ABSTRACT

BLACKWELL, ELINOR FOSTER. Perceptions of North Carolina Technology Education Teachers Concerning Their Effectiveness in Teaching Students with Disabilities in Technology Education. (Under the direction of William James Haynie.)

The purpose of this study was to determine the extent to which technology education teachers perceived they were effectively educating students with disabilities.

This study utilized a survey instrument in order to gather data from high school technology education teachers in North Carolina. The data reflected how teachers perceived the effectiveness of their own teaching skills for educating students with disabilities. Data also revealed the teachers' demographic background, teaching strategies, and training preferences.

The survey instrument was divided into three sections. The first section gathered data regarding the teachers' educational background, years of teaching, number of classes taught and number of students with disabilities in their class. The second part of the survey instrument identified the types of students with disabilities included in each class and the types of changes made to the learning environment to enhance educational outcomes. The third section of the survey identified whether teachers perceived a need for future training about students with disabilities.

The survey instruments, cover letter, and self addressed stamped envelope (SASE) were mailed to each of the technology teachers. The findings were based on the five research questions this study addressed. The results of this research revealed that more than half of the respondents expressed a need for further training in Individual Education Program (IEP) implementation. The survey instrument identified the major

contribution of Technology Education (TED) to students with disabilities. The data from this research revealed that TED teachers found behavioral-emotional disabilities to require the most intervention strategies. There were 59 of 97 respondents who revealed a need for further training relative to students with disabilities.

This study concludes that TED teachers perceive a need for additional training relative to students with disabilities. This study extends the research on the topic by identifying specific types of student disabilities that should be included as topics in the training sessions. The results of this study indicate that progress has been made, yet the need for improvement still exists. The areas of need for further training could be utilized by teacher educators to provide pre-service preparation for TED teachers.

Perceptions of North Carolina Technology Education Teachers Concerning Their Effectiveness in Teaching Students with Disabilities in Technology Education

A Dissertation in

Technology Education

by

Elinor Foster Blackwell

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DEDICATION

This dissertation is dedicated to my grandparents who epitomized greatness: Bertha Johnson and the late Thomas and Eleanor Foster.

BIOGRAPHY

Elinor Blackwell was born in a small farming community of Reidsville North Carolina. She is the third of five children born to Otis and Louise Foster. Otis is a long distance truck driver whose hobbies include farming and brick masonry. Louise retired to become a full time house wife.

Elinor earned her Bachelor of Science and Master of Science degrees at North Carolina Agricultural & Technical State University. Her undergraduate degree is in Industrial Engineering, her masters degree is in Technology Education. She earned her doctor of education degree at North Carolina State University. Her Doctoral degree is in Technology Education. She is currently working as an Assistant Professor in the Department of Graphic Communication Systems and Technological Studies at North Carolina A & T State University.

Outside of her academic and professional activities Elinor has been actively involved in ministry at Evangel Fellowship Church for the past 22 years. She is married to her high school sweetheart Jerry Blackwell Sr. The couple has four wonderful children, the eldest two are attending college. Elinor and her family live in Greensboro, North Carolina.

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CHAPTER I

INTRODUCTION

Background

Technology education is an action-based course of study designed to prepare students to become technologically literate citizens, who make informed decisions as productive members of a free and democratic society. Technology education teachers use five primary systems models to educate students: Communications, Transportation, Production, Construction and Bio-technology. Scott and Sarkees-Wircenski (1996) define technology education as an instructional program designed to provide students with a broad knowledge of the applications of technology in daily life by acquainting students with their technological environment. This study focuses on technology education at the high school level due to the more in-depth degree to which the curriculum helps prepare students for the real-world problems they will face as adults. DeLuca stated in 1991 that Technology Education provides students with the experiences that help them develop valuable problem solving skills.

A student's abilities to solve problems and think critically, facilitate development into mature adults who make wise choices in a technologically advanced society. These skills are foundational for effective competition in the global economy. All students, from all societal sectors can benefit from the wealth of educational experiences technology education has to offer. An increase in diversity among student populations makes it important to ascertain how effective technology teachers feel they are at meeting

the educational needs of students with learning disabilities. The North Carolina Department of Public Instruction, (NCDPI), Career-Technical Education, (CTE), Data Analysis Questions revealed that in 2004 more than 30% of students enrolled in technology education classes are classified as members of special populations (NCDPI CTE, 2004).

There were few research studies concerning special needs students in technology education. One reason for this lack of information could be attributed to timing. The era in which the civil rights struggle for persons with disabilities was underway, predated the discipline of technology education. Technology education evolved from the disciplines of manual training, manual arts and industrial arts. Another reason for this lack of information could be a repercussion from fewer students coming in to technology education at all levels. A study of vocational teacher programs from 1970 to 1990 revealed that university programs and student enrollment numbers continued to decline from the 1970 levels (Volk, 1993). A later research article pointed out that there was a steady decline in graduate research after industrial arts changed its name to technology education. This research indicated that there were fewer graduate students pursuing advanced degrees or fewer graduate programs which required research in technology education (Reed, 2002). Therefore; the majority of information compiled for this report was gathered from three related disciplines. The first discipline was special education. The second discipline was industrial arts, which preceded technology education. A study was conducted in 1982 by Doty to determine industrial arts teachers' perceived in-service training needs for working with disabled students. Doty's research was pivotal for this research and one of few attempts to determine if a relationship existed between disabled

students and additional training needs for industrial arts teachers. The third discipline researched was vocational education, which preceded career and technical education, and encompasses technology education. It was necessary to find information from these related disciplines in order to bridge the gap between industrial arts, which no longer exists and technology education which had not yet evolved during this transition from isolation to inclusion for students with disabilities. The declining numbers in technology education reported by Reed in 2002 could have reflected the end to spiraling enrollment into technology education.

Data recently published by the NCDPI, revealed a possible reversal to that downward trend. The NCDPI CTE Data Analysis Questions for the technology education status report revealed a 15,000 student increase in the number of students enrolled in technology education since the 2000-2001 report was published (North Carolina Department of Public Instruction, CTE Data Analysis Questions, 2004). This increase in enrollment could lead to more information becoming available on students with disabilities enrolled in technology education classes in the future, since the NCDPI reported that 30% of the students enrolled in technology education classes during this time span were considered to be members of special populations. The demographic data for the 2004 school year revealed that in general education classes 13.5% of children have disabling conditions (NCDPI Exceptional Children Division, 2005).

Problem

Persons with disabilities have not historically enjoyed the same rights and privileges afforded to non-disabled persons. The civil rights movements of the 1950's and 1960's, inspired persons with disabilities, their family members and advocates, to take unified

actions toward social change. These actions led to integration for students with disabilities (Shapiro, 1994). This new found awareness of and conviction for civil rights would lead to a cultural revolution that would ultimately change the destiny for future generations of persons with disabilities. These grassroots activists took action to lobby 1ocal, state and federal law makers to provide a free and appropriate education for all persons with disabilities. A decade later, only a few of persons who needed services due to disabling conditions were actually receiving those services (Erwin, Levin and Wexler, 1981). A problem associated with mainstreaming was the slow rate at which the concept was adopted and diffused into society.

The Rehabilitation Act of 1973, (PLl93-112), lifted wording from the 1964 Civil Rights Act to proclaim that a person cannot solely by reason of his handicap, be excluded from participation, denied benefits or be subjected to discrimination. This legislation guaranteed persons with disabilities the same rights and privileges afforded to non-disabled persons. One of the most important laws of this era came into existence in 1975, when President Ford signed PL94-142 into law. This legislation guaranteed a free and appropriate education to all persons with disabilities. PL 94-142, (Education for all Disabled Children Act) applied to all persons with disabilities whose ages ranged from three to twenty one years of age, (Erwin, Levin and Wexler, 1981). Consequently, the few students with disabilities served in public schools, who had been limited to self contained classrooms, were joined by many more of their disabled peers. This new group of students then took their places among non-disabled students in regular classrooms. Some of the provisions which were guaranteed by this law for each student with disabilities included the development of Individualized Education Programs (IEPs) and

access to the Least Restrictive Environment, (LRE). These two criteria alone permanently changed teaching and learning environments for students in general and technology education. It was clear that persons with disabilities deserved complete access to schools and other public facilities unencumbered by legal, physical or societal barriers. A major step toward accomplishing integration for students with disabilities was the eradication of the tangible or external barriers associated with gaining access to educational facilities (Cobb, 1983).

The removal of these external barriers was needed so that these institutions could more effectively accommodate persons with disabilities. These changes were made possible by passing legislation that addressed accessibility issues which helped pave the way for students with disabilities to have the same access as non-disabled persons to education and services from the public sector. This paradigm shift produced a more educated and involved community of persons with disabilities, who wanted to break the mold fashioned for them by internal barriers, such as the stereotypical attitudes. These attitudes led others to consider persons with disabilities to be somehow less human (Shapiro, 1994). Progress toward seamless integration had been achieved yet some of the negative societal stereotypes remained in place. Some people still viewed persons with disabilities as pitiable, helpless and less capable than non-disabled persons. Some of the self proclaimed advocacy groups for the disabled, which utilized emotional appeals in order to raise money for cures to disabling conditions, could have been founded on misguided good intentions (Shapiro, 1994). These charities erred by trying to find cures for conditions which persons with disabilities didn't view as illnesses, but rather normality. This new generation of persons with disabilities had advanced beyond barriers

and now fully expected and often demanded total acceptance from and integration into all sectors of society. This new generation did not want to be "fixed" but rather accepted as equals by non-disabled persons (Shapiro, 1994). The successful attempts at integration had been overshadowed by internal barriers to services such as negative attitudes and presumptions which proved to be more difficult to target and eradicate than external barriers. These lingering negative attitudes could have had a negative impact on the quality of mainstream education received by students with disabilities in technology education.

The North Carolina Course of Study for graduation requirements consists of four potential courses of study that could allow students to graduate from high school. Those four are: College/university prep, career prep, college tech prep and occupational. Of the four two require students to take (4) career and technical, (CTE), courses in order to graduate. The occupational concentrations in particular have been designated as courses of study which are made available for some students with disabilities (Guilford County Schools Student Registration Bulletin, 2004 - 2005). These stipulations could make taking classes under the CTE umbrella, including technology education, a graduation requirement for some students. The repercussions of this could be large numbers of students with disabilities enrolling in technology education classes. The problem this study addresses is to assess the extent to which technology education teachers perceive they are effective in educating students with disabilities. This study also seeks to identify and recommend viable solutions to any problems preventing these teachers from meeting their educational goals.

Purpose and Technique of this Study

The purpose of this study was to determine the extent to which North Carolina high school technology education teachers perceive they are effective in educating students with disabilities in technology education. The method for accomplishing this task was to poll each in-service technology education teachers in North Carolina to determine the types and numbers of students with disabilities served, and the types of skills and activities utilized to accomplish teaching and learning for this population. This study also sought to determine the extent to which technology teachers perceive they possess adequate training for educating students with disabilities in regular technology education classes. The method for accomplishing this task was to gather information regarding technology teachers' demographic and educational background, along with areas of perceived need for in-service training. This study specifically polled the types of exceptionality, demographic data, and techniques used to facilitate learning for students with special needs. The questions posed by this study concerned the perception technology education teachers have regarding their effectiveness in educating students with disabilities.

Significance of the Problem

The inclusion of students with disabilities into regular classrooms has become a common practice. Students with disabilities may be integrated into any class deemed appropriate based on the decisions made by the IEP development team. Students with disabilities need an appropriate educational background for preparation to successfully cope with the challenges of a technologically advanced society so they may become independent and self sufficient participants in a democratic society. The seamless

integration of persons with disabilities into society can benefit each group of stakeholders affected by mainstreaming. A look at how effectively technology education teachers perceive they are helping to educate students with disabilities will be helpful for the technology education teachers, as well as the universities and state agencies who construct technology teacher education programs. These entities must provide technology education teachers with sufficient information so that these teachers may effectively educate diverse student populations

Need for the Study

This study sought to determine the extent to which technology education teachers perceive they meet the needs of students with disabilities in technology education. It is important to provide all students with a quality education since studies have shown that educated students are better prepared for seamless integration into a global society. Johnson wrote a 1992 article which supported this view by stating that valuing and managing diversity is an important factor in an increasingly diverse work force, and has led to improved productivity. It is important to develop and retrain good workers at all organizational sectors. A couple of different approaches that organizations may employ to cope with diversity effectively are to value differences, by developing attitudes through awareness and to provide sensitivity training (Johnson, 1992). The 1982 study conducted by Doty found that 77% of respondents to his survey indicated a need for in-service training relative to disabled students. This study also sought to determine if technology education teachers expressed a need for in-service training in proportions similar to those found by Doty.

This study sought to determine which methods technology teachers considered to be most effective for educating students with disabilities. This information could prove to be beneficial to each group of stakeholders affected by mainstreaming. The ability to effectively teach students with disabilities could help technology teachers reach their goal of equipping all students with the degree of technological literacy requisite for becoming productive members of a free and democratic society. Special needs students, and their advocates could benefit from this study, because it could give them the assurance that technology education is another sector of society that strives toward integration for all students. The results of this study could also be used to inform providers of pre and in-service technology education preparation programs of any problem areas that may exist relative to preparing technology education teachers to better educate students with disabilities. Better informed teacher preparation providers could present the accurate, relevant information technology education instructors need to more effectively provide educational opportunities for all students. The results of this study could be instrumental for helping agencies that provide teacher preparation programs present the types of strategies and information that will be most beneficial to pre and in-service technology teachers. These strategies could be utilized by technology teachers in the classroom to allow students to reap the maximum potential benefit from technology education programs. These carefully developed and executed technology education courses could benefit all students by helping them to gain the critical thinking and problem solving skills they will need to be successful and productive members of a global community.

Research Questions

The research questions that guided this study were:

1. Do North Carolina technology education teachers (TED) perceive they are prepared to make input in the development of IEPs for students with disabilities in their TED classes?
2. What intervention strategies have technology education teachers used for students with disabilities in their TED classes?
3. What are the major contributions of TED curriculum toward educating students with disabilities in their TED classes?
4. What is the most significant problem that technology education teachers perceive they encounter relative to students with disabilities in their TED classes?
5. Do in-service technology education teachers perceive that they need additional training relative to students with disabilities enrolled in regular TED classes? If so, what type of training would be recommended for these teachers?

Definition of Terms

1. External access refers to the opportunity to participate in technology courses
2. Internal access refers to equitable treatment of students who have already gained access to vocational education –only those disabled students enrolled in qualified vocational education courses would be considered to have access
3. Effectiveness is producing a desired effect
4. Technology education prepares students for success as technologically literate participants in an ever-changing technological workplace. Technology education can also help students to apply, design, solve problems, lead, understand complex

technologies, assess technological implications, make wise decisions (NCDPI CTE Status Report, 2004)

5. Technological literacy encompasses three interdependent dimensions: knowledge, ways of thinking and acting, and capabilities which provide people with the tools needed to participate intelligently and thoughtfully in the world around them (Pearson and Young, 2002)

6. Students with disabilities include the following types of exceptionalities:

   a. Autistic – a developmental disorder characterized by impaired development in communication or social skills
   b. Behaviorally-Emotionally Disabled – exhibit patterns of situationally inappropriate inter or intrapersonal behavior
   c. Deaf-blind – concomitant hearing and visual impairments
   d. Hearing Impaired – hearing loss which is educationally and developmentally disabling
   e. Mentally Disabled – sub-average general cognitive functions
   f. Multi-handicapped – pervasive primary cognitive and/or behaviorally disabled in combination with other disabilities
   g. Other Health Impaired – chronic or acute health problems
   h. Pregnant Students – require special services due to pregnancy
   i. Developmentally Delayed – development and/or behavior is significantly delayed or atypical
   j. Specific Learning Disabilities – have substantial discrepancy between ability and achievement

k. Speech and Language Impaired –speech-language impairment disorder in articulation, language, voice, and/or fluency

l. Traumatic Brain Injury – acquired open or closed head injury caused by external physical force impairing students' abilities

m. Visually Impaired – functionally blind, partially seeing, legally blind

Assumptions of the Study

The following assumptions are made regarding this study:

1. Technology education teachers in the classroom are licensed technology education instructors
2. Technology education teachers will present correct, unbiased information

Limitations

Results of this study may only be generalized to North Carolina TED teachers. Information submitted by TED teachers, who were not licensed to teach TED were omitted from this research.

CHAPTER II

REVIEW OF LITERATURE

Introduction

Technology education, (TED), is an action-based course of study that is designed to prepare students to become technologically literate citizens, who make informed decisions as productive members of a free and democratic society. Recent data reveals that the numbers of students with disabilities in TED classes is rising. The TED teachers who are educating students in classes where there are increased numbers of students with disabilities need adequate training in order to facilitate positive student outcomes. The research questions guiding this study are:

1. Do North Carolina technology education teachers perceive they are prepared to make input in the development of IEPs for students with disabilities in their TED classes?
2. What intervention strategies have technology education teachers used for students with disabilities in their TED classes?
3. What are the major contributions of TED curriculum to educating students with disabilities in their TED classes?
4. Which type of disability do technology education teachers perceive creates the most significant problems in class by requiring the most intervention strategies in their TED classes?
5. Do in-service technology education teachers perceive that they need additional training relative to students with disabilities enrolled in regular TED classes? If so,

what type of training would be recommended for these teachers?

The answers provided to these questions could help prepare technology education teachers to serve students with disabilities more effectively. It is important that all students have an opportunity to reap the benefits that technology education programs have to offer. Technology education plays a vital role in helping students to develop their problem solving and critical thinking abilities.

Significance of Practical Education

Technology education utilizes a hands-on approach to educating students. This practical approach to instruction is common practice in technology education, but a source of debate among educators that has lasted for more than 100 years. Some of the proponents for this hands-on approach to education have helped lay the philosophical foundations for this discipline. One of the most outspoken proponents of this hands-on methodology was Calvin Woodward, whose philosophy of education was to educate the entire student (Benett, 1937). There were other educational pioneers for technology education who were included in a book by Ozmon and Carver which illustrated the evolution of educational philosophies. One of the pragmatic theorists who was included in this text was James Dewey. Dewey was as an advocate of hands-on learning and the incorporation of real-life problems into lessons, which he claimed helped students to develop creative intelligence (Ozmon and Carver, 2003). Other educators have found evidence that Dewey's claims were accurate. One such educator is Cardon (2000) who conducted a study which revealed the positive results students with disabilities garner

from technology education programs. This was a qualitative study which questioned eight at-risk students. The study revealed that these students generally found school to be boring and too academically focused. Although these students had difficulty experiencing achievement and success in general subjects, they found success in the technology education program. Not only did these students enjoy school more when they had successful experiences, they also indicated that the technology education program had a profound influence on their decision to remain in school. In the interviews, five of the eight students mentioned they would not be in school if it were not for successful experiences and hands-on learning activities they encountered in the technology education program. Some students also stated that they had gained positive effects from the hands-on approach to learning (Cardon, 2000). Similar results were found by Harvey when he conducted his study in 2001. He stated that secondary vocational and technical education can be a logical approach to prevent high school students with special needs from dropping out of school (Harvey, 2001). Technology teachers believe that all students, from all societal sectors can benefit from the wealth of educational experiences that these programs have to offer. These claims were echoed by Pearson and Young (2002) when they stated that individuals and the country as a whole would benefit greatly from a higher level of technological literacy (Pearson and Young, 2002).

Ozmon and Carver credited pragmatic theorist James Dewey as an advocate for hands-on learning by incorporating real-life problems into the lesson, which he claimed can help students to develop creative intelligence (Ozmon and Carver, 2003). Other professionals, such as La Porte and Sanders (1995) stated that “hands-on is one of the hallmarks of technology education”, (p. 185). These analytical skills are basic for

effective competition in local and global economies. This method of instruction has been used with success when educating students, including those with disabilities.

An increase in diversity among student populations has made it important to ascertain how effectively technology teachers feel they meet the needs of students with disabilities. A recent report from data analyzed by career and technical education at the state level revealed that the level of students who are members of special populations and are enrolled in technology education classes has risen almost ten percent in the past year (NCSDPI CTE, 2004). There are the potential educational benefits of technology to diverse student populations.

Technology education teachers use an action-based systems approach of instruction in order to equip all students with the tools needed to make wise decisions and positive contributions to society. This practical approach to education has been a topic of debate for over a century. Some of the persons opposed to this educational methodology were recorded by Bennett in reference to manual training, the predecessor of industrial arts and technology education. Bennett stated (1937) "The decade from 1880 to 1890 was a period of marked progress and of heated discussion. The new type of high school was a popular success from the first. It filled a recognized gap in the American school system; it met a real need. Yet, in doing so it aroused the active and sometimes highly emotional opposition of some of the more conservative educators who did not recognize the value of manual training in general education and feared the breaking down of the academic standards already established" (p. 360). He also stated that "conservative leaders in education were opposed to the introduction of manual training as a part of the system of general education" (p. 365). Some educators remain skeptical about the ability of

technology education to prepare students for future success.

One such educator was Fair. He offered mixed reviews on this topic. Fair (1981) stated that although students with special needs may benefit from vocational education the process of integration into these classrooms could be improved upon. The study he conducted examined the impact of teaching students with disabilities in regular vocational classrooms. The researchers interviewed 22 vocational education instructors from 11 randomly selected school districts throughout Texas. The study revealed that 87% of these teachers had never seen a copy of their students' IEPs, although, 100% of these respondents were using individualized instruction for the students with disabilities. The project supervisor observed the instructional interaction between students with disabilities and the vocational instructor. Interactions between students with disabilities and regular students were also observed. The study revealed that students with disabilities were fully participating within the groups they were assigned to 96% of instruction time. Recommendations from vocational teachers for improvements in educating students with disabilities included requests for one-on-one interaction and more specific concrete tasks, since these proved to be the most effective instructional techniques. These teachers also stated they needed more hands-on activities for students with disabilities and more vocationally oriented survival skills to be presented in lower grade levels. They also expressed a need for vocational and special education personnel to meet and share information relative to this population's participation in vocational education programs. These teachers also requested that specific guidelines be provided for mainstreaming students with disabilities into regular vocational settings (Fair, 1981). There were other educators, such as Parrish and Colby, whose opinions were reminiscent

of the age old debate regarding the need for action-based courses of study in general education. Parrish and Colby (1986) questioned the significance of technology education relative to general or special education students. They stated that coupling words like "industrial' and "arts" is an oxymoron. They also stated that vocational education and basic academic education have been considered dichotomous programs (Parrish & Colby, 1986). Another skeptic of technology education was Purcell. Purcell stated that although most people agree schools should play a major role in developing technologically literate citizens, the method for accomplishing this goal has not been agreed upon (Purcell, 1992). There were other educators who echoed uncertainties regarding the relevance of technology education. Foster (1994) wrote that technology education is simply the appropriate renaming of industrial arts. What the profession calls technology education is an attempt to distance it philosophically from industrial arts and is essentially the same definition, suggested many times in the past for industrial arts. Foster goes on to say that many of the major teaching methodologies common to technology education are not new, but have been suggested in literature as directives for industrial arts for years. Just as the definition and philosophical base for technology education have existed for years as the ideals for industrial arts, so have its teaching strategies and methodologies. Unfortunately, there is little evidence that these strategies or philosophy have ever been seriously implemented on any large scale or for any significant length of time (Foster,1994). Ozmon and Craver (2003) recorded other evidence of these opinions when they stated "although idealist education has emphasized the cognitive side of humankind, it has tended toward intellectualism to the detriment of the affective and physical sides" (p. 38).

The fact that the value of technology education continues to be questioned makes it more important than ever for technology education teachers to communicate with clarity its contribution to general education in order to assure a continued role in the general education of all students. A clear role and contribution of technology education is important in light of this program's apparent ability to prepare students for success.

The remainder of this review will examine the extent to which technology teachers perceive they are meeting the educational needs of students with disabilities in regular classrooms. Most of the research on this topic will focus on mainstreaming in disciplines related to technology education. The primary reason for this is that technology education did not emerge as a discipline until mainstreaming had been widely adopted and diffused into the American educational system. Students mainstreamed into technology education programs today, are there due to legislative mandates.

Legislative Impact on Students with Special Needs in Technology Education

Legislation was one of the tools family members and advocates for the persons with disabilities used to bring about social change. One of the first federal civil rights laws designed to protect the rights of persons with disabilities was the l973 Rehabilitation Act. Section 504 of this law specifically stated that no person could be excluded solely on the basis of a disability.

The law was strengthened in 1975 when PL94-142, was enacted which guaranteed all students an appropriate and free education in the least restrictive environment. PL94-142 is now known as the Individuals with Disabilities Education Act, or IDEA (McCarthy, Cambron-McCabe, and Thomas, 1998). A final law that impacted all vocational education and industrial arts students was The Carl D. Perkins Act. This legislation

provided funding and accountability standards that were designed to improve the quality of vocational programs by providing improved access to students with disabilities (Dean, 1995).

One of the educators demonstrating an early interest in the efficacy of such legislation was Koble. He sought to evaluate how the passage of PL 94-142 had impacted vocational education in 1978. His article discussed provisions of PL 94-142 and its implications for vocational education program development relative to instructional changes, curriculum, teacher preparation, and educational facilities. He found that the passage of PL94-142 had far reaching implications on industrial arts teachers. The law required a free and appropriate public education in a least restrictive environment be made available to all disabled children between the ages of 3 and 21 years of age. The law which guaranteed education for these people, was supposed to assist local education agencies improve appropriate, relevant programs for disabled students. An IEP had to be developed for each special needs child by an IEP development team. Instructional changes included in-service teacher training, which was supposed to include effective teaching techniques for this population with information on learning characteristics and how to adapt learning activities to accommodate disabled students. The curriculum may have required alteration to accommodate these students. Architectural modifications may have also been required (Koble, 1978). These observations sounded idealistic; however, completely satisfying these stipulations proved to be quite a challenge for educators.

Almost a decade later, in 1987, Birk tried to determine how well the regulations specified in PL 94-142 were being adhered to. He investigated the law and the extent of

compliance by colleges, universities and State Departments of Public Education in the preparation for elementary teachers to educate students with disabilities in public schools. A survey was designed and sent to 78 universities and colleges asking questions regarding the requirements for preparing elementary teachers to teach students with disabilities, the state certification requirements for preparing elementary teachers to educate these students, and which courses or activities were planned for elementary teachers in the future. The results of the study revealed that most universities and colleges required special education in some form for prospective teachers and were planning further special education course offerings. The results also revealed that most State Departments of Education failed to require elementary teachers to study special education for certification purposes, but planned to require additional special education teachers. The results of this research implied that universities and colleges had taken a more proactive step toward compliance with PL94-142 than had State Departments of Education. These results also implied that while it was understood that universities and colleges should spearhead the effort to design curriculums to assure needs were met for elementary teacher training, the states' role in monitoring compliance with the law needed clarity, and federal support to assist other agencies in compliance with this legislation. It appeared that most elementary teachers were getting exposure to special education courses due to the fact that universities and colleges required the training, despite the absence of state regulations requiring this training (Birk,1987). The results of this study implied that progress toward reaching the goals of legislation designed to improve the quality of life for persons with disabilities was steady, but slow. There appeared to have been a disconnection between federally mandated laws, and the state

and local agencies responsible for carrying out the laws. These factors could have worked together to decrease the educational benefits garnered by students with disabilities. This lack of consistency between agencies could have had an impact on the nominal results found by other researchers.

One such researcher was Causer. He conducted a study in 1995, designed to better understand the impact that the changes in Carl D. Perkins funding had on the educational opportunities of women, minorities, the persons with disabilities, individuals with limited English proficiency, economically disadvantaged, and others. The objective of his research was to determine if a positive correlation existed between changes in Perkins Act funding at Texas public community colleges and changes in the corresponding enrollment and completion rates for these colleges. The study found no correlation for changes in enrollment for any of the special population groups; however, a correlation was found between changes in funding and the completion rates for disabled students. This study found little evidence that an education production function could be developed to predict student success based on resource inputs (Causer, 1995). These results seemed to add credence to one of the arguments of the disability rights activists. The concept was that children with disabilities did not have to grow into handicapped adults. Students with disabilities, given the same opportunities as non-disabled students, could experience equal degrees of success in life. The social and educational opportunities made available to students with disabilities proved very difficult to access due to tangible and intangible barriers that initially impeded progress.

Educational Barriers

One of the early efforts to rectify educational barriers encountered by students with disabilities was initiated by Clark and Jernigan in conjunction with a Texas governmental agency in 1978. The Occupational Education and Technology Agency funded a Texas A and M University research study to identify techniques and procedures that facilitated success for students with disabilities in vocational education programs at the community college level. This study stated that a problem existed because teachers were not aware of the need to provide comprehensive vocational training facilities to persons with disabilities (Clark and Jernigan, 1978). Another problem existed because the community colleges of this era had no clear compilation of techniques and procedures in place to make it possible for persons with disabilities to get the occupational training needed to find gainful employment. The purpose of that study was to begin establishing criteria for successful completion of vocational education programs by providing reports to state agencies and guides to educators. This information would improve the quality of vocational education and facilitate successful matriculation for students with disabilities through community colleges in Texas. Some of the strategies used to achieve this accomplishment were to identify barriers which inhibited enrollment and completion, and identify the critical tasks needed to accommodate students with disabilities. The researchers found that in addition to the obvious architectural barriers in place, there were academic barriers which were even more serious. Some of the barriers this study found included transportation, since there was no means of traveling between classes on large campuses and instructional facilities and resources that were difficult to access. Other barriers included the attitudes stemming from over protective parents and fearful staff,

who lacked an understanding of students with disabilities. Another barrier included a lack of communication, coordination of services and funding which resulted in a lack of trained, supportive staff (Clark and Jernigan, 1978). Results like these revealed that students with special needs faced some of the same problems encountered by non-disabled students. Students who struggle with transportation and teacher issues are commonplace. It was; however, more difficult to find effective solutions to common problems for students with disabilities during the early stages of mainstreaming than for non-disabled students.

One reason finding effective solutions was difficult could have been due to the fact that the legislation which mandated that students with disabilities be placed into integrated environments did not fully account for the fact that these facilities were not originally designed to accommodate the persons with disabilities. One of the consequences resulting from this oversight was that students with disabilities found near insurmountable obstacles in some mundane places. Examples of these obstacles could be found in areas like restrooms, cafeterias, and laboratories. Some educators who recognized these problems began conducting studies to help provide solutions. One example of these studies is listed here.

In 1979 a study was conducted by Bruweldheide in order to identify instructional aids that would allow students with physical disabilities to gain greater access to laboratory-shop courses. The commitment to place students with disabilities into regular classes was no longer a choice, due to federal regulations. Administrators and teachers were faced with implementing integration. Barriers to this integration were many and varied. The physical barriers such as stairs and multi-level buildings were the most

obvious. The visible barriers also proved to be the easiest to remove; however, the greatest barriers to mainstreaming were intangible and not immediately seen. Some examples of these intangible barriers that disabled students faced included negative attitudes from administrators and teachers which stemmed from a lack understanding relative to students with disabilities. All regular classes, which included laboratory-shop classes, were required to make provisions for all students. This included the proper and safe use of equipment and tools that were common to activity based programs. Problems in industrial arts and vocational education programs stemmed from mandates to provide proper and adequate laboratory-shop skill instruction for physically disabled students, without adequate preparation to effectively accomplish the task. There was a need to identify and develop apparatus to assist students with physical disabilities gain access to these programs. The methodology used in this study was to evaluate students with disabilities while they used basic equipment common to new laboratory-shop programs. The level of difficulty experienced when manipulating these devices was assessed. The students with disabilities then made suggestions for correcting any problems they encountered while using the equipment (Bruwelheide, 1979). This study revealed that both tangible and intangible barriers to mainstreaming were important problems that required solutions before progress could be made. One of the major problems made clear here was that the teachers lacked preparedness to accommodate students with disabilities in the laboratory-shop classes. This study presented problems associated with filling this void from the perspective of the students. Other studies discussed the readiness of vocational education programs to mainstream students with disabilities by taking a more comprehensive look at these problems. One such study was by Erekson and White.

A holistic approach to prepare vocational teachers and facilities for mainstreaming was the subject of a project undertaken in Illinois (Erekson and White, 1980). The catalyst for this project was the legislation which mandated providing access for students with physical disabilities into vocational education programs. These laws had to be implemented despite the fact that the majority of vocational education personnel had no preparation in modifying learning environments. This project addressed the problems associated with vocational education teachers preparing to modify learning environments to accommodate the physically disabled. The first phase of the project included making efforts to determine the architectural and instructional barriers common to vocational education and assess the capabilities and limitations of each student with disabilities. These teachers could then develop the instructional strategies and handbook on educating disabled learners. These educators put some mechanisms in place in order to accomplish their desired goal. The first mechanism included changes such as instituting an advisory committee and developing project monitoring design and evaluation systems. These researchers found that preparing vocational education teachers to make their equipment and labs more accessible to all students was a necessity. These findings also implied that information regarding accessibility should have been readily available and disseminated to special educators as well as to vocational education personnel. Vocational education teachers expressed a willingness to involve students with disabilities in their programs, yet they lacked information on methods to carry out the necessary modifications (Erekson and White, 1980).

The Erekson and White study revealed how some vocational teachers embraced the concept of mainstreaming. These teachers were focused on how to carry out these

mandates. These teachers felt that the development of a handbook on information addressing basic modifications to classrooms could make mainstreaming a more orderly and predictable process. Other researchers, such as Bame (1980) also expressed an interest in a more orderly and systematic approach to serving students with disabilities in vocational and technology education classes. One of the steps taken to pinpoint some of the problems that hampered mainstreaming was a national survey Bame conducted, which polled secondary school vocational programs in 1980. The goal of mainstreaming was becoming a reality; however the results of this survey made it clear that there was much work yet to be done. The chief conclusions from this document revealed that a major shortage of industrial arts teachers existed. Another finding was that the program content had not changed appreciably and most school shops were still not equipped to accommodate students with disabilities (Bame, 1980). The results of this survey did not deter technology education teachers from seeking solutions to bridge the gap between technology education and the needs of students with disabilities.

Another effort to bridge this gap emerged in 1982, when Shackleford and Henak wrote a monograph that addressed improvements in accessibility design for industrial education facilities that could accommodate students with physical disabilities. A system was designed for modifying and improving interfaces between learners and the built environment. This model used a systems approach to address the issue of accessibility to industrial education classrooms. This system also used inputs based on student needs. The system then used safe environmental modifications as processes. Successful mainstreaming was considered to be the output. The feedback from this systems' output was finally used to make evaluations. This document considered the obstacles students

could face when attempts were made to maneuver in space while approaching machines and equipment or manipulating controls. The document also considered obstacles students could face while attempting to obtain supplies and tools or communicate with others. The systems model then discussed possible modifications that vocational teachers could make to correct these problems (Shackelford and Henak, 1982). Research of this type illustrated how educators were beginning to take a more systematic approach to finding solutions to the problems they encountered daily. Vocational and industrial arts teachers had little or no training to deal with these daily difficulties they encountered when attempts were made to meet the educational needs for growing enrollment numbers of students with disabilities.

The need to solve the daily problems associated with mainstreaming gave rise to further research. Cobb conducted a study in 1983 which attempted to assess the extent to which students with mild disabilities in Illinois secondary schools were given access to vocational education curricula. The study also examined the nature of and vocational education assessment information on students that was included on IEPs. A third criteria evaluated was the difference that could exist across demographic variables of students in the content and quality of vocational education. The method used for this study began with random samples which were taken from 98 school districts in Illinois and then reviewed for disabled students during the 1981-1982 school year. A random sample was selected for a separate on-site examination of course enrollment schedules and IEPs. This data was used to determine the extent to which these students had information on their IEP which related to industrial arts and vocational education. The research results revealed that students with disabilities had a higher enrollment in vocational education

courses than expected. The vocational information which appeared on students' IEPs; however, was generally not the result of a collaborative effort, rather resulted from informal observations. The concept of educating students with disabilities in vocational education had been widely supported and accepted in Illinois. The data revealed that external access to industrial arts and vocational courses for students with disabilities did not appear to be a problem since enrollment in these courses was nearly equal for students with disabilities and non-disabled students. There were some problem areas revealed by this study. One of these problems was that less than half of students in vocational education courses had related goals listed on their IEP. The researchers recommended that the types of vocational education services and placements for each students with disabilities, be listed in concrete terms on the IEP document (Cobb, 1983). Federal legislation had provided the opportunity for students with disabilities to gain access to regular classrooms; however, in the early stages of mainstreaming there was little available information that explained exactly how this task was to be accomplished.

The information gap made it difficult for vocation teachers to deliver course materials in a manner that would prepare students with disabilities to become productive workers in a competitive society. High numbers of unemployed or underemployed persons with disabilities was an indication that students with disabilities had not achieved the same level of personal success as their non-disabled peers in school or in society. Results from studies like this one made it clear more research was needed to create effective solutions to these problems.

One example of progressive steps taken toward obtaining the goals of mainstreaming was an Ohio initiative to facilitate inclusion that created a position for a

vocational special education coordinator. This special education coordinator was to serve as a liaison between vocational and special education programs. Buck and Barrick conducted a study in 1989, which attempted to identify the perceptions of vocational special education coordinators regarding the importance of the tasks they were assigned by the state rules and barriers to carrying out these tasks. The study also identified the level of performance for each task and ranked barriers to implementation of tasks in order of importance. The results from this research revealed that these respondents perceived the foremost important task they were required to do was to monitor student progress via the IEP. The second most important thing they were required to do was to assist classroom vocational teachers to develop and modify curriculum and instructional materials to accommodate students with disabilities. The third most important thing required of them was to actually assist the IEP development team (Buck and Barrick, 1989). This study indicates that states and educators were making efforts and some progress toward the goal of better accommodating students with disabilities in regular vocational classes. These results also reveal that barriers still existed to the support and services needed to bring about seamless integration. Some of these barriers included, time constraints and information gaps. These impediments had surfaced repeatedly as problem areas associated with mainstreaming, which still required effective solutions.

Another report was published in 1998 by Clark. This report examined some of the measures taken to provide solutions to barriers from a students' perspective. The students referred to in this document were enrolled at the Weaver High School in Hartford Connecticut. This school used a grant from The Americans with Disabilities Act (ADA) to provide information and training that would allow students with multiple

disabilities to take part in all school activities. Some of the students at this high school became active participants in finding practical solutions to problems students with special needs could encounter. One effective strategy employed by these students was a school accessibility survey. This survey was conducted by the technology education students. One example of a problem for which these students found a solution was a wall phone which hung out of reach for some students with disabilities. The students recommended the phone be replaced by a desk phone. The ADA encouraged interdisciplinary activities and strategies to effect change (Clark, 1998). The involvement of students in this real-world problem solving activity is characteristic of the hands-on approach to learning that makes technology education important to all students in general education and society.

Successful Strategies

Technology education teachers acquired recognition by some for providing students with a practical approach to presenting course materials that could enhance student learning. One such example of the practicality of technology education could be seen during the early stages of mainstreaming when industrial arts students with disabilities were assessed. The technology education teachers of that era were actively looking for ways to place the students, who could manage the work, into regular classes.

One educator who was looking for ways to help industrial arts teachers respond appropriately to the challenges associated with educating students with disabilities was Messershmidt. Messershmidt conducted a case study in 1979 which revealed that students with emotional disabilities were greater challenges to teachers than students with other types of disabilities. An example of the challenges these students could present is illustrated by one emotionally disabled student who had been expelled from different

schools for inappropriate behavior. This student was allowed in the industrial arts shop as a reward for appropriate behavior. The hands-on activities that this student was involved in seemed to lessen his emotional outbursts. This program educated a number of other students with disabilities. This program allowed these students to participate in the class to the best of his or her ability. This industrial arts teacher was actively involved in modifying the environment to accommodate students with disabilities. This teacher even involved other eager student participants in the problem solving venture for facility modification. This teacher found students with disabilities were no better or worse than regular students relative to their ability, or willingness to utilize tools appropriately (Messershmidt, 1979). Other studies later confirmed the apparent educational benefits students garnered from the industrial arts hands-on approach to learning. One example of these studies could be seen when Wenig conducted a study in 1978. Wenig stated that the multi-sensory manipulative experience garnered from industrial arts programs may provide a missing link in helping children, specifically learning disabled students, remediate their educational problems (Wenig, 1978). This study implied that educators were attempting to combine proven strategies with experimental new approaches aimed at improving student performance.

One example of these educational innovators was Kozak. He stated in 1979, that the letter and the intent of disability legislation could be satisfied by providing each student, regardless of disability status, with an IEP. He recommended that an individualized assessment be performed for each student and an IEP be developed based on industrial arts goals for all students. He felt that this approach to IEP development could improve the educational success for all students enrolled in industrial arts classes

(Kozak, 1979). The prospect of providing each student with an IEP sounded ideal; however, the vocational education teachers who would be faced with executing this additional task may not have been enthusiastic about this prospect.

A more realistic approach to providing students with an appropriate education, was illustrated in a program reported by Joyce and McFadden in 1982. This program stressed a collaborative effort linking special education to industrial arts. This team approach could help to provide students with disabilities the independent living skills needed to live self-sufficient lives. This program was based on typical industrial arts course work, which included woodworking tools, and basic measurement concepts (Joyce and McFadden, 1987). Another typical teaching tool used in industrial arts was the problem solving model. Industrial arts teachers relied heavily upon these problem solving techniques as a means for helping students to become analytical thinkers. It should come as no surprise that some of the same strategies instilled in students for solving real-world problems could be applied to the problems which persisted regarding inclusion.

A group of educators wrote a research article on how they approached mainstreaming by using a problem solving model (Green, Albright and Kokaska, 1989). They brainstormed possible solutions then gathered data. These educators then conducted a literature review on instructional strategies for special education students in regular vocational education programs. The purpose of this paper was to present four generic instructional strategies which they found vocational instructors used effectively relative to students with disabilities. Examples of these strategies included collaborative approaches to teaching, which combined knowledge, expertise, and resources from

diverse individuals or agencies in a common effort to provide successful vocational education learning experiences for students with disabilities. Another strategy they recommended was to use cooperative learning groups, or systematic models for helping teachers instruct students. This includes having students working in groups in order to learn the subject matter and skills like cooperation, collective problem solving, positive interdependence, individual accountability, and scheduling. A third strategy they recommended was task analysis, or breaking down a task into increasingly specific sub-skills or parts so students clearly understood requirements to complete a vocational activity. Other recommendations included tutoring, (adult or peer), using individuals other than teachers who were assigned to help students with disabilities to improve academically. The authors pointed out that most of the research had been done in special and regular education settings, not in vocational education. Additional investigations were needed to better understand when and how these strategies should be implemented. These findings concurred with research which reaffirmed that vocational educators were in need of more information, training and assistance in order to properly use instructional strategies that fully integrated students with disabilities (Greene, Alright and Kokaska, 1989). The results from this study revealed some of the more successful mainstreaming strategies incorporated into vocational education classes at this time. These strategies could possibly have been even more successful if they had been consistently coupled with collaborative efforts to help students with disabilities.

A study by Stodden, Meehan, Bisconer and Hodell (1989) revealed a gap which existed between successful educational strategies and the groups of educators charged to improve educational outcomes for students with disabilities. Their 1989 research study

was conducted to facilitate the vocational preparation of secondary students with disabilities. This study used a random convenience sample of 127 students with mild to severe disabilities. All assessment instruments administered to subjects were either obtained from the schools or from a central vocational assessment center. The assessment instrument and IEP was examined for each student to determine if any of 28 Life-Centered Career Education (LCCE) competencies had been measured. The first analysis revealed that 40% of students had no vocational goals or objectives on the IEP prior to vocational assessment. The second analysis examined if the IEP content of vocational goals and objectives were related to content of vocational assessment information. The findings indicated only about 50% of the IEPs were grounded in information collected through vocational assessment. The third analysis examined whether the number of vocational goals varied based on the level of student disability. These findings from this study which was designed to address the use of vocational assessment information in the IEP development process, led the researchers to conclude that in many cases IEP vocational goals and objectives were apparently written without using vocational assessment information (Stodden, Meehan, Bisconer, and Hodell, 1989).

Studies such as the previously mentioned one, presented an array of problems related to educating students with disabilities needs in regular classes continued to unfold. These problems gave vocational teachers an opportunity to use some of the problem solving skills they espoused to students. One of the most successful approaches to solving problems relative to mainstreaming, was to use the culmination of available expertise and experience into guides that helped pave the road to success for students with disabilities in vocational and industrial arts classes.

Early Technology Education Guides

An innovative curriculum guide emerged in 1977. This guide was based on the practical principles which are common among vocational courses. One of the purposes for which this guide was developed was to illustrate for elementary teachers of educable mentally retarded students how hands-on activities could be used to complement academic subjects by bringing the level of instruction down from the abstract to a concrete level (Williams and Others, 1977). The need to better train technology teachers to educate students with disabilities was clear. Efforts to satisfy this need were emerging from a variety of sources.

One institution which took an innovative approach to bridging this information gap was Florida A and M University. This university provided a platform for educators such as Heggen (1981) to help coordinate projects that were designed to create a fast-track for curriculum development which recognized the needs of special students in Florida's middle school industrial arts education programs. The method for accomplishing this goal was to have teachers and supervisors who represented four school districts meet for short brainstorming sessions. These sessions were used to develop, revise, and validate a series of curriculum materials. These curriculum materials were to be included in a guide which addressed the needs of industrial arts students with disabilities. A standardized content format was developed for the materials. This fast-track curriculum model used the expertise of key supervisor-consultants and teachers in selected districts of the state. This group engaged in brainstorming sessions for a couple of days. The group then developed and revised guides for middle school industrial arts programs which were intended to articulate with similar guides at the high

school level (Heggen, 1980). These innovative approaches to facilitating mainstreaming for industrial arts were forerunners for even more comprehensive materials on this subject.

One example of the comprehensive plans for implementing mainstreaming was produced in 1981 by Dugger. The Special Needs Guide contained information that could be used to modify vocational programs to serve students with disabilities. The guide began by stating the industrial arts standards which pertained to students with disabilities. The guide also presented a discussion on issues associated with serving students with disabilities in industrial arts. Guidelines that could help industrial arts teachers identify these students were also presented. Information that could facilitate accommodating students with disabilities in industrial arts programs was presented and addressed topics such as individualized programs, modifications needed for the physical environment, and modifications needed for curriculum and instructional approaches. Specific instructional strategies were provided for the various categories of students with disabilities. The author of this text made it clear that all children were special; however, some students had more specialized needs than others. These specialized needs included the students with disabilities, disadvantaged, gifted and talented. The educational methods, procedures, instructional programs and materials needed by each student, must be modified for the purpose of providing individualized programs and instruction to ensure all children develop to their fullest potential. Statistical data had shown that some of the problems that made mainstreaming necessary included extremely high unemployment rates among out-of-school youth and adults with disabilities and occupational stereotyping. The continuous economic growth and security of our nation is strengthened

by the intellectual development and productivity of all citizens, including those with disabilities. This guide emphasized that industrial arts teachers must effectively educate students with disabilities.

One tactic that could help technology education teachers educate students with disabilities could have been a better understanding of the different types of exceptionalities. Students with disabilities are learners who have specific or general debilitating conditions that may interfere with their functioning in regular school environments. Dugger's report revealed that high-incidence students with disabilities, were those who comprised 80% of the total population of students with disabilities. The different categories of high-incidence students who were most commonly placed in regular classrooms included; the learning disabled, mildly retarded, speech impaired, mild to moderate hearing, and visually impaired. These students had been able to achieve success in the regular school environments with supportive services and modifications to educational curriculum and teaching strategies. Low-incidence students were most often placed in self-contained classrooms, sheltered workshops or institutional settings. These low-incidence students included the severely and profoundly retarded, severely emotionally disturbed student, profoundly deaf or blind, and some students with orthopedic disabilities.

Dugger's guide also emphasized the fact that educational methods, procedures, instructional programs, materials and school facilities would all require modification in order to provide individualized instruction to students with severe disabilities in industrial arts classes. This guide also pointed out that this task could not be accomplished without a collaborative effort between professionals from special education, rehabilitation, school

psychology, guidance, and technology education. It made clear the importance of the teacher as the central factor governing the success for students with disabilities industrial art. The teachers' attitude, personality, and self-concept helped govern class performance. It was expected that most technology education teachers would experience a little anxiety about working with diverse student populations.

One technique for eliminating teacher anxiety, recommended by the guide, would be to accurately determine which components of industrial arts were appropriate for each student. The teacher would then be better equipped to establish performance criteria, modify labs, and decide how to allocate reasonable amounts of time to instruct, tutor and supervise each student with disabilities. These measures would be needed in both classrooms and laboratories in order to fulfill the industrial arts education teacher's role in IEP preparation. This guide also emphasized the fact that industrial arts teachers should become actively involved as members of the IEP development team or serve as consultants. Industrial arts teachers would benefit from this group effort by being better prepared to modify curriculum and instruction to accommodate the particular student with a disability (Dugger, 1981). This guide was evidence that industrial arts teachers were making progress in meeting the educational needs for these students.

This type of comprehensive guide was the fore-runner to other materials that could help equip industrial arts teachers to better meet the needs of students with disabilities. These guides were providing teachers with the information needed to recognize the types of student exceptionalities and devise a plan that would help each student garner the maximum amount of educational benefit from industrial arts.

A second example of a comprehensive instructional guide was the information

produced by the Wisconsin State Department of Public Instruction. This guide was put together to help both administrators and educators in technology education. It put forth standards that were applicable to students with disabilities who were in technology education. The background of legislative action on behalf of students with disabilities was also reviewed briefly along with information on identification of types of exceptionalities. This data was helpful in formulating techniques that were used to accommodate students with disabilities in technology education programs by making needed modifications to the physical environments, curriculums and instructional approaches; such as integrating career information into laboratory activities. This guide also included a chart which listed suggested instructional strategies for students who were disadvantaged, gifted students as well as disabled. The information included in this guide hinged upon a philosophy which identified the needs, abilities and interests of all learners. The guide included sections on instructional programs and the various student populations served.

Recommendations were included in this guide for instructional staff, administration, support systems and supervision. This type of information made it easier for technology education teachers to become familiar with the general characteristics, and limitations of students with disabilities. Another important issue pointed out here was the need for technology teachers to collaborate with other professionals in order to improve educational methods, procedures, instructional programs, materials, and to make modifications for school facilities. Teacher attitude was identified as a very important factor for helping govern teacher performance. Most technology teachers were concerned about how to make the needed changes emphasized by this guide. The guide

encouraged the use of the typical technology education approaches of hands-on learning in order to help students with disabilities learn. Some of the strides that technology teachers took were to become involved in the IEP development team and actively modify the curriculum, facility or equipment in order to accommodate students with disabilities. It was expected that each school system would function slightly differently regarding the utilization of supportive services which operated within the school. These differences within each system made it necessary for technology education teachers to develop an awareness of local policies and then take advantage of these policies to facilitate mainstreaming (Dugger, 1981). The comprehensive information included in this guide helped technology education instructors prepare for students with disabilities. There were other examples of efforts to make the process of mainstreaming easier to accomplish.

Robinson and Seabolt described one example of these efforts in 1986. The document they referred to was the development of a users' manual that was intended to accompany VOC-PLAN. The user-friendly format of this manual incorporated a computerized program which was designed to assist those who were preparing Individualized Vocational Education Programs (IVEP) for special needs students. The program contained a standard IEP format which allowed teachers to define criteria for mastery, evaluation, review dates and tasks. This program contained 2500 short term objectives that allowed vocational teachers to easily create, change, print, edit or erase IEP information (Robinson and Seabolt, 1986). This innovative users' manual was another attempt to find more effective solutions to problems technology education teachers encountered relative to mainstreaming, some of which proved difficult to solve.

The search continued for solutions to the problems regarding integration.

Morely published evidence of this continued search in 1987. He compiled a volume that consisted of methods proven effective for helping industrial technology teachers work with mainstreamed students with disabilities. This guide allowed industrial technology teachers to use a variety of strategies to facilitate the accommodation of students with disabilities into regular classes. It made the fact clear that successful integration required team work and successful time management skills. This team approach required a collaborative effort between administration, special education as well as industrial technology teachers. These teachers expressed a need for the tools to handle the extra time commitment associated with mainstreaming. The demands for greater investments of time could cause some industrial technology teachers to become irritated and upset, these reactions could have been due in part to what Haynie suggested to be fears that mainstreaming could lead to disaster in laboratory shop classes or possibly attribute to teacher burnout (Haynie, 1983). This volume by Morely illustrated methods to lessen the severity of such problems by adopting efficient systems of time management (Morely, 1987). Despite the best effort of researchers and technology education teachers across the country, problems associated with mainstreaming special needs students persisted. There appeared to be a gap between the comprehensive information these guides provided and effectively carrying out the strategies by technology education teachers. The search continued for the set of effective solutions that would allow technology education programs to provide all students with the quality of education that would help them to become productive citizens.

Effective Technology Education Programs

Scott and a group of other professors took up the charge of improving the efficacy of technology education for all students in 1985. This research was reflective of a renewed interest and concern about serving students with disabilities during this era when industrial arts programs were moving toward more of a technology base of instruction. Technology education teachers did not express much concern regarding the low-incidence students with disabilities, who rarely entered their classes. These teachers were primarily concerned with the high-incidence students, such as those students with severe disabilities, who appeared in their classes regularly.

Scott conducted a study in which he polled the three industrial arts teachers to help determine some answers to questions relative to mainstreaming. The answers to his questions were helpful to growing numbers of industrial arts teachers who shared these concerns. One topic addressed in Scott's interview dealt with how students with mild mental disabilities benefited from academically challenging industrial arts programs. The first respondent to this question replied that it was wrong to assume that mildly handicapped learners couldn't benefit from industrial arts. Respondent number one stated that minor adjustments to the program could allow students with limited cognitive ability to benefit from the activity-oriented instruction common to our field. He agreed with research that suggested that industrial arts could be therapeutic for students, since the sensory motor involvement from using some tools could stimulate cognitive functioning. The success these students could achieve via hands-on activities could provide a degree of success that could greatly improve other school-like performances. The second participant stated that he hoped all technology education programs were

challenging. He also stated that high incidence students learned material differently from other students. The third responded added that inclusion benefits disabled students by helping them learn skills needed to be successful on the job and in society. (Scott, 1985). The efforts these professors made were reflective of the proactive steps being taken to improve educational outcomes for students with disabilities across the country in technology education programs.

McCleod (1985) evaluated vocational education programs which were designed for students with disabilities in Texas. The purpose of this evaluation was to make recommendations for improvements. The first of three objectives was to evaluate the effectiveness of training for entry-level knowledge and skills provided to disabled students enrolled in vocational education for students with disabilities. The second objective was to review the job status of students with disabilities who completed the VEH programs. The third objective was to make recommendations for delivering effective vocational education to students with disabilities. One of the first steps taken was to develop a project advisory committee which was selected to draw up a sample and review survey instruments for VEH teachers, vocational counselors, VEH students and employers of VEH completers. The population surveyed consisted of 175 school districts. The results of the survey found a low percentage of program completers in jobs for which they had been trained. One common reason for low job placement was due to the fact that a number of the participants were still in school. A high percentage of employers thought the disabled students had a good future in the fields for which they had been trained. The survey respondents' primary recommendation for improving VEH services was for greater cooperation between the teachers in vocational education and the

teachers in special education (Mcleod, 1985). This research indicated that there still existed a need for effective technology education programs. These results implied that more effective collaborative efforts among stakeholders could help special students find gainful employment. These measures taken to improve results for students with disabilities in Texas were reflective of the continuous efforts from technology teachers from across the nation to facilitate mainstreaming and prepare students for future success.

Vocational education teachers have demonstrated a willingness to improve program outcomes for all students, further evidence of this commitment was the California Vocational Educational Resources (VERS) referrals model. The VERS was designed to help local educators improve vocational programs by performing self assessments on the extent and quality of mainstreaming efforts. The results of these self assessments could be used to develop plans for local self-improvement and then implement those plans. There were key VERS personnel who were actively involved in helping bring positive change to local schools. Some of these professionals included credentialed vocational teachers, counselors, and administrators from local school districts. One group of VERS consultants served as resource persons for self-improvement plans that were implemented. This self-assessment was a collaborative effort and was considered successful due to its short-term, voluntary and intensive focus on program improvement (Allison and Apolloni, 1987). The feedback from this program illustrated how technology education related teachers were making strides toward meeting their goals of providing effective programs to all students.

The quest to better educate students with disabilities was still underway in 1990. This fact was obvious due to the significant numbers of educators who were still

struggling in their attempts to keep students with disabilities in regular classes in order to prepare these students with the marketable skills they would need after graduation. These skills were necessary for students with disabilities to make the successful transition into meaningful occupations. In 1990 Gill and Edgar reported that one region which was credited for efforts to properly educate special students was Pierce County in Washington State. This county was home to the Pierce County Cooperative (PCC). The PCC housed a vocational education consortium which was comprised of twelve school districts that were located in the western part of the state. This cooperative focused on improving job entry capabilities and post-secondary educational opportunities for students with mild disabilities within participating districts. A large portion of the success of the Pierce County Cooperative could be attributed to the emphasis placed on continuous staff and administrator communication. Effective programs within the district could be attributed to efforts made prior to placement that helped to determine which vocational education options were most appropriate for each student. There were also efforts to collaborate between students, teachers, parents, and administrators on the development of IEPs. This collaborative effort increased the availability of support services and resources needed for student success. The consortium also offered post-placement services in order to examine the degree of out-of-school involvement students needed for success. The results of this study revealed that graduates from the PCC had better outcomes than comparison groups. The PCC graduates had significantly higher levels of employment, and were enrolled in postsecondary education at higher rates than other students with disabilities. These positive student outcomes suggested that well planned educational programs implemented by vocational education teachers could have positive outcomes

for students with mild disabilities. Some of the components of this successful program included student placement based on careful assessment of student skills and interests. Continuous support and training for the vocational teachers, was also needed since teacher proficiency in this area of specialization may not compensate for limited skills in special education. Some studies had suggested that vocational teachers often lacked knowledge of content and expectations for special needs student in various vocational classes. Feedback from this program made it clear that additional training was needed in order to make appropriate referrals to vocational courses and to maximize student benefits from these courses (Gill and Edgar, 1990).

Examining these successful programs revealed that continuous training and collaboration could prove to be an effective tool for equipping technology education teachers with the skills they needed to better educate students with disabilities. Students who had completed programs with better trained teachers received positive outcomes. Elsksnin and Elksnin suggested in 1991, that the employability for students with disabilities could be improved when these students developed more adequate social skills. Some studies revealed that the lack of proper social skills was one of the main reasons for the disproportionately high numbers of unemployed or underemployed persons with disabilities. The authors of this document believed that social skills could be taught successfully by using one of the eight social skills training programs, available at the time, which had been correlated with 20 interpersonal skills generalized across vocational programs. The vocational programs were becoming more effective at identifying and educating students with disabilities. Some of the focus began to shift toward helping students with disabilities reap positive outcomes in school and in the global community.

The methods for further bridging the gap for vocational students with special needs included tech prep programs (Elsknin and Elsknin, 1991).

A 1992 report by Brown and Others stated that There were obvious advantages for students with disabilities who were enrolled in tech prep programs. Tech prep programs combined two years of high school with two years from post-high school courses. Tech prep did not simply repackage vocational education. These programs could play a meaningful role in the occupational preparation for students with disabilities. These programs could help to stem the tide of young people with disabilities who left high school unprepared for further education, occupation or to enter adulthood (Brown, and Others, 1992).

A study was conducted in 2001 by Osher and Hanley, which was aimed at improving the quality of services for children and youth with behavioral and emotional disabilities. These students typically received inadequate services while in school, so they consequently produced poor educational and community outcomes. This study sought to identify programs or policies which implemented the targets of the National Agenda. The results of this research indicated that successful programs had some common value systems. Other commonalities found among these programs included a staff which internalized and agreed upon program values. These programs also contained the organizational structure and support needed to develop the practices associated with implementing these values. The findings of this study revealed that there were some problem areas which were impeding program implementation. These areas included a lack of adequate funding, a lack of access to some needed services, and inconsistencies in how some programs were run (Osher and Hanley, 2001). The problem areas identified

by this study required solutions before technology education teachers could reach their goals related to providing all students with the information and skills they needed to become self-sufficient in school and life.

Student Outcomes

The recent emphasis on vocational education or technology education outcomes for all students could indicate that the problems these teachers faced with mainstreaming had been solved or significantly reduced. Studies conducted early during the era of mainstreaming reflected an initial lack of awareness regarding the importance of providing information that would be effective in helping students to become successful and productive members of society. Gill conducted a study in 1972 which examined the emphasis placed on industrial arts objectives for students with mental disabilities and regular students. The study compared industrial arts teachers to special education teachers on how they ranked objectives for students with mental disabilities. These two groups of teachers ranked objectives for students with mental disabilities in a different order, than for average students. This conclusion could suggest that, teachers' attitudes toward the importance of industrial arts for the students with mental disabilities could be significantly different from their opinion of its important for average students. (Gill, 1972). These results imply that improvements were necessary regarding perceptions toward students with disabilities. A decade later educators not only demonstrated an awareness of but made active strides to bring about educational and social improvement for persons with severe disabilities.

Colvin was one researcher who in 1981 investigated the use of, an emerging technology called general case instruction, as a means for teaching students with severe

disabilities a task that could be transferred to untaught skills. This study systematically evaluated an industrial education program at the University of Oregon which used a general case screwdriver lesson to determine whether the exercise taught the screwdriver skill, and allowed the skill to be generalized for other uses. The study included eight students with severe disabilities. These students were examined relative to four levels of functionality. The first level was interpolation or the initial use of the tool. The second level was extrapolation, or additional applications for the tool. The third function was general use, or using the screw driver in novel situations. The fourth function was called related tasks, or tasks that used motions similar to those used with a screw driver. The findings of this study revealed slower subjects completed the Screwdriver Program in 26 consecutive months of 20 minutes a day five days a week training. The results were that the subjects successfully completed the task within the three domains of interpolation, extrapolation and general application (Colvin, 1981). This study revealed that the driving force behind integration, of providing a free and appropriate education for all students, was not a lost cause. These small gains were encouraging to teachers because they revealed that all students, even with severe disabilities, demonstrated some positive responses to industrial education programs.

A 2000 study by Millington sought to further illuminate why and how some students with special needs responded to difficult situations. Some students with disabilities demonstrated frustration and social skills deficits, which were hypothetical reasons for some inappropriate behaviors among students. It investigated how children coped with stress in the environment. This study tested 29 students with learning disabilities, and 30 non-disabled children. The parameters being evaluated included the

subjects' responses to various environmental stimuli, such as reading skills, coping skills and self-esteem. The results of the study indicated that students with learning disabilities displayed different coping skill preferences and were more negative emotionally to slightly stressful academic situations, than were non-disabled children. The study suggested the possibility that a link existed between coping, self-esteem and achievement among students. The knowledge gained from this study could be employed by professionals as a training tool to help provide students with disabilities the coping and problem solving strategies needed to successfully cope with environmental stimuli (Millington, 2000). The ability to think analytically in order to make rational decisions for solving problems is an important tool taught in technology education to prepare students to become productive citizens. A significant part of productive citizenship depends upon an individual's ability to acquire gainful employment and become self-sufficient.

Merachnik wrote an article in 1987, that should have served as a warning to some and a reminder to others, where in he stressed the fact that education is a non ending journey, although formal education does end. He went on to point out that students with disabilities who stop receiving formal education before acquiring employable skills or entry level positions could be easily forgotten or lost, and may never find employment. He also stated that the lack of employment could lead to a life of shame and poverty. He finally encouraged special needs teachers to help these students acquire some of the skills needed to be successful in life. These skills included a good attitude, respect, congeniality, and punctuality (Merachnik, 1987). These results seem to imply that the intangible facets of students' ability may be as important for the student to keep a job, as

the tangible ability of performing the job.

Schwarz and Taymans submitted a report related to a survey which was conducted in 1991. This study involved former special education students and was conducted to assess mainstream outcomes for urban students with disabilities. These students had been prepared for employment by being mainstreamed into regular vocational education programs. Some of the students surveyed had attended the same urban school system as far back as 1986. A vocational school completer survey form was developed to collect relevant data. The survey included open and close-ended questions regarding student demographics, school experiences and employment information. The survey results revealed that all of the respondents had worked at least one unskilled or semi-skilled job since high school. The results also indicated that a majority of the students worked in fields outside of the vocational training area they had completed. All male and female respondents had been employed, yet they were unemployed more often than they were employed. The implications of these findings could mean that unemployment problems for youth with disabilities didn't necessarily stem from the labor market, but rather from the individual students' lack of employment-related knowledge and experience. These results implied that successful participation and completion of vocational education in high school did not guarantee employment (Schwarz and Taymans, 1991). These reports point out the importance of courses like technology education providing all students with the skills needed to become self-sufficient; however, the best prepared job seeker is still subject to supervisory scrutiny.

In 2000 Kilgus conducted a study on a topic similar to that of Schwarz and Taymans. The purpose of this research was to examine the job market for students with

disabilities relative to evaluator's personal opinions. This study sought to determine if a difference existed between employment supervisor and teacher social skills ratings for students with disabilities. This researcher sought to connect a bridge between employers and educators of students with disabilities. The results revealed that employers ranked all students' social skills differently from teachers; however, there appeared to be no significant difference in the rank given to these students by employers or teachers (Kilgus, 2000). There has been much interest in the effect that teacher attitudes and opinions has on student performance. Some people believe that the interaction between teacher and student could be credited for some of the variations in student achievements. Some studies, such as the ones listed under teacher perceptions, explore the possibility that teacher opinions, attitudes and perceptions could have an impact on the ability to learn for some students with disabilities.

Teacher Perceptions

Research conducted by Zaner in 1978 attempted to reveal curriculum attitudes and practices for use in developing teacher training curriculum for industrial arts at the University of Maine. This study utilized 100 randomly selected teachers who were polled via mail surveys. The topics these teachers were polled on included professional and demographic data as well as attitudes regarding students with disabilities. The results of this study revealed that 59% of the respondents indicated that they were making specific provisions for learning disabled students in their programs; however, 40.3% indicated that they were not making any special provisions. Some of the recommendations industrial arts teachers made included revising undergraduate curriculum in response to current trends. These revisions would include a stronger study

of discipline issues and strategies to educate students with disabilities (Zaner, 1978). The data implies that these teachers could have some resistance to the ideals of mainstreaming. This resistance could account for some of the poor classroom performances recorded among students with disabilities. The high percentage of teachers who abstained from course modifications could have resulted from a genuine fear, possibly associated with a lack of knowledge and training to cope with students with disabilities. The attempt to pinpoint some of the root causes for this and other problems associated with mainstreaming resulted in other studies which attempted to determine teachers' opinions in courses related to technology education regarding students with disabilities mainstreamed into regular classes. One such study is listed here.

Avery's study took a novel approach toward assessing the attitudes of teachers toward working with students with physical disabilities who were enrolled at the Auburn University in1982. His study attempted to help these teachers demonstrate a more positive attitude toward students with disabilities. The study used the Attitude toward Disabled Persons Scale to survey all of the 67 agribusiness and technology students enrolled at the university at this time. Some of these inexperienced teacher trainees were used as a control group. The study was designed for participation by groups in pre and post tests. The study also included an activity to be performed by the treatment and experimental groups. The treatment involved two components. The first component was to perform a woodworking activity. The second phase was to perform the same activity using a prosthetic simulation device. The results revealed that a significant difference in anxiety level in attitudinal scores existed for the experimental group. The experimental group also showed a significant difference in pre and post test scores for attitudes toward

special needs students. The researcher recommended that education and industry teacher educators incorporate simulated disabilities into training programs to sensitize teachers to the needs of students with disabilities and improve teacher attitudes (Avery, 1982).

The influence of teacher attitude on students was made even clearer by a 1989 study by Honaker and Henderson, which examined secondary vocational horticulture teachers in Ohio. Some of the parameters assessed by this survey were teacher attitudes toward students with disabilities, and how these teachers felt about integrating these students into regular vocational programs. Demographic data gathered included years of teaching, level of education, in-service training, and any other experience related to students with disabilities. The findings indicated that the most positive teacher attitudes were found to be towards students with learning disabilities. The least positive attitudes were toward students with behavioral disabilities. These results were independent of years of experience, in-service training, other experience, and number of students with disabilities in the class. The author recommended in-service training for teachers possessing less positive attitudes, and more support for teachers with students with behavioral disabilities (Honaker and Henderson, 1989). This study seemed to imply that teachers can react differently toward students with disabilities depending upon the types of disabling condition the student may have. The results do not explain how teacher reactions impact upon students or why teachers react a particular way. These studies indicated that a collective effort was underway to make progress toward the goal of better educating students with disabilities in regular classes related to technology education. They also revealed that barriers to the support and services necessary for seamless integration still existed. Some of these barriers such as, time constraints and information

gaps had surfaced repeatedly as problems associated with mainstreaming.

Shipley conducted an informal survey in 1995. This study examined some of the problems associated with mainstreaming from the perspective of a parent. This survey reflected mixed attitudes about mainstreaming. Some stakeholders had expressed feelings of frustration, confusion, apathy and anger regarding inclusion. These attitudes and opinions varied between stakeholders, since neither all teachers nor all parents agreed on the merits of mainstreaming. This opinion poll included feedback from 18 parents whose children were categorized as students who were considered disabled, gifted, or non-disabled students. The poll included feedback from 28 teachers as well. This survey instrument included questions from three categories. The first question was related to the necessity of mainstreaming. The second question was related to who benefits from mainstreaming. The third question related to teacher preparation for mainstreaming. Responses to the first group of questions were mixed. One group of the parents polled agreed with teachers that appropriate and least restrictive educational environments were important. A second group of respondents felt a child should learn at his own pace. A third group of respondents felt students should be taught according to individual needs. A fourth group of respondents felt everyone benefited from inclusion, socially. Responses regarding the benefits of mainstreaming were less mixed. The majority of parents responding felt that inclusion should be limited to those students who could adjust to change easily. Many of the teachers who responded felt that students were hurt as a whole by inclusion. Responses to teacher preparation issues were virtually unanimous. The poll revealed that 94% of teachers and 98% of parents polled agreed that teachers were not adequately trained for inclusion (Shipley, 1995). This report revealed a

different perspective of mainstreaming, since it included feedback from parents. The results of this informal poll could have been reflective of other stakeholders' opinions regarding mainstreaming. These respondents repeatedly listed unfavorable attitudes and inadequate preparation as problems associated with mainstreaming.

A study conducted in 1998 by Scott, Vitale and Masten, examined classroom teachers' perceptions and use of instructional adaptations in general education classes to facilitate mainstreaming. This study revealed that general educators were positive and desirous of making instructional adaptations for students with disabilities. Another implication from this study was that when students with disabilities were included in general education classrooms the teachers were unlikely to alter traditional whole-group instructional strategies in favor of specific individualized adaptations. These findings led educators to conclude that some of the reasons for this unwillingness to change could have resulted from a lack of teacher training and limited school support. These persistent problems continued to act as barriers to some teachers' ability to accommodate individual needs of students with disabilities who had been mainstreamed into regular classes (Scott, Vitale and Masten, 1998). Educators had made progress toward the goals of mainstreaming; however problems related to attitudes and proper training continued to surface.

Bookhart conducted a case study in 1999 to determine some of the similarities and differences of perceptions between regular and special education teachers. The results of this study revealed that some students mainstreamed into regular class still preferred to be in the special education classroom. This study also revealed that the teachers were favorable toward the inclusion programs; however, they felt they lacked

the resources needed to make the venture a success. The conclusions of this study implied that the inclusion program was good; however, the needs of the special education students were not completely satisfied (Bookhart, 1999). This study again reiterated some of the positive and negative attributes associated with mainstreaming. Mainstreaming had been widely accepted as a fact of life for educators. Some of the problems associated with mainstreaming continued to emerge. One of these problems was the information gap that existed between integrated classrooms and the teachers who managed these classes.

This problem with a lack of information was the basis for a study by Luseno. The researcher conducted a study in 2001 that sought to determine if secondary special and general education teachers in Virginia who worked in mainstreamed settings, had positive attitudes towards inclusion and students with disabilities. The study also sought to determine if these teachers perceived themselves as capable of adapting instruction for students with disabilities or had the resources and support needed to make these changes. This study also tried to determine if these teachers felt they had enough knowledge regarding instructing mainstreamed students or had fashioned effective collaboration efforts between special and general education instructors. The study also sought to identify the types of support services these teachers received for students with disabilities. The study results revealed that special education teachers had more positive attitudes than general educators toward inclusion. Special education teachers perceived they had better capabilities for adapting to students with disabilities. The results also showed that special education teachers felt they had the support and resources needed to work with students with disabilities and had a greater sense of efficacy for working with

these students than did regular teachers. The results of this study indicated that both groups of educators had negative attitudes about including students with disabilities in regular classrooms, (regardless of disability level), especially students with mental retardation, behavioral disorders, and multiple disabilities. These teachers agreed that these students did not have the skills needed to master the course content in regular classrooms, and the teaching load in regular classrooms made it difficult to meet the needs of students being mainstreamed.

Luseno's study contained some of the measures these educators stated that could be used to facilitate mainstreaming. The special education teachers stated they needed more influence in decision making, smaller classes, and collaboration on student placement issues. The list of needs for general educators is more detailed. General educators indicated they needed support from parents, more resources, assistance with school administrators who hold all students to equal standards, and behavior management training. General education teachers also expressed a need for training in special education and strategies for working with disabled students. Both groups of educators requested more clarification on their responsibilities and roles in mainstreamed classrooms, smaller classes, and more help. It was recommended that school districts work with teacher education providers to give both groups of teachers information sharing workshops and in-service training that would enhance knowledge of strategies and legalities for educating students with disabilities. Both groups of educators would also need adequate time to plan and collaborate. These educators would also need district support for implementing inclusion along with the proper equipment, resources and support. The administration would need to take measures to provide these teachers with

smaller classes, the teaching materials, and other resources needed to facilitate mainstreaming. This study also recommended that administrators get additional training since it is unadvisable for the regular classroom to be deemed a least restrictive environment for all students, regardless of disability or teacher preparation. They felt that inclusion could be more effective when it was based on individual student needs and adequately prepared teachers. This researcher concludes that university programs should address these needs to help school districts succeed in implementing mainstreaming since "failure to do this will only result in placing students with special needs in classroom environments where teachers cannot help them achieve expected standards and outcomes" (p. 53). (Luseno, 2001). The results of this research revealed that some of the same issues that industrial arts and vocational education teachers faced during the early stages of mainstreaming are still an issue for teachers in the 21st Century. This study illustrated that both groups of teachers were open to the idea of inclusion; however, neither general nor special education teachers considered inclusion to be appropriate for some categories of students with disabilities. These teachers questioned if students would gain any educational benefits at all from mainstreaming. This study illustrated the importance of preparing teachers to educate students with disabilities before the goals of mainstreaming can be fully realized. The results of this research illustrated how the challenges that technology education teachers faced were very similar to the challenges faced by regular education teachers relative to inclusion. These findings also implied a need could exist to better prepare technology teachers for the challenges they will face while attempting to educate students with disabilities in regular classes.

Teacher Preparation

One of the early advocates for effective teacher preparation was Buffer. He wrote a review article in 1973, which used material written during the previous decades to conclude that industrial arts education literature contained few educational benefits for some categories of students with special needs. He suggested that in order to facilitate services to students with disabilities, industrial arts teachers should reconceptualize the rationale for industrial arts at all grade levels then restructure instructional objectives into behavioral terms. Other recommendations he made included a need to provide in-service education for teachers (Buffer, 1973). This article was an early indicator of a need for effective teacher education initiatives. These pre and in-service educational services were needed in order to provide the regular teachers in classes predating technology education with effective strategies for educating students with disabilities.

A comprehensive study published in 1980 by Taylor, revealed a need for the identification and verification of competencies that industrial education teachers needed to educate students with disabilities. The author stated that a need existed to educate industrial education teachers to educate students with disabilities in regular classes. This author conducted a review as the basis for developing a competency list with specific teaching models which included information on proper diagnosis, prescription, treatment, and evaluation of special students. The initial list of competencies was reviewed by a panel of experts in vocational, special and industrial education. The survey population included all industrial education teachers in Maine. The respondents rated the competencies from essential to not essential. The results indicated out of the 147 competencies, that pre-service was the most opportune time to train for 53 of the

competencies, in-service was considered the best time for 66 competencies and 28 competencies could be taught either way. The study revealed that education in skills needed to educate students with disabilities should be considered part of the requirements for teacher education (Taylor, 1980). The need for teacher preparation agencies to better equip teachers in disciplines related to technology education was an important element relative to providing an education to students with disabilities.

Doty conducted a 1982 study which examined this issue of mainstreaming from the perspective of the teacher. The purpose of this research was to identify perceived in-service training needs for industrial arts teachers for working with disabled students. This study revealed the industrial arts teachers perceived in-service training needs for educating students with disabilities. There were 300 industrial arts teachers polled out of a universe of 1,529 industrial arts teachers in Texas during the 1981-1982 school year. The survey instrument polled areas such as demographics and perceived in-service training needs. The survey also inquired about preferred delivery method for in-service training. The study results indicated a clear need for in-service training for industrial arts teachers educating students with special needs. Legislative mandates created the need for teachers educating students with disabilities to receive training for this population; however, only 40% of the industrial arts teachers polled had received this training. The number of respondents expressing at least some need for training in each area identified by the survey instrument was 77%. Teachers with four years or less experience did not indicate as great a need for training as did other categories of teacher on how to choose the proper educational materials for special populations. The results from this study led the author to conclude that industrial arts teachers must receive in-service training for

working with disabled students. The programs offered should cover topics such as teaching methods, assessment, facilities evaluation, and equipment management (Doty, 1982). Teachers in disciplines predating technology education expressed a need for further training with students with disabilities. This additional training could help these teachers become more effective in educating diverse student populations. Some of the specific areas of need for further instruction were the topic of interest to a number of technology education teachers.

A few years later, Parrish and Colby (1986) wrote an article which described some areas of need for vocational teachers. They stated that pre and in-service training programs for these teachers should stress generalizable skills in addition to training in other areas. They recommended that these teachers be kept informed on current trends and be educated in cross disciplinary subjects to provide a broader array of courses, which would prepare students with disabilities for the increasing demands put on workers. It was also suggested that teacher educators collaborate with business and industry to provide internships for upgrading teacher skills and knowledge. These authors pointed out that vocational teachers provide a unique educational opportunity by preparing students for productive academic and employment opportunities, which possibly help to decrease some societal barriers. Vocational teachers endeavor to impart marketable skills to students who had various levels of ability in order to prepare students who are productive employees and citizens (Parrish and Colby, 1986). The ability to consistently deliver educational programs that provide all students with the tools necessary for successful participation in society has been an important goal for technology education as well as courses related to this discipline.

Some of the road blocks to arriving at this goal were addressed by Gugerty in a 1987 review article which examined current research that suggested graduates of this country's public schools special education programs were unprepared to be self sufficient personally, vocationally, or economically. The article stated that these students left secondary education unprepared to find employment or sustain economically self-sufficiency. The article went on to say that vocational teacher educators could make a significant effort toward correcting this problem by preparing teacher trainees who understand the importance of providing a formal vocational program to special needs students. These teacher trainees should develop the necessary skills to provide the training or resources that special students need to become self-sufficient (Gugerty). The repercussion of a failure to provide adequate courses such as technology education and vocational education for students could make the transition from student to self sufficient citizenship difficult.

Martin wrote in 1987 concerning the need for effective instruction in industrial education. The purpose of the article was to improve educational and social outcomes for students with disabilities. He stated that disadvantaged students may be considered as losers or low achievers. He also said that vocational education placed a high priority on helping these students who typically had problems with math, reading, language, and writing. He later added that teacher training programs needed to address these issues. He recommended that the vocational education department use a project called Promoting Student Achievement, Teaching Behaviors that Work, to better serve disadvantaged students (Martin,1987). The need to provide all students with the types of information they needed for success in the real world continued to be a concern for technology

education related courses. It is important to produce teachers who are adequately prepared to meet the needs of special populations.

Linari and Belmont (1988) discussed a method educators could use to facilitate the preparation of students with special needs for future success. They stated that inclusion of students with disabilities in regular vocational instruction is a widespread and multidimensional phenomenon which had created a responsibility for vocational education and special education teachers to meet the needs of students with disabilities. This author suggested that one method to facilitate inclusion of secondary students with disabilities was to employ a vocational resource specialist. This specialist was to provide instructional assistance to students and faculty. The specialist could come from a variety of backgrounds as long as the specialist had a thorough knowledge of vocational areas and an understanding of the educational needs for students with disabilities. Some of the strategies used to help students with disabilities succeed included the provision of additional assistance to the regular classroom teacher. Another measure the specialist should take could be the modification of vocational textbooks to make them more reader-friendly for students with disabilities. The specialist could also assist the teacher by making modifications to curriculums as well as providing alternative evaluation measures (Linari and Belmont, 1988). Teachers of courses related to technology, such as vocational education, needed to become aware of measures that could improve educational outcomes for students with disabilities and then act on these measures.

A study conducted in 1989 by Eshenmann, identified the extent to which knowledge of students who were disadvantaged or had disabilities, was as part of statewide certification requirements for non degreed trade and industrial teachers. The

study involved polling trade and industrial education staff from ten states, including North Carolina. Trade and industrial education teacher education department heads and teachers were selected to participate in the survey from a directory. The results of this survey revealed that respondents from eight of the states polled expressed confusion regarding certification course requirements and less than 1/3 of the respondents reported receiving funding. These results show there had been little change in the past eight years toward preparing non-degreed trade and industrial teachers to work with students who were disadvantaged or disabled (Eshenmann, 1989). The results from this study indicated there remained areas of concern regarding effective preparation of teachers to educate students with disabilities.

Jones and Black provided another example of efforts to pinpoint areas of need regarding teacher preparation in 1995. The purpose of this study was to examine teacher certification requirements for non-vocational and vocational teachers regarding students with disabilities. It provided the vocational special needs supervisors' perspective of teacher certification requirements and the supervisors' perceptions regarding readiness of vocational teachers to educate students with disabilities. This research was conducted partly in response to the significant number of studies that implied teachers had not been adequately prepared to educate students with disabilities. This study used two separate questionnaires to address research questions regarding the certification requirements for regular and vocational teachers and perceptions of the state vocational special needs supervisors regarding the adequacy of certification requirements for these teachers. The results of this research revealed that 78% of the respondents felt the requirements were not sufficient although 78% of first year and 24% of all vocational teachers received in-

service training. Results from this study implied that vocational teacher preparation programs needed reform in order to become more effective in providing these teachers with the training needed to educate students with disabilities (Jones and Black, 1995). The feedback from this study indicated that more teacher preparation programs needed to improve the quality of training provided in disciplines related to technology education such as vocational education on topics regarding students with disabilities.

Another study was conducted by Womble and Turner in 1997, which tried to pinpoint specific areas in which vocational teachers needed to improvement. This study was intended to determine vocational teachers' knowledge of the characteristics of at-risk learners. The sample included 392 vocational teachers in the state of Georgia. The results of this study indicated that the vocational teachers of the middle school had a good foundation of knowledge concerning the characteristics of students at risk of dropping out of school, which could help these teachers identify and assist students to remain in school. The respondents were able to identify the characteristics for at-risk learners as reading below grade level, being older than peers, and excessive absenteeism. The data revealed teachers had a pessimistic or negative opinion of their ability to convince these dropouts to return to school. Some teachers believed that early identification of these students could help prevent failure, and dropout. Vocational teacher education programs need to equip middle school teachers to identify students who are disabled or at risk, in order to equip these students with the knowledge and attitudes that will help them become successful. This information could be helpful if included in teacher preparation programs (Womble and Turner, 1997). This research was one of the early attempt to identify the specific skills vocational teachers needed in order to more effectively educate

students with disabilities.

Another attempt to identify specific skills teacher need was a study that Howell conducted in 2000. This research sought to identify the types of knowledge, experience and attitudes industrial technology teachers needed to educate students with disabilities. The study also sought to utilize this information as the basis for future training needs for industrial technology teachers. The researcher used a questionnaire to gather data on the types of formal training teachers received for educating students with disabilities. The teachers who responded to the survey felt that they had the skills needed to teach students with disabilities, but could improve results with more training. These participants also indicated that including students with disabilities was appropriate and they could adapt instruction to meet needs of students with disabilities. The respondents indicated that they needed additional training, support, and more help developing IEP's. These results led to the conclusions that industrial technology teachers had a need for additional training in educating students with disabilities. The respondents indicated that their preference to receive this needed training would be ranked in the following preference order: Professional days at school without students, release time from school to attend training, college courses meeting weekly, or summers and weekends (Howell, 2000).

Evanciew (2003) also provided information regarding the teacher preparation skills technology education teachers needed in order to effectively include students with disabilities into regular classes. The researcher pointed out that inclusion in technology education classes would be beneficial to students with special needs due to the hands-on approach to instruction incorporated into technology education. The practical approach to instruction has been researched for its apparent educational benefits for students with

disabilities and could lead to future success. Evanciew emphasized the fact that although federal mandates required students with disabilities to have IEP's technology education teachers are often not aware of, nor involved in the development of these documents. There are two important reasons it is essential to include the technology teacher in the IEP development. The first reason is that students with disabilities produce better educational results when engaged in the psychomotor activities embedded in technology education classes. The second reason is that involvement and review of the IEP could help the technology education teacher to make the accommodations some students with disabilities may need to be successful. Evanciew pointed out that the types of accommodations students need for success must be incorporated into the lesson without modifying the lesson, since a watered down curriculum may not be sufficient. The realistic experiences that technology education provides through its action-based method of delivery can lead to future successes for students with disabilities. The effective use of the IEP in the technology education classroom could impact students with disabilities by fostering short-term success academically and long-term success occupationally. (Evanciew, 2003). This article illustrates the necessity for technology education teachers to fully understand and participate in the IEP development. Teacher preparation programs that provide this important information can help technology teachers become more successful when educating students with disabilities. Technology education teachers who are better prepared to educate these students could help to improve educational outcomes for students with special needs.

Summary

The review of literature on this topic revealed a concerted on going effort on the part of TED teachers to provide all students with the analytical and problem solving skills needed to become productive members of a global society. The students that these teachers are educating are increasingly diverse. The prospect of a TED teacher in the classroom with the responsibility of educating a student with a disability is an increasing in probability.

TED teachers have historically faced the challenge of mainstreaming head on and used the resources at their disposal to solve problems associated with this endeavor. Some of the initial problems included tangible and intangible barriers which made gaining access to facilities and opportunities difficult for students with disabilities. TED teachers have a rare obstacle to face since their classrooms also include laboratories. These teachers have joined in the effort to make classrooms and labs more effective learning environments for students with disabilities.

Some of the of the tools utilized by TED teachers during the early stages of mainstreaming included developing and incorporating successful strategies for educating students with disabilities. TED teachers began compiling these strategies into comprehensive educational guides and programs. These tools served to extend the ability of TED teachers to more effectively educate all students in their classes including those with disabilities. Providing all students with the information and practical skills they will need to be successful in society is a basic service that TED teachers provide for all students; however teachers' perceptions of the best methodology for meeting this goal varies. One of the most commonly cited means for arriving at this end has been

identified as effective teacher preparation. Since the onset of mainstreaming, TED teachers have historically and continually called for more training in areas that will increase their productivity and effectiveness in the classroom.

CHAPTER III

INVESTIGATIVE PROCEDURES AND DESIGN

Experimental Procedures

The purpose of this study was to determine the extent to which technology education teachers perceive they are effective in educating students with disabilities. The methodology used to conduct this research was similar to that utilized by Doty (1982). This research examined a similar population, TED teachers in North Carolina, whereas Doty studied industrial arts teachers in Texas. The survey instrument utilized in this study was modeled after the one developed by Doty. A few of the steps Doty followed to develop his survey instrument are overviewed here.

Doty's Instrument Development & Procedures

The steps Doty undertook to assure usability, validity and reliability were to construct the original instrument, and perform revisions based on a pilot study. Doty began by reviewing industrial arts teacher studies. He found no studies in industrial arts that provided the specific measures he wanted; therefore he investigated vocational education, where he found information that helped him to develop his survey instrument. His instrument included sections on perceived needs for additional teacher training, preferred delivery methods for this training as well as demographic data. He utilized a panel of judges consisting of professional educators to strengthen the validity of his instrument. He revised his survey based on their input. Doty then pilot tested, and followed up on the survey instrument. He performed a correlation coefficient on each

item, and finally revised his survey based on this analysis. Doty's population consisted of the 1499 industrial arts teachers working in Texas. His sample was comprised of a stratified random sample of 300 teachers. He had 212 responses, or a 70% response rate, which represents 14% of the entire universe.

Investigative Procedures and Design for This Research

The steps undertaken in this research closely paralleled those taken by Doty. The categories of data gathered were demographics, teaching strategies, training needs and preferences. The survey instrument closely resembled the one Doty created. The differences resulted from modifications via validity tests by professional committees. The validity of the instrument was strengthened by getting feedback from the reviewers. The reviewers included three technology education professionals, one career-technical county administrator, and one special populations county administrator.

The feedback from the first technology education professional was very specific regarding the construction of the survey instrument. This individual focused on the appropriateness of the survey format design for allowing the subjects an opportunity to express their opinions. This individual stressed stating questions clearly and utilizing enough space to provide the answers requested. The second reviewer focused on using current terms relative to technology education. He made resources available for checking the accuracy of the terms used on the instrument pertaining to the types of technology education courses taught and the delivery systems associated with technology education . The third technology education professional functioned in an administrative role. This individual gave input about the overall appearance and accuracy of the document. This

reviewer pointed out a number of typographical errors, omissions, style of writing and font. The fourth reviewer served in an administrative role for CTE. This individual made comments regarding the overall survey instrument which included the topic of discussion. The fourth reviewer gave positive feedback regarding the timely choice of subject and expressed and interest in the outcome of the research. The fifth reviewer was a special populations county administrator. This individual looked carefully at the terms that related to students with disabilities. This viewer confirmed that list of disabling conditions and intervention strategies utilized for this study were accurate. This fifth reviewer also provided additional resource materials relative to the policies and procedures that relate to students with disabilities state-wide.

The survey document was revised based on feedback from these reviewers. The questions that required an open ended answer were replaced with likert scale items. Some of the other changes made to the document were to align questions in each section and to provide additional space for responses labeled 'other'. The instrument was comprised of three major sections. The first section collected demographic data. The second section gathered data relative to the types of students with disabilities served as well as any training received for students with these disabling conditions. This section also gathered data on the teaching/learning environment as well as impacts on student outcomes. The third section of the survey queried if there be a need for further training relative to students with disabilities and the preferred methodology for receiving any training. A few definitions were added to add clarity for some recipients of the survey instrument who may not be familiar with the terms chosen. The final version of the

survey instrument was printed two-sided on three panels of a regular sized sheet of paper, in booklet form.

Subject Source

The participants in this research were the technology education (TED) teachers in North Carolina. The sampling frame was obtained from the North Carolina Department of Public Instruction (NCDPI). The list contained 323 names and was received via email within minutes of the request. Each participant was assigned a random number to facilitate confidentiality and to mailing follow-up surveys. These random numbers were hand written on the back of each survey instrument. The initial proposal for this research suggested taking a stratified random sample of the names included on the list, from the six geographic regions into which North Carolina is divided. The final survey actually included the entire universe of TED teachers in North Carolina. The rationale behind this decision was to increase the accuracy of the survey results by using the largest sample possible. This research was intended to be generalizable to all of the TED teachers in North Carolina.

Sampling Procedures

The sampling frame was obtained by making a call to the NCDPI to request a listing of high school TED teachers in North Carolina. The list was sent via email. The document included the names and school addresses for the entire universe of high school TED teachers in North Carolina. Survey instruments were mailed to each person on the list.

The number of respondents who actually returned the survey instruments was low. The return rate was 119 out of the population of 323 recipients, which equates to a 36.8%

response rate for this survey. The random code number was entered into the spread sheet for each survey which was returned. This identification information was included in the grand totals to demonstrate respect for each of the 119 individuals who sacrificed their time to return the surveys. The input from some of the participants was not counted in the final analysis. Information from the 14 unlicensed TED teachers who responded was entered as zeros. The reason for this omission was due to the possibility that variations in these responses could be due to factors unrelated to TED. There were four instruments excluded because these licensed TED teachers were not currently teaching TED. Finally there were four other surveys left out due to responder errors. This resulted in 97 or 30% of the surveys containing analyzable data.

Instrumentation

This survey instrument was modeled after a similar survey instrument first utilized in 1982 by Dale Doty. He used his survey instrument to measure the perceived need for additional training by industrial arts teachers. Industrial arts teachers were the forerunners to technology education teachers. Doty recognized a problem existed due to the influx of students with disabilities into regular industrial arts classes; he also had difficulty finding studies on industrial arts. The industrial arts teachers were expected to teach students with disabilities with little or no additional training. Doty sought to determine the degree to which these teachers felt they needed additional training to cope with increasing numbers of diverse populations (Doty, 1982). This present research is similar in that it sought to determine the extent to which technology education teachers educate students with disabilities. Doty's concept of the information needed to determine industrial arts teachers' need for additional training was an important factor in

determining the types of information to include in this study as research questions and survey items. One issue of particular interest while conducting this research was to determine if technology education teachers expressed concerns about deficiencies in some of the same key areas and in the same degree of intensity as industrial arts teachers had decades ago. A couple of these areas include: experience developing an IEP and a perceived need for additional training.

Measurement Characteristics of the Instrument

Category 1

This instrument contains 99 self-report items. Demographic information is gathered via the first 35 items. Questions one and two allowed room for open responses to informants' college major and year the degree was earned and how many years of experience each teacher had. The third item queried which TED classes were being taught. Items four and five questioned the total number of students and the number of students with disabilities being taught. The sixth item questioned if teachers had worked with students who were members of the various types of exceptionalities and it there had been training for any of the disabling conditions (NCPDI CTE, 2004). All responses required a yes or no answer. Item number seven also required a yes or no response and it sought to determine if teachers had experience in IEP development.

Category 2

Each of the following 5 sections required responses on a likert scale which ranged from 1(not effective) to 4(very effective). These items were numbered eight through thirteen on the survey instrument. Item number eight included three questions which

examined teachers' perceptions of efficacy and comfort educating students with disabilities. Number nine on the survey included six items which addressed teachers' perceptions of efficacy for various in-service training methods. The tenth question included four items which probed the type of TED delivery system considered to be most effective. Item eleven assessed the effectiveness for 16 different types of intervention strategies. Question twelve was a single open ended response query which sought to determine which type of disability requires the most time. The thirteenth item included the last three divisions in this section and evaluated the contribution of TED curriculum to students.

Category 3

The final category of questions related to additional training. The fourteenth question in this category required a yes or no response, regarding need for additional training. Item fifteen included nine questions which specified particular areas of training need. The questions regarding additional training were some of the same ones Doty asked in his 1982 study. A five-point likert scale was utilized: 1(no need), 2(slight need), 3(some need), 4(greater need) and 5(major need). The sixteenth and final item in this section required a yes or no response request that a copy of research results be sent to interested respondents.

The changes recommended during the validity test were made to the survey instrument. The instrument was typed and mailed via the US Postal Service on November 10th. A time span of one month was allowed before follow up letters were mailed on December 10th, due to the Thanksgiving Holiday which fell between these two mailings.

Procedures

The steps involved in conducting the study included designing a cover letter and a survey instrument which was modeled after Doty's instrument. Each respondent was assigned a unique random number, which was written on the back of each survey instrument to allow tracking. The cover letter and survey instrument were submitted and approved by the North Carolina State University Institutional Review Board. A token was designed by this researcher and produced to specifications. The token was a book marker which read "Technology Education Teachers Have Class", which was printed on 20 weight, glossy, white paper in red ink. There were 323 tokens produced and inserted into the envelopes along with the 323 cover letters, survey instruments and self addressed stamped envelopes (SASE) to comprise a complete packet for each respondent. Labels were printed for the SASE and the cover letter; however, due to limited label space the respondents' names were handwritten on each envelope. Tokens had to be special ordered to accompany the packets. The tokens were book markers printed on white glossy card stock, which read "Technology Education Teachers Have Class". All of the packets were mailed collectively on November 10th from the main post office in Greensboro, NC. The majority of the initial responses came back within the allotted two week waiting period; however, those numbers quickly dwindled and only a few letters trickled in for the next week. The Thanksgiving Holiday interrupted the data collection process; therefore, an allowance of an extra week of data collection was utilized to allow additional time for any respondents who may have been affected by the Holiday.

The response to the first mailing of the survey was small. Only 79 people responded to the first mailing. The respondents were cross referenced utilizing the random numbers

assigned earlier. The random numbers were written at the end of return zip code on the follow-up surveys, since a couple of respondents blotted the random number out on the initial instrument. None of the respondents blotted out the random number on the follow-up letter. The follow up survey of 245 cover letters, survey instruments and SASEs were mailed on December 10th. An address stamp was purchased to stamp the return address on the SASE and the cover letter; however, each respondent's address was hand written on each envelope. The follow-up letters were mailed from the Yanceyville Street post office in Greensboro, to the non-respondents. The response to the follow up letter was similar to the initial survey since only 40 respondents returned the surveys.

CHAPTER IV

FINDINGS

Technology Education is an action-based course of study which benefits students by preparing them to utilize hands-on activities which help them to apply the principles of technological literacy in diverse areas of their lives. Students who are analytical thinkers and problem solvers are better equipped to meet the challenges posed by an increasingly high-tech global community. Productive citizens of a democratic society are better prepared to make positive contributions in life for themselves and others.

The TED teachers who provide this solid foundational education need to remain on the cutting edge of technology in order to present an accurate, effective, solutions-oriented education to students. These teachers must receive the most comprehensive and precise educational tools available which will best prepare them for the challenges they will face while educating increasingly diverse populations of students. One segment of this diverse population includes students with disabilities. TED teachers have endeavored to provide students with disabilities the same high quality education that they provide to all students.

This survey attempts to determine how effectively TED teachers in North Carolina perceive they educate students with disabilities. This research utilized a survey instrument in order to gather feedback from this population. Each question from the survey is listed in this chapter along with the responses gathered for each question. The research questions, which were foundational for the survey, are provided. The surveys were entered into a Microsoft Works spreadsheet. The Microsoft Works Spreadsheet was downloaded into an Excel Spreadsheet. The Excel Spreadsheet was uploaded into SPSS

for further analysis. The data was analyzed at the C.H. Moore building on NC A&T SUs' campus. The excel spreadsheet was also loaded into SAS for further analysis via consultation with the statistics department on NCSUs' Campus.

Research Questions

The data analysis will seek to determine if there are significant differences between licensed TED teachers who majored in TED and licensed TED teachers who did not major in TED. The research questions that guided this study were:

1. Do North Carolina technology education teachers (TED) perceive they are prepared to make input in the development of IEPs for students with disabilities in their TED classes?
2. What intervention strategies have technology education teachers used for students with disabilities in their TED classes?
3. What are the major contributions of TED curriculum toward educating students with disabilities in their TED classes?
4. What is the most time consuming problem that technology education teachers perceive they encounter relative to students with disabilities in their TED classes?
5. Do in-service technology education teachers perceive that they need additional training relative to students with disabilities enrolled in regular TED classes? If so, what type of training would be recommended for these teachers?

The Survey Instrument

This survey instrument gathered three basic categories of information. The first category was demographic background. Demographic data were gathered on both the TED teachers and the students. The data on the instructors included information

regarding educational background, years of teaching experience, the types of TED courses taught, and the numbers of students in their classes. The information gathered on the student populations served included the total numbers of students taught, the number of students with disabilities taught, the types of students with disabilities taught and training received for students with disabilities. The second category of information gathered from this survey included material regarding TED teacher perceptions, practices, preferences and opinions of TED phenomena as they relate to students with disabilities. The third category of questions on this survey polled teachers for perceived needs for further training relative to students with disabilities.

Frequency data was collected and ranked according to mean in tables. The significant manova and anova data was also tabulated. The survey items analyzed were 8, 9, 10, 11, 13 and 15, the results are tabulated and listed here. The first four categories of questions required a response on a four point likert scale which ranged from: Not effective (1) to very effective (4). Responses to the third category of questions listed under item 15 related to in-service training and utilized a five point likert scale with values ranging from: No need (1) to major need (5).

Responses to Survey Items

Surveys were mailed to each of the 323 TED listed on the sampling frame emailed from the NCDPI. A total of 119 surveys were returned. The returned surveys which were not usable totaled 22. The unusable surveys were either filled out incorrectly or submitted by non-licensed TED teachers or licensed TED teachers who were teaching scientific visualization instead of TED. The data from non-licensed respondents was omitted from this research due to the possibility that variations in responses could stem

from issues unrelated to this survey; such as, becoming familiar with the requirements associated with teaching or becoming familiar with the requirements associated with the technology education curriculum. This left a total number of 97 usable surveys or 30% of the entire universe of TED teachers in North Carolina. The response rate data is listed in Table 1.

TABLE 1

TED Teacher Response Rate

TED teachers	Returned Surveys	Mailed Surveys	Rate of Return
Total	119	324	.36
Non licensed	14	119	.11
Scientific Visualization	4	119	.03
Incorrect surveys	4	119	.03
Usable Surveys	97	323	.30
Licensed TED majors	48	97	.49
Licensed non TED majors	49	97	.50

Methods of Data Analysis

The results were ranked by the mean and listed in frequency response tables. Both anova and manova statistical analysis was performed on these data. There were some slightly significant anova values found for segments of items eight, eleven and thirteen. However, this analysis revealed no significant manova results since the survey items yielded no significant P values at the 5% alpha level.

Category 1: Demographic Data

The questions on this survey gathered demographic data on the TED teachers, which included their educational background, licensure status, years of teaching experience,

types of TED classes taught, training received relative to students with disabilities, and experience developing an IEP. The respondents reported 96 teachers had undergraduate degrees. Three informants did not indicate the type of degree earned. The survey revealed that 56 respondents had graduate degrees at the masters' level. There were two respondents who had doctoral degrees. That equates to 59% of the sample having advanced degrees. The number of teachers included in this survey both licensed to teach TED and who majored in TED totaled 48. The types and numbers of undergraduate and graduate degrees reported by licensed TED teachers who did not major in TED are listed in Table 2.

TABLE 2

Types of Degrees for Non-TED Majors

Major	Teachers	Major	Teachers
Industrial technology	15	Computer science	2
Engineering	10	Phpysics	2
Education	5	Recreation	1
Vocational education	5	Math	1
Science	3	Home economics	1
Industrial education	2	Guidance	1
Biology	2	Business	1

The second item polled the number of years of TED teaching experience the respondents had. The number of teachers with experience is listed in Table 3.

TABLE 3

TED Teachers' Years of Teaching Experience

Years of teaching experience	1-5	6-10	11-15	16-20	21+	NA	Total
Respondents	27	19	8	8	20	15	97

There were five categories for experience. The categories ranged from 1 to more than 21 years of experience. The category that was selected most frequently by respondents was 1 to 5 years of experience.

Item three queried the types of TED courses each respondent taught. The choices were: structural systems, transportation systems, communication systems, manufacturing systems, fundamentals of technology, principles of technology I, principles of technology II, and advanced studies. A number of respondents reportedly taught multiple courses. There were 22 teachers who taught structural systems. The surveys revealed that 19 respondents were teaching transportation systems. Communication systems was taught by 37 respondents. The respondents who reported teaching manufacturing systems totaled 21. There were 72 TED teachers teaching fundamentals of technology. There were 37 and 28 respondents, respectively, who reported teaching principles of technology I and principles of technology II. The TED teachers who reported teaching advanced studies totaled 32.

The survey instrument also gathered information on the students enrolled in TED classes. This information included data such as, total student population, as well as the numbers of students with disabilities. The survey included items four through six which collected data on the fourteen disabling conditions which are certified under IDEA. The fourth item on the survey revealed a wide variation in the total numbers of students enrolled in TED courses across the state. The total numbers of students enrolled in TED classes is reported in Table 4.

TABLE 4

Total Number of Students Enrolled in TED Classes

Total Number of Students in TED	1-20	21-40	41-60	61-80	81-100	101-120	121-140	141-160	161-180	NA	Total 8235
Number of TED Teachers Reporting	4	10	12	11	15	21	6	8	3	7	97

The numbers of students enrolled in TED classes ranged from 1 to 180. The response mode was 101 to 120 students since there were 21 TED teachers who reported having total student populations which fell in this category.

Item five of this research revealed the numbers of students with disabilities enrolled in TED classes. The numbers of students with disabilities being educated in TED courses are listed in Table 5.

TABLE 5

Number of Students with Disabilities

Students with disabilities enrolled in TED classes	0	1-10	11-20	21-30	31-40	41-50	51-60	NA	Total 1067
Number of TED Teachers Reporting	9	20	29	9	2	2	1	25	97

There were six categories of numbers which ranged from 0 to 60. The number of students with disabilities enrolled in TED classes was 30.9% (CTE, 2004); however, the number of students with disabilities found in this study was similar to numbers reported in general education classes or 13% (NCDPI Exceptional Children Division, 2005).

The sixth survey item questioned the types of disabling conditions that existed among students with disabilities enrolled in TED classes. The sixth question also addressed any training teachers had relative to the different types of disabling conditions.

In most cases the numbers of students with disabilities exceeded the numbers of teachers who had been trained for that specific type of disabling condition. The data gathered on disabling conditions is listed in Table 6.

TABLE 6

Types of Disabling Conditions in TED Classes

Type of disabling condition	Number of students with disabilities enrolled in TED classes	Percent of 1067Total Students with Disabilities
Specific learning disabled	64	5.99%
Other health impaired	47	4.40%
Behaviorally-emotionally disabled	44	4.12%
Developmentally delayed	26	2.43%
Mentally disabled	21	1.96%
Hearing impaired	20	1.87%
Visually impaired	18	1.68%
Speech-language impaired	18	1.68%
Pregnant student	17	1.59%
Orthopedicallly impaired	15	1.40%
Autistic	12	1.12%
Multi-handicapped	12	1.12%
Traumatic brain injury	7	.6.56%
Deaf-blind	1	.093%

There were a number of teachers who reported students with various types of disabling conditions in their classes. Some of the teachers had received training for the types of

students with disabilities who were enrolled in their classes; however, other teachers had not been trained for the type of student with disability enrolled in their class. The students with the most common type of disabling condition reported to be in TED classes were those with specific learning disabilities. This was also the type of training most TED teachers had received. Other types of exceptionalities frequently encountered in TED classes included Other Health Impaired and behavior and emotional disabilities. These conditions ranked second and third in both classroom enrollment and teacher training received. The numbers of TED teachers who had received training for each type of disabling condition are listed in Table 7.

TABLE 7

Number of Ted Teachers Trained for Disabling Conditions

TED Teachers Trained to Educate Students with DisabilitiesType of disabling condition	TED teachers trained for population	% of Total 97 TED Teachers	TED Teachers Trained to Educate Students with DisabilitiesType of disabling condition	TED teachers trained for population	% of Total 97 TED Teachers
Specific learning disabled	35	36.0%	Autistic	13	13.4%
Other health impaired	27	27.8%	Visually impaired	13	13.4%
Behaviorally-emotionally disabled	22	22.6%	Speech-language impaired	12	12.3%
Multi-handicapped	22	22.6%	Pregnant student	10	10.3%
Mentally disabled	15	15.4%	Orthopedicallly impaired	9	9.27%
Developmentally delayed	15	15.4%	Deaf /blind	7	7.21%
Hearing impaired	14	14.4%			

This section of the survey also sought to determine if TED teachers had been involved in the IEP development process, 73 informants gave positive feedback; which equates to 75.2% of the total sample.

Category 2: Teacher Perceptions, Practices, Preferences and Opinions

There were three questions listed under item eight which attempted to determine how effective teachers perceived their efforts were relative to educating students with disabilities. Informants were asked to choose from the range of responses listed on the survey. The responses in this section were gathered on a likert scale and ranged from: 1(not effective), 2 (slightly effective), 3(effective), to 4(very effective).

TED Teacher Perceptions of Effectiveness

The second subject under item eight related to the perceived level of comfort for teachers educating students with disabilities. The mean on this item for TED majors was substantially higher than the mean for non TED majors. There were 38.1% of TED majors and 28.7% of non TED majors who claimed to feel effective to very effective in this area. The anova analysis of these data revealed a significant variation between TED and non TED majors regarding their level of comfort educating students with disabilities. The manova evaluation of this item did not however yield significant values. The results from the frequency analysis are listed in Table 8. The bivariate analysis is reported in Table 9 and the Wilks' Lambda results appear in Table 10.

TABLE 8

Ranked Frequency Table for TED Teacher Perceptions

Ranking (Item #)	Stem	Major	Mean	Responses					
				Not Effective (1)	Slightly Effective (2)	Effective (3)	Very Effective (4)	NA	Total
1 (8b)	How comfortable do you feel educating students with disabilities	TED	2.95	0	10	26	11	1	48
				0.0%	10.3%	26.8%	11.3%	1.0%	49%
		Non TED	2.55	4	14	19	9	3	49
				4.1%	14.4%	19.5%	9.2%	3.0%	50%
2 (8c)	How prepared do you feel to educate students with disabilities	TED	2.60	2	16	21	7	2	48
				2.0%	16.4%	21.6%	7.2%	2.0%	49%
		Non TED	2.36	3	22	15	6	3	49
				3.0%	22.6%	15.4%	6.1%	3.0%	50%
3 (8a)	How effective do you perceive your input into the IEP process to be?	TED	2.29	10	13	18	5	2	48
				10.3%	13.4%	18.5%	5.1%	2.0%	49%
		Non TED	2.08	13	14	15	4	3	49
				13.4%	14.4%	15.4%	4.1%	3.0%	50%

TABLE *9*

Means and Bivariate Values for Perceptions

Rank Stem	Ted majors		Non-Ted majors		Anova	
	Mean	Std	Mean	Std	F	Pr > F
1. How comfortable do you feel educating students with disabilities	2.958	0.797	2.551	1.081	4.44	0.0377
2. How prepared do you feel to educate students with disabilities	2.604	0.939	2.367	0.993	1.45	0.2309
3. How effective do you perceive your input into the IEP process to be?	2.291	1.051	2.081	1.076	0.94	0.3336

TABLE 10

Multivariate Analysis for Comfort Level

Statistic	Value	F Value	df	Pr > F
Wilks' Lambda	0.94979261	1.64	3	0.1858

Methods of In-serviceTraining

The ninth item addressed various methods for receiving in-service training relative to students with disabilities. The choices were listed on a four point likert type scale for rating how effective TED teachers perceived these training methods to be. The highest ranking mean for these responses revealed a majority of informants considered observing exemplary teachers to be effective or very effective. Taking graduate level courses was considered the least effective method for receiving training. Both the bivariate and multivariate analysis for this item yielded insignificant values. The frequency response data is presented in Table 11 and the manova results are recorded in Table 12.

TABLE 11

Ranked Frequency Table for In-Service Training

Ranking (Item #)	Stem	Major	Mean	Responses					
				Not Effective (1)	Slightly Effective (2)	Effective (3)	Very Effective (4)	NA	Total
1(9c)	Observing exemplary teachers, programs	TED	2.85	2	4	29	10	3	48
				2.0%	4.1%	29.9%	10.3%	3.0%	49.48%
		Non TED	2.57	3	7	23	10	6	49
				3.0%	7.2%	23.7%	10.3%	6.1%	50.52%
2(9a)	Conferences/ Professional meetings	TED	2.60	2	14	25	5	2	48
				2.0%	14.4%	25.7%	5.1%	2.0%	49.48%
		Non TED	2.38	2	19	19	5	4	49
				2.0%	19.5%	19.5%	5.1%	4.1%	50.52%
3(9e)	Workshops	TED	2.56	3	9	26	6	4	48
				3.0%	9.2%	26.8%	6.1%	4.1%	49.48%
		Non TED	2.36	2	14	22	5	6	49
				2.0%	14.4%	22.6%	5.1%	6.1%	50.52%
4(9b)	Individual training modules	TED	2.45	4	17	20	5	2	48
				4.1%	17.5%	20.6%	5.15%	2.0%	49.48%
		Non TED	2.20	5	18	17	4	5	49
				5.1%	18.5%	17.5%	4.1%	5.1%	50.52%
5(9d)	Graduate courses	TED	2.12	6	18	16	3	5	48
				6.19%	18.5%	16.4%	3.0%	5.1%	49.48%
		Non TED	2.06	7	16	18	2	6	49
				7.2%	16.4%	18.5%	2.0%	6.1%	50.52%

TABLE 12

Manova Table for In-service Training Methods Needs, Item 9

Statistic	Value	F Value	Df	Pr > F
Wilks' Lambda	0.97703633	0.43	5	0.8282

The multivariate analysis did not reveal significant differences for methods of receiving in-service training. The analysis revealed that there was no difference between the means for TED and non Ted teachers for observing exemplary teachers and programs. Both groups of teachers ranked attending graduate level courses as the least effective method for receiving in-service training

Delivery Systems

Item number 10 addressed TED delivery systems. The types of delivery systems were ranked by means greatest to lowest in effectiveness for educating students with disabilities (games and simulation ranked first). The informants ranked cooperative groups as the preferred delivery system for TED. The least effective method for educating students with disabilities was reportedly formal presentations and demonstrations. The bivariate evaluation of this item yielded no significant results. The multivariate analysis of this item revealed no significant difference between majors. The frequency data illustrates the preferences of each group of teachers are listed in Table 13. The Wilks' Lambda values are presented in Table 14.

TABLE 13

Frequency Table for TED Delivery Systems

Ranking (Item #)	Stem	major	Mean	Responses					
				Not Effective (1)	Slightly Effective (2)	Effective (3)	Very Effective (4)	NA	Total
1(10d)	Games/simulations	TED	3.04	0	4	26	15	3	48
				0.0%	4.1%	26.8%	15.4%	3.0%	49.48%
		Non TED	2.73	3	6	25	11	4	49
				3.0%	6.1%	25.7%	11.3%	4.1%	50.52%
2(10b)	Cooperative groups	TED	3.00	0	7	22	16	3	48
				0.0%	7.2%	22.6%	16.4%	3.0%	49.48%
		Non TED	2.67	1	14	23	7	1	49
				1.0%	14.4%	23.7%	7.2%	1.0%	50.52%
3(10c)	Discovery, inquiry, Experiments	TED	2.97	2	3	25	15	3	48
				2.0%	3.0%	25.7%	15.4%	3.0%	49.48%
		Non TED	2.79	4	5	5	12	3	49
				4.1%	5.1%	5.1%	12.3%	3.0%	50.52%
4(10a)	Formal presentations	TED	2.35	4	19	18	3	3	48
				4.1%	19.5%	18.5%	3.0%	3.0%	49.48%
		Non TED	2.20	6	22	14	4	3	49
				6.1%	22.6%	14.4%	4.1%	3.0%	50.52%

TABLE 14

Manova Table for TED Delivery Systems

Statistic	Value	F Value	Df	Pr > F
Wilks' Lambda	0.96422787	0.85	4	0.4952

Intervention Strategies

The results for item 11 addressed the types of intervention strategies considered to be most effective for students with disabilities. The highest ranked mean in this category was found to be for praise and attention. The second favorite intervention strategy was found to be modified instruction. The lowest ranked types of interventions related to removing or isolating students with disabilities from TED classes.

The mean and frequency summary data between majors for intervention strategies are listed in Table 15. The bivariate analysis for segments of this item which yielded slightly significant values between majors are recorded in Table 16. The multivariate evaluation for item 11 did not however yield significant values; therefore, interpretations of these values should be done with caution.

TABLE 15

Frequency Table for Intervention Strategies

Ranking (Item #)	Stem	Major	mean	Responses					
				Not Effective (1)	Slightly Effective (2)	Effective (3)	Very Effective (4)	NA	Total
1(11a)	Praise/attention	TED	3.37	0	1	16	28	3	48
				0.0%	1.0%	16.4%	28.8%	3.0%	49.48%
		Non TED	2.97	1	5	25	15	3	49
				1.0%	5.1%	25.7%	15.4%	3.0%	50.52
2(11b)	Modified instruction	TED	3.10	0	6	23	17	2	48
				0.0%	6.1%	23.7%	17.5%	2.0%	49.48%
		Non TED	2.81	1	9	25	11	3	49
				1.0%	9.2%	25.7%	11.3%	3.0%	50.52
3(11f)	Parent Follow-up	TED	2.97	1	13	15	17	2	48
				1.0%	13.4%	15.4%	17.4%	2.0%	49.48%
		Non TED	2.53	3	15	17	10	4	49
				3.0%	15.4%	17.5%	10.3%	4.1%	50.52
4(11j)	Specialized instruction	TED	2.70	0	15	16	13	4	48
				0.0%	15.4%	16.4%	13.4%	4.1%	49.48%
		Non TED	2.02	7	14	16	4	8	49
				7.2%	14.4%	16.4%	4.1%	8.2%	50.52
511(k)	Peer tutor	TED	2.64	2	13	21	9	3	48
				2.0%	13.4%	21.6%	9.2%	3.0%	49.48%
		Non TED	2.24	4	15	16	7	7	49
				4.1%	15.4%	16.4%	7.2%	7.2%	50.52

TABLE 15

Frequency Table for Intervention Strategies (Continued)

Ranking (Item #)	Stem	Major	mean	Responses					
				Not Effective (1)	Slightly Effective (2)	Effective (3)	Very Effective (4)	NA	Total
6(11c)	Modified environment	TED	2.62	2	10	24	8	4	48
				2.0%	10.3%	24.7%	8.2%	4.1%	49.48%
		Non TED	2.55	4	13	17	11	4	49
				4.1%	13.4%	17.5%	11.3%	4.1%	50.52
7(11d)	Counseling support group	TED	2.50	3	14	15	11	5	48
				3.0%	14.4%	15.4%	11.3%	5.1%	49.48%
		Non TED	2.24	3	21	16	4	5	49
				3.0%	21.6%	16.4%	4.1%	5.1%	50.52
8(11m)	Support services	TED	2.5	1	11	23	7	6	48
				1.0%	1.3%	23.7%	7.2%	6.1%	49.48%
		Non TED	2.02	5	15	16	4	9	49
				5.1%	15.4%	16.4%	4.1%	9.2%	50.52
9(11l)	Community resources	TED	2.31	3	17	18	5	5	48
				3.0%	17.5%	18.5%	5.1%	5.1%	49.48%
		Non TED	2.00	7	15	15	4	8	49
				7.2%	15.4%	15.4%	4.1%	8.2%	50.52
10(11e)	Behavioral contracts	TED	2.16	3	23	17	1	4	48
				3.0%	23.7%	17.5%	1.0%	4.1%	49.48%
		Non TED	2.10	8	17	15	4	5	49
				8.2%	17.5%	15.4%	4.1%	5.1%	50.52

TABLE 15

Frequency Table for Intervention Strategies (Continued)

Ranking (Item #)	Stem	Major	mean	Responses					
				Not Effective (1)	Slightly Effective (2)	Effective (3)	Very Effective (4)	NA	Total
11(11g)	Time out	TED	1.98	1.04	13	17	12	4	48
					13.4%	17.5%	12.3%	4.1%	49.48%
		Non	2.02	1.05	11	18	12	3	49
		TED			11.3%	18.5%	12.3%	3.0%	50.52
12(11n)	Public/private	TED	1.97	6	11	21	1	9	48
	agencies			6.1%	11.3%	21.6%	1.0%	9.2%	49.48%
		Non	1.81	8	16	11	4	10	49
		TED		8.2%	16.4%	11.3%	4.1%	10.3%	50.52
13(11i)	Detention	TED	1.91	11	19	13	1	4	48
				11.3%	19.5%	13.4%	1.0%	4.1%	49.48%
		Non	1.93	13	14	14	3	5	49
		TED		13.4%	14.4%	14.4%	3.0%	5.1%	50.52
14(11h)	Change schedule	TED	1.83	9	22	9	2	6	48
				9.2%	22.6%	9.2%	2.0%	6.1%	49.48%
		Non	2.02	10	21	9	5	4	49
		TED		10.3%	21.6%	9.2%	5.1%	4.1%	50.52
15(11p)	Change teachers	TED	1.77	8	21	5	5	9	48
				8.2%	21.6%	5.1%	5.1%	9.2%	49.48%
		Non	1.61	10	15	9	3	12	49
		TED		10.3%	15.4%	9.2%	3.0%	12.3%	50.52

TABLE 15

Frequency Table for Intervention Strategies (Continued)

16(11o)	Chapter 1	TED	1.45	5	15	9	2	17	48
	funds			5.1%	15.4%	9.2%	2.0%	17.5%	49.48%
		Non	1.36	5	14	10	1	19	49
		TED		5.1%	14.4%	10.3%	1.0%	19.5%	50.52

TABLE 16

Manova Table for Intervention Strategies

Stem	Ted majors		Non-Ted majors		Anova	
	Mean	Std	Mean	Std	F value	Pr > F
Praise / attention	3.37	1.02	2.97	1.03	3.59	0.0611
Specialized instruction	2.70	1.12	2.02	1.21	8.33	0.0048
Peer tutor	2.64	1.04	2.24	1.23	2.99	0.0873
Support services	2.50	1.16	2.02	1.23	3.87	0.0521

The bivariate analysis for specialized instruction yielded significant values 13 TED majors listed this intervention strategy as very effective however only 4 non TED majors agreed. The multivariate analysis produced no overall significance between the rate of response between majors. The manova results are listed in Table 17.

TABLE 17

Manova Table for TED Intervention Strategies

Statistic	Value	F Value	Df	Pr > F
Wilks' Lambda	0.79764936	1.27	16	0.2382

Disabling Condition Requiring the Most Intervention Strategies

Item 12 attempted to determine the type of disabling condition which required the most instructional time in the form of intervention strategies. The highest mean response

in this category was for behavioral and emotional disabilities. The second greatest mean was for mental disabilities. The third type of disabling condition requiring the most classroom time due to intervention strategies was found to be Specific Learning Disabilities. The frequency results from the three disabling conditions selected most often are in Table 18.

TABLE 18

Frequency Table for Disabling Conditions Requiring the Most Interventions

Rank Stem	Ted majors		Non-Ted majors		Total	Sample %
	TED	%	Non TED	%		
1(12b) Behavioral-emotional disability	15	15.3%	10	10.2%	25	25.7%
2(12f) Mental disability	6	6.1%	1	1.0%	7	7.2%
3(12l) Specific learning disability	3	3.0%	3	3.0%	6	6.2%

Contributions of TED Curriculum to Student Success

The contributions of TED curriculum to successful student outcomes was evaluated in item 13. The most effective contribution of TED for students was revealed to be relative to choosing a career path. The second highest ranking mean in this category was for student success in the TED classroom. The results from the mean and frequency analysis are listed in Table 19. There was some variation between responses to contributing to student success in both career paths and in the TED classroom, between TED and non TED majors. The bivariate evaluation for differences between majors is presented in Table 20. The multivariate analysis in Table 21 revealed these variations were not significant.

TABLE 19

Frequency Table for Contributions to Student Success

Ranking (Item #)	Stem	Major	Mean	Responses					
				Not Effective (1)	Slightly Effective (2)	Effective (3)	Very Effective (4)	NA	Total
1(13a)	TED Classroom	TED	2.89	1	10	18	16	3	48
				1.0%	10.3%	18.5%	16.4%	3.0%	49.48%
		Non TED	2.44	4	13	22	6	4	49
				4.1%	13.4%	22.6%	6.1%	4.1%	50.52%
2(13c)	Career Path	TED	2.87	2	11	19	14	2	48
				2.0%	11.3%	19.5%	14.4%	2.0%	49.48%
		Non TED	2.53	3	12	27	4	3	49
				3.0%	12.3%	27.8%	4.1%	3.0%	50.52%
3(13b)	General Education	TED	2.70	4	10	22	10	2	48
				4.1%	10.3%	22.6%	10.3%	2.0%	49.48%
		Non TED	2.30	6	16	21	3	3	49
				6.1%	16.1%	21.6%	3.0%	3.0%	50.52%

TABLE 20

Bivariate Values for TED Contributions to Student Success

Rank Stem	Ted majors		Non-Ted majors		Anova	
	mean	Std	Mean	Std	F value	Pr > F
1(13a)TED Classroom	2.89	1.09	2.44	1.08	4.08	0.0461

TABLE 21

Multivariate Values for *TED Contributions to Student Success*

Statistic	Value	F Value	Df	Pr > F
Wilks' Lambda	0.95629342	1.42	3	0.2428

Category 3: Perceived Needs for Further Training Relative to Students with Disabilities

The final section on this survey examined the need for in-service training relative to students with disabilities. The first question in this section was item 14, which asked informants to indicate if they had a need for further training on this topic. More than half of the respondents to this survey, 59.7% stated they had a need for further training on this topic. The second item in this category addressed some of the same issues which Doty addressed in his 1982 study. This section sought to determine the perceived needs for further training in specific areas relative to students with disabilities. The responses to items related to in-service training were listed on a five point likert scale. The two highest ranking means were in the areas of identifying and managing problem behaviors and utilizing support from resource persons. There were no statistically significant manova or anova results for item 15. The frequency and mean values are listed in Table 22. The Wilks' Lambda values are presented in Table 23.

TABLE 22

Frequency Table for In-Service Training Needs

Ranking (Item #)	Stem	Major	Mean	Responses						
				No Need (1)	(2)	Some Need (3)	(4)	Major Need (5)	NA	Total
1(15e)	Identify/ manage problem behaviors	TED	2.29	0	5	2	11	10	20	48
				0.0%	5.1%	2.0%	11.3%	10.3%	20.6%	49.48%
		Non TED	2.46	2	4	10	9	9	15	49
				2.0%	4.1%	10.3%	9.2%	9.2%	15.4%	50.52%
2(15f)	Utilize support/ resource persons	TED	2.25	0	3	8	7	10	20	48
				0.0%	3.0%	8.2%	7.2%	10.3%	20.6%	49.48%
		Non TED	2.30	2	6	7	12	6	16	49
				2.0%	6.1%	7.2%	12.3%	6.1%	16.4%	50.52%
3(15d)	Modify machines and tools	TED	2.12	2	3	10	8	6	2	48
				2.0%	3.0%	10.3%	8.2%	6.1%	2.0%	49.48%
		Non TED	2.42	2	2	10	12	7	2	49
				2.0%	2.0%	10.3%	12.%	7.2%	2.0%	50.52%
4(15d)	Modify traditional instruction	TED	2.06	1	4	8	9	6	20	48
				1.0%	4.1%	8.2%	9.2%	6.1%	20.6%	49.48%
		Non TED	2.32	3	2	10	13	5	16	49
				3.0%	2.0%	10.3%	13.4%	5.1%	16.4%	50.52%
5(15h)	Feel comfortable	TED	1.97	2	4	4	12	5	1	48
				2.0%	4.1%	4.1%	12.3%	5.1%	1.0%	49.48%
		Non TED	2.26	4	3	7	10	8	0	49
				4.1%	3.0%	7.2%	10.3%	8.2%	0.0%	50.52%

TABLE 22

Frequency Table for In-Service Training Needs (Continued)

Ranking (Item #)	Stem	Major	Mean	Responses						
				No Need (1)	(2)	Some Need (3)	(4)	Major Need (5)	NA	Total
6(15g)	Evaluate individual performance	TED	1.97	1	1	15	8	3	20	48
				1.0%	1.0%	15.4%	8.2%	3.0%	20.6%	49.48%
		Non TED	2.40	2	4	6	15	6	16	49
				2.0%	4.1%	6.1%	15.4%	6.1%	16.4%	50.52%
7(15a)	Establish expectations	TED	1.87	1	2	16	8	1	20	48
				1.0%	2.0%	16.4%	8.25%	1.0%	20.6%	49.48%
		Non TED	2.16	2	3	15	7	5	17	49
				2.0%	3.0%	15.4%	7.2%	5.1%	17.5%	50.52%
8(15b)	Implement IEP	TED	1.75	1	6	14	6	1	20	48
				1.0%	6.1%	14.4%	6.1%	1.0%	20.6%	49.48%
		Non TED	2.24	2	5	14	10	3	15	49
				2.0%	5.1%	14.4%	10.3%	3.0%	15.4%	50.52%

TABLE 23

Multivariate Values for In-service Training Needs

Statistic	Value	F Value	Df	Pr > F
Wilks' Lambda	0.90325358	1.18	8	0.3213

Summary of Findings

The primary purpose for this study was to determine the extent to which TED teachers perceived they were effectively educating students with disabilities. The survey instrument consisted of three categories of questions which solicited demographic background, perceived effectiveness of educational practices and areas of need for in-service training. The responses to the survey are recorded in the tables included in this chapter. More than half of the respondents to this survey still indicated they had some degree of need for further training in the areas identified by this study

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

This study was conducted in order to assess the degree to which TED teachers in North Carolina perceive they are effective educating students with disabilities. A need for this study existed due to the fact that current graduation requirements combined with efforts to provide least restrictive environments could result in large numbers of students with disabilities being included in regular TED classes. The ability to provide students enrolled in TED classes, with adequate instruction is important to all educational stakeholders.

Summary of findings in Review of Literature

There were seven major categories of data which had a major impact on the disciplines which have evolved into technology education. The first group of data focused on the past, present, and future significance of practical education. An action-based systems approach to instruction is a critical component of preparing students to become successful, technologically literate citizens. Another important factor which affected technology education was the impact of legislation such as The 1973 Rehabilitation Act and PL-94-142. This legislation provided an access to education for individuals with disabilities who had previously been excluded. These opportunities did not come without problems. There were many tangible and intangible barriers blocking the pathway to success for students with disabilities

These road blocks became a focal point for pioneers like Dugger and Buffer. These men helped develop viable solutions to these problems that have benefited a generation of teachers and students alike. Their early recommendations and guides

provided the structure needed to make mainstreaming more functional. The benefits students garner from enrolling in technology education was another area of research which focused on what students can gain from the time invested in TED classes. The amount and quality of instruction students receive in class can be influenced by the perceptions of the teachers. The literature focusing on teacher perceptions examined some of the impacts positive and negative attitudes relative to mainstreaming could have on the classroom environment. Effective teacher preparation could help alleviate some negative attitudes regarding mainstreaming by providing teachers with the tools they need to effectively navigate diverse classrooms.

Problem

The inclusion of students with disabilities into regular classrooms is required by law. Students with disabilities may be integrated into any class deemed appropriate based on the decisions made by the IEP development team. Students with disabilities need an appropriate educational background for preparation to make the transition from student to productive citizen successful. Clearly, the seamless integration of persons with disabilities into society can benefit all societal sectors affected by mainstreaming. A look at how effectively technology education teachers perceive they are helping to educate students with disabilities will be helpful for the technology education teachers, as well as the universities and state agencies who construct technology teacher education programs. These entities must provide technology education teachers with sufficient information so these teachers may effectively educate diverse student populations

Procedures

Surveys were mailed to each of the 323 TED listed on the sampling frame emailed from the NCDPI. There were 119 surveys returned, which is a 36% response rate. Four of the surveys were not correctly filled out which left 115 surveys that could be utilized in this analysis. The 115 usable surveys included four surveys from TED teachers not currently teaching TED and 14 instruments from non-licensed TED teachers. The data from these respondents was omitted from this research; therefore the number of usable surveys totaled 97 or 30% of the TED teacher universe in North Carolina. This survey instrument gathered three basic categories of information: Demographic background; TED teacher perceptions, practices, and preferences; and perceived needs for further training relative to students with disabilities.

Findings

The research questions that guided this study are listed below:

1. Do North Carolina technology education teachers (TED) perceive they are prepared to make input in the development of IEPs for students with disabilities in their TED classes? This question was addressed on the survey in a number of ways. Item eight posed this issue to respondents on a likert scale. There were 28 TED and 21 non TED major respondents, who suggested their input into the IEP process was effective to very effective in this area. There were 58 respondents, or 57.4% of the sample, who indicated a degree of need for further training in IEP implementation. This question was addressed a second time in the section which tried to determine if TED teachers perceived a need for further training. The majority of respondents did not indicate a

need for training on this topic. There were 14 TED and 14 non TED majors or 28.8% who expressed some need for training in this area, despite the fact that 73 respondents claimed to already have experience in the IEP development process.

2. What intervention strategies have technology education teachers used for students with disabilities in their TED classes? This item was 11 on the survey. The majority of participants indicated that praise and attention was the most commonly used intervention strategy, since 44 TED and 40 non TED major participants described this strategy as effective to very effective. The second most common choice for intervention strategies was modified instruction. There 40 TED and 36 non TED majors who considered this strategy to be effective to very effective. The third intervention strategy most commonly used among TED teachers was parental follow-up. It was interesting to note that the top three choices among respondents related to interpersonal skills. The least popular choices in this area, according to their ranking, generally involved separating the child from the classroom environment; however there were no significant differences found between these groups.

3. What are the major contributions of TED curriculum toward educating students with disabilities in their TED classes? Item 13 on the survey posed this question to the informants. The options were the TED curriculum contributes most to successful outcomes for students with disabilities in TED courses, general education courses or in choosing a suitable career path. The most popular choice among these three was in the TED classroom. There were 34 TED and 28 non TED respondents who stated that TED effectively or very effectively contributes to successful student outcomes relative to the TED curriculum.

4. What is the most time consuming problem that technology education teachers perceive they encounter relative to students with disabilities in their TED classes? This question had to be asked delicately. The Internal Review Board required the question not be directed toward students. The question is posed on the survey instrument as item 12. This question asks which type of disability requires the most intervention strategies. The most common answer to this question was behavior-emotional disabilities, since 15 TED and 10 no TED informants listed this response.

5. Do in-service technology education teachers perceive that they need additional training relative to students with disabilities enrolled in regular TED classes? If so, what type of training would be recommended for these teachers? The last question was a two part question. The first revealed there were 58 respondents who expressed at least some need in this area. More than half of the respondents expressed some need or more for training. The second part, questioned particular areas of additional training needed. The most common request for additional training was in the area of identification and management of problem behaviors in the classroom since 23 TED and 38 non TED major respondents or 62.8% of the sample expressed a need for this training. The entire list of options represented an area of need for some of the respondents. The least common area requested for training was related to developing an IEP. This implies that progress in this area has been made since Doty posed the question two decades ago.

Summary of Findings

The three categories of data gathered on this survey presented mixed results. The demographic data revealed that the majority of those teaching TED, were licensed to do so; however, only about half or 49% of TED teachers actually majored in TED. There were 73 participants or 75.2% who stated they had been involved in IEP process; however, there were only 69 respondents, or 71.1% of the sample who suggested their input into the IEP process was slightly or more effective. There were 58 respondents, or 59.7% of the entire sample, who indicated a degree of need for further training in IEP implementation. Additionally, there were 37 TED and 28 non TED respondents who felt their comfort level was effective to very effective educating students with disabilities. There were however, only 28 TED and 21 non TED majors who felt effectively or very effectively prepared to educate this population.

Conclusions

The data collected for this study of the TED teachers of North Carolina regarding their perceptions of effectiveness in educating students with disabilities led to the following conclusions: There were about 50% of individuals teaching technology education majored in other disciplines; however, there were no statistically significant differences found. There were some non-significant trends which appeared in the data. There still exists a need for training relative to students with disabilities. The majority of respondents to this survey were teaching students with disabilities; however, a minority of these respondents had training for the type of student with a disabling condition enrolled in their class. TED Teachers feel relatively comfortable, prepared and effective

while educating students with disabilities. The majority of TED teachers still feel a need to obtain more training with this population. One of the most common areas of need for this training was found to be identifying and managing problem behaviors. The most effective means for obtaining this training would be observing other exemplary teachers rather than attending graduate courses. Additionally, games and simulations are considered a more effective method of instructional delivery than formal presentations. Praise and attention for students was considered to be a more effective strategy than more formal approaches to classroom management such as IEPs and time spent outside of the classroom.

The study conducted by Doty in 1982 proved to be a valuable source for directing this study. A number of the issues he addressed 22 years ago are still matters of interest today. A similar study conducted by Wenig and Peterson (1983) yielded results which were comparable to those obtained by Doty since both studies revealed a deficiency in the numbers of industrial arts teachers who were prepared to instruct students with disabilities and a desire to correct this problem with additional training (Wenig and Peterson, 1983).

This study confirms that the problem of TED teachers who need additional training with students with disabilities still exists. This study extends the research on this topic by identifying specific types of students with disabilities that should be included in the training sessions. The results of this study indicate that progress has been made, yet room for improvement still exists. The areas of need for further training which were pointed out in this study could be utilized for TED educators in their effort to provide preparation that is relevant and effective for TED teachers.

Recommendations

The goals of laws pertaining to mainstreaming can accomplished more effectively if TED teachers get the training they need and desire. The most popular method for obtaining this training was found to be by observing other exemplary teachers. Therefore, TED teachers should be provided release time during school hours in order to get training by observing other teachers while their classes are in session during regular school hours.

The respondents to the survey considered games and simulations to be the most effective method of instructional delivery. TED teachers, teacher educators and educational specialist should look for more of the innovative hands-on activities that make TED effective, educational and fun. These practical lessons that help students prepare to solve real-world problems are foundational to TED.

The majority of respondents expressed a need for further training relative to students with disabilities and the area of need most often selected for additional training was found to be in identifying and managing problem behaviors. This implies problem behaviors are an issue that TED teachers need a solution for. Additionally, this data revealed that TED teachers considered praise and attention a more effective method of intervention than other more formal intervention strategies. Since TED teachers perceive this method of managing problem behaviors is effective, TED education providers should incorporate techniques that will allow TED teachers to improve on the areas they have found to be effective. The act of effectively providing praise and attention to students is an interpersonal skill that can be developed and improved upon.

One area of need that resurfaced repeatedly in this research was the lack of time, services and equipment needed to make mainstreaming flow seamlessly. There are resources, funds and agencies available to provide some of these tools; however, if TED teachers are not fully aware of how to gain access to these entities they will not be able to fully take advantage of and benefit from them. If TED teacher educators include information on these topics in their lessons it could give TED teachers the additional support needed facilitate educating all students

The fact that half of TED teachers did not major in TED implies there is a shortage of TED majors. This apparent shortage could be filled if active and aggressive efforts to publicize the advantages of a career in TED and recruit new majors. A potential area for recruitment could be from among the students reportedly enrolled in most TED classes at the high school level.

This research pointed out some key areas of need for further training. Some of these areas have been problem areas for over two decades. TED teacher educators should focus energy on finding workable solutions in these areas. These solutions could help TED teachers increase efficacy of instruction to students with disabilities.

Further research needs to be done on this topic to determine if these same conditions exist among TED teachers in other states. Additional research could also reveal if there exists a difference between recent and experienced teachers. Continued study on this topic could also determine if similar conditions exist among other disciplines.

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APPENDIX A

COVER LETTER

Dear Colleague:

I am a technology education student at North Carolina State University. I am conducting research for a dissertation regarding in-service technology teachers' perception of how well they educate students with disabilities enrolled in technology education classes. This survey asks you to rate your experience and skills in working with disabled students. This may cause you a bit of discomfort, but we will take care to keep your responses confidential. Your professional opinion and advice could be the key to helping students with disabilities achieve their maximum potential in technology education classes.

I am asking for your voluntary help in determining the perceptions of technology education teachers relative to educating students with disabilities. Please take a few minutes to respond to this survey. Your honest and timely response is vitally important. All responses will be kept strictly confidential.

Please return the survey instrument in the self addressed stamped envelope within seven days of receiving this material. I will be happy to send you the final results of this study if you so desire.

Thank you for your time and consideration. If you have any questions, please call me Monday through Thursday, between the hours of 10:00am – 1:00pm at: (336)334-7391. If you have any questions about your rights as a research participant, you may call the North Carolina State University Institutional Review Board for the use of Humans in Research at: (919)515-4514.

Sincerely,

Elinor Blackwell
Doctoral Student at
North Carolina State University
Advisor: Dr. James Haynie, III

Mailing Address:
6002 Still Run Drive
Greensboro, NC 27455

APPENDIX B

SURVEY INSTRUMENT

NORTH CAROLINA TECHNOLOGY EDUCATION TEACHERS MEETING THE NEEDS OF STUDENTS WITH DISABILITIES

DIRECTIONS: Please answer the questions listed here in the space provided. Some questions may require more than one response.

Educational Background

1. Degree Earned (mark with "x")		Major	Year degree earned	You are licensed to teach TED * Yes or No	
Undergraduate					
Graduate					
Doctorate					
Other (specify)					

2. How many years of TED teaching experience do you have? (count this year) _____

3. Place an "x" by the following technology education courses you teach:							
Structural Systems		Communication Systems		Fundamentals of Technology		Principles of Technology II	
Transportation Systems		Manufacturing Systems		Principles of Technology I		Advanced studies	

4. What is the total number of students enrolled in all of your TED classes this year? _____
5. How many of the students enrolled in all of your TED classes this year have disabilities? _____

6. The following fourteen disabling conditions have been certified under IDEA*. In section (A) check "yes" for each type of student with a disability enrolled in your technology education classes this year. In section (B) check "yes" for each type of student with a disability you have been trained to work with:

Individuals w/ disabilities presently enrolled in TED courses:	(A) Enrolled in my TED class this year:		(B) Received training for this population:	
	Yes	No	Yes	No
a. Autistic				
b. Behaviorally-emotionally disabled				
c. Hearing Impaired				
d. Visually Impaired				
e. Deaf-Blind				
f. Mentally Disabled				
g. Multi-handicapped				
i. Orthopedically Impaired				
j.Other Health Impaired (asthma, etc)				
k. Pregnant Students				
l. Developmentally Delayed				
m. Specific Learning Disabled				
n.Speech–Language Impaired				
o. Traumatic Brain Injury				

7. Have you worked with others in the IEP* development process? Yes_____ No_____

8. Choose from the range of numbers provided here to answer the following questions: 0(not effective) 1(slightly effective) 2(effective) 3(very effective)	0	1	2	3
a. How effective do you perceive your input into the IEP development process to be?				
b. How comfortable do you feel educating students with disabilities?				
c. How prepared do you feel to educating students with disabilities?				

9. How effective do you consider the following methods for in-service training to be relative to students with disabilities?	0	1	2	3
a. Conferences/ professional meetings				
b. Individual training modules or work books				
c. Observing exemplary teachers or programs				
d. Graduate level courses				
e. Workshops				
f. Other (specify)				

10. Place an 'x' in the box beside the degree of effectiveness you perceive the following TED delivery systems to be relative to students with disabilities : 0(not effective) 1(slightly effective) 2(effective) 3(very effective)	0	1	2	3
Formal presentations and demonstrations				
Cooperative group interactions				
Discovery, inquiry and experimentation				
Games and simulations				

11. Place an 'x' in the box beside the degree of effectiveness you perceive for the following intervention strategies relative to students with disabilities:
0(not effective) 1(slightly effective) 2(effective) 3(very effective)

	0	1	2	3		0	1	2	3
Praise/attention					Detention				
Modified instruction					Specialized instructional equipment				
Modified environment					Peer tutor				
Counseling Support Group					Community Resources				
Behavioral contract, Point system, charts					Other supports Volunteers				
Parent Follow- up					Public/private Agency				
Time-out					Chapter 1				
Change in schedule					Change in teacher(s)				

12.Which type of disability requires the most intervention strategies?_____

13. How effectively do you perceive the TED curriculum contributes to successful outcomes for students with disabilities in the following areas: 0(not effective) 1(slightly effective) 2(effective) 3(very effective)	0	1	2	3
TED (technical)				
General Education (Academic)				
Career Path (Societal)				

INSERVICE TRAINING NEEDS

The purpose of this section is to assess training needs of teachers who are educating students with disabilities in technology education courses. The statements in this section are brief descriptions of some of the skills and activities needed to effectively teach students with disabilities in regular technology education classes. The results of this needs assessment could be used to plan future in-service activities and programs.

14. Do you perceive a need for additional training relative to students with disabilities?
    Yes____ No____ (If "yes please answer question #15).

15. If the answer to the question above is "Yes", then please answer the questions listed below. This is a list of professional skills and activities for working with students with disabilities. Please read each task to determine your degree of need for additional training concerning each task. Then circle one response to each task according to your professional opinion at the time of this survey. The answers range from: (1) which indicates no need for training, to (5) which indicates a major need for training.

Activities and Skills	Need For In-Service Training				
	No Need		Some Need		Major Need
Need for additional training in order to:					
a. Establish appropriate expectations for program success	1	2	3	4	5
b. Implement Individualized Education Program	1	2	3	4	5
c. Modify traditional teaching methods in relation to each student	1	2	3	4	5
d. Modify machines and tools for students w/ disabilities	1	2	3	4	5
e. Identify and manage problem behavior in the classroom	1	2	3	4	5
f. Utilize support and resource persons for students with disabilities	1	2	3	4	5
g. Evaluate individual performance in meeting objectives of the program	1	2	3	4	5
h. Feel comfortable educating students with disabilities	1	2	3	4	5

i. Other training needs not listed here _____
_____
_____

16. Would like to receive a copy of the results from this survey? Yes____ No____

*Definitions:
1. TED – Technology Education
2. IDEA – Individuals with Disabilities Education Act
3. IEP – Individualized Education Program
4. Chapter 1 – Title 1 funds available to provide remediation to students with disabilities
5. Detention – Could include isolation

Thank you for your time. Please return this information in the self addressed stamped envelope to:

Elinor Blackwell
Greensboro, NC 27455

APPENDIX C

PERMISSION FROM DOTY

Hi Elinor:

I would be honored to have you use the instrument and any other information from my work. I did a few workshops with Voc Ed and Tech Ed teachers while I was in North Carolina to help teachers adjust to having disabled students in their classes. I found that most teachers were already doing most of the things necessary to be successful with these students, they just did not realize the similarity between the instructional techniques they were already using and the intervention processes that were used in what we called Special Education at that time. Most of the instructors did very well with these students once we got them to understand that they were well prepared for this group.

I found my interest in special needs populations very helpful when I entered the world of Industrial Training. All of the strategies were useful in that setting as well. These same experiences are valuable now that I am back in Higher Education at the two year college level.

Please let me know if you have any questions while working on your dissertation. It may be helpful to discuss things with someone who has no direct interest in the outcome of your activities.

Good Luck!

Dale