EFFECTS OF AN INTRODUCTORY AGRICULTURAL EDUCATION COURSE ON THE AGRICULTURAL LITERACY AND PERCEPTIONS OF AGRICULTURE OF URBAN STUDENTS

Abstract

Urban agriculture education classrooms may differ physically and culturally from the traditional rural agriculture education classroom. Urban students have little interaction with agriculture, which inhibits their knowledge of agriculture compared to their rural counterparts (Ellibe, 1990). In Understanding Agriculture: New Directions for Education the National Research Council asserted 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). However, both rural and agricultural education students should possess an understanding and appreciation of the agricultural industry. This study examined the effects of an introductory course on the agricultural literacy and perceptions of urban students regarding the agriculture industry. Introductory agriculture classes may provide the foundation of agricultural literacy and change students' stereotypes and views of agriculture. In this study, a literacy and perception questionnaire was administered to students before and after they took an introductory agricultural education course. Upon completion of the introductory agricultural education course, students did increase their agricultural literacy; however, their literacy rates were still low after completing the course. The students showed greatest improvement in agriculture literacy regarding public policy and the least improvement in career related knowledge. Differences in the pre and post course perception scores of students regarding agriculture were not statistically significant. However, students possessed slightly positive attitudes regarding agriculture before and after taking the course. State curriculum decision makers should consider revising the current introductory course to possess more competencies in the affective domain of learning. Other recommendations include creating a middle school course based on building the literacy and positive perceptions of agriculture for students before they attend high school.

Introduction

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). 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. Urban students have little interaction with agriculture, which inhibits their knowledge of agriculture compared to their rural counterparts (Ellibee, 1990).

Agricultural education programs in an urban setting are no longer an oddity, but are becoming the norm. In the 2000 U.S. Census Bureau report, only 21% of United States citizens

were reportedly living in rural areas (U.S. Census, 2004). 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). The typical American does not realize the value or the impact of agriculture on their daily life (Richardson, 1990).

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. 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 also 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 program must teach to its students what rural students take for granted... personal and interactive experience with agriculture throughout their lives (Gless, 1993). 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). In Understanding Agriculture: New Directions for Education the National Research Council asserted that there were 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).

High school 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 stated, "all students are to be conversationally literate about the agriculture, food, fiber, and natural resources systems" (National Council for Agricultural Education, 1999, p. 4).

Past researches have reached various conclusions regarding the literacy of urban and rural students. Frick,et.al.(1995) concluded that rural high school were more knowledgeable about agriculture than urban students but that both rural and urban students had limited knowledge of

agriculture. They also found that overall both respondents had positively positive perceptions about agriculture. Pense and Leising (2004) concluded that students in rural schools had significantly lower levels of agricultural knowledge than those students of urban and suburban schools; however, neither groups were deemed agriculturally literate by the literacy measurement used.

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. Introductory agriculture courses provide the foundation of agricultural literacy and change students' stereotypes and views of agriculture. These courses typically have the highest enrollments and reach a variety of students with different career interests.

Theoretical/Conceptual Framework

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 introductory agricultural education 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. This study proposed that the students would gain agricultural literacy and an improved perception of agriculture after completing an introductory agricultural education course. Within this variable, there are immediate and long-term effects that can be measured. In this study, the researchers were solely concerned with immediate pupil growth upon conclusion of an introductory agricultural education course.

Purpose and Objectives

The purpose of this study was to determine what influence an introductory agricultural education course administered to students in urban schools had upon students' agricultural literacy and their perceptions of agriculture. An instrument developed by Frick, Birkenholz, Gardner, and Machtmes (1995) was used to measure the agricultural literacy and perceptions of high school students before and after taking an introductory agricultural education course. This study determined if introductory agricultural education classes in urban schools achieved the objectives of providing knowledge about the food and fiber industry, career opportunities, and the impacts of agriculture upon their lives, 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 course increase student literacy of agricultural public policy issues?
4. Does an introductory agricultural education course change a student's understanding of agriculture's relationship with the environment and natural resources?
5. What influence does an introductory agricultural education course have upon students' perceptions of the food and fiber industry?

Procedures

The methodology of this study was descriptive research design. The population of the study included urban high school students enrolled in an introductory agricultural education course during the fall semester of 2005. In the state where this study took place, there are six counties that contain an urbanized area. According to the US Census Bureau, an urbanized area consists of densely settled territory that contains 50,000 or more people or counties containing urbanized areas having at least 200,000 people each (U.S. Census Bureau, 2004). There are 26 high schools with agricultural education programs in counties in our state that were identified as urban using this definition.

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. 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 three counties in the state to participate. Due to the inability for some schools to participate, a random sampling of the schools was not feasible. According to Wiersma and Jurs (1990), a purposive sampling method was used to achieve the sample for the study. Of the 26 schools eligible, six schools offered the introductory agricultural education course and volunteered to participate in the study and completed all components of the study.

A total of 173 students were enrolled in the introductory agricultural education course 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). Surveys 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.

An agricultural literacy instrument that was constructed by Frick, Birkenholz, Gardner and Machtmes (1995) was used to evaluate student agricultural literacy and perceptions. 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 perceptions of agriculture 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 agricultural literacy section of the instrument (general knowledge, career knowledge, policy knowledge, and environmental and natural resource knowledge) 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 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 the introductory agricultural education .

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. The teachers were instructed to not include any students first or last name on the tests, but students were given identification numbers.

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 worked 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. When the tests were returned to the surveyor, the data were recorded with the identification number. 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 were entered into a SPSS 11.5 data file. The first and second sections of the instrument measured the respondents' knowledge of agriculture and their perceptions of agriculture. To compare the scores of the pretest 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.

Findings

The gender of those surveyed in this study were 44% (n=60) female and 56% (n=75) male. The racial breakdown of the group was 4 % (n=5) Asian, 18% (n=24) Black, 7% (n=9) Hispanic, 68 %(n=93) White, and 3% (n=4) were other races.

The students participating in this test were considered to be attending urban schools according to the studies' definition of an urban school. Of the students surveyed, 7% (n=10) resided on farmland, 43% (n=58) resided in a rural area not on a farm, and 46% (n=62) lived in what they considered a town or city, 4% (n=5) did not respond to this question.

The introductory course studied was a course intended for freshmen students beginning a scope and sequence of high school agricultural education courses. The students in this study included 51% (n=68) freshmen, 30% (n=41) sophomores, 13% (n=18) juniors, and 6% (n=8) seniors.

Some students described having an agriculturally related experience at some point in their lives. Fifty-six percent (n=76) of the students had relatives who live or worked on a farm, 44% (n=59) have relatives who work in an agricultural business. Of the students 16% (n=22) of the students had taken agricultural courses and 84% (n=1 13) had not taken an agricultural course in high school before. Additionally, 86% (n=1 16) of the students had been involved in raising plants, while 14% (n=19) did not help to raise gardens or crops. Finally, 89% (n=120) of the students had been involved in raising animals or pets, while 11% (n=15) did not help in raising an animal or pet.

The findings for each study question are as follows:

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

The overall mean Literacy of Agriculture score was 20.99 out of 35 before taking the introductory agricultural education course and 24.13 out of 35 after taking the introductory agricultural education course. The difference in means between the pretest and posttest was statistically significant c□.05 (t= 5.31, df= 134, p=.001) and is shown in Table 1. 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			

* c□.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.

Questions in the general agricultural literacy subgroup also had a pre and post score. There were 12 questions that were included in this subgroup. The pretest general agricultural literacy 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 who completed the introductory agricultural education course did increase by 10.6%. As illustrated in Table 2, the difference in means between the pretest and posttest was statistically significant c□.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			

* c□.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. As illustrated in Table 3, the difference in mean scores for literacy of agricultural careers was statistically significant at the c□.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 introductory agricultural education 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			

* c□.05
Maximum score= 5

Question 3: Does an introductory agricultural education class increase student literacy of agricultural public policy issues?

There were ten questions in the agricultural public policy literacy subgroup (government policy, trade, supply, food prices, and exportation and food distribution).
The difference in mean scores for the agricultural public policy literacy was statistically significant at the c□.05 level (t=3.81, df=134, p=.001). Mean literacy of public policy was 5.97

out of 10 before students took the introductory agricultural education course and was 7.0 out of 10 after taking the course. As illustrated in Table 4, the literacy of public policy did increase by over one point upon completion of the introductory agricultural education course. This was a 10.3% increase in literacy of agricultural policy.

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			

* c□.05
Maximum score= 10

Question 4. Does an introductory agricultural education course 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 (how agriculture effects the environment and how these effects relate to society). As illustrated in Table 5, the difference in mean scores for agricultural environment and natural resources literacy was statistically significant at the c□.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			

* c□.05
Maximum score= 7

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

The perception portion of the instrument used to determine if the introductory agricultural education course impacted 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.

Urban high school students' perceptions of agriculture before and after taking the course were not statistically significant at the c□.05 level. As illustrated in Table 6, the mean pretest score was 92.98 out of 175 and the posttest score was 92.84 out of 175 (t=0.109, df=127). 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.

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			

* I<.05
Maximum score= 175

Conclusions

The conclusions of this study are not intended to be generalized past the 135 urban high school students 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 an introductory agricultural education course did increase their knowledge of the food and fiber industry while taking the course. However a post course score of 69% indicates that they are still not agriculturally literate after taking the course.
2. Urban high school agricultural education students slightly increased their literacy of careers in the food and fiber industry upon completion of the introductory agricultural education course.
3. Urban high school agricultural education students increased their literacy of agricultural public policy upon completion of the introductory agricultural education course.
4. Urban high school agricultural education students increased their literacy of agricultural environment and natural resources upon completion of the introductory agricultural education course.
5. The introductory agricultural education 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. The introductory agricultural education course examined in this study was intended for freshmen students. The demographic data illustrates that only half of the students in the course were freshmen and 16% of the students had taken an Agricultural Education course prior to this course. School counselors, teachers and administrators should have students follow the proper sequence of courses in Agricultural Education.
2. Low post test course scores in agricultural literacy suggest that the introductory agricultural education course in this state is not succeeding in producing students who are agriculturally literate. This suggests a need for a literacy course in our state. Supplemental

literacy materials such as Ag in the Classroom could also be integrated throughout grades K-8 to increase student agricultural literacy rates.

3. Further research should be conducted to update agricultural literacy standards and measurements that could be used at the state and national levels.

Discussion/Implications

While 69% correct answers on an agricultural literacy knowledge test may not be the desired outcome for an introductory agriculture course, the results do represent an improvement in agricultural literacy over the Horn and Vining (1986) study in which only 30% of the students responded correctly to agricultural literacy questions. Our findings are also similar to those of Pense and Leising (2004) who concluded neither rural nor urban students in their study to be agriculturally literate.

Regarding students' perceptions of agriculture, no change resulted from completion of the introductory course. Perhaps this is due to the possibility that urban students who enroll in an agricultural course already have a generally positive perception of agriculture prior to enrolling in the course. In 1995, Frick et.al. also found both rural and urban students to have slightly positive perceptions of agriculture. The results in this study related to agricultural perceptions could have been influenced by the 16% of the participants who had already completed an agriculture course before enrolling in the introductory course.

Currently, the introductory agricultural education course in this state is written by a team of teachers and members of the agricultural industry. The focus of the course is to prepare students for a job in agriculture and includes content in 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. 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 might be the middle school. An agricultural literacy course would be an opportunity for students to explore the agriculture industry in a number of respects. The curriculum team that creates this new course should 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.

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.

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