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

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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 (Ellibee, 1990). In Understanding Agriculture: New Directions for Education the National Research Council asserts that there are still too many Americans who 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 whereas the least improvement was in career related literacy. Differences in the pre-test and post-test 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. Other suggestions 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 location, programs share the same objectives: provide classroom instruction that promotes agricultural literacy, develop skills enabling career success, and foster leadership skills among 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 & Cano, 1990). Raven and Cano stated that females and students of diverse socioeconomic and ethnic backgrounds tend to make up an urban agricultural education classroom, greatly diverging from the often typical white, male dominated rural agricultural education classroom. As stated by Ellibee, fewer than 10% of these urban students have a farming background; and they have had little interaction with agriculture, which inhibits their knowledge of agriculture compared to their rural counterparts (Ellibee, 1990).

According to the 2000 Census Bureau report, only 21% of United States citizens were living in rural areas (U.S. Census, 2000). And in agriculture classrooms around the country, 60% of students lack farming backgrounds (Helsel & Hughes, 1984). Urbanization and technology have forced society to distance itself from its deep agricultural roots (Leising, Pense, & Igo, 2001). Americans, urban or otherwise, have little knowledge of what agriculture is and what it does for 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 increase, 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 science and the food and fiber industry. The students should also be made aware of the many 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 (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 programs must teach 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, demonstrating how agriculture impacts and is impacted upon by the community. Although many people may feel an agriculture program is not appropriate for an urban setting, there are numerous opportunities for SAE's, 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 little idea how their consumer choices affect farming practices or food security (Richardson, 1999). In "Understanding Agriculture: New Directions for Education" the National Research Council asserts that there are still too many Americans 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" (1991, p. 52). Yet in a study of Oklahoma students, only 30% could correctly answer questions that pertained to these issues (Horn & 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 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. 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. These students, who are future decision making citizens, must realize the impact their decisions will have on agriculture and ultimately their health and the health of the environment.

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. Each of these variables is a separate entity, but 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 past and present experiences that together define 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 controlled by the teacher. Variables include who the pupil is, and explain what the classroom and community factors are. These variables were of particular interest 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 suggests 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 taking an introductory agricultural education 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 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 has upon those students' agricultural literacy and their perceptions of agriculture. An instrument developed by Frick, et.al (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 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?

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. According to the U.S. Census Bureau, an urbanized area consists of densely settled territory with 50,000 or more people within counties of at least 200,000 people (U.S. Census Bureau, 2000). In the state where this study took place, there are six counties that contain an urbanized area.

Of the many (26) schools that were located in urban counties, several did not qualify for the study. Many of the programs did not offer the introductory agricultural education course. Some schools chose not to participate in the study or had circumstances relative to their program that made it difficult for them to participate. Of the potential six counties in the state, three were able to be involved. Due to the inability for some schools to contribute, 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 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 these six schools. Data were collected from 135 of the students in the sample (78% response rate). Some surveys were not included due to incompletion of the entire survey process (both pre-test and post-test), insufficient completion of the survey (completing the survey in less than ten minutes) or failure to follow instructions.

An agricultural literacy survey that was constructed by Frick et.al (1995) was used to evaluate student agricultural literacy and perceptions. Reliability and validity of the Frick, et al. instrument used in their study of inner city and rural high school students was reviewed. The agricultural knowledge section of the instrument 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 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 would better acquaint the researcher with the respondent's background in agriculture. This section consisted of questions asking respondents about their individual gender, race, home location, population of nearest town, if parents farm- the acreage, if relatives worked on a farm or 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 any agricultural courses were taken prior to the introductory agricultural education.

Two identical instruments for each respondent were provided to the lead teacher at each participating testing site. One of the instruments was to be used as a pre-test and the other as a post-test. The pre-tests were distributed in early August so that teachers would be able to administer them during the first week of the fall 2005 semester. The post-tests were administered the final week of the same semester. The teachers were instructed not to include the student's first or last name on the tests, but students were given identification numbers.

The lead teachers at the individual schools administered the pre-test and post-testing at the appropriate times. 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; and no correlation was made to the identity of the student. This identification number was known by the student and used for both the pre-test and post-tests. 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 entered into a SPSS 11.5 data file. The data were 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. To compare the scores of the pre-test to the post-test, a correlated t-test was employed. The differences in the mean scores of the pre-test and post-test were compared.

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=25) Black, 7% (n=10) Hispanic, 68 %(n=68) 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=64) lived in what they considered a town or city, 4% (n=20) did not respond to this question.

The introductory course studied was intended for freshmen students beginning a scope and sequence of high school agricultural education courses. However, the students in this study included 51% (n=70) freshmen, 30% (n=42) sophomores, 13% (n=17) juniors, and 6% (n=8) seniors.

Some students described having an agriculturally related experience at some point in their lives. Fifty-six percent (n=77) of the students have relatives who live or work on a farm, 55% (n=59) have relatives who work in an agricultural business. Of the students, 16% (n=74) had previously taken agricultural courses in high school and 84% (n=115) had not. Additionally, 86% (n=112) of the students had been involved in raising plants, while 14% (n=14) did not help raise gardens or crops. Finally, 89% (n=115) 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 pre-test and post-test was statistically significant $\alpha \leq .05$ ($t = 5.31$, $df = 134$, $p = .001$) and is shown in Table 1. The increase in pre-test to post-test 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.

Questions in the general agricultural literacy subgroup also had a pre-test and post score. There were 12 questions that were included in this subgroup. The original general agricultural literacy test scores were 7.37 out of 12 and the post-test 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 the introductory agricultural education course did increase by 10.6%. As illustrated in Table 2, the difference in means between the pre-test and post-test 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 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 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			

* $\alpha \leq .05$
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 (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 $\alpha \leq .05$ level ($t = 3.81$, $df = 134$, $p = .001$). Mean literacy of public policy was 5.97 out of ten before students took the introductory agricultural education course and was 7.0 out of ten after taking the course. As indicated in Table 4, the literacy of public policy did increase by more than 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			

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

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 (how agriculture effects the environment and how these effects relate to society). 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-test and post-test 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 pre-test to 5.39 out of 7 on the post-test. This was 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 introductory agricultural education course impacted perceptions of agriculture was composed of 35 items. The respondents were directed to use a Likert-type 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 $\alpha \leq .05$ level. The pre-test and post-test scores (t=.109, df=127, p=.913) are found in Table 6. The mean pre-test score was 92.98 out of 175 and the post-test mean score was 92.84 out of 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.

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

Conclusions

The conclusions of this study are not intended to be generalized for other populations. 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-test course score of 69% indicates 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. Urban high school agricultural education students increased their literacy of agricultural environment and natural resources upon completion of the introductory agricultural education course.

4. 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 researcher's 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 scope and sequence of courses in agricultural education.

2. Low pre-test and post-test course scores in agricultural literacy suggest that agricultural education in this state is not succeeding in producing students who are agriculturally literate. This suggests a need for a literacy course in this state. Supplemental literacy materials such as Ag in the Classroom could also be integrated throughout subjects in 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. Pense and Leising (2004) also concluded that neither rural nor urban students were found 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. 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. Frick et al. (1995) also found both rural and urban students to have slightly positive perceptions of agriculture.

Currently, the introductory agricultural education course in this state is written by a team of teachers and members of the agriculture 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 becomes more urban and this urbanization increases questions about agricultural issues, agricultural education must continue to reflect and address the need for agricultural literacy and the objectives that the National Research Council suggested in 1988.

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