

Preservice Elementary Education Majors' Knowledge of and Perceptions Toward Agriculture

John K. Humphrey, Assistant Professor

Arkansas State University

Bob R. Stewart, Professor

Richard E. Linhardt, Associate Professor
University of Missouri

In 1988, the National Research Council published a document entitled Understanding Agriculture: New Directions for Education. The Council sought to pull together concerns and research to address issues of declining agricultural profitability; international competitiveness; and enrollments, instructional content, and quality of U.S. agricultural education programs. Coupled with these concerns were issues that dealt with the declining level of knowledge about and a growing negative attitude towards agriculture by our society. From these issues the committee developed the idea of "agricultural literacy-the goal of education about agriculture" (p.8).

Recommendations by the National Research Council (1988) included the statement that "all students should receive at least some systematic instruction about agriculture beginning in kindergarten or first grade and continuing through twelfth grade" (p. 10). Stewart (1989) expanded this statement by suggesting to encompass the adult population. Further recommendations involved the incorporation of agricultural-related information into existing curricula, thereby reducing the need for a separate class. Williams and White (1991) pointed out that if agricultural educators expected our nation's youth to understand American agriculture, information related to agriculture must be "included in the day-to-day curriculum" (p. 10). The National Research Council (1988) recommended encouraging teachers to modify their lesson plans to incorporate materials about scientific, economic, and public health aspects of agriculture and related topics.

With these statements in mind, one key player in this issue of agricultural literacy and adopting and following through with the recommendations of the Council is the teacher. Dewey (1902) contended that at best, teachers

observe and direct the mental life of the learner. Buchmann (1983) stated that "knowledge is what teaching is about. For teachers to act in a way that does justice to this intrinsic connection, they need to have content knowledge" (p. 3).

Peters (1977), in discussing the priority of content in teacher preparation stated that the process of preparing to become a teacher requires that priority be given to content. Peters equated the lack of a thorough grounding in content to an actor that is skilled in gesture, audience control, and voice, yet has omitted one vital thing--to learn the script. Buchmann (1983) supported Peter's perspective by adding that "part of the meaning of teaching is an understanding of what is to be taught. It would be odd to expect a teacher to plan a lesson on, for instance, writing reports in science and to evaluate related student assignments, while admitting that the teacher is ignorant about writing, as well as science" (p. 5).

Similar studies in the areas of world geography, American history, American government, and economics (McKinney et. al., 1988 & Ford et. al., 1988; and Gilmore et. al., 1988) added further support to the argument that teachers with limited content knowledge affect classroom practice. Conant (1963) stated that "if a teacher is largely ignorant or uninformed he/she can do much harm" (p. 93). Both Dewey (1902) and Hawkins (1974) suggested that a teacher's ability to hear children is enhanced through a firmer grasp of content knowledge.

Purpose and Objectives

The purpose of the study was to provide information related to knowledge about and perceptions toward agriculture of preservice elementary education majors at the University of Missouri-Columbia. More specifically, the

objectives of this study were a) to determine the level of knowledge about agriculture held by preservice elementary education majors, b) to determine the perceptions toward agriculture held by preservice elementary education majors, and c) to identify relationships between knowledge and perception scores and selected descriptive variables.

Procedures

A survey instrument comprised of three sections was developed as a part of a research project. This instrument with adaptations in the demographic section was used for this study. Development of the instrument began with the project staff performing an analysis of Frick, Kahler, and Miller's (1991) 11 identified concepts. The purpose of the concept analysis was to develop a set of statements that described the concepts of societal significance of agriculture, economic impact of agriculture, public agricultural policies, the global significance 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. Based on the results of pilot test data, items were grouped in seven concept areas.

Section 1 of the instrument contained 29 questions related to general agricultural knowledge. The respondent was required to choose a response of either "true", "false", or "don't know" to a given statement. Section 2 contained 29 statements relating to the respondents perceptions toward agriculture. The respondents selected their response from a five point Likert-type scale. The scale values were 1 = strongly agree; 2 = agree; 3 = neutral; 4 = disagree; 5 = strongly disagree. Section 3 contained statements related to demographic characteristics.

The responses of the group using the instrument were subjected to item analysis. Based on this process, 21 items were used for analysis from the knowledge scale and 21 items were used from the perception scale. The instrument was reviewed for validity and changes were made in the wording of items as suggested by the Agricultural Literacy Project Panel involving professionals from four universities. Procedures used to estimate the

instrument's reliability were the Kuder-Richardson 20 for Section 1 (knowledge about agriculture with a true/false/don't know format) and Cronbach's Alpha for Section 2 (perception towards agriculture with a five-point Likert-type scale). The estimate of reliability for the revised instrument (21 items) used in this study was .76 for the knowledge section and .86 for the perception section.

This study involved the collection of responses about Agricultural Awareness of preservice elementary education majors at the University of Missouri-Columbia. The purposive sample included 82 preservice elementary education majors at the University of Missouri-Columbia completing their student teaching during the winter semester of 1992. Kerlinger (1973) stated that "purposive sampling, is characterized by the use of judgement and a deliberate effort to obtain representative samples by including presumably typical areas or groups in the sample" (p. 129). A total of 65 preservice elementary education majors responded. This represented a usable response rate of 79 percent of the subjects surveyed. Late response data were obtained by hand delivering and picking up instruments from 10 student teachers.

In order to determine if a nonresponse bias existed, analysis of variance (ANOVA) was utilized to compare early and late respondents. Since the ANOVA yielded an F value of .55 with a probability of 0.46 for the knowledge section and an F value of .94 with a probability of 0.33 for the perception section, it was concluded that no statistically significant difference ($p < .05$) existed between early and late respondents.

Research questions were analyzed using descriptive statistics. Frequencies, means, and standard deviations were reported for each data set. In addition, Pearson Product Moment Correlations were estimated for the variables of the study.

Findings

The first objective was designed to determine the level of knowledge about agriculture held by preservice elementary education majors. The mean for the knowledge section for the preservice elementary education group was 16.96 (range 0 to 21) with a standard deviation of 3.26 (see Table 1).

Table 1. Means and Standard Deviations for the Preservice Elementary Education Majors Knowledge and Perception Scores (N=65),

Variable	Mean	SD
Knowledge	16.96	3.26
Perception	47.78	9.28

The second objective was designed to determine the perceptions of preservice elementary education majors toward agriculture. Lower values were assigned to the more positive responses. More positive perceptions toward agriculture resulted in a lower score on this section. The scale was reversed when items were deemed negative toward agriculture in order to remain consistent with the project staffs theory of a lower score equals a more positive perception. The perception score for the preservice elementary education majors was 47.78 (range 21 to 105) with a standard deviation of 9.28 (Table 1).

The third objective was designed to examine relationships. Correlations were calculated for the data. A significant relationship ($r=-.27$) existed between knowledge and perception. Based on the design of the perception scale, those individuals with lower perception scores reflected a more positive perception toward agriculture. Another relationship was related to the respondents' confidence in teaching agricultural topics in the classroom. There was a significant correlation between confidence in teaching agricultural concepts and agricultural experience ($sr=.24$), having parents or grandparents that either work on a farm or work in an agricultural business ($r=.30$), and having worked at a job on the farm or an agricultural off-farm job ($r=.45$) (See Table 2).

Table 2. Correlations Among Variables (N=65)

Variable	2	3	4	5	6	7	8	9	10	11
Knowledge (1)	-.27	-.22	-.16	-.23	-.04	-.24	-.06	-.00	-.02	-.17
Perception (2)		.02	.04	.08	.19	-.10	-.21	-.18	-.10	.12
Home locale (3)			.38	.30	.32	.56	.14	.04	-.10	.22
Experience with animals/crops (4)				.28	.34	.18	.15	-.01	-.13	.24
Relatives on farm (5)					.33	.23	.22	-.07	-.03	.30
Work in agriculture (6)						.20	.12	.08	.06	.45
High school offered agriculture (7)							.13	.12	.20	.13
Member of 4-H (8)								-.11	-.01	.13
Weeks of student teaching (9)									.08	-.19
Credit hours in biological sciences (10)										-.10
Confidence in agriculture (11)										

Conclusions and Recommendations

The following conclusions were based on the data for preservice elementary education majors at the University of Missouri.

The overall mean level of knowledge about agriculture held by preservice elementary education majors is high but varies widely.

The overall mean level of perceptions toward agriculture held by preservice elementary education majors is positive but varies widely.

Elementary education student teachers with higher knowledge scores tend to have more positive perceptions toward agriculture.

Elementary education student teachers with agricultural experience are more confident about teaching science topics related to agriculture.

Significant correlations existed between those variables related to agricultural experience and the respondents' confidence to teach agriculturally-related topics. Unfortunately, only 20 percent of respondents were confident to teach agricultural concepts. With agricultural experience significantly related to confidence to teach, and evidence of those experiences waning, concern as to the success rate of the presentation of the information about agriculture in the classroom becomes an issue. Teachers' own subject matter knowledge influences their own efforts to help students learn subject matter (Ball and McDiarmid, 1989). Research has found that teachers often feel inadequate to present certain topics and often avoid

them because of an inadequate background in the subject (Bethel and Hord, 1981).

The results of this study pose some interesting challenges to the profession of agricultural educators and education as a whole. If the old adage is true that "teachers tend to teach what they know", then agricultural educators have a challenge. Educating society about the importance of agriculture is vital. If elementary educators are to integrate agricultural information into existing curricula such as science and social studies and agricultural educators are to rely on individuals to teach these concepts successfully, then networking with teacher educators that prepare elementary teachers should become a priority for agricultural education.

References

- Ball, D.L., and McDairmid, G.W. (1989). The subject matter preparation of teachers (Issue Paper No. 89-4). Washington, DC: National Center for Research and Improvement.
- Bethel, L.J., & Hord, S.M. (1981). A case study of change: I service teachers in a National Science Foundation Environmental Science Education Program (Report No. SP017955). Washington, DC: National Science Foundation.
- Buchmann, M. (1983). The priority of knowledge and understanding in teaching (Paper No. 61). East Lansing, MI: Michigan State University, Institute for Research on Teaching (ERIC Document No. ED237503).
- Conant, J. (1963). The education of American teachers. New York; McGraw-Hill.
- Dewey, J. (1902). The child and the curriculum. Chicago: University of Chicago Press.
- Ford, M.J., McKinney, C. W., Gilmore, A.C., Larkins, A.G. & McKinney, K.C. (1988). Preservice elementary education majors' knowledge of American history. (Report No. SO 019 804). University of Southwestern Louisiana. (ERIC Document Reproductive Services No. ED 305 314).
- Frick, M.J., Kahler, A.A. & Miller, W.W. (1991). A definition and the concepts of agricultural literacy. Journal of Agricultural Education, 32(2): 49-57.
- Gilmore, A.C., McKinney, C.W., Larkins, A.G., Ford, M.J. & McKinney, K.C. (1988). Preservice elementary education majors knowledge of American government (Report No. SO 019 805). Atlanta, GA: Mercer University. (ERIC Document Reproductive Service No. ED 3053 15).
- Hawkins, D. (1974). Nature, man, and mathematics. In The Informed Vision (pp. 109- 131). New York: Agathon (originally published 1972).
- Kerlinger, F.N. (1973). Foundations of behavior research. (2nd ed.). New York: Holt, Rinehart and Winston, Inc.
- McKinney, C.W., McKinney, K.C., Ford, M.J., Gilmore, A.C. & Larkins, A.G. (1988). Preservice elementary education majors' knowledge of world geography. (Report No. SO 019 803). Oklahoma State University. (ERIC Document Reproductive Service No. ED 305 313).
- McKinney, C.W., Larkins, A.G., McKinney, K.C., Gilmore, A.C. & Ford, M.J. (1988). Preservice elementary education majors' knowledge of economics. (Report No. SO 019 802). Oklahoma State University. (ERIC Document Reproductive Service No. ED 305 312).
- National Research Council, Board on Agriculture, Committee on Agricultural Education in Secondary Schools. (1988). Understanding & culture: New directions for education. Washington, DC: National Academy Press.
- Peters, R'S. (1977). Education and the education of teachers. London: Routledge & Paul.