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# A Pilot Study: Assessment of Agricultural Literacy Among College Students

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## Introduction

During the 20th century this country has been transformed from an agrarian society into one with 98 percent of the workforce employed off the farm. Over the past several decades there has been a significant decline in the number of U.S. citizens employed in production agriculture (Birkenholz, 1990).

Previous generations in the United States were characterized by higher proportions of adults employed in the food and fiber industry known as agriculture. However, advances in technology have improved the efficiency of agricultural production dramatically. Therefore, fewer people were needed to produce the food and fiber to sustain this country's population. These trends have enabled the United States to develop and maintain a higher standard of living than any other country in history (Birkenholz and Stewart, 1991).

Although involvement in production agriculture has declined over the past century; the public has become more vocal with regard to issues related to agriculture, food, and the environment (National Agricultural Research and Extension Users Advisory Board, 1991). Production practices employed by farmers have come under close scrutiny. Sporadic outbreaks of violence have directed public attention toward issues of importance in the agricultural industry. Incidents such as the Alar pesticide scare concerning the Washington apple crop and the deaths which resulted from the consumption of tainted hamburger meat from a fast-food restaurant in a western state are two noteworthy examples of the vulnerability of the consuming public with regard to issues affecting the industry of agriculture.

Consumers in the United States have been bombarded with information concerning the quality, value, safety, and convenience of the food they eat. Previous generations of citizens produced more of their own food and were therefore more responsible for quality control. However recently, the vast majority of food consumed in this country is not produced by the consumer. Consumers have also been eating more meals outside the home which has effectively transferred quality

control to people and businesses involved in processing, preparing, cooking, and serving food in restaurants, institutions, or other eating establishments.

In addition to food issues, citizens of this and many other countries around the world have placed increased emphasis on issues related to the environment. Issues such as the greenhouse effect, global warming, and acid rain have sparked significant debate between and among individuals and groups from grass roots organizations to the United Nations Conference on the Environment held in Rio de Janeiro in 1992. Each participant in the debate regarding environmental issues functions from a unique perspective based on their past experiences and the beliefs, attitudes, and values they have developed. Consensus-building efforts have frequently been thwarted due to the fact that many of those involved have approached the issues with value sets from polar extremes.

Recognizing the diversity of views possessed by U.S. citizens is an important first step to begin dialogue regarding issues confronting agriculture (Wright, 1992). Citizens of the United States and many foreign countries constitute the customer base for U.S. agriculture. Therefore, it is essential that present and future agricultural leaders assess the knowledge and perceptions of consumers who purchase agricultural products (Traxler, 1992).

## Purpose

The central purpose of this study was to assess college student knowledge and perceptions of issues related to agriculture, food, and the environment. This study was conducted to determine if selected demographic characteristics were predictive of greater knowledge or more positive perceptions of agriculture. The following questions were developed to guide the research effort:

1. What is the level of agricultural knowledge possessed by college students.
2. What is the perception of college students regarding issues affecting agriculture
3. What demographic characteristics are predictive of greater agricultural knowledge among college students?
4. What demographic characteristics are predictive of more positive college student perceptions of agriculture?

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## Procedures

Students enrolled at Southeast Missouri State University during fall semester, 1992 comprised the population for the study. The sample included a purposefully selected group of students who were enrolled in three sections of a course titled "World Food and Society". The course was developed to enable students to meet a general education requirement for the B.S. degree. The course did not enroll students majoring in an agricultural discipline.

The data collection instrument was developed specifically for this study. The instrument consisted of three major sections. The first section contained a list of 66 knowledge items to which respondents were asked to answer "true", "false", or "don't know". After the data were collected the responses were recoded into dichotomous data whereby a correct response received a score of "1" and an incorrect (including "don't know") response received a "0". Therefore the range of possible scores for the knowledge section of the instrument was 0 - 66.

The second section of the data collection instrument consisted of 66 perception items to which respondents were asked to use a Likert-type response scale ranging from "A" for Strongly Agree, "C" for Neutral, and "E" for Strongly Disagree. Some items in the perception section were stated negatively so that a "disagree" response which would reflect a positive perception of agriculture. Responses to negatively worded statements were recoded prior to data analysis to allow summation of responses for a total perception score. The potential range of scores for the perception section of the data collection instrument was from 66 - 330, with lower scores reflecting a more positive perception.

The third major section of the data collection instrument consisted of a series of demographic items. Respondents were asked to provide information by recording answers on optically scanned answer sheets.

Data collection instruments and optically scanned answer sheets were sent to instructors of the three course sections which comprised the sample for this study. Instruments were administered during the first week of the fall semester to reduce the potential for bias due to instructor differences. Data collection instruments and answer sheets were returned to the University of Missouri where the responses were scanned into a data file on the mainframe computer system for analysis.

Data were analyzed using the SAS package on the University of Missouri mainframe computer. Statistical analysis involved computing descriptive statistics to summarize the demographic characteristics of the respondents. Means and standard deviations were also computed for the knowledge and perception scores. Regression analysis was employed to assess the value of demographic characteristics in predicting both the mean knowledge and perception scores of the respondents.

Instrument reliability was assessed following the data collection process. The knowledge section of the instrument was assessed by calculating a KR-20 coefficient of .85 for the 66

items in the knowledge section. A Cronbach's alpha coefficient of .90 was computed for the 66 items in the perception section of the instrument. Instrument validity was examined in several ways. Initial development of the instrument was based on the Agricultural Literacy concept areas identified by Frick (1990). In addition, a national panel of experts in agricultural literacy reviewed the instrument to insure content validity. The instrument was pilot tested with a group of undergraduate Agricultural Education students at the University of Missouri prior to data collection.

## Findings

Demographic characteristics of the respondents are presented in Table 1. The group of respondents were 55 percent female and 45 percent male. Over 70 percent of the respondents were white. 10 percent were black, 6 percent were Asian, and the remainder (< 4%) were hispanic or members of other races.

Over 55 percent of the respondents indicated their home was located in a city or town. 23 percent lived in a rural area, and about 10 percent lived on a farm. Slightly less than half of the respondents indicated that the town closest to their home had a population of 10,000 people or less. Over a third of the respondents indicated the town nearest their home had a population of over 25,000.

Nearly half of the respondents (46.5 percent) were in their sophomore year at the time they completed the data collection instrument. About 15 percent were freshman, 24 percent were juniors, and 15 percent were seniors.

Slightly over half of the respondents indicated they had relatives that lived or work on a farm. Less than half of the respondents reported having relatives that worked in an agribusiness. Approximately 18 percent of the respondents had completed an agriculture course while they were in high school. 8 percent had been FFA members, and 14 percent had been in 4-H. Over three fourths of the respondents had experience in raising plants and animals. Nearly 80 percent reported reading news magazines, however over 90 percent indicated they regularly used newspapers, radio, and television as a source of news.

Data presented in Table 2 reflect the means, standard deviations, and ranges for the knowledge and perceptions scores. The mean knowledge score was 44.97 with a standard deviation of 8.90 and a range of 18 to 61. The mean perception score was 143.28 with a standard deviation of 22.4 and a range of 62 to 186. The mean knowledge score was equal to 68.1 percent (i.e.  $44.97 / 66 = 68.1\%$ ). The mean perception score translated to a scale value of 2.17 (i.e.  $143.28 / 66 = 2.17$ ) which was most closely aligned to the "agree" response category.

Table 3 presents the results of the stepwise regression analysis using the knowledge of agriculture score as the dependent variable. Due to the exploratory nature of this pilot study, the .15 alpha level was used as the criteria to determine which of the demographic characteristics were to be included in the prediction equation. Six characteristics were

**Table 1 Demographic Characteristics of Respondents**

Characteristic	<i>n</i>	%
<b>GENDER</b>		
Male	69	45.4
Female	83	54.6
<b>ETHNICITY</b>		
Asian	10	6.0
Black	17	10.2
Hispanic	3	1.8
White	123	73.7
Other	1	1.8
<b>HOME LOCATION</b>		
Farm	17	10.2
Rural area	38	22.8
Town/City	96	57.5
<b>POPULATION OF NEAREST TOWN</b>		
less than 2,000	27	17.4
2,001 - 10,000	40	25.8
10,001 - 25,000	29	18.7
25,001 - 100,000	41	26.5
more than 100,000	18	11.6
<b>GRADE LEVEL</b>		
Freshman	24	14.1
Sophomore	79	46.5
Junior	41	24.1
Senior	26	15.3
Relatives on a farm	90	57.7
Relatives in an agribusiness	67	42.9
Enrolled in secondary agriculture	28	17.9
FFA member	12	7.7
4-H member	22	14.7
Raised animals or pets	135	86.5
Raised crops or gardens	118	75.6
Farm organization member	10	6.4
Regular news source:		
News magazines	122	78.2
Newspapers	147	94.2
Radio	141	91.6
Television	144	94.1

found to account for 36.75 percent of the variance associated with college student knowledge of agriculture scores. The variables included in the prediction equation in the order of entry into the model were: (a) white race, (b) relatives on a farm, (c) 4-H member, (d) population, (e) raised crops or garden, and (f) other race. Respondents who were white, had relatives who lived on a farm, raised crops or gardens, and members of other races produced higher knowledge of agriculture scores. Respondents who had been members of a 4-H club and or lived near cities or towns with larger populations produced lower knowledge of agriculture scores. Nearly two-

thirds of the knowledge score variance was not accounted for by the demographic characteristics examined as part of this study.

Table 4 presents the results of the stepwise regression analysis using the perception of agriculture score as the dependent variable. The alpha level for including a predictor variable in the model was set at .15 due to the exploratory nature of the study. Four demographic characteristics met the criteria for inclusion in the prediction equation. Significant predictor variables in the order of inclusion were: (a) white race, (b) population, (c) experience raising animals or pets, and (d) completion of high school agriculture courses. Respondents who were white, and/or had completed high school agriculture courses produced lower perception of agriculture scores which reflected a more positive perception toward agriculture. Respondents who lived in larger population areas and/or had experience raising animals or pets, produced higher perception of agriculture scores which reflected

**Table 2 Agricultural Literacy Knowledge and Perception Scores of College Students (n = 167)**

Category	<i>M</i>	<i>SD</i>	Min	Max
Knowledge	44.97	8.90	18	61
Perception	143.28	22.40	62	186

**Table 3 Regression Analysis of Respondent Characteristics on the Agricultural Literacy Score**

Characteristic	<i>b</i>	<i>F</i>	prob.> <i>F</i>
Intercept	38.96		
White Race	6.96	10.37	.002
Relatives on farm	3.25	6.03	.016
4-H member	-5.61	10.98	.001
Population	-1.46	6.12	.015
Raised crops/garden	3.64	3.73	.056
Other race	12.33	2.64	.108
Overall $F_{(5,93)} = 9.01$	$p < .001$		$r^2 = .3675$
Alpha level ( $\alpha$ ) = .15			

**Table 4 Regression Analysis of Respondent Characteristics on the Agricultural Literacy Perception Score**

Characteristic	<i>b</i>	<i>F</i>	prob.> <i>F</i>
Intercept	138.13		
White race	-14.16	8.70	.004
Population	2.62	4.78	.031
Raised animals/pets	5.63	4.35	.040
Agriculture in high school	-7.80	4.26	.042
Overall $F_{(4,95)} = 7.32$	$p < .001$		$r^2 = .2357$
Alpha level ( $\alpha$ ) = .15			

a less positive perception toward agriculture. Over three-fourths of the variance associated with the respondents' perception of agriculture scores was not explained by the demographic characteristics examined in this study.

## Discussion

The students enrolled in the World Food and Society course at Southeast Missouri State University (SEMO) during the fall semester, 1992 were quite knowledgeable about agriculture. Although the SEMO campus is located in a relatively rural area, the majority of the respondents indicated they lived in a town or city with a population of 10,000 or more. White students, those with relatives living on farms, who had raised crops or gardens, and members of 'other' races were more knowledgeable about agriculture than other students. Respondents who had been 4-H members or lived near larger population centers were less knowledgeable about agriculture.

The explanation of relationship between race and knowledge or perception of agriculture was not clear. However, membership in the white race may have reflected a sociological phenomenon where the members of minority races may have sought to distance themselves from the industry of agriculture which has been viewed as a labor intensive, dirty occupation, with low economic returns, and historical ties to slavery. The significance of the racial differences in agricultural literacy should be the subject of further investigation in other sociological and educational settings.

Respondents who had relatives living on a farm produced higher knowledge scores as was expected. Visits to relatives on a farm most likely provided an educational experience for those students. However, as farms become larger with fewer farmers, the opportunities for future generations to visit on the farms of relatives will become more rare. Therefore, urban dwellers of the future will be less likely to realize the educational benefits of on-farm visits.

College students who lived near larger population centers were less knowledgeable about agriculture. This finding was consistent with the trend which has been expressed in recent years that urban residents were less knowledgeable, but more vocal about agriculture. This observation reflects a situation which should be addressed by educators throughout the United States at all levels.

Elementary and secondary educators should provide instruction which enhances student understanding of the significance of agriculture, food, and food production (Kahler, et al. 1976). This recommendation will likely increase in significance with each passing generation.

Student perceptions of agriculture were more positive among white students and those who had completed high school agriculture courses. Again, students from other races

may be somewhat biased against agriculture due to the sociological and historical factors described above. It was logical that students who had completed high school agriculture, would have had more positive perceptions. Instruction in secondary agriculture courses would most likely have been presented the opportunities and issues in agriculture from a positive perspective. However, students who lived near larger population centers or had raised animals or pets had less positive perceptions of agriculture. It should be recognized that, although less positive, the perceptions were not negative. They're perceptions were simply less positive than other students.

In general, the college students who provided data for this study were knowledgeable and held positive perceptions of agriculture. However, the following recommendations were offered to further enhance college student knowledge and perceptions of agriculture:

1. Provide opportunities for students (especially urban students) to visit farms.
2. Provide instruction about agriculture to students in elementary, secondary, and higher education.
3. Develop educational programs to overcome sociological and historical barriers among minorities regarding agriculture.

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