated, five hundred twenty awarded to Duke University, four hundred sixty-five awarded to Lenovo, four hundred fifty awarded to North Carolina State University, four hundred seventeen awarded to Red Hat, three hundred sixty-four awarded to the University of North Carolina, and one hundred eighty-eight awarded to SAS Institute.¹⁴ Also, among the areas where technology utility patents were awarded from 2000 to 2015 were Charlotte-Gastonia and Rock-Hill, South Carolina with four thousand five hundred twenty-seven patents over fifteen years, Greensboro-High Point with two thousand, Winston-Salem with one thousand five hundred twelve, and Hickory-Lenoir-Morganton with one thousand one hundred seventeen.¹⁵

In 2017, the Research Triangle Park (RTP) provided a company directory that includes insight into the progress over more than half of a century. RTP is seven thousand acres surrounded by three counties, with two hundred sixty-four companies. There are forty-eight thousand four hundred ninety-five high-tech employees in twenty-two million five hundred thousand square feet of built space.¹⁶

During the two centuries after freedom in 1776, the development of the economy of the State of North Carolina depending mostly on the past with people in other states improving the gathering and manufacturing of natural resources. The Research Triangle Park was established for the future economy of inventions and innovations. Maybe the patents of the universities will create companies for the future economy. In addition, the patents in metropolitan areas of the state could lead to the development of more research parks.

A Greater Community or Greater Chaos?

As a longtime resident of the Greater Research Triangle community, I cannot help but reflect on the many changes in our community since we arrived here forty-three years ago. Almost all of these changes have had a positive influence on my life and the lives of our family members. Foremost among these positive changes is the wonderful diversity in culture, people, neighborhoods, jobs, and entertainment that has developed.

Currently, there are debates throughout the seven counties of the greater Triangle community about how we can maintain and improve the quality of living for all our citizens. Unfortunately, we seem to have too little experience working across city, county, and regional boundaries. However, in all my life I have never concerned myself with who has jurisdiction over the road, sewer, taxing, or zoning where I experienced a traffic jam, litter, or a neighborhood under stress. It seems to me that we act locally and complain regionally.

There are many reasons given by those with vested local interests about the challenges they face in responding to an at-large constituency. How many regions in the country have eight counties, fifteen municipalities divided by an interstate highway, two river basins, two transportation planning authorities, two power companies, two telephone companies, three major research university hubs, and one airport named for two cities? There are probably more than we can imagine who have found a way to act locally but plan regionally. Maybe we could start by formally naming our region the Greater Research Triangle Community and our airport the Greater Research Triangle Airport. Immediately we all have a brand name that we can use to embrace all the people, like myself, most of whom pay little attention to who's in charge and who rightly demand that regional issues be addressed now. In addition, we would be instantly known around the world. The world already recognizes the successful Research Triangle Park, and the expanded name and brand would convey our ongoing growth, progress, and competitiveness.

Research Triangle II

There are few places in the world better positioned than the Greater Research Triangle Community to be a world-class community throughout the twenty-first century. However, this position is tenuous and could rapidly evolve into a situation of too little too late. Just by reading the newspaper, by listening to business programs on television, or by observing the changes in the stock market, you can sense that something big is happening. It appears that more and more smart people are starting software, internet, health care, biotechnology, e-commerce, service, and technical training businesses. Entrepreneurs abound throughout our national economy.

As the post-World War II economy developed, North Carolina was twenty years late in aggressively engaging the science- and technology-based opportunities of the space program and of the Cold War economics that brought prosperity to the Northeast, Midwest, and West Coast of the United States. The vision for a research park was, indeed, a strategy to catch up by attracting the evolving communications, pharmaceutical, and computer industries to our state. The success of this strategy is self-evident in many indicators such as per-capita income, percentage of Ph.D.s, research expenditures per capita, national rankings for industrial site locations, and quality of living. As recently as 1990, we were number one.

So why not just do more of what we have done? For one thing, our success appears to be on the verge of exceeding the capacity of our infrastructure, at least in a number of geographic areas of the greater Triangle. Second, there is a new economy in the Triangle that complements the more established economy but requires very different responses from the greater community to prosper. Third, there are essential geographic regions outside the traditional three-county Triangle that are increasingly providing homes, schools, and other requirements for their citizens who work in the Research Triangle Park or the traditional three-county region. Fourth, the infrastructure needed to support the economy over the next forty years will be even more demanding, increasing the requirements for supporting the Research Triangle Park.

Smart Growth Plus

Our regional planning efforts have yielded some positive signs, as exemplified by the United Way, the Greater Triangle (Chamber of Commerce), the Greater Research Triangle Council, the Special Olympics, the Triangle J Council of Governments, and the Smart Growth Initiative. Nevertheless, there is no sign of a call to action by civic leaders, elected officials, or corporate executives in the Triangle Community. Even the much-heralded Transportation Summit has not provided a single amen or echo from our individual communities. Could it be that local interests are

so powerful and focused that a regional effort cannot find any other connection? Maybe we are in planning gridlock (no pun intended).

For a number of largely forgotten reasons, the economy produced by the Research Triangle Park did not originate through a community planning effort. In a sense it was handed to the community leaders to respond to the enormously successful effort of state and university leaders who supported a vision of economic prosperity not only for our region but also for our entire state. Therefore, it is not surprising that elected officials do not have a forum or a mandate from voters to address regional issues. They have never had to produce an economic development strategy or to experience a severe recession where their agenda had to show how smart they are at addressing the questions by their constituency of "Show me the jobs."

While the Greater Triangle Community has been blessed in so many ways, the geography known as the Research Triangle Park will be fully developed in much less than the forty-plus years it has been in business. Since we have depended so much upon this geography for our past, do we have any idea where our future geography for economic prosperity will be? Do we care what kind of jobs are created there? Do we care about losing job opportunities to other parts of the country in the new economy just as they have lost jobs to us in the old economy? If the answer to any or all of these questions is yes, it is time for our community to develop a strategy to go from what our economic engine is today to what will be producing jobs forty years from now. Short of this, we risk that the very best time is now.

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NOTES

CHAPTER I

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During his tenure as Chancellor of North Carolina State University, Larry K. Monteith witnessed the state's transformation from a largely agrarian-based economy into one driven by major pharmaceutical, medical, and technological advances. In this sweeping survey from colonial times to the modern era, Monteith argues that it was North Carolina's investment in practical education that drove this change more than anything else, bringing prosperity and progress that was unique to the South.

Monteith begins his study with our roots starting with the traditions of England and Europe in the late eighteenth century, and then he traces developments through the World Wars. Much of the foundation for North Carolina's progress was built during these years. The major transformation took place in the post-World War II era when the investment in higher education paid off. The key was the alliance of industry, technology, and education. It is easy to lose sight of how radical the concept of something like Research Triangle Park was during its inception. North Carolina may have seemed like an unlikely place to invest, but its universities and the research happening there attracted companies like IBM, Bayer, and Eli Lilly that would become critical economic anchors. It was during this time that innovations and discoveries in the burgeoning fields of medicine, science, and engineering led to valuable patents, copyrights, and companies that would become the backbone of the state's economy.

Comparing North Carolina with the rest of the nation, *In Pursuit of Prosperity* explores what was unique about its system of education, institutions, and economy. Monteith himself was directly involved, especially in the early formation of Research Triangle Park, and he offers readers a unique perspective on this part of the state's history.

LARRY K. MONTEITH, a native of Bryson City, NC, was an undergraduate of North Carolina State University and received his MS and PhD in electrical engineering from Duke University. He worked at the Solid State Laboratory of the Research Triangle Institute before joining the faculty of the NC State University Department of Electrical Engineering in 1968. Monteith became NC State's eleventh chancellor, serving from 1990–1998, and he was instrumental in developing its Centennial Campus. He lives with his wife, Nancy, in Morrisville, NC.

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