Agricultural Awareness of Eleventh Grade Students in Rural Schools

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The knowledge and perception of agriculture held by students and adults, often referred to as ***agricultural literacy,*** has received increasing emphasis in the literature. The need for agricultural literacy is evident when examining the changes that have occurred in agriculture in the United States. In the late 20th century, over 97 percent of all U.S. workers were free to manufacture and provide services, while 97 percent were involved in agricultural production. The consuming public has little knowledge of where and how food is produced and consumer groups are raising questions about the safety of the food supply (National Research Council, 1988). In addition, media reports of food contamination and related illness have focused concern on the safety of the food supply. The level of knowledge about agricultural practices and related perceptions by U.S. consumers has created a concern about the quality and safety of our food supply (Birkenholz & Stewart, 1991).

The concern about the public perceptions about agriculture, food, and food production is not new. Hamlin (1962) noted that voters elect representatives who create farm policy and without knowledge, could be responsible for the demise of the agricultural industry. Others (Mayer & Mayer, 1974; Mawby, 1984; Nipp, 1988; National Research Council, 1988) have cited the importance of agriculture and the need for the public to be informed. "People make sense of literacy as a social phenomenon, literacy lies at the root of their attitudes. . .and their actions" (Barton, 1990, p. 7). Public policy affecting agriculture and society is directly affected by societal goals. These goals have been decided by people who have little knowledge about agriculture, how it relates to society, and its economic and global significance to our nation (Deavers, 1987; North Carolina State University, 1988; Nipp, 1988).

In developing a definition for the term ***agricultural literacy,*** one must first define what the term literate means. Smith (1989) wrote, "literacy is not a set of skills or a finished state; it is an attitude toward the world" (p. 354-355). Frick and Spotanski (1990) wrote, "literacy usually refers to a minimal level of reading and writing skills" (p. 6).

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The value of literacy is important because, "People make sense of literacy as a social phenomenon, . . . literacy lies at the root of their attitudes . . . and their actions" (Barton, 1990, p. 7). Public policy affecting agriculture and society is directly affected by societal goals. These goals are being decided by people who have little knowledge about agriculture, how it relates to society and its economic and global significance to our nation (Deavers, 1987; North Carolina State University, 1988; Nipp, Seminar, UMC, April 14, 1992).

Townsend (1990) believed that a pre-secondary agricultural education program can build a positive attitude with students that will let them develop into positive leaders. Perritt and Morton (1990) believed that if you give younger students pre-secondary agriculture that you can develop a positive association with agriculture. They stated, "The younger you start them the better they will become" (p. 14), implying we should be incorporating agricultural literacy concepts into the curriculum early in the educational process. Kuempel and Spivey (1991) agreed with the concept of improving perceptions of agriculture programs by introducing agriculture classes to pre-secondary students and incorporating agriculture into academic courses.

The National Research Council Committee on Agricultural Education in Secondary Schools (1988) stated in the report, Understanding Agriculture: New Directions for Education, that:

> In its analysis of the status of agricultural literacy, the committee found a number of disturbing trends. The committee recom-

> mends that each school, school district, and state assess the status of its existing programs and implement the recommendations it considers appropriate (p. 9).

The Council position has been supported by a limited number of studies. Horn and Vining (1986) used a 45 item instrument to collect data about the basic agricultural knowledge possessed by public school students in Kansas. They reported that fewer than 30 percent of the students correctly responded to "basic" questions. Similar findings were reported in a study of students from Virginia (Bowers & Kohl, 1986) and Oklahoma (Williams & White, 1991). Brown (1991) found a positive change in both knowledge and perceptions about agriculture after middle school students in Missouri had received six to eighteen weeks of related instruction. Humphrey (1992) studied the knowledge level and perceptions about agriculture of elementary education student teachers at the University of Missouri and found that their knowledge and perception scores were positive but varied widely. Brown and Humphrey reported a weak relationship between knowledge and perception scores.

It is logical to assume that students enrolled in agriculture courses have increased levels of literacy about agriculture. Data were not found to support this assumption or to document the contribution, if any, of the impact of local programs of agriculture on the perceptions about agriculture of students not enrolled in the program.

Purpose and Objectives

The purpose of this study was to compare the knowledge of and perceptions about agriculture of eleventh grade students in small out-state Missouri schools with and without a secondary agriculture program.

The following research questions were addressed:

> Is there a significant difference in the mean knowledge of agriculture scores among eleventh grade students when grouped by agricultural enrollment from schools with or without agriculture programs?
>
> Is there a significant difference in the mean perceptions about agriculture scores among eleventh grade students when grouped by agricultural enrollment from schools with or without agriculture programs?

Related null hypotheses were formulated for purposes of data analysis.

-Procedures

The data for this paper were collected as part of a larger study completed by Wright (1992). The original study examined the influences of demographic characteristics on student outcomes in the area of agricultural literacy.

The population for this study included students in the eleventh grade in all public secondary schools in Missouri with a total enrollment (grades 9-12) not exceeding 250 students and which were not located in an urban area or included in a population center of 50,000 or more. A cluster random sampling procedure with replacement was used in selecting schools for the sample. There were 7,845 students at the eiventh grade level in this population. According to Krejice and Morgan (1970) a sample size of 367 students would be needed for a population ranging from 7,000 to 8,000. There were 254 schools in this population, 129 schools with an agriculture program and 125 without an agriculture program. Since it was impractical to obtain a list of all eleventh grade students of this sample, cluster sampling of the entire eleventh grade classes of randomly selected schools was used (Borg & Gall, 1983). Fifteen schools without agriculture programs, and 11 schools with agriculture programs were randomly selected to receive surveys. Returns were received from 10 of the 15 schools without agriculture and 8 of the 11 schools with agriculture programs. Usable responses were returned for 237 students (49 enrolled and 188 not enrolled in agriculture) from schools without agriculture programs and for 198 students (115 enrolled and 183 not enrolled in agriculture) from schools with agriculture programs. Data were collected during the final weeks of the school year. It was not possible to obtain data for students in the nonresponding schools.

The Agricultural Awareness Survey was initially developed through a cooperative project of the University of Missouri-Columbia, Lincoln University, Michigan State University, and Purdue University. The instrument was based on Frick, Kahler, and Miller's (1991) 11 identified concept

areas for agricultural literacy. Items related to the concepts of societal significance of agriculture, economic impact of agriculture, agriculture's relationship with the environment, agriculture's relationship with natural resources, production of plant products, production of animal products, the processing of agricultural products, the marketing of agricultural products, and the distribution of agricultural products. Validity was established by a panel of professionals from the four cooperating institutions. The knowledge section of the instrument used for data collection involved 35 items for both the knowledge and perception scales. Students responded using a true, false, or don't know scale for knowledge and a 1 to 5 Likert-type scale (1 as strongly agree, 5 as strongly disagree) for perceptions. Sample items from the knowledge scale include, "Less than 3 percent of the U.S. gross national product is from agriculture" and "The use of pesticides has increased the yield of crops". Sample items from the perception scale include, "Agriculture employs a large number of people in this country" and "Pesticides can be used safely when producing food".

The instrument used in this study was evaluated using item total correlations (SAS, 1992). Items having correlations of less than .20 were eliminated. The Kuder-Richardson 20 procedure yielded an estimate of reliability of .81 for the knowledge section. There were 28 items in the knowledge section judged to be acceptable. Cronbach's Coefficient Alpha procedure yielded an estimate of reliability of .84 for the perception section. There were 24 items in the perception section judged to be acceptable. The knowledge score scale ranged from 0 to 28. The perception score scale was standardized and ranged from 1 to 5, with 1 the most positive.

School principals were first contacted by phone to obtain permission for their school to participate in the study. All school principals granting permission were sent the materials needed to conduct and return the survey. Follow-up procedures involved contacting all schools by phone that did not return the instruments.

A multivariate analysis of variance procedure using Pillai's Trace was employed with the dependent variables of knowledge about agriculture and perceptions toward agriculture and the independent variables of identifiable agricultural education programs in schools and students having had or are enrolled in an agriculture course. The analysis yielded a partial correlation of .174, significant at the .0001 level, for the dependent variables. Since this correlation was significant, it was judged appropriate to run the MANOVA. When significant, the MANOVA was followed by a univariate analysis of variance procedure. The a priori alpha level. of .05 was used to test the hypotheses.

Results

Means and standard deviations were calculated for four groups of students for both the knowledge scale and the perception scale. The data by groups are presented in Table 1. Knowledge group mean scores ranged from 18.08 to 21.37; and perception group mean scores ranged from 2.20 to 2.36, with the lower perception scores being more positive.

The MANOVA yielded a Pillai's Trace value for variable one (agriculture program offered in the school versus no agriculture program offered in the school) of .0288; for variable two (enrollment in agriculture educational program versus no enrollment in agriculture education program) of .0277; and for the interaction between variables one and two of .0149 (see Table 2). All test statistics were significant at the .05 level. An ANOVA procedure was then used to test for significant differences among groups on the knowledge and perception scales.

The first null hypothesis was rejected. There was a significant difference in the mean knowledge of agriculture scores among all eleventh grade students in schools not offering agriculture, among eleventh grade students enrolled in agriculture and not enrolled in agriculture, and for the interaction between the two variables. Students enrolled in agricultural education at school with a local agriculture program had higher knowledge scores than did the students enrolled in agriculture from schools not having an agriculture program or students not studying agriculture.

The ANOVA test on the knowledge scale revealed that all variables (agriculture program offering - $F = 15.6$; student enrollment in an agricultural education program - $F = 7.4$; and the interaction of the two independent variables - $F = 7.5$) were significantly different at the .05 level (Table 3).

Table 1. Mean Knowledge and Perception Scores of Respondents by Groups

Variable	Mean	n	SD	Var.	Standard error
Students in agriculture schools; had or taking agricultural education.					
Knowledge	21.374	115	4.950	24.499	.462
Perceptions	2.200	115	.456	.208	.043
Students in agriculture schools; no agricultural education					
Knowledge	18.683	183	5.088	25.888	.376
Perceptions	2.338	183	.478	.228	.035
Students in nonagriculture schools; had agricultural education					
Knowledge	18.082	49	5.275	27.827	.754
Perceptions	2.199	49	.606	.367	.087
Students in nonagriculture schools; no agricultural education					
Knowledge	18.085	188	4.688	21.982	,342
Perceptions	2.363	188	.433	.187	.032

Table 2. Pillai's Trace for Multivariate Analysis

Source	df	Pillai's Trace	F	p
Schools with or without agriculture	2,530	.0288	7.86	.0004
Students had or taking agriculture	2,530	.0277	7.56	.0006
Subgroups	2.530	.0149	4.02	.0185

Table 3. ANOVA Results for the Knowledge and Perception Scales

Source	df	ss	F	p
Knowledge				
Schools with or without agriculture	1	379.415	15.56	.0001
Students had or taking agriculture	1	181.059	7.42	.0066
Subgroups	1	181.997	7.46	.0065
Error	531	12950.850		
r^2 = .062				
Perceptions				
Schools with or without agriculture	1	.014	.07	.7959
Students had or taking agriculture	1	2.288	10.31	.0014
Subgroups	1	.017	.08	.7792
Error	531	117.845		
r^2 = .022				

The second null hypothesis was rejected. A significant difference existed in the mean perception of agriculture scores between students enrolled in a secondary agriculture program and those who were not enrolled in agriculture. The ANOVA test for the perception scores revealed a significant difference (F = 10.3) for independent variable two (enrollment in agriculture). Students enrolled in a secondary agricultural education program had a more positive perception of agriculture (2.20 than did students who were not enrolled in agricultural education (2.35).

Conclusions

Based on the findings of this study, the following conclusions were drawn:

Students studying agriculture in schools with an agricultural education program have greater knowledge about agriculture.

Students enrolled in a secondary agricultural education program have a more positive perception towards agriculture.

The Agricultural Awareness Survey instrument is able to detect differences in student knowledge and perception of agriculture.

A weak positive relationship exists between knowledge and perception scores.

Implications

The relationship between knowledge and perception scores merits additional study. Studies by Brown (1991) and Humphrey (1992) found that a weak relationship existed between perception and knowledge scores about agriculture. This study found a weak r = .174 correlation between knowledge and perception scores. It should be noted that all groups in this study had a positive perception about agriculture (the highest at 2.20 and the lowest at 2.35 when 3.0 was the midpoint on the scale). Variables, other than knowledge, such as the overall importance of agriculture in their communities evidently has shaped this perception. The data also revealed that students studying agriculture, whether in the home school or an area school, had similar and more positive perceptions about agriculture than did the other students. This positive perception could have resulted in enrollment rather than developed because of enrollment.

A comparison of the mean scores for knowledge in nonagriculture schools for students taking agriculture (mean = 18.082) and those not taking agriculture (mean = 18.085) revealed no significant difference between the groups or from the group not taking agriculture in schools with agriculture programs (mean = 18.683). The courses offered were not basic knowledge agriculture courses but more of a specialized nature such as agricultural mechanics or horticulture. Incorporation of more agricultural literacy concepts into the current agricultural education programs should result in increased agricultural literacy among students working toward an occupation in agriculture as well as among their peers.

A positive knowledge of and perception about agriculture has been suggested as a prerequisite to the development of good policy decisions related to agriculture. The results of this study would suggest that the issue is much more complex than providing the public information about agriculture. To the extent that the larger public is somewhat similar to eleventh grade students would suggest that the profession must examine ways to impact perceptions about agriculture. The outcomes of efforts to integrate instruction of science and agriculture for larger numbers of students and of FFA projects such as Food for American should be examined. As a profession we should seek to document ways to foster a positive perception about agriculture.

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