ABSTRACT

RIEDEL, JODI SONGER. Effects of an Introductory Agricultural Education Course on Agricultural LIteracy and Perceptions of Agriculture in Urban Students. (Under the direction of Dr. Elizabeth Wilson.)

The purpose of this study has been to determine the effects of an introductory agricultural education course on high school urban students agricultural literacy and their perceptions of the food and fiber industry. North Carolina schools offer an introductory course called Agriscience Applications and is meant to be the first in a series of agricultural education courses. This course is expected to positively impact the agricultural literacy and perceptions of agriculture upon its students. Data were collected from six schools in urban counties throughout North Carolina with 152 respondents. Five questions were specified for this study as follows: 1) Does an introductory agricultural education course increase students agricultural literacy in an urban agricultural education program; 2) does an introductory agricultural education course increase student knowledge of agricultural careers and opportunities for employment; 3) does an introductory agricultural education class increase student knowledge of agriculture's relationship with public policy; 4) does an introductory agricultural education class change a student's understanding of agriculture's relationship with the environment and natural resources; 5) what influence does an introductory agricultural education class have upon students' perceptions of the food and fiber industry? Upon completion of the Agriscience Applications course, students did increase their agricultural literacy. The students showed greatest improvement in agriculture literacy regarding public policy and the least improvement in career related knowledge. The perception scores of students regarding agriculture were not statistically significant.

Effects of an Introductory Agricultural Education Course on Agricultural Literacy and Perceptions of Agriculture in Urban Students

by
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BIOGRAPHY

Jodi Songer Riedel is a high school agricultural education teacher in an urban classroom in Raleigh, NC. She heads the agricultural education program and advised the school's FFA organization and proudly runs and maintains the school's greenhouse, gardens, and its prize winning garden at the North Carolina State Fair. Mrs. Riedel resides with her husband and loves to garden and spend time with family.

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CHAPTER I

High school agricultural programs currently exist in both rural and urban communities throughout the United States. Regardless of their location, programs share the same objectives to provide classroom instruction that promotes agricultural literacy, provide skills enabling career success, and develop leadership skills among its students (National FFA Organization, 2005). However the students and the educational environment of the programs may widely vary both physically and culturally.

Urban agriculture classes may differ physically and culturally from the traditional rural agricultural education classroom. Differences in the urban classroom are due to the distinction in cultural capital between urban and rural students (Raven and Cano, 1990). Raven and Cano stated that females and students of diverse socioeconomic and ethnic backgrounds make up an urban agricultural education classroom, greatly diverging from the once typical white, male dominated rural agricultural education classroom. As stated by Ellibee, fewer than 10% of enrolled agricultural education students have a farming background. Urban students have little interaction with agriculture, which inhibits their knowledge of agriculture compared to their rural counterparts (Ellibee, 1990). It is the responsibility of the instructors of urban agricultural education classrooms to adapt to the needs of its changing and diverse students, provide a solid foundation of agricultural knowledge, and promote a positive perception of the United States' agricultural industry.

The United States once agrarian society has significantly changed in every facet of agriculture over the past century. In the 2000 U.S. Census Bureau report, only 21% of United States citizens were reportedly living in rural areas (U.S. Census, 2000). Agricultural education programs in an urban setting are no longer an oddity, but are

becoming the norm. In agriculture classrooms around the country, 60% students lack farming backgrounds (Helsel and Hughes, 1984). Both urbanization and technology have forced society to space themselves from their deep agricultural roots (Leising, Pense, and Igo, 2001). Americans, urban or otherwise, have little knowledge of what agriculture is and what it does for the people, society, and the economy. The majority of citizens identify agriculture only as farming and ranching (Blackburn, 1999).

Food comes from the supermarkets and clothes are made in a factory is the general mentality of American citizens. Today's students have little general knowledge of agriculture, social or economic impacts of agriculture, human health issues related to agriculture, or understanding of agriculture's relationship with the environment. The typical American does not realize the value or the impact of agriculture on their daily life (Richardson, 1990).

Even in rural areas, students have been found to have little knowledge of the food and fiber industry or its importance and applications in everyday life. Students in Oklahoma classrooms, the supposed rural heartland of agriculture, were surveyed to determine their agricultural literacy. Over 15 years ago, students enrolled in agricultural education were found to have lacked a basic understanding of the food and fiber system, agricultural history, current economic issues, and current social and environmental issues (Williams and White, 1991).

Urban students need knowledge of agriculture as an essential enterprise. As the world's population continues to grow, the agricultural industry must meet the needs of this growing population. The competency of urban agricultural education students in agriculture is weak, but their eyes must be opened to the many growing opportunities of

the agriculture industry. Students, whether urban or rural, need to be given the opportunity to understand the relationships between the food and fiber industry with science. The students should be made aware of the multitude of opportunities and careers in the agricultural industry and recognize that these careers are not limited to production agriculture (Sutphin, 1990). The future of the agricultural industry depends on allowing students to believe that their education will allow them to become active participants in the food and fiber industry in some manner, no matter how small (Helsel and Hughes, 1984).

The urban agricultural education program has made and continues to strive to meet the needs of educating students about agriculture. The urban program must teach to its students what rural students take for granted… personal and interactive experience with agriculture throughout their lives (Gless, 1993). Emphasizing career opportunities in agriculture, the urban program should provide SAE opportunities within the community, promoting how agriculture impacts them. Although many people may feel that an agriculture program is not appropriate for an urban setting, there are numerous opportunities here for SAE, career sites, and other hands on experiences (Sutphin, 1990). These work and classroom experiences and opportunities aid in developing agricultural literacy and promoting sound agricultural choices.

The need to provide students with sound agricultural knowledge is imperative as these students' choices will assist in the development and implementation of public policy. Aside from understanding basic agricultural knowledge, Americans have no idea how their choices as a consumer affects farming practices or food security (Richardson, 1999). The agricultural education teacher needs to understand what today's student

perceives as agriculture and strive to make the necessary changes to equip our students with the knowledge that will shape the nation's future (Williams and White, 1991). In Understanding Agriculture: New Directions for Education the National Research Council asserts that there are still too many Americans that are unaware of the social and economic value of agriculture in the United States (National Research Council, 1988).

According to Frick, Kahler, and Miller's definition of agricultural literacy, a person should be able to understand the food and fiber system to such a level that he/she "can communicate and understand the economic impact of agriculture, its societal significance, and agriculture's important relationship with natural resources and the environment" (Frick, Kahler, and Miller, 1991, p. 52). Yet in a 1986 study of Oklahoma students, only 30% of the students could answer questions correctly that pertained to these issues (Horn and Vining, 1986).

"Graduates of our secondary school systems should not be considered to have received a well-rounded education if they lack an understanding and appreciation of the significance of agriculture in their daily lives" (Frick, Birkenholz, Gardner, Machtmes, 1995, p. 8). When a student exits a high school and is supposedly prepared for the next phase of his/her life, the educational system is doing a great disservice by not educating each and every student about a subject that effect nearly every aspect of his/her daily life and routines. "All students should receive at least some systematic instruction about agriculture beginning in kindergarten or first grade and continuing through twelfth grade" (National Research Council, 1988, p. 10). Every student should understand the great importance of the food and fiber industry, as these are the same individuals, who will be making decisions in some fashion that will impact future generations.

Graduates should have a working knowledge of what agriculture is and what it does, as well as, the career opportunities and importance of agriculture within their communities. This is especially true of individuals from urban settings, who have little hands on experience with agriculture. Teachers must help urban students to develop an understanding of the importance and the significance of agriculture in their world (Frick, Birkenholz, Gardner, Machtmes, 1995). The National Council for Agricultural Education's vision for the year 2020 states, "all students are to be conversationally literate about the agriculture, food, fiber, and natural resources systems" (National Council for Agricultural Education, 1999, p. 4). Agricultural education programs can ensure that urban students, who would otherwise have little or no agricultural literacy, will gain invaluable knowledge, understanding, and improved perceptions of agriculture. Students, future decision making citizens, must realize the impact their decisions will have on agriculture and ultimately their health and the environment.

Agricultural education has evolved according to the needs of its communities and its students. This country's once predominantly agrarian society has emerged into a technologically advanced and metropolitan world. Teachers in agricultural education programs are aware that their survival thrives upon student enrollment in these electives courses. This means that students should enroll in courses to learn about possible career opportunities or to learn new skills in a topic in which they are interested. The once cows, sows, and plows mentality has been restructured to include biotechnology, sustainability, and general agricultural literacy to fulfill the needs of its now urban learners.

Statement of the Problem

Urban sprawl has taken away a great number of the farms, and fewer and fewer people live in rural areas. With fewer individuals actually having contact and interaction with production agriculture there is a great need to educate students about a world that exists outside of their own, but impacts their lives nearly every minute of their lives. Although the number of people producing our food and fiber is dwindling, there is still a void and a need for future members of the agricultural industry. Students are deserving of an opportunity to learn about agriculture and all of the career opportunities. They need to be given skills and inspiration to learn about and become a part of the agriculture industry.

Teachers must also make students aware that the stereotypical farmer is not the reality of today. The perception that agriculture rests totally in the hands of farmers is history. Agricultural careers, including farming, are extremely technologically advanced and there are even greater numbers of jobs that involve agriculture but have no direct contact with growing or producing any food or fiber commodities. These future members of the workforce should see that the negative stereotypes of agricultural jobs should no longer exist as the agricultural industry has long ago taken on new components to its livelihood. Both the traditional agricultural careers and the emerging new agricultural areas need highly trained, well-educated young people entering those career fields. Without a future generation of agricultural workers, there will be no one to sustain the lives of the people or the environment.

Students should learn about the plethora of agricultural career opportunities, but there is a greater need for each and every student to understand the impact and value of

agriculture. Every student should enter the working world or step into the next facet of their education with the knowledge of what agriculture is and what it does for the world. Future decision makers should be armed with the knowledge that food and fiber really does come from a working farm. Children should know that all of the facets of agriculture are extremely important in their lives and that issues involving agriculture should be taken very seriously and with great care. Agricultural education provides innumerable skills, but some of the greatest impacts it can make in a student's life, for today and tomorrow, are to give them the knowledge and truth about agriculture.

The purpose of this study was to determine what the influence of an introductory agricultural education courses administered in North Carolina urban schools have upon students' agricultural literacy and their perceptions of agriculture. There is a need for society to understand the value of introductory agriculture classes and what changes they make in urban students' thinking and daily lives. Introductory agriculture classes may provide the foundation of agricultural literacy and change students' stereotypes and views of agriculture. These same agriculture classes may perhaps provide students with the knowledge of agriculture, while allowing them to explore agricultural careers. The agricultural education introductory classes, could allow the students to realize that there is relationship between agriculture and themselves.

The Agriscience Applications course for North Carolina should influence agricultural literacy. This course should have impacted perceptions of agriculture in its students. Whether the students were literate on a national standard because of this class was addressed. The instrument developed by Frick, Birkenholz, Gardner, and Machtmes (1995) was a national standard and measure of high school students' agricultural literacy

throughout the country. This instrument was developed by professionals in teaching and agriculture and was considered a means of assessing agricultural literacy of a high school student in nearly any situation. Even if the Agriscience Applications course meets the needs of North Carolina's standards there was a need to determine if this course was meeting the criteria for agricultural literacy on a national level.

This study determined if introductory agricultural education classes throughout urban North Carolina schools achieved the objectives of providing knowledge about the food and fiber industry, career opportunities, and the impacts of agriculture upon their lives, health, and the environment. This study attempted to answer the following questions:

1. Does an introductory agricultural education course increase students' agricultural literacy in an urban agricultural education program?
2. Does an introductory agricultural education course increase student literacy of agricultural careers and opportunities for employment?
3. Does an introductory agricultural education class increase student literacy of agriculture's relationship with public policy?
4. Does an introductory agricultural education class change a student's understanding of agriculture's relationship with the environment and natural resources?
5. What influence does an introductory agricultural education class have upon students' perceptions of the food and fiber industry?

Assumptions

The following assumptions were made regarding this study:

1. The respondents will fully understand the questions asked.

2. The respondents will answer questions to the best of their ability.
3. The respondents will answer questions honestly.

Limitations

1. The Agriscience Applications course is only offered in North Carolina. The schools selected, time of year, and specific student selection could never be duplicated. Additionally, the teachers who taught the course and all individuals involved make this study unique in its entirety. Thus, results cannot be generalized to other students than those who were surveyed in this study.
2. Not all urban schools have agricultural education programs.
3. Not all agricultural education programs teach the Agriscience Applications course.
4. The study did not control for individual differences between teachers' ability to teach the course.
5. Many of the students enrolled in the introductory agricultural education course had already taken other agricultural education courses. This could have contributed to additional knowledge of agriculture on the pretest and reduced gain scores.

Definition of Terms

Agricultural Literacy-Agricultural literacy can be defined as possessing knowledge and understanding of our food and fiber system. An individual possessing such knowledge would be able to synthesize, analyze, and communicate basic information about agriculture. Basic agricultural information includes: the production of plant and animal

products, the economic impact of agriculture, its societal significance, agriculture's important relationship with natural resources and the environment, the marketing of agricultural products, the processing of agricultural products, public agricultural policies, the global significance of agriculture, and the distribution of agricultural products (Frick, Kahler, and Miller, 1991).

Agriscience Applications- an introductory course taught at public high schools in North Carolina that teaches the foundations of the food and fiber industry and its applications.

Urban Area- An Urbanized Area is a new statistical geographic entity designated by the Census Bureau for the 2000 Census, containing a "densely settled area" with a population greater than 50,000. Typically, the overall population density is at least 1,000 people per square mile. Urban Areas are based on Census block and block group density and do not coincide with official municipal boundaries (U.S. Census Bureau, 2000).

Urban County- A county containing an urban area (as defined by the 2000 U.S. Census Bureau) and also possessing a population of more than 200,000 people.

Urban High School- A high school in an urban county having an urban area.

Summary

Agricultural literacy was a term made very popular by the 1988 National Research Council. This term has become a topic of great discussion, debate, and concern. Educators, legislators, agriculturists, and citizens alike are concerned with the limited knowledge that Americans have about something that impacts nearly every minute of their lives, agriculture.

Not only is there a great concern about citizens, and students alike, being agriculturally illiterate citizens and students, there is also a concern that such a negative

association with the food and fiber industry sheds a bleak outlook on the agriculture industry. If today's student is not willing to even consider an agriculturally related career, then the future of this nation is in great danger. Although only 2% of the nation is employed in production agriculture, many other jobs are connected to the great breadth of agriculture (U.S. Census, 2000).

As Americans shift from their agricultural and rural roots to an urban society rich in technology, there is the possibility of a great void in agriculture. The National Research Council demanded that Americans be systematically instructed in agriculture and understand its vitality in everyday life. The National Research Council also illustrated the great need to educate the youth and the public about the great opportunities provided by agriculture (1988). However, regardless of the council's demands and suggestions, there still is question about how today's youth regard agriculture, and if their knowledge about agriculture has increased sufficiently to consider them agriculturally literate.

CHAPTER II

REVIEW OF LITERATURE

Since 1988, when the National Research Council concluded that there was an epidemic of lack of agricultural literacy among Americans, there has been a change in education and agriculture. The National Research Council noted that the majority of Americans had very limited agricultural knowledge and that the trend in American living was to an urban environment. The suggestion by the National Research Council was to reform and improve agricultural knowledge by adopting agricultural literacy programs and changing the face and structure of agricultural education to meet the needs of an evolving and urbanizing public (National Research Council, 1988).

Numerous programs have changed, evolved, or been developed to meet the calling for educating the public about agriculture. The Agricultural Education program was described in the 1988 study as having been successful in the past about teaching solely vocational skills, small numbers of students enrolled in agricultural education, white males made up the majority of agricultural education's students, and program material was outdated (National Research Council, 1988). These findings shocked and jump-started a new era of agricultural education. The mandate by the National Research Council for updated and better programs led to many revisions in education. In the Agricultural Education program, changes were witnessed. New course offerings and a face-lift of its leadership organization the FFA (formerly known as the Future Farmers of America and changing its name to the National FFA Organization) were a few of the modifications made after the 1988 report.

Agricultural education programs around the country understood the need to teach its students and change its vehicle to accommodate the needs of its evolving audience. Classrooms were no longer always set in a rugged shop in the middle of a farm town. Places like inner –city Chicago, Baltimore and Detroit had agricultural education programs with students in need of education regarding agriculture. The National Research Council did not state that only the agricultural education program had to be changed, but the entire kindergarten through twelfth grade method of teaching students about agriculture (National Research Council, 1988).

In 1988 the National Research Council stated that all students from kindergarten through the twelfth grade had to be taught, systematically, about agriculture to improve agricultural literacy. The council also stated that the subject matter of instruction about agriculture had to be broadened. Students in all grade levels and realms of education had to know about agriculture, its numerous applications, its significance in their lives, career opportunities, and what role the student played in agriculture (National Research Council, 1988). With this information provided by the study, many questions began to be raised. Numerous changes to Agricultural Education and the development of agricultural literacy programs were put into action.

The Model for this Research

Duncan and Biddle (1974) presented a model for classroom teaching and learning that provides the foundation for this research. In the model, four major variables are proposed that result in student learning. These variables are: presage, context, process, and product variables. Each of these variables is a separate entity, however, they work together to change student knowledge.

The presage variable explains those factors and characteristics associated with a teacher. This variable relates to a teacher's experiences in the past and present that together make up who the teacher is and how the teacher teaches. In this study, this variable was not of concern to the researcher.

The context variables are those that are not in control by the teacher. These variables include who the pupil is, and explains what the classroom and community factors are. These variables were of particular interest in this study. In this study, the student's knowledge and attitudes about agriculture would be evaluated before the student interacted with information presented regarding agriculture. The demographics relating to residency in an urban setting also played a major role in studying the classroom teaching experience.

Process variables explain what actually takes place in the classroom, the exchange and interaction between the presage variables and the context variables. This was of particular interest in this research, as the study was to determine if urban agricultural education students' knowledge of agriculture and their perceptions of agriculture would change once they were exposed to the Agriscience Applications course work. The study of the exposure to agricultural knowledge and the changes associated with that exchange would then be further studied in product variables.

The product variables are the final category of variables in the model. This variable is the outcome of the educational exchange in the process variables. The model proposed that there would be change as a result of the interaction between the presage and context variables. The research of this study proposed that the students would gain agricultural literacy and an improved perception of agriculture after being taught the

materials provided by the Agriscience Applications course. Within this variable, there are immediate and long-term effects that can be measured. In this study, the author was solely concerned with immediate pupil growth upon conclusion of the Agriscience Applications course.

Agricultural Literacy Defined

Once the findings of the National Research Council in 1988 illustrated the intense need for agricultural literacy, a question was raised as to what the real definition of agricultural literacy was. Moore (1987) defined agriculture as a subject including politics, economics, environment, sociology, international relations and international trade, and technology. A year later, the National Research Council defined agriculture as

> "… the production of agricultural commodities, including food, fiber, wood products, horticultural crops, and other plant and animal products. The term also includes the financing, processing, marketing, and distribution of agricultural products; farm production supply and service industries; health, nutrition, and food consumption; the use and conservation of land and water resources; and related economic, sociological, political, environmental, and cultural characteristics of the food and fiber systems" (National Research Council, 1988, p. vi).

The definition of agriculture is difficult to summarize in a few words, as it encompasses so many topics and facets of life in general.

The definition of agriculture has great breadth, however, the National Research Council stated the definition of agricultural literacy in 1988. In 1988, the National Research Council stated that "…an agriculturally literate person's understanding of the

food and fiber system would include its history and its current economic, social and environmental significance…" (National Research Council, 1988, p.8). The National Research Council suggested that an agriculturally literate person would have a broad understanding of "…food and fiber production, processing, and domestic and international marketing" (National Research Council, 1988, p.9). The National Research Council went on to further define the broad definition of agricultural literacy to include knowledge of nutrition and enough useful knowledge to care for their lawns, gardens, parks, and other recreational environments.

A 1991 article by Frick, Kahler, and Miller asked members of the industry and education to join in the effort to define agricultural literacy and refine the 1988 definition. Using a Delphi study, Frick, et.al. worked with 98 participants and two questionnaires to develop a definition of agricultural literacy. The Frick, et.al. study defined agricultural literacy as "…possessing knowledge and understanding of our food and fiber system… An individual possessing such knowledge would be able to synthesize, analyze, and communicate about agriculture" (1991, p. 52). The Frick, et.al. study identified eleven specific subject areas within agriculture that are recognized as agricultural literacy:

1. Agriculture's important relationship with the environment
2. Processing of agricultural products
3. Public agricultural policies
4. Agriculture's important relationship with natural resources
5. Production of animal products
6. Societal significance of agriculture
7. Production of plant products

8. Economic impact of agriculture

9. Marketing of agricultural products

10. Distribution of agricultural products

11. Global significance of agriculture (p.54)

With the definition of agricultural literacy in place, Frick, Birkenholz, Gardner, Machtmes assessed the definition and its eleven identified subject areas and suggested three areas that should be stressed in secondary agricultural education programs (Frick, Birkenholz, Gardner, Machtmes, 1995). The 1995 study suggested that the following three areas be of the greatest emphasis in a secondary agricultural education program:

1. An understanding of the applied processes or methods of agriculture

2. The basic vocabulary of agricultural terms, and

3. The impact of agriculture on society (p.6)

Like the definitions and the subject areas proposed by the Frick, et.al. study, other definitions have emerged. Applications of the definition have also materialized. Law (1990) suggested that the definition of agricultural literacy should also include an awareness of the impact of agriculture upon everyday life in respect to the environment and society. In 1999, the National Council for Agricultural Education (NCAE) stated in its goals for the year 2020 that students must be agriculturally literate; including the food, fiber, and natural resource industries. The NCAE expected students to be able to communicate, understand, and therefore make decisions about agriculture that will undoubtedly impact their world (National Council for Agricultural Education, 1999).

The Need for Agricultural Literacy

Members of the California agricultural and educational communities contributed their feelings about agricultural literacy and the current effects of agricultural literacy programs in their state. In 1991, Braverman and Rilla surveyed three groups; crop extension directors, school superintendents, and district superintendents on issues related to agricultural literacy. All populations received two surveys with a 59% response to survey number one and a 54% response to survey number two. The first survey related to the importance of teaching agricultural literacy and the second had those surveyed identify ongoing agricultural literacy programs.

The instruments used allowed Braverman and Rilla to better understand what agricultural literacy issues educators felt were important. Braverman and Rilla noted that the majority of those surveyed felt there was inadequate public knowledge in and about agriculture. There was a need to promote agricultural vocational skills in agriculture and a need to promote agricultural literacy about agriculture. Those surveyed felt that the most critical agricultural literacy issues were food safety, land use, water policy, and the role of agriculture in society and the economy (Braverman and Rilla, 1991).

The educators were also asked to rate the need to teach agricultural literacy in their communities. Braverman and Rilla showed that the respondents suggested that agricultural literacy was a moderately high priority for grades 4th through 6th and somewhat high for grades 7th through 9th. Few respondents of the survey could actually illustrate or knew of an agricultural literacy program that was in action. Those respondents only knew of agricultural education programs that could meet the criteria of

teaching about agriculture vocational skills and agricultural literacy (Braverman and Rilla, 1991).

The instruments used in the Braverman and Rilla study also helped to illustrate the level of interest about teaching agricultural literacy amongst those surveyed. The individuals coming from a rural area were more interested in agricultural issues and education than those surveyed from urban areas. The majority of those surveyed felt that topics of high public debate should most likely be linked to agricultural education and agricultural literacy education. Those topics that Braverman and Rilla's survey identified as needing to be taught in an agricultural literacy program were toxics in food and the environment and also water quality and water policy issues.

Those subjects surveyed by Braverman and Rilla illustrated the overall need for agricultural literacy programs but the current lack of identifiable programs other than established agricultural education programs in high schools. The three groups surveyed by Braverman agreed upon the need and the overall priority of educating in regards to agricultural literacy. The subjects also agreed upon the public's failure to recognize or understand the agriculture industry. Braverman and Rilla suggested the need to apply and establish agricultural literacy programs. Members of the educational and agricultural communities needed to understand their existence as an educational unit.

Horn and Vining (1986) surveyed over 2,000 public education students to better understand their knowledge of agriculture. The subjects of the study were from various residences, including rural and urban. The students were subjected to an assessment instrument that was selected by faculty in the college of Agriculture and Education at Kansas State University.

The results of the Horn and Vining study indicated that students do not know the basic facts regarding agriculture. In most cases, less than 30% of the respondents answered questions correctly that pertained to agricultural knowledge. For the most part, students who had lived on farms had more knowledge than those students who did not, however, the correct response rate was poor regardless of location, residence or gender.

Urban and rural students were surveyed in the Midwest to understand their knowledge and perceptions of agriculture. Frick, et.al. presented a study that illustrated urban students lack fundamental knowledge of agriculture comparatively to urban students. The Frick, et.al. study also concluded that there was a more negative perception of the agriculture industry, as a whole, from urban students in an inner city high school (Frick, Birkenholz, Gardner, Machtmes, 1995).

Frick, et.al. surveyed 668 rural and 453 urban high school students using an instrument that was developed from Frick's, et.al. (1991) Delphi study of the definition of agricultural literacy. The eleven concept areas were reduced to seven agricultural subject areas. There was a knowledge and a separate perception section that employed a Likert-type scale. Using means and standard deviation to analyze data of agricultural knowledge and a General Linear Model to analyze perception, several conclusions were drawn.

Frick, et.al. concluded that student respondents had limited knowledge of agriculture. The rural high school student respondents were more knowledgeable about agriculture than urban students. Overall, both respondent groups had relatively positive perceptions of agriculture. There is a great deficit in knowledge of agriculture for many of the subjects regardless of race or residence, but the underlying data illustrates that

students are not agriculturally literate, and Frick, et.al. suggested further examination of this topic in education.

In a 2004 study, Pense and Leising worked to further study and assess an agricultural literacy program's effect on agricultural literacy in general and agricultural education high school students. Pense and Leising noted that previous research had focused on elementary students and teachers, but very little was concentrated on high school students. Employing a criterion ex post facto research, Pense and Leising surveyed 330 senior students from six schools in Oklahoma (including urban, suburban, and rural) using purposive sampling. Pense and Leising also devised an instrument based on an agricultural literacy framework curriculum that had been implemented in the schools. The instrument employed a criterion-referenced test to evaluate student knowledge about agriculture and a Tukey HSD post-hoc strategy was used to make pair-wise comparisons to determine where the groups varied.

The data collected by Pense and Leising concluded that all students, general and agricultural education, had some knowledge of agriculture. Agricultural education students did not differ from general education students in their overall level of agricultural knowledge. Students enrolled in rural schools had significantly lower levels of agricultural knowledge than those students of urban or suburban schools. Students involved in an agricultural youth organization possessed high agricultural knowledge. Overall, however, the agricultural knowledge of seniors in the six schools surveyed in Oklahoma did not exhibit agricultural literacy as defined by the framework being tested.

Agricultural Literacy and its Relationship with Careers

Among the agricultural literacy subjects that should be emphasized in secondary agricultural education programs, according to Frick's, et.al. 1991 study, the implication of agricultural career knowledge was suggested in all three. Processes, vocabulary, and social impacts were undoubtedly touched upon when discussing and learning about agricultural occupations. Average students had a low awareness of agricultural careers and were considered to be agriculturally illiterate by Frick's, et.al. definition.

Mallory and Somner (1986) studied 540 twelfth grade students in various school settings to determine their understanding of agricultural careers. There was an even distribution of rural, suburban and urban students, male and female, and white to non-whites in this California study. Using a 27 item multiple-choice questionnaire, Mallory and Somner found that students have an overall negative connotation of agriculture. Most students see farming as important but do not see agriculture as a career possibility.

This 1986 study found that, overall, students thought that agricultural jobs were only associated with production and restricted to farming. Most students were surprised to learn about the breath of careers. Rural students thought of agricultural careers more positively and overall, farm experience promoted consideration of an agricultural career. Urban students thought of agriculture careers as low paying and boring (Mallory and Somner, 1986).

Very few of the students had been taught about agriculture careers or the possibilities to attend a college for agriculture. Seventy-eight percent of the student in the Mallory and Somner study never had a suggestion to attend an agricultural college. Only two percent of the students had a high school counselor suggest an agricultural college. The typical student sees him/herself with a career in the city and not in

agriculture. They see the importance of food production in agriculture, but they are unaware of the other agricultural career opportunities (Mallory and Somner, 1986).

Students may not give consideration to the agricultural careers because of their preconceived ideas and associations of the work-traits of those careers. Rawls (1995) studied 23 college students in an introductory agriculture class, 58 high school vocational students (sophomores and juniors), and 51 high school vocational students (juniors and seniors) in regards to their feelings about work-traits associated with selected careers in the food and agricultural sciences. All of the students in this study were of various agricultural backgrounds and were exposed to various levels of agricultural information. The work-traits were then linked with four career related work-trait clusters (education and communication, marketing, management, and merchandising, agricultural resource development, research and development). Students were asked to indicate on an eleven-point scale their interest in performing the work-trait. Based on the research, Rawls concluded that the more education that students had in agriculture, the more positively and the more interest they showed in that career cluster and in agricultural careers in general (Rawls, 1995).

A difference between rural and urban students could be described by the number of minority students in the classroom. In an urban classroom, minorities are in greater numbers. A study by Talbert and Larke (1995) described the perceptions and attitudes of minority students toward agriculture careers. Talbert suggested that the increasing number of minority students in secondary agricultural education could easily fulfill the vacancies in the industry. Secondary agricultural education has an important role and source of minority recruits for the industry.

In Talbert and Larke's study, minority students in Texas classrooms were surveyed about their knowledge and attitudes toward agriculture careers. It was reported by Talbert and Larke that in 2025, less than 50% of Texans will be white. Still, the number of minority students enrolled in agriculture classes in Texas was low.

Talbert and Larke (1995) used an instrument that asked 26 questions of minority students. These questions involved students' knowledge of agricultural careers, the status of agriculture careers, pay of the agricultural jobs, and the skills and expertise that were required by agriculture occupations. The data compiled by the researchers demonstrated that minority students have a negative attitude towards agricultural careers. Minority students believed that there were fewer personal opportunities in agricultural occupations (Talbert and Larke, 1995). Talbert and Larke also found that minority students believed that agricultural occupations were primarily associated with production agriculture. Very few students believed that agricultural careers required much, if any training (Talbert and Larke, 1995).

Agricultural Literacy and Public Policy

To better understand how agricultural literacy impacts public policy it is essential to have a comprehension of what is policy. "Agricultural and food policy is economic policy that deals with the production, marketing, and consumption of food" (Knutson, Penn and Boehm, 1990, p. 3). Agricultural policy involves a number of interrelated and controversial issues that can impact every citizen in the United States and around the world.

Agricultural policy is a process and one that is impacted by a number of factors that are controlled within one's self. Factor's that influence one's policy position is illustrated by Knutson, Penn, and Boehm as a pyramid with personal beliefs and values, along with goals and facts all working to provide a policy position. That position works with other's policy position to play a role in Knutson, Penn, and Boehm's Model of the agricultural food policymaking process. This model illustrates that interest groups (including: producers, consumers, agribusiness, cooperatives, and public officials) and Congress, the Executive Branch and the Judicial Branch work together. In this model, government policies effecting agriculture can be proposed, developed, adopted and carried out with consumers' (everyday citizens) influence. There is a need for American citizens to understand policy options and consequences, as well as, those affected by agricultural and food policy to recognize and understand their contributions to these policies (Knutson, Pen, and Boehm, 1990).

Several scientific sources have also noted the serious need for agricultural literacy in American citizens to ensure their informed and active participation in the development and implementation of agricultural policy that will undoubtedly affect their daily lives. In 1995, Frick, et.al. surveyed Midwest high school students from rural and urban environments to better understand their knowledge and perceptions of agriculture. This study looked at student perceptions and knowledge of agricultural public policy.

Frick, et.al. collected data from 1,119 respondents using an instrument, composed of 35 questions using a Likert-type response scale. Frick, et.al. assessed student knowledge and their perceptions of agriculture in seven subject areas, including: Societal and Global Significance of Agriculture, Public Policy in Agriculture, Agriculture's

relationship with the Environment and Natural Resources, Plant Science, Animal Science, Processing of Agricultural Products, and Marketing and Distribution of Agricultural Products.

In the 1995 study comparing rural and urban inner-city high school students' knowledge and perceptions of agriculture, urban students were found to be least knowledgeable about agricultural policy. Overall, students had the least positive perception of Agricultural Policy (Frick, et.al., 1995).

In 1997, Broder conducted a study among agricultural students enrolled at the University of Georgia. Broder's objective was to identify and compare student values and factors associated with determining agricultural policy issues. Using an ordinal scale of values, students ranked the importance of policy issues confronting agriculture. The following issues were ranked in order of importance: Decline in the Number of American Farmers, Policy Responses to Uncertainty in Agriculture, Increasing Internationalization of Agriculture, Environmental Consequences of Agricultural Production, Food Safety and Availability, and Managing Technological Advances in Agriculture.

Student backgrounds, interests, and values play a great role in the development of the ranking of the importance of agricultural policy issues, according to Broder's research. The overall findings of the paper regarding the importance of the agricultural policy issues were as follows:

1. Students from all backgrounds and majors placed food safety and environmental issues associated with agriculture of utmost importance.
2. Some students see the conservation of family farms an issue, but the overall group does not feel that this policy issue is of great importance.

3. Globalization of agriculture is not perceived as having great importance in agricultural policy issues.
4. The agricultural economics class did not change student values and thus the course had little impact or change in the students ranking of the agricultural policy issues.

The Broder study concluded that many factors are involved in an individual's understanding and values of agricultural policy issues (1997).

Agricultural Literacy and the Environment and Natural Resources

Among the eleven subject areas identified by the Frick, et.al. (1991) definition of agricultural literacy, he noted that agriculture's important relationship with natural resources and the environment must be recognized and understood. Frick, et.al. noted that an agriculturally literate person would understand that there is a need to conserve natural resources, sustain agriculture, identify the effects of pollution, and overall recognize the important relationship between agriculture and natural resources. Frick, et.al. also stated that an agriculturally literate person would understand that an agriculturalist has a role in protecting the environment. The definition also suggested that an agriculturally literate person would be familiar with the positive and negative effects of agriculture on the environment, as well as, the chemicals used in agriculture. The definition of agricultural literacy suggested that a person possessing agricultural literacy would be able to analyze and converse using the environmental and natural resource relationships with agriculture state previously.

In the Frick, et.al. (1995) study of urban and rural student knowledge of agriculture, students were surveyed about their knowledge regarding the environment and natural resources. Both rural and urban high school students were most knowledgeable about these agriculturally related concepts. The students also had the most positive perception about the natural resource concept area. Frick, et.al. suggested that although the knowledge scores in this concept area were the highest there was still ample room for improvement.

Kirts (1990) illustrated the genuine need for interrelating environmental and natural resource concepts into the agricultural education curriculum. Kirts explained that the goals of both environmental and agricultural education are the same and that their efforts are well aligned. Kirts' study illustrated the relevance of environmental and agricultural issues in today's world.

In Kirts' descriptive study, she clarified the need for teaching environmental and natural resources. Kirts described the issues surrounding natural resource management is extremely relevant to the concerns of today's society. The study explained that future decision makers and citizens must be educated about the environment and agriculture to make the appropriate and educated decisions that will affect the world, the environment, and its people.

Today's texts and courses in either agricultural or environmental education do not promote future citizens armed with decision-making tools. Kirts describes texts that lack chapters that involve environmental ethics, environmental decision-making, environmental policy, or environmental economics. Kirts stressed that many texts need to include environmental education with agricultural education and vice versa.

Kirts (1990) states that literature, including the "Mission Statement" of the North American Association for Environmental Education (NAEE) suggested that educational education within agricultural education should emphasize students' understanding of their morals and values in shaping theirs' and other individual's attitudes and actions towards the environment. Another vital role of agricultural education is the need to promote active citizenship to positively change and promote environmental stewardship. Finally, it is reiterated that agricultural and environmental education should be a life-long process that begins from infancy and throughout life.

Other authors and researchers were cited by Kirts (1990) as having written the need to have an environmentally educated public. In order to successfully conserve and maintain ecosystems, Kirts explained that the authors Wood and Wood believed that this was only possible with informed and motivated citizens. Kirts explained that the author Troost (1972) described that the public must have a working knowledge and understanding of ecological concepts, facts, ecology, sociology, urban environments, and policy to make sound environmental decisions.

Environmental and agricultural education provides the avenue for teaching the youth skills and information that will allow them to make powerful decisions. Kirts explained that the agricultural curriculum provides the opportunity to fulfill a niche for environmental subject matter. The environmental education practices and philosophies employed by agricultural education can provide the groundwork for the void in natural resource instruction in secondary level instruction.

CHAPTER III

METHODOLOGY

The purpose of this study was to determine the influence introductory agricultural education courses administered in North Carolina urban schools have upon students' agricultural literacy and their perceptions of agriculture. In order to fulfill the intentions of this study, an instrument was used to determine high school students' agricultural knowledge and their perceptions of the food and fiber industry. This chapter describes the methods and procedure used in developing and carrying out this research.

The methodology of this study was descriptive research design. This method is suitable for research that wishes to systematically depict a real situation factually. The data that is acquired from this research is then used to make generalizations about a population from the sampling that occurred. This type of research does not involve the testing of hypotheses. A limitation of using this method of research is that it cannot determine the cause of an identified behavior. Other weaknesses of using this research design are that it lacks external validity and is usually more extensive than intensive.

Population

The population of the study included high school Agriscience Applications students enrolled in urban high schools in the state of North Carolina during the fall semester of 2005. In the state of North Carolina, there are six counties that contain an urbanized area. An urbanized area consists of densely settled territory that contains 50,000 or more people (U.S. Census Bureau, 2002). The counties containing urbanized areas also have at least 200,000 people each (U.S. Census Bureau, 2000). The six counties identified were Buncombe, Durham, Forsyth, Guilford, Mecklenburg, and

Wake. Respectively, their urbanized area defined by the U.S. Census Bureau was Asheville, Durham, Winston-Salem, Greensboro, Charlotte, and Raleigh, NC. Of the counties with urbanized areas, 26 high schools had agricultural education programs.

Of the 26 schools that were located in urban counties, several of the schools did not qualify for the study for a number of reasons. Some of the agricultural education programs did not offer the introductory course, Agriscience Applications (including one entire county that does not offer the course). Additionally, some schools chose not to participate in the study or had circumstances relative to their program that made it difficult for the program to participate in the study. This left Buncombe, Guilford, and Wake counties.

Due to the inability for some schools to participate, a random sampling of the schools was not feasible. According to Wiersma and Jurs (1995), a purposive sampling method was used to achieve the sample for the study. Of the 26 schools eligible, six schools offered Agriscience Applications and volunteered to participate in the study. Originally there were eight schools committed to participating in the study. Two schools, who had participated in the beginning did not take the post test altogether and were therefore excluded. Those schools that had completed the pre and posttest were included in the study, a total of six schools.

A total of 173 students were enrolled in the Agriscience Applications courses in the six schools that agreed to participate in the study. Data were collected from 135 of the students in the sample (78% response rate). Those surveys, that were not included were due to incompletion of the entire survey process (both pre and post test), insufficient

completion of the survey (completing the survey in less than ten minutes) or failure to follow instructions.

Instrumentation

In 1995, Frick, Birkenholz, Gardner, and Machtmes employed an instrument that measured both high school student perceptions and general knowledge of agriculture. This instrument had been used in a previous study with college students as respondents. The title of this instrument was Agricultural Awareness Survey (see Appendix I) and was considered a cooperative project of the University of Missouri, Lincoln University, Michigan State University and Purdue University. The researcher contacted the authors of the instrument to obtain permission to use the instrument in this study (APPENDIX J).

Reliability and validity of Frick, et.al. (1995) instrument used in their study of inner city and rural high school students was reviewed. The agricultural knowledge section of the instrument used had been assessed using a Kuder-Richardson 20 (KR-20) coefficient of internal consistency. The KR-20 computed for the knowledge section was .85. The perception section of the instrument had been reviewed using a Cronbach's alpha coefficient as a measure of internal consistency. The Cronbach's alpha coefficient for the items related to perception was .90. In 1994, a national panel of experts examined the instrument and determined it was a valid tool for measuring agricultural literacy concepts.

The instrument used was made up of three sections including: general knowledge, perception, and demographics. The general knowledge portion of the instrument tested seven concept areas including: Societal and Global Significance of Agriculture, Public Policy in Agriculture, Agriculture's Relationship with the Environment and Natural

Resources, Plant Science, Animal Science, Processing of Agricultural Products, and Marketing and Distribution of Agricultural Products. The knowledge section of the instrument directed respondents to answer "True", "False", or "Don't Know" for each of the 35 statements. The second section, the perception instrument, included 35 perception statements to which respondents used a Likert-type response scale ranging from Strongly Agree to Neutral to Strongly Disagree. The demographic portion of the instrument was not used in the study; however, a new demographic section was composed by the researcher and substituted in the study.

The demographic section of the instrument contained questions that asked respondents questions that would better acquaint the researcher with their background in agriculture. The demographics section consisted of questions asking respondents about their individual gender, race, home location, population of nearest town, acreage of parents who farm, if relatives worked on a farm, if relatives worked in an agribusiness, agricultural courses taken, membership in FFA, involvement in raising animals or pets, involvement in raising gardens or crops, news sources read, highest grade level completed, and if there were any agricultural courses taken prior to Agriscience Applications.

Data Collection

Each school that had agreed to participate in the study was directly contacted via email, telephone, or in person to identify a lead agricultural teacher. The lead teacher collaborated with the researcher to obtain permission from the research site to obtain permission from the school and continues to proceed with the survey (see Appendix A). Once contact was established by the lead agricultural education teacher with the school

administration the researcher then made personal contact to the school administration with a letter and a telephone call (see Appendix B).

The lead agricultural teachers were contacted in person by the researcher or via phone and email to prepare the teachers for test administration. Prior to the first testing session, teachers were given packets that described the reason for the study, the format of the instrument (see Appendix A), and specific instructions for administering and collecting surveys. Teachers were also given a student consent form (see Appendix F) and a parent consent form (see Appendix H).

Two identical instruments were provided for each respondent to the lead teacher at each participating testing site. One of the instruments was to be used as a pretest and the other as a posttest. The pre-tests were distributed in early August for lead teachers to then administer to the respondents during the first week of the fall during the 2005 school year. The posttests were to be administered the final week of the fall semester 2005. Most North Carolina schools are on a block schedule that has two semesters. The first semester, fall semester, commence in August and conclude in January after the holiday break.

At the time the pre and posttests were delivered, teachers were instructed to use the student's personal identification number to the school. This number could be a state assigned or a school assigned identification number, however, it was confidential and only a manner of which to coordinate pre and posttest scores. The teachers were instructed to not include any students first or last name on the tests.

The lead teachers at the individual schools administered pre and post-testing during the first week of class and again during the last week of the course during the fall

semester of the 2005 school year. Prior to the test, lead teachers introduced the instrument and read all instructions pertaining to answering and finishing the instrument. Each student work independently to mark all answers on a general purpose NCS® answer sheet. Students were expected to answer questions to the best of their ability. Therefore, surveys that were returned in less than ten minutes were deemed ineligible to eliminate skewed results.

Data Analysis

An identifiable student number was selected by the teacher and given to each student for the pre and posttest. When the tests were returned to the surveyor, the data was recorded with the identification number. There was no correlation to the identity of whom the student was known or made. This identification number was known by the student and used for both the pre and posttests. Additionally, respondents marked a two-digit code on the answer sheet to identify the school.

Once the answer sheets were returned they were scanned and data was entered into a SPSS 11.5 data file. The data was entered according to each section of the instrument. Depending upon the data gathered, various methods of analysis were employed.

The first and second sections of the instrument were based upon questions measuring the respondents' knowledge of agriculture and their perceptions of agriculture. The data was collected in August at the beginning of the school year and collected in December after a completed Agriscience Applications course. To compare the scores of the pre-test to the post-test scores, a correlated t-test was employed. The differences in the mean scores of the pre-test were compared to those of the post-test.

The data collected from the third section of the instrument dealt with demographics of the respondents. Descriptive statistics were employed to state frequencies, numbers, percentages, standard deviations and means.

CHAPTER IV

DATA ANALYSIS AND FINDINGS

The purpose of this study was to determine the influence introductory agricultural education courses administered in North Carolina urban schools have upon students' agricultural literacy and their perceptions of agriculture. To determine if students increased their knowledge and perceptions of agriculture, the study employed an instrument that had been used in a prior agricultural literacy study.

Demographics

The urban schools included: Millbrook, Knightdale, Wake Forest-Rolesville, Enka, Southern Guilford, and Southeast Guilford High Schools. Teachers administered the instrument at each site. In the study, 44% of the students were female and 56% of the students were male students. Of these students 4% were Asian, 17% were Black, 7% were Hispanic, 69% were White, and 3% were other races.

Although the students participating in this test were considered to be attending urban schools according to the studies' definition of an urban school in North Carolina, many of the students came from various demographic regions. Of the students, 7% resided on farmland, 43% resided in a rural area not on a farm, and 46% lived in what they considered a town or city.

The majority of the students enrolled in the Agriscience Applications course are presumed to be freshmen since Agriscience Applications is considered to be an introductory course in North Carolina. This study included 51% freshmen, 31% sophomores, 13% juniors, and 6% seniors.

Many of the students had experience with agriculture or had already taken an agriculture course previously, thus having some knowledge of agriculture regardless of this course's description of being an introductory course. Fifty-six percent of the students had relatives who live or worked on a farm, 55% have relatives who work in an agricultural business, and 16% of the students had taken agricultural courses in high school before. Additionally, 86% of the students had been involved in raising plants; gardens or crops and 89% of the students had been involved in raising animals or pets. The questionnaire did not measure the amount of experience students had in each of these agriculturally related activities.

Analysis by Study Questions

Question 1: Does an introductory agricultural education course increase students' agricultural literacy in an urban agricultural education course?

Students answered 35 true and false questions to determine their level of agricultural literacy. The instrument was supplemented with an optical scan sheet to record the answers to the questions. The students' teachers administered the tests during the first week and during the last week of the semester long course. The instrument that was employed was considered a national standard that was developed to measure agricultural literacy in the Rural and Urban Inner-City High School Student Knowledge and Perception of Agriculture Study developed by Frick, Birkenholz, Gardner, and Machtmes (1995).

The students' scores were analyzed using SPSS 11.5 and a paired sample T-Test analyzed means of literacy scores as presented in Table 1. The overall mean Literacy of Agriculture score was 20.99 out of 35 before the Agriscience Applications course and

24.13 out of 35 after the Agriscience Applications course. The difference in means between the pretest and posttest was statistically significant $\alpha \leq .05$ ($t = 5.31$, $df = 134$, $p = .001$). The increase in pre to posttest scores was a 9% gain in agricultural literacy.

Table 1
Overall Agricultural Literacy Scores

	Mean	Std Deviation	T	df	P
Pre Score	20.99	5.95	5.31	134	.001
Post Score	24.13	6.84			

* $\alpha \leq .05$
Maximum score= 35

Additionally, the literacy scores were further studied and broken down into subgroups to respond to the questions posed by the study. These subgroups were general agricultural literacy, career literacy, public policy literacy, and environmental and natural resources literacy. The general agricultural literacy subgroups included questions that had a sense of overall agricultural literacy and could not be grouped into careers, public policy, or environmental and natural resources (See Appendix I).

Questions in the general agricultural literacy subgroup also had a pre and post score. There were 12 questions that were included in this sub grouping (noted in the Appendix I). The original general agricultural literacy test scores were 7.37 out of 12 and the post agricultural literacy knowledge scores were 8.64 out of 12.

The analysis of the data illustrates that the general agricultural literacy of urban students subjected to North Carolina's Agriscience Applications course did increase by 10.6%. As illustrated in Table 2, the difference in means between the pretest and posttest was statistically significant $\alpha \leq .05$ ($t = 5.35$, $df = 134$, $p = .001$).

Table 2
General Agricultural Literacy Scores

	Mean	Std Deviation	T	df	P
Pre Score	7.37	2.56	5.35	134	.001
Post Score	8.64	2.53			

* $\alpha \leq .05$
Maximum score= 12

Question 2: Does an introductory agricultural education course increase student literacy of agricultural careers and opportunities for employment?

There were five questions in the agricultural careers literacy subgroup. The students' scores were analyzed using SPSS 11.5 and a paired sample T-Test analyzed means of literacy scores as presented in Table 3. The mean score of the pre and posttests, corresponding standard deviations, t score, df value, and p value are all presented Table 3.

The difference in mean scores for literacy of agricultural careers was statistically significant at the $\alpha \leq .05$ level (t= 2.35, df= 134, p=.001). Mean literacy of agricultural careers and opportunities was 2.8 out of 5 before students took the Agriscience Applications course and was 3.1 out of 5 after taking the course. This was a 6% increase in agricultural career literacy.

Table 3
Agricultural Career Literacy Scores

	Mean	Std Deviation	T	df	P
Pre Score	2.80	2.55	2.35	134	.001
Post Score	3.10	2.53			

* $\alpha \leq .05$
Maximum score= 5

Question 3: Does an introductory agricultural education class increase student literacy of agriculture's relationship with public policy?

There were ten questions in the agricultural public policy literacy subgroup. These questions, from the Frick, Birkenholz, Gardner, and Machtmes (1995) instrument dealt with issues related to government policy, trade, supply, food prices, and exportation and food distribution. The students' scores were analyzed using SPSS 11.5 and a paired sample T-Test analyzed means of literacy scores as presented in Table 4.

The difference in mean scores for the knowledge of agricultural public policy literacy was statistically significant at the $\alpha \leq .05$ level ($t=3.81$, $df=134$, $p=.001$).

Table 4
Agricultural Public Policy Literacy Scores

	Mean	Std Deviation	T	df	P
Pre Score	5.97	2.25	3.81	134	.001
Post Score	7.00	2.77			

* $\alpha \leq .05$
Maximum score= 10

As indicated in Table 4, the literacy of public policy did increase by over one point upon completion of the Agriscience Applications course. This was a 10.3% increase in literacy of agricultural policy.

Question 4: Does an introductory agricultural education class change a student's understanding of agriculture's relationship with the environment and natural resources?

There were seven questions in the environment and natural resource agricultural literacy subgroup. These questions dealt with literacy specifically relating to how agriculture effects the environment and how these effects relate to society.

The students' scores were analyzed using SPSS 11.5 and a paired sample T-Test analyzed means of knowledge scores as presented in Table 5. The mean score of the pre and posttests, corresponding standard deviations, t score, df value, and p value are all presented in the table.

The difference in mean scores for agricultural environment and natural resources literacy was statistically significant at the $\alpha \leq .05$ level ($t=3.69$, $df=134$, $p=.001$). The difference in mean scores between the pre and posttest scores of the environmental and natural resources literacy portion of the instrument increased. There was a change in score from 4.87 out of 7 on the pretest to 5.39 out of 7 on the posttest. This is a 7% increase in test scores related to agricultural literacy of the environment and natural resources.

Table 5
Agricultural Environmental and Natural Resources Literacy Scores

	Mean	Std Deviation	T	df	P
Pre Score	4.87	1.60	3.69	134	.001
Post Score	5.39	1.67			

* $\alpha \leq .05$
Maximum score= 7

Question 5: What influence does an introductory agricultural education class have upon students' perceptions of the food and fiber industry?

The perception portion of the instrument used to determine if the Agriscience Application course of North Carolina impacted literacy and perceptions of agriculture was composed of 35 items. The respondents were directed to use a Likert scale ranging from Strongly Agree (1), to Neutral (3), to Strongly Disagree (5). Lower perception scores reflected a more positive perception of agriculture. Negatively stated items were reverse coded for analysis.

The students' scores were analyzed using SPSS 11.5 and a paired sample T-Test analyzed means of perception scores. The mean score of the pre and posttests, corresponding standard deviations, t score, df value, and p value are all presented in Table 6.

Urban high school students' perceptions of agriculture before and after taking the course were not statistically significant at the $\alpha \leq .05$ level. The pre and posttest scores ($t=.109$, $df=127$, $p=.913$) are found in Table 6. The mean pretest score was 92.98 out of 175 and the posttest score was 92.84 out of 175.

Standard deviations for these scores were much higher than the literacy section. Unlike the literacy section of the instrument, based on the student's knowledge, this section relied upon students' perceptions and has much more variance from the mean due to matters of opinion, which is much different than a right or wrong answer.

Table 6
Agricultural Perception Scores

	Mean	Std Deviation	T	df	P
Pre Score	92.98	7.37	.209	127	.913
Post Score	92.84	13.26			

* $\alpha \leq .05$
Maximum score= 175

Students' scores on the perceptions scale were approximately 93 out of 175. This would place their overall perceptions of the agriculture, food, and fiber industry in the slightly positive range.

CHAPTER V

CONCLUSIONS, RECOMMENDATIONS AND DISCUSSION

Summary

Purpose

The purpose of this study was to determine the influence introductory agricultural education courses administered in North Carolina urban schools have upon students' agricultural literacy and their perceptions of agriculture. To achieve this, the study employed an instrument to measure agricultural literacy and perceptions, developed by experts in the field, to test urban high school students in the Agriscience Applications of North Carolina.

Objectives

To carry out the purpose of the study, the research was intended to answer the following questions:

1. Does an introductory agricultural education course increase students' agricultural literacy in an urban agricultural education program?
2. Does an introductory agricultural education course increase student literacy of agricultural careers and opportunities for employment?
3. Does an introductory agricultural education class increase student literacy of agriculture's relationship with public policy?
4. Does an introductory agricultural education class change a student's understanding of agriculture's relationship with the environment and natural resources?

5. What influence does an introductory agricultural education class have upon students' perceptions of the food and fiber industry?

Study Design and Procedure

The methodology for the study was descriptive research design. The population of this study included urban high school students taking the Agriscience Applications course offered in North Carolina. Urban counties in North Carolina, as deemed by the U.S. Census Bureau, included: Buncombe, Durham, Forsyth, Guilford, Mecklenburg, and Wake. Random sampling was not possible as 26 high schools offered Agriscience Applications and of those high schools, only six schools agreed to participate in the study.

Many schools did not or could not participate in the study for a number of reasons. In one county, the Agriscience Applications course is not offered. In another county, no teacher or principal would agree. In a third county, the only teacher teaching the course was a first year teacher and did not feel it was possible to take on the responsibility of the surveys. Finally, two schools only submitted the first set of responses and did not do the second set of responses with their students.

Population

The purposive sample included urban high school students from six different high schools in Buncombe, Guilford, and Wake counties of North Carolina. The urban schools chosen to be included in the study were composed of schools that taught Agriscience Applications and agreed to participate in the study. The data sample included 135 urban high school students. The study did not include an additional 38

respondents as these students were either absent on one of the testing days or turned in their answer sheets within ten minutes after the start of the testing segment.

Instrumentation

A review of literature revealed an instrument developed by a group of national experts to assess agricultural literacy and perceptions of high school students. The researcher chose to use the instrument from the Rural and Urban Inner-City High School Student Knowledge and Perception of Agriculture study (Frick, et.al., 1995). This instrument contained three parts. The first part of the instrument contained 35 agricultural knowledge questions, the second contained 35 agricultural perception items, and the remaining questions pertained to demographic characteristics of the participants.

This instrument had already been analyzed for reliability and validity at the time of the original study conducted by Frick, et.al. The reliability of the knowledge section of the original literacy instrument was assessed using the Kuder-Richardson 20 (KR-20) coefficient. The Kr-20 score was .85 which indicates the instrument was reliable. The perception section was analyzed using a Cronbach's alpha coefficient. The perception sections Cronbach's alpha coefficient score was .90. Additionally, a national panel of experts in agricultural literacy reviewed the validity of the questions. The experts reviewed the instrument and determined the instrument to be a valid tool for assessing agricultural literacy and perceptions of high school students (Frick, et.al., 1995).

Data Collection and Analysis

The instrument was given to six different teachers. The researcher sent copies of permission forms for students and parents, instruments, and answer sheets. On site teachers were given the responsibility of distributing permission forms, testing materials,

answer sheets, and identification numbers to the respondents. The data was then sent back to the researcher after the pre test and the posttest.

Once the answer sheets with the identification number were returned to the researcher, analysis of demographics began. The researcher scanned results and entered data into the SPSS 11.5 data file. The software analysis program, SPSS, was used to calculate frequencies and percentages of respondents by gender, race, location of residents, grade, age, family agricultural background, student's personal activity with agriculture, FFA membership, and prior agricultural education courses.

Much like the analysis of the demographics, analysis of the literacy and perceptions scores was conducted using the SPSS program. Using the compute procedure, overall literacy scores for pre and posttest were added and means were determined. The means were then compared using a correlated T-test. This procedure was replicated for grouped literacy questions, including: general agricultural literacy career literacy, public policy literacy, and environmental and natural resources literacy. Again, after completion of computing mean scores for each of these categories, pre and posttest means were compared using a paired sample T-test. Much like the literacy scores, the perception scores were computed and then means were compared using the paired sample T-Test.

Demographics

The population included 135 urban high school students enrolled in the Agriscience Applications course at six schools throughout North Carolina. Of the respondents, 56% were male, 44% were female, 4% were Asian, 17% were Black, 7% were Hispanic, 69% were White, and 3% were other races. Of these students, 7% resided

on farmland, 43% resided in a rural area not on a farm, and 46% lived in what they considered a town or city.

The majority of the students were freshmen but had some agricultural ties. Fifty-one percent of the students were freshmen, 31% were sophomores, 13% were juniors, and 6% were seniors. Of these students, 16% of the students had taken an agricultural education course in the past. Fifty-six percent of the students had relatives who lived or worked on a farm and 55% had relatives who work in an agricultural business. Eighty six percent of the students had been involved in raising plants, gardens, or crops and 89% of the students had been involved in raising animals or pets.

Question 1: Does an introductory agricultural education course increase students' agricultural literacy in an urban agricultural education course?

The students overall agricultural literacy score on both the pre and post tests was below what would be considered a passing grade in nearly any grading system. The pretest score of overall agricultural knowledge and agricultural literacy was 20.99 or a percentage score of 60%. The respondents' final overall knowledge mean score was 24.13 on a 35-question literacy instrument or a percentage score of 69%. There was a nine percent increase in overall literacy scores upon completion of the Agriscience Applications course. The difference in the mean scores between the pretest and posttest was statistically significant with an $\alpha \leq .05$ level ($t=5.31$, $df=134$, $p=.001$).

The literacy scores were broken down into subgroups, with one of the subgroups being general agricultural literacy. Students' pre and posttest scores rose by 10.6% from the 7.37 on the pretest to 8.64 on the posttest. Twelve questions related to general

agricultural literacy. The difference in the mean scores between the pretest and posttest was statistically significant with an $\alpha \leq .05$ level ($t=5.35$, $df=134$, $p=.001$).

Question 2: Does an introductory agricultural education course provide students with literacy of agricultural careers and opportunities for employment?

The portion of the instrument dealing directly with agricultural career literacy contained five questions. A paired sample T-test was used to evaluate pre and post test scores after administering the instrument to measure agricultural career literacy of urban high school students enrolled in an introductory agricultural education course. Students' scores rose from a 2.8 to a 3.1. This is a 6% increase in agricultural career literacy. The difference in mean scores for knowledge of agricultural careers was statistically significant at the $\alpha \leq .05$ level ($t=2.35$, $df=134$, $p=.020$).

Question 3: Does an introductory agricultural education class increase student knowledge about agriculture's relationship with public policy?

A paired sample T-test was used to evaluate pre and post test scores after administering an instrument to measure agricultural public policy literacy of urban high school students in North Carolina. The difference in mean scores for knowledge of agricultural public policy literacy was statistically significant at the $\alpha \leq .05$ level ($t=3.81$, $df=134$, $p=.001$). Ten questions on the literacy instrument dealt with agricultural public policy literacy. The students' scores increase nine percent upon completion of the Agriscience Applications course.

Question 4: Does an introductory agricultural education class change a student's understanding of agriculture's relationship with the environment and natural resources?

The literacy portion of the instrument contained seven questions relating to the environment and natural resources. A paired sample T-test was used to evaluate the data involved with students' responses to an instrument measuring agricultural environment and natural resource literacy. The difference in mean scores for literacy of agricultural environment and natural resources is statistically significant at the $\alpha \leq .05$ level ($t=3.69$, $df=134$, $p=.001$). The pretest average mean was 4.87 and the posttest mean was 5.39. This is a seven percent change in agricultural environment and natural resource literacy scores upon completion of the Agriscience Applications course.

Question 5: What influence does an introductory agricultural education class have upon students' perceptions of the food and fiber industry?

The instrument also included 35 perception items related to agriculture. Students were subjected to a Likert type scale of strongly agreeing (1) to strongly disagreeing (5) to items. Responses were analyzed using SPSS 11.5 and were subjected to a paired sample T-Test to compare data. The lower the perception score the more positively the students perceive the agriculture industry. The difference in mean scores for perceptions of agriculture was not statistically significant at the $\alpha \leq .05$ level ($t=3.209$, $df=127$, $p=.913$) The average mean on the pretest was 92.98 and the posttest was 92.84.

Conclusions

The conclusions of this study were not intended to be generalized past the 135 urban high school students in the six selected Agriscience Applications courses

throughout the state of North Carolina who participated in this study. The major findings offered in the study sustain the subsequent assumptions.

1. Urban high school agricultural education students enrolled in Agriscience Applications did increase their knowledge of the food and fiber industry. Final mean scores of 69% on the instrument, deemed as a valid and reliable tool for determining agricultural literacy, illustrates that upon completion of the North Carolina Agriscience Applications course , students demonstrated a small gain in agricultural literacy. However, the overall agricultural knowledge of urban high school students enrolled in Agriscience Applications did not demonstrate they were agriculturally literate according to a national standard of agricultural literacy.
2. Urban high school agricultural education students slightly increased their literacy of careers in the food and fiber industry upon completion of the introductory course Agriscience Applications.
3. Urban high school agricultural education students increased their literacy of agricultural public policy upon completion of the introductory course Agriscience Applications.
4. Urban high school agricultural education students increased their literacy of agricultural environment and natural resources upon completion of the introductory course Agriscience Applications.
5. The Agriscience Applications course did not change the students' perceptions of agriculture. There was no significant difference between the student's perception of agriculture prior to taking the course and after taking the course.

However, students enrolled in the introductory course did maintain slightly positive perceptions of the agricultural industry throughout the course.

Recommendations

The following recommendations were made based upon the researchers opinions while accomplishing the study, assessment of the major findings of the study, and the conclusions of the overall research project.

1. According to the demographic data collected, many students considered to be attending urban high schools throughout the state of North Carolina do not actually reside in a city. Students in the urban high schools (a little over half) resided in rural areas and had some working knowledge of agriculture due to family or personal experiences with agriculture. When future studies are completed, more attention should be paid to the degree of agricultural experiences and the significance of those experiences prior to completing the initial and final instrument.
2. The Agriscience Applications course is intended as an introductory agriculture class for freshmen students. The demographic data illustrates that only half of the students were freshmen and 16% of the students had taken an Agricultural Education course prior to Agriscience Applications. School counselors, teachers and administrators should have students follow the proper scope and sequence of courses in Agricultural Education.
3. Low agricultural literacy scores on the instrument, developed and used by national experts to assess agricultural literacy, establishes that North Carolina's Agriscience Applications course is not teaching objectives that

national experts feel determine and exemplify agricultural literacy. There is a need for literacy courses. This could be satisfied throughout a student's education through Ag in the Classroom programs and the addition of courses that specifically address agricultural literacy.

4. Low agricultural career literacy, environment and natural resource literacy, and public policy literacy scores expresses the call for North Carolina agricultural education to reassess its curriculum and teach objectives that will help students to attain agricultural literacy on a national standard. There is a great deal of opportunity for North Carolina to add courses, especially at the middle school level, to fill the void in agricultural literacy curriculum.
5. Further research should be conducted to update agricultural literacy standards and measurements that could be used at the state and national levels.

Discussion

The review of literature regarding the literacy of agricultural education students has the undying anthem that there is a need for agriculturally literate citizens and more importantly a means to educate today's students and tomorrow's society. Key studies by Horn and Vining (1986), Braverman and Rilla (1991), Frick, Birkenholz, Gardner, and Machtmes (1995) and Pense, Leising, and Igo (2001) illustrate that in a ten year span there is still a deficit in producing agriculturally literate youth. Their studies demonstrated a need for students with improved agricultural literacy in careers, public policy, and environmental and natural resources.

Just as these previous studies illustrated, agricultural education students could still improve their agricultural literacy. In Horn and Vining's study (1986) only 30% of

Oklahoma students, regardless of urban or rural, correctly responded to agriculturally related questions. Frick, Birkenholz, Gardner, and Machtmes (1995) confirmed that students were not agriculturally literate when urban students scored 48% on an instrument to measure agricultural literacy. Urban North Carolina students in Agriscience Applications responded to this same instrument over ten years later and scored significantly higher with a little over 69%. This figure shows that students are slightly more literate, however, there is a great deal of room for improvement.

The Frick, et.al. study (1995) employed the same instrument and also divided the literacy instrument into different clusters. This research exhibited that students had the least knowledge of agricultural policy and the greatest literacy of agricultural environment and natural resources. Unlike the 1995 study, where students exhibited the least knowledge of public policy, students in this study exhibited the least literacy of agricultural careers. Like this study where students demonstrated the highest scores in agricultural environment and natural resources, Agriscience Applications students in North Carolina demonstrated the greatest literacy in agricultural environment and natural resources, as well.

Currently, the Agriscience Applications course, in North Carolina, is written by a team of North Carolina's teachers and members of the agriculture industry and focuses on preparing students for careers in agriculture. The course's intentions are to teach students in the field of agriculture, providing job skills. This means that this course is heavily focused on experiences in agriculture, such as welding and machinery, animal care, plant culture, and agronomy. At present, this course is expected to give students

skills that will prepare them for the workforce and may not necessarily be intended to make them agriculturally literate.

The reform process to promote agricultural literacy in today's students should include a team who will review the national agricultural literacy objectives and standards (Frick, et.al. 1995) and develop a course that will meet the criteria needed to help today's students become agriculturally literate. North Carolina Agriscience Applications course could be the course used to attain these national standards, however, there would need to be a complete overhaul of the curriculum. Perhaps, there is a better means of helping all students become agriculturally literate by offering an entirely new course completely outside of a career preparatory course of study.

A well-suited environment for teaching a course in agricultural literacy course could be provided in the middle school grades. An agricultural literacy would be the perfect opportunity for students to explore the agriculture industry in a number of respects. A new middle school agricultural literacy course would be a great platform to teach students about general agricultural knowledge, agricultural careers, agricultural environmental and natural resource issues, and agricultural policies. Middle school students must be made aware of what essential role agriculture plays in their everyday life. As these students are exploring so many other courses and facets of life and society, they should undoubtedly learn about the value of agriculture in today's world.

All teachers, especially today's agriculture educator, must make every day in their classroom an opportunity for them to educate their students in a manner which will promote a positive impression about the agriculture industry. The agricultural educator

should be responsible for creating a learning environment that allows students to see how beneficial agriculture is in their daily lives and the positive impacts it makes upon them. All agriculture educators should pool their agricultural policy resources and use the people involved with these issues to influence today's students to become educated and realize their role in public policy and government. It is imperative that teachers promote agriculturally literate and responsible citizens, who will eventually be the voters and lawmakers of the future.

All science-based educators also have a responsibility to teach their students about agriculture's role in the environment and issues associated with the environment. Students should be made aware that the agriculture industry strives to comply with environmental laws and regulations while also bettering the environment.

Along with new courses and the integration of literacy topics into science and agricultural education, there is a need for improving and providing new standards and instruments for measuring agricultural literacy. As our student population continues to become more urban and as agricultural issues continue to develop, agricultural education must continue to reflect and address the need of agricultural literacy and the objectives that the National Research Council suggested in 1988.

REFERENCES CITED

Braverman, M. T. & Rilla, E. L. (1991). How California educators and educational directors view "agricultural literacy" programs. *California Agriculture*, 45 (6), 4-5, 8-9.

Blackburn, D.A. (1999). Ag science fairs: The next wave in agricultural literacy. *Journal of Extension*, 37(4), 1-3.

Broder, J.M. (1997). Agricultural Policy Agenda: What's Important To Students? *NACTA Journal*, 29-37.

Brown, L.G. & Coffey, D.M. (1992). Contributing to Agricultural Literacy: The Science of Agriculture. *Journal of Natural Resources Life Science Education*, 21 (2) 169-170.

Duncan, M.J. & Biddle, B. J. (1974). The Study of Teaching, 2nd Ed. New York, New York: Holt, Rinehart, and Winston.

Easter, E. (1982). What Makes an Urban Program Successful? *The Agricultural Education Magazine*, 55 (1), 13-14.

Ellibee, M. (1990). Urban Agricultural Education "It Works". *The Agricultural Education Magazine*, 63 (4), 8, 15-16.

Frick, M. J., Kahler, A.A. & Miller, W.W. (1991). A definition and the concepts of agricultural literacy. *Journal of Agricultural Education*, 32 (2), 49-57.

Frick, M.J., Birkenholz, R.J., Gardner, H. & Machtmes, K. (1995). Rural and urban inner-city high school student knowledge and perception agriculture. *Journal of Agricultural Education*, 36 (4), 1-9.

Gless, R.(1993). The Urban Student Challenge. *The Agricultural Education Magazine*, 65 (12), 13, 21.

Helsel, D.G. & Hughes, L.B. (1984). Urban students in agriculture: The challenge. *Journal of Agronomic Education*, 13, 31-33.

Horn, J. & Vining, B. (1986). An Assessment of Student Knowledge of Agriculture. College of Education, Kansas State University, Manhattan, KS.

Kirts, C. (1990). Linking Agricultural and Environmental Education By Integrating Environmental Concepts and Vocational Skills. *NACTA Journal*, 34 (1), 31-35.

Knutson, R.D., Penn, J.B., & Boehm, W.T. (1990). Agricultural and Food Policy, 2nd Ed. Englewood Cliff, New Jersey: Prentice Hall.

Law, D.A. (1990). Implementing agricultural literacy programs. *The Agricultural Education Magazine*, 62(9), 5-6, 22.

Leising, J.G., Pense, S.L., & Igo, C.G. (2001). An Assessment of Student Agricultural Literacy Knowledge Based on the Food and Fiber Systems Literacy Framework. *Proceedings of the National Agricultural Education Research Meeting*, USA, 259-268.

Mallory, M.E. & Somner, R. (1986). Students Show Low Awareness of Agriculture Careers. *California Agriculture*, 40 (3/4), 4-6.

Moore, J.A. (1987). New wine in old bottles. *The Agricultural Education Magazine*, 60 (4), 5-6.

National Council for Agricultural Education. (1999). A new era in agriculture: reinventing agricultural education for the year 2020. Initiative sponsored by the W.K. Kellogg Foundation as a special project of the National FFA Foundation, Inc. Alexandria, Virginia.

National FFA Organization. (2005). The FFA Handbook. Indianapolis, Indiana.

National Research Council, Board on Agriculture, Committee on Agricultural Education in Secondary Schools. (1988). Understanding agriculture: New directions for agricultural education. Washington, D.C.: National Academy Press.

Parker, K. (1982). The Urban Dimension. *The Agricultural Education Magazine*, 55 (1), 5-7.

Pense, S.L. & Leising, J.G. (2004). An assessment of food and fiber systems knowledge in selected Oklahoma High School. *Journal of Agricultural Education*, 45(3), 86-96.

Rawls, W.J. (1995). Cluster Analysis of Students' Interst in Work-Traits Related to Careers in the Food and Agricultural Sciences. *NACTA Journal*, 39(2) , 54-57.

Raven, M. R. & Cano, J. (1990). Multicultural Education and Urban Agricultural Programs. *The Agricultural Education Magazine*, 62 (9), 17-19.

Richardson, L. (1990). Reinforcing the Common Bond Between Urban and Agricultural Interests. *The Agricultural Education Magazine*, 62 (9), 7, 18.

Richardson, R.H. (1999). Ag Education As Urban Survival School. *The Agricultural Education Magazine*, 71 (4), 18-19.

Sutphin, D. (1990). Urban Agricultural Education Opportunities, Future Directions

and Implications for the Profession. *The Agricultural Education Magazine*, 63(4), 6-8.

Talbert, B. A. & Larke, A. Jr. (1995). Minority Students' Attitudes Toward Agricultural Careers. *NACTA Journal*, 34 (1), 14-17/

U.S. Census Bureau. Statistical Abstract of the United States: 2004-2005. Retrieved February 23, 2005, from http://www.census.gov/prod/2004pubs/04statab/pop.pdf.

Wiersma, W. & Jurs, S.G. (1990). Educational measurement and tests, 2nd Ed. Needham Heights, MA: Allyn and Bacon.

Williams, G. & White, J.D. (1991). Agricultural Literacy in Agriculture's Heartland. *The Agricultural Education Magazine*, 63 (8), 9-11.

APPENDIX A

Letter to Cooperating Teachers

July 20th, 2005

Dear fellow Agricultural Educator:

School is just around the corner and it is time to start thinking about what you are going to be doing that first week of classes. I have the solution! Have your Agriscience Applications students participate in the Agricultural Literacy and Perceptions of Agriculture survey. This is a very short survey conducted by North Carolina State University's Agricultural and Extension Education department. The survey asks the students questions about general agricultural information and determines what they actually know about agriculture, while also assessing students' perceptions of agriculture.

The instrument that is being used will not only help the research team, but the data gathered can help you determine how much your students know about agriculture and discover how they perceive the agriculture industry.

The survey needs to be administered during the first five days of the semester and once again the last five days of the semester. By comparing pre and post-test scores, you can determine how your students' agricultural literacy and their perceptions of agriculture changed.

The process for administering the test is easy and it is a great way to get the class started and finished. Just think, by having your Agriscience Applications class participate, you will be helping our profession to better understand agricultural literacy. Please let your principal and department chair know of your intentions to participate in this study and the value of the project for the students, you, and your profession.

If you prefer that the Agriscience Application students *not* be included in this study, please sign and return the attached form. By not returning the attached consent form you are illustrating your intent to allow your Agriscience Applications students to participate in the survey. Participation is voluntary, and anyone may withdraw from the study, including withdrawing from any data collection, at any time.

If you have any questions, concerns, or comments please feel free to contact me by phone at 919-562-3600; email jsonger@wcpss.net; or write me at 2200 Wakefield Pines Dr., Raleigh, NC 27614.

Sincerely,

Jodi Songer
Project Director
Wakefield High School Agricultural Education

North Carolina State University Agricultural and Extension Education Graduate Student

APPENDIX B

Letter to Cooperating Principals

July 20th, 2005

Dear Principal:

The Agriscience Applications course offered by your Agricultural Education department has been selected to participate in a statewide research study conducted by North Carolina State University on agricultural literacy and perceptions of agriculture in urban high schools. This study will take place during the 2005-2006 school year. The major goal of the project is to determine whether students' agricultural literacy and their perceptions of agriculture improve after taking an introductory agricultural education course.

The Agriscience Applications classes will be given two surveys during the course to assess their agricultural literacy and their perceptions of agriculture. One survey will be given during the first five days of the course and the other during the last five days of the course.

The survey data will be used for research purposes only and will not affect their grade in the course. No information collected for this study will be released to the school or any other recipient, and all identifying information will remain strictly anonymous and confidential.

The survey will take very little instructional time away from teachers and the instrument used can actually be a great tool for the instructor. The data and the information taken from this research can also help your teachers in their instruction.

If you prefer that the Agriscience Application students *not* participate in this study, please sign and return the attached form. If you do not return it, we will ask your Agricultural Education instructor(s) if he/she would like to participate in the study. After hearing and reading an explanation of the study and what is involved, and being given a chance to ask questions and voice concerns, the Agriscience Applications teacher will be asked to sign a consent form. Participation is voluntary, and anyone may withdraw from the study, including withdrawing from any data collection, at any time.

If you have any questions or concerns you can reach me at 919-562-3600; email me at jsonger@wcpss.net; or write me at 2200 Wakefield Pines Dr, Raleigh, NC 27614.

Sincerely,

Jodi Songer

Project Director
Wakefield High School Agricultural Education Teacher
North Carolina State University Agricultural and Extension Education Graduate Student

APPENDIX C

Principal Consent Form

Research Study of Agricultural Literacy and Perceptions of Agriculture
Experimental group

Return this form **only** if you **do not** want your student to participate in this research study.

Print your name _____

Print the school's name _____

I **DO NOT CONSENT** to have the Agriscience Applications students participate in the Agricultural Literacy and Perceptions of Agriculture surveys being conducted by researchers of North Carolina State University.

_____	_____	_____
Printed Name	Signature	Date

If you agree to the Agriscience Applications students' participation in the surveys, you can discard this form. If you have signed the form to indicate you do not want your student to take part, return this to: Jodi Songer, Wakefield High School, 2200 Wakefield Pines Dr., Raleigh, NC, 27614.

APPENDIX D

Teacher Consent Form

North Carolina State University Agricultural and Extension Education Graduate Student
Research Study of Agricultural Literacy and Perceptions of Agriculture
Experimental group

Return this form **only** if you **do not** want your student to participate in this research study.

Print your name _____

I **DO NOT CONSENT** to have the Agriscience Applications students participate in the Agricultural Literacy and Perceptions of Agriculture surveys being conducted by researchers of North Carolina State University.

_____	_____	_____
Printed Name	Signature	Date

If you agree to the Agriscience Applications students' participation in the surveys, you can discard this form. If you have signed the form to indicate you do not want your student to take part, return this to: Jodi Songer, Wakefield High School, 2200 Wakefield Pines Dr., Raleigh, NC, 27614.

APPENDIX E

Experimental Student Letter

August 7th, 2005

Dear Student:

We are university researchers who work with high schools and students. Your teacher has volunteered to work with us in a statewide study of agricultural literacy in urban students, called the "Effects of an Introductory Agricultural Education Course on Agricultural Literacy and Perceptions of Agriculture in Urban Students".

The study will require you to participate in a survey at the beginning of the school year in your Agriscience Applications class and again near the end of the course.

All of your responses to the surveys will remain completely anonymous and confidential, and will not be used for any other purpose than this research project. Your name will not be associated with any results.

Participation in the study is important but strictly voluntary. You may withdraw from the study at any time and it will have no effect on your grade in this class. Please fill out the attached form and return it to your teacher indicating whether you would like to participate.

If you want to ask someone about this study, you may call us at 919-562-3600 and ask for Jodi Songer; email us at jsonger@wcpss.net ; or write us at 2200 Wakefield Pines Dr., Raleigh, NC 27614.

Sincerely,

Jodi Songer
Project Director
Wakefield High School Agricultural Education
North Carolina State University Agricultural and Extension Education Graduate Student

APPENDIX F

Participant Consent Form

Research Study of Agricultural Literacy and Student Perceptions of Agriculture Experimental Group

Check one of these boxes:

☐ I **CONSENT** to participate in the agricultural surveys in the Agriscience Applications course being conducted by researchers from North Carolina State University.

☐ I **DO NOT CONSENT** to participate in the agricultural surveys in the Agrisicence Applications course being conducted by researchers from North Carolina State University.

Printed Name	Signature	Date

APPENDIX G

Experimental Group Parent Letter

August 7th, 2005

Dear Parent:

A class your child is taking has been selected to participate in a statewide research study on agricultural literacy and perceptions of agriculture in urban high schools. This study will take place during the 2005-2006 school year. The major goal of the project is to study whether students' agricultural literacy and their perceptions of agriculture improve after taking an introductory agricultural education course.

Students, *including your child*, will be given two surveys during the course to assess their agricultural literacy and their perceptions of agriculture.

The survey data will be used for research purposes only and will not affect their grade in the course. No information collected for this study will be released to the school or any other recipient, and all identifying information will remain strictly anonymous and confidential.

If you prefer that your child *not* participate in this study, please sign and return the attached form. If you do not return it, we will ask your child if he/she would like to participate. After hearing and reading an explanation of the study and what is involved, and being given a chance to ask questions and voice concerns, your child will be asked to sign a consent form. Participation ins voluntary, and anyone may withdraw from the study, including withdrawing from any data collection, at any time.

You can reach me at 919-562-3600; email me at jsonger@wcpss.net; or write me at 2200 Wakefield Pines Dr, Raleigh, NC 27614.

Sincerely,

Jodi Songer
Project Director
Wakefield High School Agricultural Education Teacher
North Carolina State University Agricultural and Extension Education Graduate Student

APPENDIX H

Parent Consent Form

Research Study of Agricultural Literacy and Perceptions of Agriculture
Experimental group

Return this form **only** if you **do not** want your student to participate in this research study.

Print your student's name _____

I **DO NOT CONSENT** to have my child participate in the Agricultural Literacy and Perceptions of Agriculture surveys being conducted in his or her Agriscience Applications course by researchers of North Carolina State University.

_____	_____	_____
Printed Name	Signature	Date

If you agree to your student's participation, you can discard this form. If you have signed the form to indicate you do not want your student to take part, have your student return the form to his or her teacher.

APPENDIX I

High School Student Perceptions and Agricultural Literacy Survey

This survey is made up of three sections. Section I relates to the general information about agriculture, food, and food production. Section II relates to your general perceptions of agriculture, food, and food production. Sections III requests demographic information about respondents.

Responses to the survey will be kept confidential and should be recorded on the computer answer sheet provided. Use a #2 lead pencil to darken the circle corresponding to your response to each statement. After completing each of the three sections, please return the answer sheet and the survey form.

If you need to change one of your answers, erase the first mark completely from the answer sheet before filling in the new answer.

On side two of the answer sheet indicate your birth date (year and month)

Section I

Directions: Read each statement and mark "A" if you think the statement is TRUE or mark "B" if you think the statement is FALSE. If you DON'T KNOW whether the statement is true or false, then mark "C" on the answer sheet.

	True	False	Don't Know		
Example:	A	B	C	D	E
U.S. farms are smaller than those in Europe.	○	●	○	○	○

If you think the statement is FALSE, then fill in the blank under the letter "B".

Statements

1. There are more farmers in the U.S. than there were 10 years ago. **C**
2. Less than 3 percent of the U.S. gross national product is from agriculture. **C**
3. Soil erosion does Not pollute U.S. lakes and rivers. **E**
4. The use of pesticides has increased the yield of crops. **E**
5. Animal health and nutrition are important to farmers. **G**

6. Food safety is a major concern of the food processing industry. **P**
7. Processing increases the cost of food products. **G**
8. U.S. research has improved farming methods in other countries. **P**
9. One of every five jobs in the U.S. is related to agriculture. **C**
10. Many farmers use tillage practices that conserve the soil. **E**

11. Plant products are the main source of human foods. **G**
12. Animals can be a valuable source of medical products. **G**
13. Homogenization kills bacteria in milk with heat. **G**
14. The U.S. does not sell its feed grains on the world market. **P**
15. Thousands of people in the world die of starvation each year. **G**

16. Local laws and regulations have little effect on farmers. **P**
17. Farming and wildlife cannot survive in the same geographic area. **E**
18. Biotechnology has increased the pest resistance of plants. **E**
19. Animals eat foodstuffs that cannot be digested by humans. **G**
20. New products have been developed using surplus grains. **G**

(continued on next page)

21. Grain exports are usually transported between continents by airplane. **G**
22. The average U.S. farm is larger than 500 acres. **C**
23. U.S. agricultural policies influence food prices in other countries. **P**
24. Animal wastes are used to increase soil fertility. **E**
25. Profits increase as farmers strive for the maximum crop yields. **C**

26. Biotechnology has increased animal production in the U.S. **G**
27. Pasteurization kills bacteria in milk with heat. **G**
28. An efficient food distribution system is essential to the agricultural industry. **P**
29. Several countries depend on U.S. agricultural exports for food and fiber. **P**
30. Government subsidy payments to farmers are used to stabilize food prices. **P**

31. Water, soil, and minerals are important in agriculture. **E**
32. Very little of the grain produced in the U.S. is exported. **P**
33. Hamburger is made from the meat of pigs. **G**
34. Using grain alcohol for fuel reduces the U.S. dependence on foreign oil. **P**
35. Transportation and storage affects the supply of agricultural products. **G**

G= General Agricultural Knowledge
C= Agricultural Career Literacy
P= Agricultural Policy Literacy
E= Environmental and Natural Resources Agricultural Literacy

(continued on next page)

Section II

Directions: read each statement completely. Darken the circle under the letter which corresponds to your response to each statement on the answer sheet provided. Use one of the following letters to resent your response.

Strongly agree
Agree
Neutral
Example: All farmers live beyond their means. Disagree
Strongly disagree

	A	B	C	D	E
If you DISAGREE with the statement,					
Fill in the circle below the letter "D".	○	○	○	●	○

Statements

36. U.S. citizens spend a higher percent of their income on food than in other countries.
37. Agriculture employs a large number of people in this country.
38. Pesticides can be used safely when producing food.
39. Organic production methods are a realistic alternative to using pesticides.
40. Confinements is an acceptable practice when raising livestock.

41. Consumers prefer processed foods to raw products.
42. Developing countries need help to be able to store food safely.
43. People are moving away from rural areas due to changes in agriculture.
44. Farmers earn too much money.
45. Not all land is suitable for farming.

(continued on next page)

46. Biotechnology has increased the yield of crops in developing countries.
47. Farmers take good care of their animals.
48. Processing adds value to farm products.
49. Farmers should develop new and innovative marketing strategies.
50. A strong agricultural industry is more important than military power.

51. Agricultural exports help to reduce the U.S. trade deficit.
52. Agricultural practices are harmful to the environment.
53. Raising hybrid plants results in higher yields.
54. Farmers are concerned about the humane treatment of animals.
55. Processing food products is a benefit to consumers.

56. The U.S. should allow free trade with other countries for food products.
57. The world food supply has increased as a result of improved technology.
58. The U.S. needs a steady supply of food and fiber products to remain strong.
59. Only organic methods should be used to produce food.
60. Farmers should not use chemicals in crop production.

61. Animals have the same rights as people.
62. Processing adds more to the cost of food than the raw product.
63. Farmers have no control over food prices.
64. Developing countries lack the ability to produce enough food.
65. The government should exert more control over farming.

66. Agriculture is the greatest polluter of our water supplies.
67. Agriculture has become too mechanized.
68. Animals should not be used for food.
69. Farm grains are becoming an important energy source in the U.S.
70. Developing countries need help in distributing food among needy people.

(continued on next page)

Section III

Directions: Read each statement in this section completely. Select the most accurate response to each statement and mark your answer on the answer sheet.

Example: What is your age?
A. 10-15 years
B. 16-20 years
C. 21-30 years
D. 31-40 years
E. Over 40 years

If you are 17 years of age, you should A B C D E
in the circle under the letter "B".

71. Gender A. Female B. Male
72. Race A. Asian B. Black C. Hispanic D. White E. Other
73. Where is your home located?
    A. Farm
    B. Rural Area Not on a Farm
    C. Town/City
74. What grade are you in?
    A. 9th
    B. 10th
    C. 11th
    D. 12th
75. Do you have relatives who live or work on a farm? A. Yes B. No
76. Do you have relatives who work in an agricultural business? A. Yes B. No
77. Have you taken agricultural courses in high school before? A. Yes B. No

(continued on next page)

78. Did you choose to take Agriscience Applications class? A. Yes B. No
79. Are you or will you be a FFA member? A. Yes B. No
80. Have you been involved in raising animals or pets? A. Yes B. No
81. Have you been involved in raising plants, gardens, or crops? A. Yes B. No

- **Please be sure you have filled in your NC Wise identification number in the identification area of the answer sheet.**

- **Please check to see that you have also filled in your birth date with month and year in the birth date section of the answer sheet.**

- **Please return both the answer sheet and the survey when you are finished.**

APPENDIX J

Permission to use Agricultural Survey Letter

Jodi: You have my permission to use the instrument.

Best wishes,

B2

Robert J. Birkenholz
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Birkenholz.1@osu.edu

From: JSONGER@wcpss.net [mailto:JSONGER@wcpss.net]
Sent: Wednesday, July 20, 2005 1:59 PM
To: birkenholz.1@osu.edu
Subject: agricultural awareness survey

alright... i contacted you last semester and you were so fantastic in sending me a copy of your instrument for your agricultural literacy and perceptions study. anyhow, now i am just about ready to get my study in gear and would really like to use your instrument for my study. i would of course give you tons of credit and even include a copy of your approval for its use in my study in the appendix. can you think of anything more exciting?

dr. flowers from ncsu just wanted me to make sure that i would have your approval before we went any further.

just to let you know, i am looking at the agricultural literacy and perceptions of urban students before taking an introductory agriculture class and then once completed. i hope that there will be an improvement in scores. hopefully!

i hope to hear thanks again for sending the instrument this past spring.

jodi songer
agricultural education
wakefield high school
raleigh, nc
ncsu aee grad student