

AGRICULTURAL AWARENESS ACTIVITIES AND THEIR INTEGRATION INTO THE CURRICULUM AS PERCEIVED BY ELEMENTARY TEACHERS

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Abstract

The purpose of this study was to analyze the status of agricultural awareness efforts in elementary grades (K through 6) in a selected seven county area in east central Iowa. The two objectives of this study were: (1) To identify elementary school teachers' perceptions regarding the agricultural industry, the integration of agriculture into the elementary curriculum and the need for agricultural awareness; and (2) to identify selected agricultural activities being used in elementary school instruction. This study was conducted using a mailed questionnaire that measured teachers' perceptions. Agriculturally related activities were identified to indicate the extent to which these activities were conducted in elementary classrooms. Demographic information was also collected. Elementary teachers had positive perceptions about the agricultural industry, the need for agricultural awareness, and the integration of agriculture into the elementary curriculum. Elementary teachers use numerous agricultural awareness activities in their instruction. Over 80 per cent of the elementary teachers in this study were using agricultural activities to enrich the curriculum. Most of these activities focused on the study of animals, plants, food, nutrition, environment, wildlife and insects. Fifty percent of the respondents reported teaching in an urban or metropolitan community. Teachers reported that agriculture can be taught as a part of nearly all subject areas. The results of this study support Fishbein & Azjen's (1975) attitude theory that positive beliefs and attitudes lead to specific intentions and behaviors.

Introduction

Agricultural educators have discussed the need for instruction in agriculture in elementary grades for many years (Fox, 1932; Shively, 1936; Herr, 1968; Wolfson, 1970; Keenan, 1970; Shepard, 1970; Swan and Donaldson, 1970; Peterson and Bardson, 1973; Snowden, & Shoemaker, 1973). However, there was renewed interest in education about agriculture in the 1980s with the birth of the "Agriculture in the Classroom" program in 1981 (Hillison, 1998). In 1988, the National Research Council recommended that "beginning in kindergarten and continuing through twelfth grade, all students should receive some systematic instruction about agriculture" (p. 2).

The National Research Council (1988, p. vi) defined agricultural literacy as "an understanding of basic concepts and knowledge spanning and uniting all of those subjects" that broadly encompass agriculture. Moreover, Frick, Kahler, and Miller (1991) defined agricultural literacy as "possessing knowledge and understanding of our food and fiber system. An individual possessing such knowledge would be able to synthesize, analyze, and communicate basic information about agriculture" (p. 52). Although agricultural literacy and agricultural awareness are closely related, the term agricultural awareness was used for this study and was conceptualized as "experiencing or exploring agriculture as it relates to the subject matter being studied or context of life being lived; the ability to identify the connections of agriculture to areas of study or life"

(Knobloch, 1997, p. 12).

In reviewing the literature, Radhakrishna (1998) found that there were only two studies conducted in the 1980s and sixteen studies conducted in the 1990s regarding agricultural literacy and awareness as identified in the National Agricultural Education Research Meeting (NAERM) proceedings from 1974 to 1998. Specifically, agricultural educators have found teachers and students vary in their perceptions and knowledge of agriculture. Elementary teachers have been found to have little knowledge of agriculture (Terry, Herring, and Larke, 1992; Swan and Donaldson, 1970). Students lack basic knowledge of agriculture according to Horn & Vining (1986, cited in Herr-en & Oakley, 1995). On the other hand, Humphrey, Stewart, & Linhardt (1994) found that preservice elementary teachers' awareness of agriculture was high and their perceptions towards agriculture were positive and varied. Harris and Birkenholz (1996) concluded that secondary educator groups were knowledgeable of and had positive attitudes toward the industry of agriculture. Moreover, White, Stewart, & Linhardt, (1991) found that urban students perceived agriculture positively.

A teacher's background and experience plays a significant role in educating students about agriculture. Researchers have found that teachers with agricultural experience had more agricultural knowledge and more accurate perceptions of agriculture (Terry, Herring, & Larke, 1992; Humphrey, Stewart, & Linhardt, 1994). Further, preservice elementary teachers with agricultural experience have been found to be more confident in teaching agriculture (Humphrey, Stewart, & Lindhardt, 1994). Rudd and Hillison (1995) concluded that teachers' knowledge, attitude, and expectations of a new curriculum were positively correlated predictors of the amount of new curriculum taught.

Agricultural educators believe that agriculture should be integrated into elementary

classes (National Research Council, 1988; Terry, Herring, & Larke, 1992; Leising and Zilbert, 1994; Birkenholz, Frick, Gardner, and Machtmes, 1994; Frick, Birkenholz, and Machtmes, 1995). Trexler and Suvedi (1998) found that elementary teachers in Michigan were sometimes comfortable using the problem solving method, connecting science teaching to community problems, and using agriculture as a context for science. Furthermore, elementary teachers have moderately supported the concept that science can be taught through agricultural examples (Trexler & Suvedi, 1998). Balschweid, Thompson, and Cole (1998) found that K-12 teachers perceived their students most interested in animals, crops, and food processing. Elementary teachers in Texas were found to be teaching agricultural knowledge and concepts approximately 8 hours a year. They favored topics related to food, nutrition, environment, plants, wildlife, insects, and history (Terry, Herring, & Larke, 1992).

Intervention programs with elementary teachers have shown positive results. Balschweid, Thompson, and Cole (1998) found that 90 percent of the elementary and secondary teachers who participated in an agricultural literacy in-service program integrated agriculture into at least one of their lessons. Trexler and Suvedi (1998) found that teacher perceptions of agriculture and confidence toward integrating agriculture in science improved after a curriculum intervention program on science and agriculture. Herren and Oakley (1995) concluded that elementary teachers taught how to integrate "Agriculture in the Classroom" resources reported higher student achievement of agricultural concepts. Further, the Agriculture in the Classroom Program has been effective for students in rural and urban settings (Herr-en & Oakley, 1995).

Mawby (1985) suggested "few issues are of greater importance to the world than adequate food supplies, proper food use, and knowledge about the components of the agricultural industry" (p. 7). Spokespersons outside of agricultural

education have recommended that agricultural knowledge be taught in the elementary school grades (Lucht, 1993; De Christopher, 1993). The literature provides ample evidence that agricultural awareness is a worthy area of inquiry. Therefore, a basic understanding of the knowledge base of agriculture, and most importantly, how it relates to real-life applications were identified as the need for this study. Specifically, there was a need to identify activities that build on this knowledge base of agriculture.

Theoretical Framework

The philosophical foundation underpinning the need for agricultural awareness in elementary classrooms was based on Dewey's (1938) philosophy of education. He stated that "anything which can be called an area of study, whether arithmetic, history, geography, or one of the natural sciences, must be derived from materials which at the outset fall within the scope of ordinary life experience" (p. 73). Further, Dewey expounded,

It is a sound educational principle that students should be introduced to scientific subject matter and be initiated into its facts and laws through acquaintance with everyday social applications. Adherence to this method is not only the most direct avenue to understanding science itself as the pupils grow more mature it is also the surest road to the understanding of the economic and industrial problems in present society. For they are the products of a large extent to the application of science in production and distribution of commodities and services, while the latter processes are the most important factor in determining the present relations of human beings and social groups

to one another (p. 80)

Therefore, integrating agricultural awareness activities into elementary education would provide learning opportunities and sound education based on experiences related to production and distribution of agricultural commodities and services. Significantly, agriculture has employed more people than any other industry in the nation (American Farm Bureau Federation, 1998). Dewey (1938) expostulated that schools should teach students to learn knowledge and thinking skills by solving problems in real life experiences. Since agricultural education strives to teach students how to solve problems using Dewey's scientific investigation on a practical level, the integration and infusion of agriculture in elementary education is based upon sound pedagogical principles.

Fishbein and Ajzen's (1975) attitude theory served as the theoretical base for this study. Fishbein and Ajzen (1975) purported that "a person's beliefs serves as the informational base that ultimately determines his attitudes, intentions, and behaviors" (p. 14). Salient beliefs about an object shapes one's attitude toward an object (Fishbein & Ajzen, 1975). Moreover, they suggested that "a person's attitude toward some object is related to the set of beliefs about the object but not necessarily to any specific belief. In similar fashion, attitude toward an object is viewed as related to the person's intentions to perform a variety of behaviors with respect to that object" (p. 14). Fishbein and Ajzen's theory postulated that,

Each intention is viewed as being related to the corresponding behavior, and since we view most social behavior as being volitional, barring unforeseen events, a person should perform those behaviors he intends to perform. It follows that attitude toward an object will again be related only to

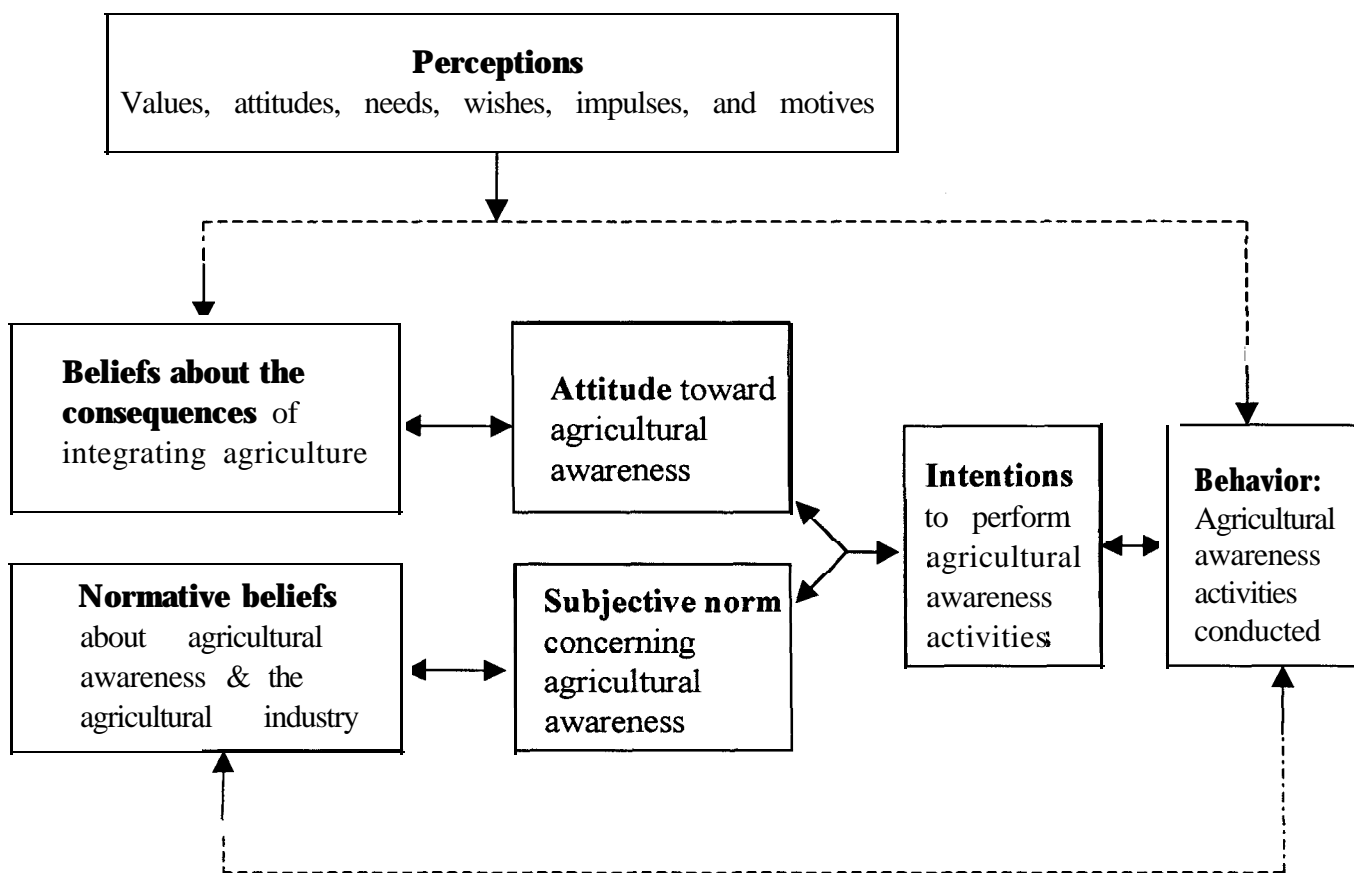


Figure 1. Schematic presentation of conceptual framework (Adaptation of Fishbein & Ajzen, 1975).

the total behavioral pattern rather than to any specific behavior with respect to the attitude object (p. 15).

Further, Fishbein and Ajzen's (1975) attitude theory postulated that a person's behavioral intention is a function of two factors: (1) one's attitude toward the behavior, and (2) one's subjective norm. First, a person's belief about the consequences and evaluation of those consequences influences the person's attitude and serves as a major determinant of that person's intention to perform a behavior in question. Second, other beliefs that may influence a person's intention to perform a behavior are of a normative nature. Normative beliefs are related to certain referents that think the person should or should not perform the behavior in question. Normative beliefs and motivation to comply lead to normative

pressures and the totality of these normative pressures are termed "subjective norm." Like a person's attitude toward a behavior, subjective norms are a major determinant of one's intention to perform a behavior.

This study did not specifically measure beliefs and attitudes. However, this study was based on the premise that "values, attitudes, needs, and wishes, as well as impulses and motives, are projected upon objects and behaviors outside of the individual" (Kerlinger, 1973, p. 514). Therefore, people perceive the world through their own set of values, beliefs, attitudes, and intentions. Taken together, these components form the overall perceptions of individuals. Figure 1 illustrates a conceptual framework that was adapted from Fishbein and Ajzen's theory and formed the basis for conducting this study.

Methods and Procedures

The role of the teacher has been shown to be very important for integrating agriculture into the elementary curriculum (Terry, Herring, & Larke, 1992). Therefore, if teachers are change agents for integrating agriculture into the elementary curriculum, then their perceptions about this process and the associated activities would affect the integration of agriculture into the elementary curriculum. Although some researchers (Humphrey, Stewart, & Lindhardt, 1994; Terry, Herring, & Larke, 1992) have studied pre-service and in-service elementary teachers' knowledge and perceptions of agriculture, the agricultural education profession has not sufficiently addressed these integration issues. The basic problem addressed by this study focused on an assessment of the dimensions of the integration of agriculture into the elementary curriculum. Therefore, this study assessed elementary teachers' perceptions related to integrating agriculture into their elementary instruction, their perceptions of the agricultural industry, and the need for agricultural awareness. Understanding the perceptions of elementary teachers and the activities they conduct will help guide agricultural educators to develop and implement programs and curriculum related to the integration of agriculture into the elementary curriculum.

Purpose and Objectives

The purpose of this study was to identify the status of agricultural awareness efforts in elementary grades (K through 6). The objectives of this study were:

1. Assess elementary school teachers' perceptions of the agricultural industry, the integration of agriculture into elementary curricula, and the need for agricultural awareness; and,
2. Identify agricultural awareness activities being conducted by elementary teachers.

The respondents in this study were elementary teachers in a seven county educational service area. There were 52 school districts represented in the sample which included 33 public school districts and 19 private school districts. The districts in the sample ranged in size from very small with six students to the second largest school district in the state with over seventeen thousand students. The mean size of the school districts in the sample was 5,725 students per district. The Grant Wood Area Education Agency mailing list of teachers served as the frame. There were 2,067 teachers in the frame. An equal-probability-of-selection method sample of 689 teachers was selected using a systematic sampling method (Babbie, 1990). Forty-five percent of the teachers (311/689) returned the questionnaire. Since some questionnaires were returned blank or partially completed, the data were used from 281 questionnaires.

The instrument used to collect the data for this study was a mailed researcher developed questionnaire containing 90 items in four parts. Part A contained 31 items related to perceptions regarding agriculture and its inclusion in elementary education representing three conceptual domains:

1. Integration of Agriculture;
2. Agricultural Awareness; and
3. The Agricultural Industry.

Perceptions were measured using a 5 point summated rating scale. teachers were asked to respond to each statement using the following rating scale: Strongly Disagree (SD = 1), Disagree (D = 2), Neutral (N = 3), Agree (A = 4), and Strongly Agree (SA = 5). Part B contained 48 items regarding agricultural activities used in the classroom. The activities related to the general agriculture and the seven career areas of

agriculture-agricultural mechanics, agricultural processing, agricultural production, agricultural sales and services, forestry, horticulture, and natural resources and conservation (Newcomb, McCracken, & Warmbrod, 1993). The teachers were asked to respond to the number of times they had conducted the activities in their instruction during the past year. Their choices were: Never = 0, Once a year = 1, Twice a year/once a semester = 2, and Three or more times a year = 3. Part C contained one open-ended question used to ascertain other comments regarding the teachers' thoughts on teaching agriculture. Part D contained ten items related to demographic information.

Content and face validity were determined by a panel of experts in education including elementary teachers, a school superintendent, a professional accountant, and faculty members of the Department of Agricultural Education and Studies at Iowa State University. Items related to the agricultural activities were teaching ideas developed by elementary teachers attending the Teachers' Academy on Agricultural Awareness workshops. The estimates of reliability, using Cronbach's alpha, were 0.88 for the items related to Integration of Agriculture, 0.86 for the items related to Agricultural Awareness, and 0.85 for the items related to the Agricultural Industry (Nunnally, 1967).

Descriptive statistics were used to analyze the data. The data set was analyzed using SPSS to calculate frequencies, medians, means, and standard deviations. Negatively worded items were reverse coded in the summations of the conceptual domains. Means were calculated for composite scores. Means and standard deviations of the conceptual domains were calculated from the means of the items.

Questionnaires were sent to the elementary teachers at their school addresses. A follow-up postcard was sent as a reminder 10 days after the initial mailing. One plausible reason for the lower

response rate was because there was not enough time to send subsequent follow-up reminders because of the impending end of the school year. Non-response error was controlled by the "double-dip" method (Miller & Smith, 1983). A random sample of five percent of the non-respondents was used for comparison. These responses were compared to respondents using summated means. T-tests indicated no significant differences between the data provided by non-respondents and respondents on ten randomly selected items.

Results and Discussion

Eighty-eight percent ($n = 248$) of the teachers were female and 12 percent were male ($n = 33$). The grade levels taught by the elementary teachers were divided into kindergarten through second grade (50%); third to fourth grade (34%); and fifth to sixth grade (34%). Many teachers taught more than one grade level and more than one subject in the elementary curriculum. The elementary teachers taught a wide array of subjects including: language arts (78%), math (74%), social studies (72%), science (69%), geography (58%), health (54%), art (21%), music (13%), and thirteen other subject areas were mentioned.

The years spent teaching varied considerably across the span of teaching experience-novice to full career. The teachers' education level was either a bachelors' or masters' degree; over one-third ($n = 103$) of the teachers had a master's degree. None of the respondents had a doctoral degree. Nearly half of the teachers ($n = 136$) in the sample taught in a rural community; approximately one-fourth ($n = 67$) of the teachers taught in a metropolitan community; and about one-fourth ($n = 67$) taught in an urban community. One hundred fifty-six elementary teachers (56%) had some kind of agricultural experience. Thirty-nine elementary teachers (14%) had taken agricultural classes, workshops, or in-service programs. One hundred twenty-one elementary teachers (43%) had an agriculture teacher in their school district.

Generally, elementary teachers were favorable towards integration of agriculture into the curriculum. Ninety-seven percent ($n = 273$) of the elementary teachers agreed that agriculture would enhance the elementary curriculum. Moreover, 84% ($n = 236$) of the elementary teachers agreed that agriculture could be integrated into any subject matter. Elementary teachers reported that agricultural knowledge helps people make decisions. Fifty-eight percent

($n = 164$) agreed that basic knowledge of agriculture is important to make daily decisions. Elementary teachers had a positive outlook for agriculture in that 93% of the respondents ($n = 262$) disagreed that there was no future in agriculture. Elementary teachers had positive perceptions about the agricultural industry, integrating agriculture into the elementary curriculum, and the need for agricultural awareness (Table 1).

Table 1. Perceptions of elementary teachers regarding the agricultural industry, need for agricultural awareness activities, and integration of agriculture into the curriculum. ($N = 262$)

Domain	Mean	Standard Deviation
Integration of Agriculture	3.75	0.44
Agricultural Awareness	3.50	0.64
Agricultural Industry	3.97	0.39

Note: Scale: 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly agree

The Integration of Agriculture domain focused on perceptions about agriculture's infusion into the curriculum. There were 14 items in this domain. Examples of these items with levels of agreement/disagreement percentages reported in parentheses included "Agriculture would enhance the curriculum (97% agreed with this statement);" "There is no time to teach agriculture in the elementary curricula (84% disagreed or were neutral);" "Agriculture can be taught in any subject matter area (84% agreed);" and "Elementary school teachers are not trained to teach agriculture (85% were neutral or agreed)." The mean of this domain was 3.75 ($SD = 0.44$) for items related to the integration of agriculture in the elementary curriculum. Mean scores between 3.50 and 4.49 were in the agree category. Therefore, elementary teachers in this study generally agreed that agriculture could be integrated into their elementary classes.

The Agricultural Awareness domain related to the extent that there was a need for

students to learn about agriculture. There were 4 items in this domain including: "Basic knowledge of agriculture is important to make daily decisions (89% were neutral or agreed);" "Every elementary student should be taught agriculture no matter what career they want to pursue (93% were neutral or agreed);" "Every junior high/middle school student should be taught agriculture no matter what career they want to pursue (93% were neutral or agreed);" "Every high school student should be taught agriculture no matter what career they want to pursue (88% were neutral or agreed)." The mean of this domain was 3.50 ($SD = 0.64$). Therefore, elementary teachers in this study believed that agricultural knowledge is important and all students should have some awareness of agriculture.

The Agricultural Industry domain contained items that related to the teachers' perceptions of the agricultural industry. There were 13 items in this domain. Examples of these items included: "Agriculture includes horticulture

and floriculture (9 1% agreed);” “There is no future in agriculture (93% disagreed);” “Agriculture is America’s largest employer (91% were neutral or agreed);” and, “Agriculture is an environmentally conscious industry (89%) were neutral or agreed.” The mean of this domain was 3.97 (**SD** = 0.39). Therefore, elementary teachers in this study indicated that they believed that agriculture is a broad science-based, environmentally conscious industry with a positive future and many career opportunities including areas related to horticulture, natural resources, forestry, and food processing.

The second objective of the study asked elementary teachers to identify agricultural awareness activities they were using in their instruction. Elementary teachers in this study conducted a variety of agricultural activities in their classrooms at least once a year. Over half of the forty-eight activities listed in the questionnaire were conducted by a majority of the teachers at least once during the school year. Two hundred twenty-eight teachers (81%) indicated that they had conducted agricultural activities in their instruction at least once during the school year.

The ten most commonly conducted agricultural activities were: recycled paper and discussed renewable resources (84%); discussed an agricultural issue about the environment (78%); identified the life cycles of plants and animals (77%); planted and germinated seeds (77%); viewed birds or wildlife (74%); identified types of trees in a forest (74%); identified foods eaten in other cultures (74%); identified the ingredients from a food label (72%); discussed the role of food for holidays (72%); and, identified insects and their role in society (70%).

The ten agricultural activities conducted least by elementary teachers in their instruction were: raised earthworms (9%); composted plant material (12%); toured a local agribusiness (12%); used an agricultural theme in a music program (12%); played agricultural games (15%);

conducted an agricultural theme poster contest (15%); calculated the volume of a storage structure (16%); incubated eggs and hatched chicks (16%); acted or role played agriculture situations (20%); and, calculated the area of a field (25%).

For the third part of the questionnaire, the teachers were asked to respond to the following question: “What are your thoughts and ideas regarding the integration and teaching of agriculture in the elementary curriculum?” One hundred seventy-nine of the respondents provided comments to this open-ended item. Of that number, 101 teachers supported integration of agriculture or were currently integrating agriculture into their instruction; 45 teachers were concerned about time to integrate agriculture into their instruction; 35 teachers mentioned that up-to-date educational resources were needed to integrate agriculture into their instruction; and 11 teachers said they taught farm-related units. One teacher taught agricultural related topics without realizing it, “At first I didn’t think I taught very much about agriculture, but looking at all the related areas of agriculture, I cover many topics.” Some teachers commented that the term agriculture was not being used to refer to the related activities identified in the questionnaire. “The term agriculture is not part of our direct curriculum vocabulary. The basic school philosophy has eight commonalities to push in its curriculum. Connectedness to nature, the life cycle and producing and consuming, all deal with aspects of agriculture.” In addition, a teacher added “. . . we already do quite a bit. It’s just not called ‘Agricultural Activities’ .”

Conclusions, Recommendations & Implications

Elementary teachers in this study had positive perceptions about the agricultural industry, the integration of agriculture into the curriculum, and the need for agricultural awareness. This finding was consistent with

findings from a few previous studies that found that teachers had positive attitudes about agriculture (Humphrey, Stewart, & Linhardt, 1994; Birkenholz, 1996). This finding was not in agreement with Coon and Cantrell (1985) who concluded that the public's view of agriculture is traditional, negative, and outdated.

The elementary teachers' positive perceptions related to the integration of agriculture, agricultural awareness activities, and the agricultural industry overall may be reasons why many teachers were conducting agricultural activities in their instruction. These findings supported research conducted by Rudd and Hillison (1995) that found that teachers' attitudes related to the amount of new curriculum that was taught. Moreover, this finding is congruent with Fishbein and Ajzen's (1975) attitude theory and supports the implication that elementary teachers with positive beliefs about the agriculture industry, the consequences of integrating agriculture and positive normative beliefs about agricultural awareness activities leads to positive attitudes and subjective norms, thus, leading to intentions and behaviors of integrating agriculture into their instruction.

Elementary teachers in this study supported the notion that agriculture should be integrated into elementary classes. This finding supported the recommendations of the National Research Council (1988), Terry, Herring, and Larke (1992), Leising and Zilbert (1994), Birkenholz, Frick, Gardner, and Machtmes (1994), and Frick, Birkenholz, and Machtmes (1995). Approximately 80 percent of the elementary teachers in this study were using agricultural activities in their instruction. This was similar to a finding in the study conducted by Terry, Herring, and Larke (1992). They found that 76% of the 4th grade elementary teachers in Texas conducted some type of agricultural activity in their instruction.

Elementary teachers in this study agreed

that agriculture could be taught in science units. This finding was supported by findings by Trexler and Suvedi (1998). Additionally, elementary teachers in this study conducted activities related to the topics of animals, plants, food, nutrition, environment, wildlife, and insects. This finding is consistent with the research conducted by Balschweid, Thompson, and Cole (1998), and Terry, Herring, & Larke (1992).

This study should be replicated in other states to determine if the findings vary because of geographical differences. Further, this study should be replicated to determine if the economic and societal influences change normative beliefs of elementary teachers. This study should also be conducted to measure the changes in attitudes and behaviors after an intervention program related to agricultural awareness or agricultural literacy has been implemented.

Integrating agriculture into elementary instruction has been discussed for many years. Elementary teachers' attitudes may indicate a relationship to their behaviors focused on integrating agriculture into their instruction. Why were teacher attitudes so positive in this study? What barriers are limiting elementary teachers from integrating agriculture into their instruction? Are teachers with experiences and education related to agriculture more likely to integrate agriculture into their instruction? What levels of cognition are developed through the integration of agriculture? Does the integration of agriculture make the instruction more relevant, thus improving student learning? These questions should be pursued in future studies. Further, data should be collected to assess why elementary teachers believe that agriculture should or should not be integrated into their instruction. Research should also be conducted to address the extent to which teacher attitudes predict their behaviors for integrating agriculture into their instruction.

The findings and conclusions of this study should be considered in the development of

intervention programs for pre-service and in-service teachers by teacher education programs, agriculture teachers, and state department of education consultants. Moreover, commodity organizations, agricultural promotion groups, and elementary education programs such as Agriculture in the Classroom should consider the findings of this study in developing resources and programs that elementary teachers need and use in integrating agriculture into their curriculum. Agricultural educators should develop relationships and assist elementary teachers to integrate agriculture into their instruction since it appears that many elementary teachers are positive about agricultural awareness activities.

The results from this study suggest that teachers require an awareness about agriculture if they are to be successful at helping students understand agriculture and its many dimensions. Additionally, as suggested by Fishbein and Azjen (1975), in other areas of education the future study of agriculture may have more to do with beliefs, attitudes and behaviors of elementary teachers than is currently realized. The whole agricultural awareness issue is critical and needs to be taken seriously by agricultural and educational leaders at every level.

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