COMPARISON OF ELEMENTARY TEACHERS' USE OF AGRICULTURE IN THEIR TEACHING

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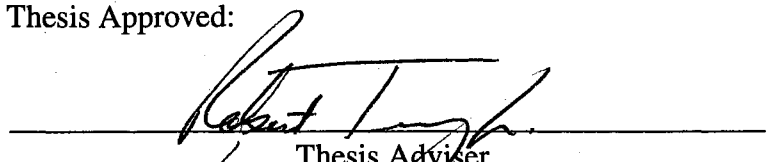

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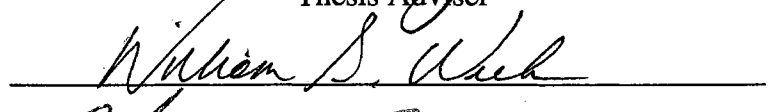

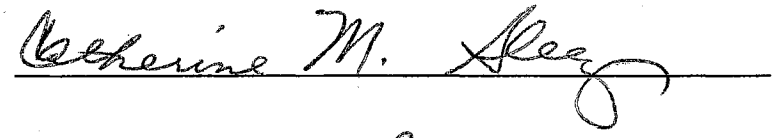

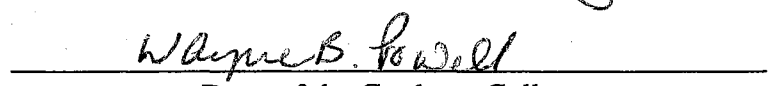

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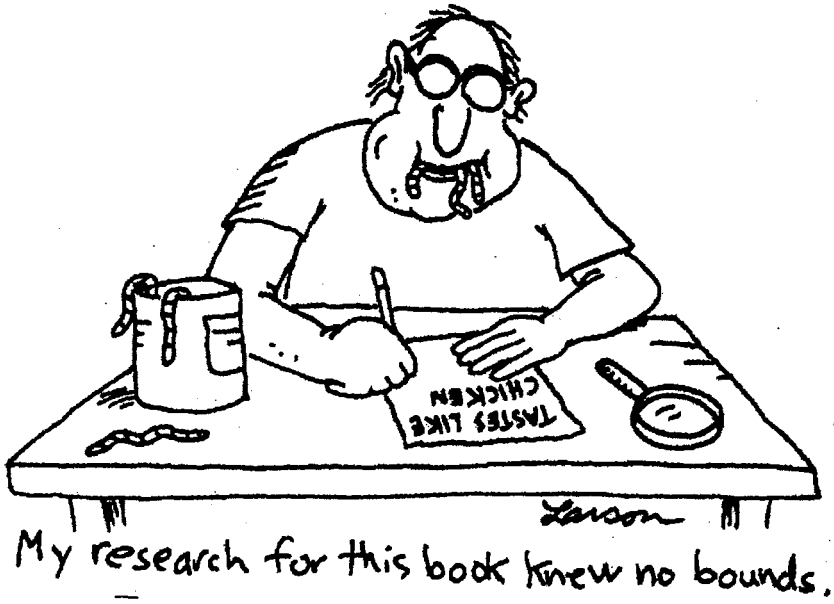

(Gary Larson, The Farside)

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CHAPTER I

INTRODUCTION

In 1988, the National Research Council (NRC) appointed a committee to assess the status of agricultural education. With the release of Understanding agriculture: New directions for education (1988), the Committee on Agricultural Education in Secondary Schools recommended the expansion of agricultural education to include education "about" agriculture in grades less than the high school level. Two reasons exist for this need to provide education about agriculture – the decrease of individuals from production agriculture and the value of agriculture as a vehicle to teach other subjects.

In the 1960s, one farmer supplied food for nearly 26 people in the United States and abroad (Agriculture Council of America, 1998). In 1994, it was reported that one agriculture producer could feed 129 other people (Agriculture Council of America, 1998). Advancements in agriculture have allowed for a more efficient production of food and fiber. Therefore, fewer people work to produce agricultural products for the world. The number of farms in the United States has declined from over 3 million in the mid-1960's to less than 2 million in 1992 (United States Department of Agriculture [USDA], 1992).

Historically, every individual had a direct connection to production agriculture (USDA, 1992). Families were charged with the necessity of growing food for their own consumption and fiber for clothing. Agricultural products were also used to barter and

trade for other goods necessary for survival. The development of mechanical technology reduced the need for large labor inputs and enabled others to pursue off-farm careers (Cochrane, 1984). The "green" revolution, which began in the 1960's, was an effort to increase and diversify crop yields world wide (Young, 1997). With fewer people needed to produce food and fiber, more and more individuals have become further removed from the farm and agriculture.

Agriculture remains one of the most important industries in the world. Although few members of society, less than two percent (Glickman, 1996), are directly involved in the production of agricultural commodities, all individuals do play some role in agriculture. That role may be through employment in a related career or simply as a consumer of agricultural products.

In 1988, the Committee on Agricultural Education in Secondary Schools, appointed by the NRC, identified agriculture as a means to teach subject areas such as science and math. Russell, McCracken, and Miller (1990) agreed that subjects such as science, social studies, mathematics, history, and reading could easily be taught through the use of agricultural topics and examples. Agriculture is a part of every individual's daily life. Incorporating topics related to agriculture into existing curricula, as suggested by the National Research Council (1988), provides the opportunity to relate subject matter directly to students' lives. Budke (1991) further identified the use of agriculture as a vehicle to teach other subjects, especially science. Teaching science through the use of agricultural concepts and examples has been suggested for all grade levels (NRC, 1988, Russell, Miller & McCracken, 1990, Trexler & Miller, 1992, Trexler, 1994, Mabie & Baker, 1996a, Mabie & Baker, 1996b, and Trexler & Suvedi, 1998).

Prior to the recommendation by the NRC (1988) to expand agricultural education to all grades, programs existed that attempted to address the need to educate all students about agriculture. One such program was Agriculture in the Classroom (AITC). AITC – a program to provide education about agriculture to children in kindergarten through twelfth grade – was initiated by the United States Department of Agriculture in 1981 (Traxler, 1990). AITC programs have traditionally operated through state departments of agriculture or state Farm Bureau organizations (Traxler, 1990). Every state has an AITC program of some kind. With programs such as AITC, an effort was and is still being made to educate students in the elementary grades about agriculture. In Oklahoma, a strong AITC program currently exists (Cox, 1994). With the development of instructional materials for grades kindergarten through six and in-service opportunities through teacher institutes, elementary students are provided with education "about" agriculture (Cox, 1994).

Educational materials that emphasize topics related to agriculture are available from commodity groups and government agencies. One way to distribute this information to teachers is through teacher development experiences.

Summer workshops are a common format for teacher development and in-service. Several states such as California, Idaho, Montana, Michigan, New Mexico, Oregon, and Oklahoma, provide teacher workshops to familiarize teachers with the use of agriculture to teach core areas (Emery & Linder, 1993, Pals & Waitley, 1996, Lombardi & Malone, 1990, Moore, 1993, Dormody & Shanks, 1992, Balschweid, Thompson, & Cole, 1998, Wilhelm, Cox, & Terry, 1998).

In Oklahoma, the AITC program is a cooperative effort of the Oklahoma Department of Agriculture, the Oklahoma State Department of Education, and the Cooperative Extension Service through Oklahoma State University (Cox, 1994).

Oklahoma AITC instructional materials are available to every public school through county cooperative extension offices (Cox, 1994). Teachers may also purchase materials directly from the Oklahoma State 4-H Office. In-service opportunities include one-day workshops offered by the State Department of Education or by the local Extension educator and the multi-day summer institute offered by the AITC faculty and staff from the Oklahoma State 4-H Office and faculty of Oklahoma State University (C. Cox, personal communication, June 1997). The summer institute is designed to introduce teachers to instructional materials, use of those materials in the classroom, and agriculture topics in general (Wilhelm, Cox, & Terry, 1998).

A significant amount of resources are put into the Oklahoma summer institutes. Those resources include financial, time and labor resources on the part of Oklahoma AITC program and faculty and staff. With such investment, accountability of the summer institutes must be considered. The NRC (1996) identified examination of an in-service program's cost effectiveness or efficiency as a suggestion for program planners to include in evaluation of a program.

Little is known about the effectiveness of efforts to facilitate the teaching about agriculture in Oklahoma. Because of this, there is a need to examine the effectiveness of Oklahoma AITC program teacher development efforts that are designed to increase the use of agriculture by teachers as a vehicle to teach core areas.

Problem Statement

What is the value of the Oklahoma AITC summer institute as a means to introduce and increase Oklahoma elementary school teachers' use of agriculture in their teaching?

Purpose

The purpose of this study was to determine whether the AITC summer institutes have influenced teachers' use of topics related to agriculture in their teaching.

Objectives

To accomplish the purpose of this study, the following objectives have been formulated.

1) Describe and determine differences in selected demographic characteristics of teachers who have been introduced to AITC.
2) Describe and determine differences in topics related to agriculture that teachers who have been introduced to AITC are teaching.
3) Describe and determine differences in use of resources related to agriculture by teachers who have been introduced to AITC.
4) Describe and determine differences in the number of lessons taught using topics and/or examples related to agriculture in core area subjects by teachers who have been introduced to AITC.

Definition of Terms

Agricultural literacy: Education about the food and fiber system including its history and current economic, social and environmental significance (NRC, 1988).

Agriculture in the Classroom: A program began in 1981 by the USDA for children in kindergarten through twelfth grade. The program was designed to expose school children to agriculture and its importance in their every day lives. State departments of agriculture or state Farm Bureau organizations typically operate AITC programs.

Core area subjects: Subjects identified as core curriculum areas by the Oklahoma Department of Education and published in the Priority Academic Student Skills (1997) for grades K – 12. Those subjects are science, mathematics, language arts, social studies, visual arts, and information skills.

Elementary grade levels: For this study, elementary grades include kindergarten through sixth.

Assumptions

The following assumptions were made in conducting this study:

1. All teachers on the mailing list had been introduced to AITC in some way.
2. The responses from all teachers reflected their actual use of topics, resources, and examples related to agriculture.

Limitations of the Study

This study had two limitations that should be considered in the interpretation of the findings. Those limitations are the use of a mailed questionnaire, which have the possibility of a low response rate, and the non-response technique used. The technique of comparing early respondents to late respondents has been criticized as not accurately comparing respondents to non-respondents of a sample.

CHAPTER II

REVIEW OF LITERATURE

This review of literature was developed to provide a rationale and foundation for this study. The purpose of this chapter is to present a review of the relevant literature for this research study. Information for this review was gathered from a variety of sources.

This review is divided into the following sections: 1) Rationale for Education About Agriculture, 2) Assessment of Agricultural Literacy, 3) Efforts To Improve Agricultural Literacy, 4) Using Agriculture As a Vehicle to Teach, 5) Perceptions of Teachers, and 6) Teacher Development Efforts.

Rationale for Education About Agriculture

The early settlers who came to Jamestown in 1607 struggled for survival. The settlers used nearly all of their time in collecting and producing food (Cochrane, 1984). They needed to be engaged in this activity to avoid starvation and to provide necessities for life. Families were faced with the need to produce food and fiber for themselves and ultimately for others as well. There was a personal stake in the agricultural process. Cochrane (1984) found that it took nearly 40 years for the settlers to develop an agricultural system that actually produced a surplus of agricultural products that could then be used as salable goods.

Since that time, fewer and fewer individuals have been personally engaged in agricultural production (Flood & Elliot, 1994). Today, less than two percent of the population is involved in the production agriculture yet one in five individuals are employed in some sector of the agriculture industry (Moore, 1993). Few people longer live on farms (Tisdale, 1991). In 1997, the number of farms declined nearly one percent from 1996 (National Agriculture Statistics Service, 1998). According to Tisdale, the result is a public that is removed from agriculture and therefore has little or no knowledge of the importance of agriculture to their lives.

In 1985, Douglass found that approximately 90% of America's population was classified as having been "non-farm" for over 30 years. This characteristic results in a lack of knowledge about agriculture for a majority of the American population (Tisdale, 1991) This lack of knowledge leaves an overwhelming number of people who are ill-equipped to make informed decisions about agriculture (Mayer & Mayer, 1974, NRC, 1988, & Tisdale, 1991). Mawby (1984) stated that "many bad decisions affecting food production can be traced to a lack of understanding about agriculture on the part of the 98 percent of our people who don't live on farms" (p. 72). Raven (1994) indicated that a consequence of the lack of agriculture knowledge is the development of public policy that can adversely affect the production of food and fiber. Interestingly enough, the tremendous advancements in agricultural technology have lead to this result.

Mawby (1985) noted that "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). Other researchers have echoed this view. In an effort to determine the status of agricultural education, the National Research Council [NRC]

(1988) established the Committee on Agricultural Education in Secondary Schools to conduct a study to address the status of agricultural education. From that study, the Committee reported findings about the state of agricultural education. Those findings were: most Americans knew little about agriculture and its direct effects on social, economic, health and environmental issues, few efforts were being made to develop agricultural literacy, no efforts were being made toward teacher education about agriculture, teachers were generally unaware of instructional materials designed to address agricultural literacy, and most people did not have an accurate perception of the scope of agriculture which included career possibilities and the association of agriculture and scientific progress (NRC, 1988).

Further, the Committee stated (NRC, 1988) "Agriculture - broadly defined - is too important a topic to be taught only to the relatively small percentage of students considering careers in agriculture and pursuing vocational agriculture studies" (p. 8). Why should agriculture be such an important topic to require that each individual should have a basic understanding of the industry? All people are affected by the agriculture industry, socially, economically, and environmentally (Pope, 1990). Law and Pepple (1990) suggested all members of society have a vested interest in agriculture.

Pope (1990) identified agricultural literacy as a "basic American need." Because Americans rely on agriculture daily for survival needs, economic needs, and environmental needs, individuals should be concerned about agriculture. Issues that affect agricultural producers and consumers are continually facing the general public (Lichte & Birkenholz, 1993). Mawby (1984) indicated that by "educating Americans in

the wise management of food supplies and related renewable resources, we can anticipate more knowledgeable decision-making about agriculture in the future" (p. 72).

Another concern lies in the efforts of groups opposed to agricultural production. Lichte and Birkenholz (1993) said that the massive amount of information presented by special interest groups through media sources, might have tainted public perceptions of agriculture. They went on to say that "recent trends indicate that people have become more interested in issues related to agriculture, food, and the conservation of our precious natural resources" (p. 15). The general public has an interest in agricultural topics but that interest has been brought about by the negative media campaigns from opposition groups (Lichte & Birkenholz, 1993).

The Committee (NRC, 1988) recommended providing education "about" agriculture. It was believed that increasing education "about" agriculture would improve the agricultural literacy of students. In setting the goal of education "about" agriculture, a definition was developed for agricultural literacy. In the report, an agricultural literate person was described as having an understanding of the food and fiber system as it related to history and current economic, social, and environmental issues (NRC, 1988). Perritt and Morton (1990) predicted that a major responsibility for agricultural educators in the 1990's would be the task to develop a positive perception of agriculture in the public sector.

What is agricultural literacy? What does an agricultural literate person know? These questions have been explored to some extent and the answers are still being debated. In the search for the definition of agricultural literacy, Russell, Miller, and McCracken (1990) asked "How much of what information is needed to achieve

agricultural literacy?" Douglass (1985) and the NRC (1988) offered definitions of agricultural literacy. Using a Delphi method, Frick, Kahler, and Miller (1990) developed the following definition:

> Agricultural literacy can be defined as possessing knowledge and understanding of our food and fiber system. An individual possessing such knowledge would be able to synthesize, analyze, and communicate information about agriculture. Basic agricultural information includes: the production of plant and animal products, the economic impact of agriculture, its societal significance, agriculture's important relationship with natural resources and the environment, the marketing of agricultural products, the processing of agricultural products, public agricultural policies, the global significance of agriculture, and the distribution of agricultural products (p.52).

This definition included 11 broad agricultural subjects that should be learned. Those subject areas included: 1) agriculture's important relationship with the environment, 2) processing of agricultural products, 3) public agricultural policies, 4) agriculture's important relationship with natural resources, 5) production of animal products, 6) societal significance of agriculture, 7) production of plant products, 8) economic impact of agriculture, 9) marketing of agricultural products, 10) distribution of agricultural products, and 11) global significance of agriculture (p. 54). From these 11

concept areas, the researchers indicated that agricultural topics and examples could be easily integrated into curricula at grade levels from kindergarten to grade 12.

The American Heritage dictionary defines "literate" as being knowledgeable or educated. In the case of agricultural literacy, it is not that individuals should possess a perfect level of understanding about agriculture but instead a minimum level of understanding (Frick & Spotanski, 1990). That minimal level of understanding about agriculture has been and will most likely continue to be difficult to define. Yet as Frick and Spotanski (1990) specified, one of the main concepts that should be addressed in developing agricultural literacy initiatives is the impact of agriculture on society. The main point is that there does need to be some level of understanding.

Assessment of Agricultural Literacy

In their landmark research, Horn and Vining (1986) determined that a low level of agricultural awareness existed among students in Kansas. This research sponsored by the Kansas Foundation of AITC members proposed this question, "how do we know where to go if we don't know where we are?" (p, 2). Horn and Vining conducted this study as an "assessment intended to provide baseline information..." (p. 6) about the status of agricultural knowledge of school children in Kansas. For this study, Horn and Vining used a population that consisted of students representative of a cross section of grade levels among schools in Kansas. Specifically, students were grouped by 5^{th} and 6^{th} , 8^{th}, and 11^{th} grades. From that population, a random sample of students were used. The questionnaire instrument included questions to assess students' knowledge of agriculture based on the six concept areas outlined in curriculum developed by the Kansas

Foundation AITC. The study found that only 30% of the sample of 2016 Kansas students could correctly answer basic agricultural questions on a questionnaire. From this, the researchers concluded "the level of knowledge about agriculture, as assessed in this study, is quite low" (p. 112). In a similar study in Oklahoma (Williams & White, 1990), students had a mean correct score of a low 32.62%. Both Kansas and Oklahoma have been considered rural states, yet both indicate a low level of agricultural knowledge (Williams & White, 1991).

Students exposed to agricultural education programs had higher knowledge and perception of agriculture than those students not exposed to agricultural education programs (Wright, Stewart, & Birkenholz, 1994). These researchers found significant differences in knowledge of agriculture and in perception of agriculture between students enrolled in an agricultural education program and students not enrolled in an agricultural education program.

In Missouri, students were affected by exposure to agriculture. Brown and Stewart (1993) found that middle school students who received agricultural instruction had a positive change in their knowledge and attitude concerning agriculture. Yet, the researchers found a weak relationship between knowledge and attitude about agriculture. This indicated to the researchers that while students may possess knowledge about agriculture they may not possess a positive attitude about agriculture. Conversely, students may possess a positive attitude about agriculture but have little understanding about it. Wright, Stewart, and Birkenholz (1994) reported a similar finding in their study of agricultural awareness of eleventh graders. According to Brown and Stewart (1993),

this finding strengthened the need for agricultural literacy to insure that individuals make informed and competent decisions regarding agriculture.

Peritt & Morton (1990) found that most children who lived in urban and suburban areas had little exposure to agriculture. In comparing rural and urban high school students, Birkenholz, Frick, Gardner, and Machtmes (1994) found that there were some differences between the two groups but overall both groups had positive perceptions about agriculture. However, the researchers found that the area of least positive perception was agricultural policy. The rural students scored higher on overall knowledge of agriculture but with an average score of only 65%. Urban students scored nearly 48% in the knowledge category. In studying 4-H member knowledge and perceptions of agriculture, Frick, Birkenholz, and Machtmes (1995a), found that while members, for the most part, were knowledgeable about agriculture and had a positive perception of agriculture further efforts were necessary to educate youth regarding the agriculture industry. The researchers found that members had positive perceptions toward areas such as natural resources and animal science but had the least positive perceptions toward agricultural policy. The researchers recommended identifying the status of agricultural literacy of groups to insure that programs that target areas of deficiency are developed.

In a study comparing adult rural and adult urban groups' knowledge and perception of agriculture, Frick, Birkenholz, and Machtmes (1995b) found that both rural and urban groups were somewhat knowledgeable about agriculture and had relatively positive perceptions of agriculture. Yet, the researchers found that respondents living on farms were more knowledgeable than the non-farm rural respondents were and non-farm

rural respondents were more knowledgeable than the urban participants were. As people are further removed from agriculture, less is known about agriculture.

To increase the number of students exposed to agriculture, it has been recommended to integrate agriculture into core area subjects (Trexler & Miller, 1992; Leising & Zilbert, 1994; Birkenholz, Frick, Gardner, & Machtmes, 1994; Frick, Birkenholz, & Machtmes, 1995b).

In 1992, Terry, Herring, and Larke found that fourth grade teachers in Texas had little agriculture knowledge as nearly three-fourths of the teachers scored less than 60% on an agriculture knowledge test. A score under 60% was classified by the researchers as an unacceptably low knowledge level about agriculture. Additionally, these teachers had a "low" perception of agriculture with 90% of the teachers defining agriculture as "farming and ranching only." The researchers concluded that teachers needed access to materials and resources as well as training programs to broaden their perceptions of agriculture and to better understand agriculture and its uses in their classrooms.

Similar results were found in Oklahoma. Cox (1994) found that in Oklahoma, fourth grade elementary teachers faced many of the same barriers as did teachers in Texas. Fourth grade elementary teachers in Oklahoma averaged 60% on an agriculture knowledge test. Cox concluded that teachers needed assistance in order to use agriculture to teach core areas. Teachers preferred a more extensive list of resource, materials, and training programs as methods to receive information they might use to integrate agricultural concepts into their present curriculum (Cox, 1994).

If one of the goals of the agricultural literacy movement is to promote a positive perception and beliefs about agriculture, exposure to agriculture topics would seem essential.

Efforts To Improve Agricultural Literacy

The Strategic Plan for Agricultural Education was originally developed in 1989. Further revisions have occurred since that time. In 1996, the updated strategic plan stated that "the agricultural education community needs to move forward together to engage the challenges and opportunities of the future..." (Strategic Plan for Agricultural Education, 1996). The plan stated as one of its goals "to update instruction in and expand programs *about* [emphasis added] agriculture, food and natural resources systems". This signified a continued dedication to agricultural literacy.

Research on agricultural literacy has become more prevalent in the past fifteen years. Although there is still discussion of what an agriculturally literate person should know, many advocates are focusing on the next challenge. That next challenge is to determine how agricultural literacy can be attained. As Frick (1996) termed it, it is not a question of "Why?" but now a question of "How?"

The NRC (1988) reported that "few systematic efforts are made to teach or otherwise develop agricultural literacy in students of any age" (p. 9). It was recommended that "all students should receive at least some systematic instruction about agriculture beginning in kindergarten or first grade" (NRC, 1988).

Agriculture education at the elementary level is not a new concept (Everett, 1985). Everett cited that in 1914 the role of agricultural education at the elementary level was the

awareness and orientation of agriculture. Ferguson and Lewis (1908) identified knowledge of the science of agriculture was desirable. They advocated that "every American should understand the elementary principles of agriculture because it is our country's most important industry" (p. 1). These authors further stated that "school is a place where many of our ideas and ideals are formed" (p. 264). For this reason, Ferguson and Lewis (1908) advocated the use of school gardens as a means to study about agriculture through observation and investigation. Snowden and Shoemake (1973) described the role of education about agriculture at the elementary level.

> To make the elementary child aware of agriculture and the many things of the natural environment is teach him the care of things; to show him in some measure that there are many things that affect his life; and to make him aware of that practically everything he enjoys comes from work by someone (p. 149).

Yet, Hall (1991) reported that three years after the NRC study was published, there was some education "about agriculture." Hall surveyed state leaders to determine the status of agricultural education in kindergarten through eighth grades in each state. According to Hall, 32 states reported some education about agriculture being conducted in these grades. However, only six had education about agriculture at each grade level.

In the recommendations from their report, the Committee on Agricultural Education in Secondary Schools (1988) identified some model programs and activities. Agriculture in the Classroom (AITC), the National FFA Organization, and 4-H were cited

by the NRC as providing opportunities to gain experience and knowledge about agriculture.

AITC programs have developed useful materials primarily for the elementary grade levels. Agricultural education has primarily existed in comprehensive high schools (NRC, 1988) with little organized agricultural education at the elementary level. The USDA began the AITC program in 1981 (Traxler, 1990). This program was an effort to educate students in kindergarten through twelfth grade about the importance of agriculture to themselves and society as a whole. AITC programs are present in every state (Moore, 1993). The state structure of the program does vary from state to state. In some states, farm bureau associations administer the program while in other states it may be administered through state departments of agriculture or affiliated with a university or cooperative extension service (Traxler, 1990). The individual state programs are associated with the National AITC program. The NRC (1988) reported that the USDA had estimated that teachers using AITC materials have reached approximately 1.2 million elementary students.

In an evaluation of the AITC program in Georgia, Herren and Oakley (1995) found that the program was effective in teaching agricultural concepts to elementary students. With urban sprawl in that state, agricultural literacy has become a concern in both rural and urban settings. The researchers concluded that the program was effective in both rural and urban settings.

In California, Emery and Linder (1993) described the mission of the California Foundation AITC program as an attempt to foster a greater public knowledge of the agricultural industry through public education activities and classroom incorporation of

agricultural information. Through summer institutes, other teacher development opportunities, and media attention, the California program hoped to enlighten students, educators and leaders in the public and private sectors about agriculture's vital role in American society (Emery & Linder, 1993).

Similar to the mission of the California Foundation of AITC, Law (1990) described the two goals of the Illinois AITC. According to Law, those goals were to provide infusion of agricultural concepts into basic subject areas of curricula and to provide in-service opportunities to teachers of the basic subject areas in order to provide the necessary information to enable them to incorporate agricultural information into the curricula.

In Oklahoma, the first AITC instructional material guides were made available in 1993 (Cox, 1994). According to Cox, the instructional materials were developed by volunteers from commodity groups and academic departments, graduate students, and staff in the Oklahoma Cooperative Extension Service 4-H Department. Three volumes of instructional materials are currently available. Those instructional guides include guides for kindergarten through second grade, third and fourth grades, and fifth and sixth grades. The instructional materials include lessons plans which provide background material and identify the Priority Academic Student Skills (revised 1997) that are met with each lesson.

Using Agriculture as a Vehicle to Teach

The early idea of using agriculture as a vehicle for education came about much earlier than the adoption of AITC by the USDA in 1981. In his historical review of agricultural education, Hillison (1997) cited that in the early 1900's the importance of agriculture as a learning tool was identified. Hillison (1997) outlined the early beginnings of agricultural education in the elementary grades. Through his extensive review of literature, Hillison found that the use of projects and hands-on activities were widely used to teach in a variety of core area subjects. These areas were taught using agricultural examples. With the interest in agricultural literacy, the concept of teaching core area subjects is being revisited.

With continued pressure to teach core areas and prepare students to score well on standardized tests, teachers do not need additional subjects to teach. In fact, few teachers would be willing to do so. As stated earlier, agriculture is a part of every individual's daily life. Incorporating topics related to agriculture into existing curricula as suggested by the NRC (1988) provides the opportunity to relate subject matter directly to students' lives. Incorporation of topics related to agriculture allows teachers to not have to teach another subject but instead simply use agriculture as a vehicle to teach core area subjects.

Russell, McCracken, and Miller (1990) agreed that subjects such as science, social studies, mathematics, history, and reading could easily be taught through the use of topics and examples related to agriculture. Budke (1991) further identified the use of agriculture as a vehicle to teach other subjects, especially science.

Agriculture can be used to teach science (NRC, 1988, Russell, McCracken & Miller, 1990, Trexler & Miller, 1992, Trexler, 1994, Mabie & Baker, 1996a, Mabie & Baker, 1996b, Trexler & Suvedi, 1998). By definition, agriculture is an applied science that combines principles of the physical, chemical, and biological sciences throughout the process and production of food and fiber. Science has long been a part of agricultural education. Teaching science through the use of agricultural concepts and examples has been suggested for all grade levels science (NRC, 1988, Russell, McCracken & Miller, 1990, Trexler & Miller, 1992, Trexler, 1994, Mabie & Baker, 1996a, Mabie & Baker, 1996b, Trexler & Suvedi, 1998). Studies have been conducted to assess differences in student learning as a result of using agriculture to teach science.

Whent and Leising (1988) and Enderlin and Osborne (1991) compared the students taught science by use of agriculture concepts and examples with those taught by the use of traditional science curricula. Both studies found that those students taught science by the use of agricultural examples performed at a level equal to, and in some cases greater than those taught by traditional methods. Connors and Elliot (1995) found similar results when comparing high school seniors in a similar situation. Mabie and Baker (1996b) found that elementary students increased their knowledge about agriculture when taught with integration approach. In this study, agriculture was used to teach science concepts. These researchers found that elementary students taught science through the use of agricultural concepts and examples gained a higher level of knowledge about agriculture while learning science concepts than a control group receiving traditional science curricula. In a related study Mabie and Baker (1996a) studied the use of agriculture-based activities in science classes. They found that in a comparison study

of fifth, sixth grade, and fifth/sixth grade combination classrooms, "participation in the experiential activities helped students in their ability to observe, communicate, compare, order and infer" science process skills (p. 5). Trexler & Suvedi (1998) found that Michigan fifth graders performed equally as well when taught science using agricultural concepts and examples as those who received traditional instruction. These studies indicate the credibility of agriculture as a vehicle for teaching core area subjects such as science.

Cox (1994) found that most teachers surveyed did not associate agriculture with science although many did indicate teaching agriculturally related topics. This indicates that teachers simply need to become educated on agriculture as a science and its importance to the scientific community as a whole. From a three-year study, Trexler and Suvedi (1996) reported that teachers possessed a more favorable perception of agriculture and science after receiving training and support throughout the three years. It is not only in science that agricultural concepts and examples can be used. In other areas, such as mathematics, language arts, visual arts, etc. agricultural concepts and examples can be used.

Perceptions of Teachers

Osborne (1992) said that efforts must be made to provide elementary teachers the opportunity to experience agricultural materials to use in their classrooms. He maintained that it was not enough to develop the materials and let teachers discover them on their own time. To promote the adoption of agricultural materials at the elementary level, Osborne promoted that those involved in agricultural education and the pursuit of

agricultural literacy needed to provide leadership to encourage and influence adoption of new curricula that promote agriculture awareness. Norris and Briers (1989) found that the best adoption indicator of curriculum change among teachers in Texas was the teachers' perception of the change process. Teachers were less willing to adopt new curricula if they felt they had little opportunity for input on their part. Teachers need to see a need and have a desire to adopt changes. Barriers to adoption must be addressed to do so.

As cited by Rudd and Hillison (1994), teachers tend to teach what they know. Less anxiety is felt and more confidence in delivery is evident when teachers do so (Rudd & Hillison, 1994). Most elementary teachers have little if any background in agriculture (Hillison, 1992). This would provide a barrier to teaching curricula using agriculture topics and examples. Humphrey, Stewart, and Linhart (1994) found that teachers' experiences directly affected what information was taught and how it was taught to students.

To change lesson planning or to introduce new material may cause anxiety for some teachers. Fullam (1982) found that "educational change depends on what teachers do and think" (p. 107). Hillison (1992) said that "if elementary teachers are confident that agricultural educators will assist them and serve as resource people when needed, they will be much more likely to incorporate information about agriculture in their instruction" (p. 12). Russell, McCracken, and Miller (1990) stated that to overcome the barrier of lack of knowledge, agricultural resource people needed to be available at schools.

Balschweid, Thompson and Cole (1998) identified time and necessary materials as the greatest barriers to implementation of agricultural materials by teachers attending summer agricultural institutes in Oregon. The researchers reported that teachers felt a lack of time necessary to implement curricular changes. They also identified access to necessary supplies, materials, and additional information as a barrier.

Lack of knowledge about agriculture is a barrier to adoption of the many materials available to integrate agricultural concepts into their current curriculum (Terry, Herring, & Larke, 1992). Teachers need assistance in this area. Parmley, May, and Hutchinson (1996) concluded that approaches that involved activities which allowed individuals to connect agriculture to their daily lives were most successful in internalizing the information. This prevented the information from simply becoming isolated pieces of information.

In 1985, Darr found that teachers' knowledge of curriculum content was a strong predictor of subjects taught in the classroom. Rudd and Hillison (1994) reported similar results among Virginia middle school teachers. Teacher knowledge of agriscience was found to predict the use of agriscience curriculum within classrooms. Kirby (1990) reported that in North Carolina, teachers believed that a lack of knowledge was a major barrier to adopting agriscience into their curriculum. In researching pre-service elementary majors, Humphrey, Stewart, and Linhardt (1994) found that, participants had a high level of knowledge and high perceptions about agriculture, but only 20% felt confident in their ability to teach using agricultural concepts. Similar to other studies regarding individual background and experiences, those students who had some

agricultural background were more confident in their ability to teach using agricultural topics (Humphrey, Stewart, & Linhardt, 1994).

Teacher Development Efforts

Providing agricultural education to students in kindergarten through twelfth grade requires teachers who are able to teach current curricula using agricultural topics. To assist teachers in developing necessary skills to teach about agriculture the NRC (1988) suggested that "in-service education or special summer programs for teachers should be offered focusing on how to use new instructional materials and take advantage of students' interest in agricultural subjects" (p. 17). From the same report, the Committee determined that "few efforts at best were being made to train teachers in the area of agriculture and that teachers were unsure about how to obtain and use materials to enhance the use of agricultural concepts into their curriculum" (p. 16).

Hillison (1992) proposed that a key to educating students about agriculture, especially at the elementary grade levels, was through the elementary teachers. He believed that elementary teachers were in a position to provide education about agriculture but needed assistance in doing so. Birkenholz, Frick, Gardner, and Machtmes (1995) recommended pre-service and in-service opportunities as the vehicle to facilitate the use of agricultural topics and examples in the classroom. This agreed with studies by Terry, Herring, Larke (1992), Cox (1994), and Connors and Elliot (1994) that found that teachers needed assistance through in-service opportunities and material and information resources to develop skills to incorporate agriculture topics into their curricula.

The NRC (1988) also recommended that teachers should be encouraged to modify lesson plans to incorporate materials that would include the use of agricultural concepts. Further, if teachers were to accomplish this goal, they would need resources and support. Hillison (1992) contended that elementary teachers tend to be more generalized in subject matter and many do not have a strong background in agriculture. This statement is supported by the studies of Terry, Herring, and Larke (1992) and Cox (1994). In the findings from both studies, it was recommended that teacher training sessions and material and resource lists be made available to teachers.

Elementary teachers are required to teach certain core area information during a school year. To ask them to add an additional subject such as agriculture, would most likely be poorly received and not adopted (NRC, 1988). As Hillison (1992) stated, elementary teachers "are not looking for new topics to teach." For this reason, the NRC (1988) and Hillison (1992) both advocated integration of material into existing curricula as a greater benefit to teachers and to the cause of agricultural literacy. Similarly, AITC programs promote the integration of agriculture into existing curricula (Law, 1990, Emery & Linder, 1993).

Several states have implemented such programs to reach teachers. In 1985, a grassroots volunteer program called Agriculture in Montana was organized (Lombardi & Malone, 1990). This program was designed as one effort in Montana to provide agricultural literacy education. Lombardi and Malone identified the purpose of this organization was "to provide a better understanding to students and teachers of the contribution of agriculture in their lives and to the state and national economies (p. 9). To provide teachers with the necessary information to offer education about agriculture,

organizers offered workshops ranging from ten hours to a two-day workshop. Both workshops were offered for credit to teachers.

In New Mexico, summer workshops have been used to teach teachers about agriculture since 1983. The New Mexico AITC program is a cooperative effort between several groups: the New Mexico Farm and Livestock Bureau, Agricultural and Extension Education Department at New Mexico State University, the New Mexico Department of Agriculture, New Mexico Cooperative Extension Service, and the New Mexico Beef Council (Dormody & Shanks, 1992). The summer workshop is designed for non-agricultural kindergarten through twelfth grade teachers. The workshops serve to promote the integration of agricultural concepts into traditional core areas such as language arts, science, mathematics, and social studies. The summer workshops are credited as contributing to the strength of the New Mexico AITC program (Dormody & Shanks, 1992).

In California, Emery, a teacher, attributed the increased interest of her students in science concepts to the use of agricultural topics learned in a California summer institute (Emery & Linder, 1993). In Idaho, Pals and Waitley (1996) credited the success of summer institute workshops for Idaho AITC to quality content and activities offered. The content and activities allowed teachers to experience first hand the potential use of ideas related to agriculture in their classrooms. Additionally, teachers were given resources and training on how to incorporate these activities and ideas into their existing curricula (Pals & Waitley, 1996).

In evaluating the Summer Agriculture Institute in Oregon, Balschweid, Thompson, and Cole (1998) found that teachers had positive perceptions of the usability

of the information provided. The researchers hypothesized that teachers used the materials from the institute to revitalize their current curriculum and to improve their teaching.

In Oklahoma, Wilhelm, Cox, and Terry (1998) found that the use of summer institute workshops was successful in meeting the needs and expectations of elementary school teachers. All teachers indicated that they were satisfied with the content, activities, and resources gained as a result of the three-day institute. Further, it was highly recommended that summer institutes continue to be conducted and should be expanded. In addition to meeting the teachers' needs, the researchers found that the teachers had broader perceptions of agriculture. Using a pre-test/post-test model, teachers who attended the 1997 summer institute developed a broader perception of agriculture as a result of the institute.

Summary

Much research has been directed toward the concept of agricultural literacy. Although efforts have been developed to increase overall understanding of agriculture by individuals, there appears to continue to be a need for further efforts in this area. More opportunities need to be available to teachers that focus on how to use agriculture to teach other core areas such as science, math, and social studies.

Individuals tend to develop perceptions and beliefs at a young age and continue to develop and change perceptions and beliefs throughout life. It would stand to reason that in order to develop informed perceptions and beliefs about agriculture, agricultural education must begin at an early age and continue through life (Lichte & Birkenholz,

1995). Since fewer and fewer individuals are personally involved in agriculture, one way to expose individuals to agriculture is through schools. This education should begin at the elementary level and continue through secondary and post-secondary levels. Programs such as AITC can play a key role in educating students about agriculture and informing their perceptions and beliefs about agriculture.

To do so, teachers need to be trained to understand agriculture and identify its uses in the classroom. Efforts in several states are being made through in-service training. Teachers need to feel confident in their ability and knowledge to teach core area subjects by using agriculture topics and examples.

CHAPTER III

METHODOLOGY

The purpose of this chapter is to describe the procedure and methodology used in conducting this study. The purpose of this study was to determine whether the Agriculture in the Classroom (AITC) summer institutes have influenced teachers' use of topics related to agriculture in their teaching. The research design used in this study was the survey research method.

Objectives

To accomplish the purpose of this study, the following objectives have been formulated.

1) Describe and determine differences in selected demographic characteristics of teachers who have been introduced to AITC.
2) Describe and determine differences in topics related to agriculture that teachers who have been introduced to AITC are teaching.
3) Describe and determine differences in use of resources related to agriculture by teachers who have been introduced to AITC.

4) Describe and determine differences in the number of lessons taught using topics and/or examples related to agriculture in core area subjects by teachers who have been introduced to AITC.

Institutional Review Board (IRB) Statement

Federal regulations and Oklahoma State University policy require review and approval of all research studies that involve human subjects before investigators can begin their research. The Oklahoma State University Office of University Research Services and the Institutional Review Board conduct this review to protect the rights and welfare of human subjects involved in biomedical and behavioral research. In compliance with the aforementioned policy, this study received the proper surveillance and was granted permission to continue as project IRB: AG-98-033. A copy of the approval form appears in appendix F of this document.

Population

The population for this study was teachers on the Oklahoma AITC newsletter mailing list. That population was divided into two groups based on the type of Oklahoma AITC training they received.

Teachers introduced to the Oklahoma AITC program are placed on the mailing list for The Corner Post. The Corner Post is the quarterly newsletter for the Oklahoma AITC program published through the Oklahoma Cooperative Extension Service. There were a variety of ways that teachers could be added to the mailing list to receive the

newsletter. The Corner Post was mailed to teachers who have attended past summer institutes, attended a mini-workshop by the Oklahoma State Department of Education, attended a one-day workshop led by 4-H personnel/Extension educator, signed up at a trade show or Oklahoma Education Association annual conference booth, or found the materials in their school, purchased instructional materials through The Corner Post newsletter.

The most intensive training opportunity available to Oklahoma elementary teachers was the AITC summer institute. The summer institutes have been a multi-day experience designed to introduce teachers to the use of agricultural topics and examples in the classroom. To this point, three AITC summer institutes have been held on the campus of Oklahoma State University in the summers of 1995, 1996, and 1997. The three-day institutes were organized and presented by Oklahoma State University faculty and staff. Oklahoma elementary teachers made application to attend the summer institute. Applications were provided to the teachers by Cooperative Extension Service educators, school administrators, and in The Corner Post newsletter.

Up to 40 teachers were selected to attend each institute. Applicants were accepted based on letters of recommendation, geographical location, grade level that they teach, and statement of their desire to attend. One goal of the institute has been to select participants from a variety of locations in Oklahoma and a variety of grade levels.

Two groups were utilized in this study. One group consisted of the 92 Oklahoma elementary teachers who had attended one of the first three summer institutes offered at Oklahoma State University. These teachers taught in grades ranging from kindergarten to

sixth. The population was identified by using rosters from the first summer institutes conducted.

The second group consisted of a random sample of teachers from the current newsletter mailing list who had not attended a summer institute. The target group was those teachers on the mailing list who taught grades kindergarten through sixth. The current mailing list consisted of 826 Oklahoma teachers. Teachers who had attended a summer institute were removed from the mailing list leaving a list of 734 eligible teachers. From this list, a sample of 250 teachers, per the recommendation of Krejcie and Morgan (1970), was selected. Random sampling procedures were used.

Instrument Development

A mailed questionnaire was used to collect data for this comparison study. The questionnaire was designed by the researcher from research instruments used in similar studies (Terry, Herring, & Larke, 1992, Cox, 1994). The questionnaire consisted of four parts which included demographic information, use of topics and resources related to agriculture, number of lessons using a topic related to agriculture in core area subjects, and teacher development experiences.

To establish content and face validity, faculty and staff of the department of Agricultural Education, Communication, and 4-H Youth Development at Oklahoma State University reviewed the instrument. These reviewers examined the instrument based on appropriateness to measure the objectives. Additionally, a pilot study was used. Seven Oklahoma elementary educators not included in the sample piloted by the questionnaire. Based on the recommendations of the teachers in the pilot study and those of the faculty

and staff at Oklahoma State University, some questions were re-written and/or re-designed for clarity.

Reliability was established from portions of questionnaires used on past similar studies. Part II of the questionnaire, used in the study by Terry, Herring, and Larke (1992), had a Cronbach's alpha reliability of .89. Part III of the questionnaire had a Cronbach's alpha reliability of .73 that was calculated from this study

Demographic Information

Part I of the questionnaire included questions designed to ascertain demographic information about each group of elementary teachers. Fourteen forced-answered questions were offered. Information was to be collected regarding the following: age, gender, teaching experience, classification of community in which they taught, classification of community in which they grew up, membership in FFA and/or 4-H organizations, enrollment in agriculture courses, highest degree earned, agriculture as a major source of income, and agricultural organizations of which they were involved.

Use of Topics and Resources Related to Agriculture

Part II of the questionnaire addressed the use of topics related to agriculture that elementary teachers used in their in teaching. As in studies by Terry, Herring, and Larke (1992) and Cox (1994), teachers were asked to identify, from a given list, those topics related to agriculture taught in their classrooms. Teachers were asked to check "Yes" or "No" to indicate use of a topic.

Again, as in studies by Terry, Herring, and Larke (1992) and Cox (1994), teachers were asked to identify, from a list, resources they used to teach about topics related to agriculture in their classrooms.

In both areas, the option was given at the bottom of each list for participants to indicate "other" topics or resources that were used but not listed.

Number of Lessons Using Agricultural Topics in Core Areas

Part III was used to determine the number of lessons that teachers used an agricultural topic in the core areas. Those core areas were: math, science, reading, language arts, visual arts, social studies, and information skills. These core areas were addressed in the Oklahoma Priority Academic Student Skills (PASS) manual prepared by the Oklahoma Department of Education (revised 1997). This manual identified general skills that students should be able to perform in each core area subjects at different grade levels. In this section, PASS skills were listed for each core area. Teachers were asked to give a number response estimating the number of lessons that utilized an agricultural topic in each core area.

In the second section of Part III, space was provided for teachers to list ways topics or examples related to agriculture were used in teaching the various core area subjects. These examples will not be analyzed or reported in this study, but will be analyzed and reported at a later date.

Teacher Development Experiences

Part VI solicited responses concerning the means by which teachers had become familiar with Oklahoma AITC materials. Teachers were asked to indicate, from a list, the how they were introduced to Oklahoma AITC materials. Additionally, a general

comment section was provided for open-ended responses. Comments can be found in Appendix E These comments will not be analyzed or reported in this study, but will be analyzed and reported at a later date.

Collection of Data

A questionnaire packet was mailed to each participant. Each packet contained a cover letter explaining the purpose of the study, a copy of the questionnaire and a self-addressed prepaid return envelope. Two weeks after the original mailing, a follow-up post card was mailed to those teachers who had not yet responded. A third reminder consisting of a second cover letter, a second copy of the questionnaire, and self-addressed prepaid return envelope was mailed two weeks following the post card reminders. A total of three mailing attempts were made to ensure adequate response.

The questionnaires were coded to identify those who had or had not returned the questionnaire. For confidentiality purposes, only the researcher of the study had access to the identification codes. Actual questionnaires did not contain the names of participants. Participants were offered the opportunity to receive a summary of the findings of this study. The cover letters, questionnaire, reminder card, and follow up correspondence can be found in Appendices A, B, C, and D, respectively.

Non-response

Non-response was taken into consideration in this study. Early respondents were compared to late respondents to determine any differences between respondents and non-

respondents. Research has been cited indicating that late respondents are similar to non-respondents (Barrick, Miller, Van Tilburg, Warmbrod, 1985). Early respondents were categorized as those who responded to the first mailing. Late respondents were those who responded to the third mailing. Early respondents were compared to late respondents for differences in demographic characteristics. As no significant differences were found, the sample included both early and late respondents. For this study, the findings are cautiously inferred to the larger population.

Data Analysis

Data were coded and entered into Microsoft Excel by the researcher. Data were analyzed and reported in aggregate form only. In evaluating demographic information, descriptive statistics were used. Descriptive statistics were also used in analyzing group means and frequencies.

The participants were classified by training experiences they had received, namely whether or not they had attended a summer institute. Chi-square procedure was used to analyze questions that required a categorical response of yes or no in order to look at differences between the two population groups. On questions that asked for a number response, analysis of variance (ANOVA) was used to compare differences between the two population groups. Data was analyzed using the data analysis tools of Stat View™ and Microsoft Excel computer programs.

CHAPTER IV

FINDINGS

The purpose of this study was to determine whether the Agriculture in the Classroom (AITC) summer institutes have influenced teachers' use of topics related to agriculture in their teaching.

Objectives

To accomplish the purpose of this study, the following objectives have been formulated.

1) Describe and determine differences in selected demographic characteristics of teachers who have been introduced to AITC.
2) Describe and determine differences in topics related to agriculture that teachers who have been introduced to AITC are teaching.
3) Describe and determine differences in use of resources related to agriculture by teachers who have been introduced to AITC.
4) Describe and determine differences in the number of lessons taught using topics and/or examples related to agriculture in core area subjects by teachers who have been introduced to AITC.

This chapter was to describe and analyze the collected data as it relates to the objectives. The findings are reported by the research objectives.

Respondents were divided into two groups based on their Agriculture in the Classroom training experience. Those groups were 1) Oklahoma elementary teachers who had attended one of the first three AITC summer institutes offered at Oklahoma State University and 2) a random sample of teachers from the current AITC newsletter mailing list who had not attended a summer institute. AITC summer institutes are the most intensive training opportunity available to Oklahoma elementary teachers. The past summer institutes have been a multi-day experience designed to introduce teachers to the use of agricultural topics and examples in the classroom. The first three AITC summer institutes have been held on the campus of Oklahoma State University in the summers of 1995, 1996, and 1997. Throughout the remainder of this study, teachers in the first group were referred to as "institute teachers" and the teachers in the second group were referred to as "non-institute teachers".

Of the 92 institute teachers, 55 questionnaires were returned. From the 55 respondents, three were deemed not useable as those three teachers were no longer teaching an elementary classroom. The response rate of institute teachers was nearly 60%.

Of the 250 questionnaires mailed to the random sample of non-institute teachers, 138 questionnaires were returned. Of the 138 questionnaires, 45 were deemed not useable because those respondents were no longer teaching in an elementary classroom. The response rate of non-institute teachers was 55.20%. Table I shows these data.

TABLE I

RESPONSE RATE INFORMATION

Group	N	Number of respondents	Response rate (%)
Institute	92	55	59.98
Non-Institute	250	138	55.20

Findings Related to Objective One

Objective One was to describe and determine differences in selected demographic characteristics of teachers who have been introduced to AITC. Demographic information was reported on each group separately. Comparisons were then made between the two groups. These data are summarized in Table II and III.

Institute teacher respondents were all female and had a mean age of nearly 44 years. They had nearly 15 years teaching experience and most reported their highest degree to be a bachelors degree (64.71%). Grade levels taught ranged from pre-kindergarten to sixth grade. Eighty percent of institute teachers taught in rural communities and small towns. Very few of the respondents, fewer than 4%, had been a member of the FFA. Over half, 51.00%, had been a member of 4-H with a mean length of membership of slightly more than 2 years. Few of the respondents had ever taken an agriculture course in either high school and/or college. Of the respondents, 60.00% grew up on farms or ranches or in small towns. Nearly half of the respondents indicated agricultural production or an agricultural business had been the major source of income for them and/or their family. Twenty-one of the respondents (41.18%) also indicated

involvement in organizations such as 4-H leader and/or parent, FFA booster organizations, Farm Bureau, and/or farmer's cooperatives.

Non-institute respondents were predominantly female (95.65%) with a mean age of nearly 43 years. They had nearly 16 years teaching experience and had reported a bachelors degree (59.78%) as their highest degree. Grade levels taught ranged from pre-kindergarten to sixth grade. Nearly 40% of non-institute teachers taught in rural communities, followed by small towns (23.91%). Nearly ten percent of the respondents had been a member of FFA. Less than half of the respondents had been a member of 4-H with a mean of just more than 2 years of membership. A limited number of the respondents (18.48%) had ever taken an agriculture course in either high school and/or college. The respondents indicated a variety of types of communities in which they grew up. Nearly 27% of the respondents grew up on farms or ranches, followed by large towns (21.35%) and small towns (19.10%). Nearly 40% of the respondents indicated that agricultural production or an agricultural business had been the major source of income for them and/or their family. Nineteen of the respondents (20.65%) also indicated involvement in organizations such as 4-H leader and/or parent, 4-H Foundation, FFA booster organizations, FFA Alumni, Young Farmers, Farm Bureau, and/or farmer's cooperatives.

TABLE II

AGE, GENDER, AND TEACHING EXPERIENCE OF INSTITUTE AND NON-INSITUTE TEACHERS

Characteristic	Institute teachers			Non-institute teachers			P(t)
	N	M	%	N	M	%	
Years of teaching experience	51	14.76		92	15.60		.5921
Age	51	43.80		87	42.98		.6204
Gender							.1310
Female	51		100.00	88	95.65		
Male	0		0.00	4	4.35		

TABLE III

OTHER DEMOGRAPHIC CHARACTERISTICS OF INSTITUTE AND NON-INSTITUTE TEACHERS

Characteristic	Institute teachers		Non-institute teachers		χ^2 p-value
	N	%	N	%	
Member of FFA	2	3.92	9	9.78	.2077
Member of 4-H	26	51.00	43	46.74	.6268
Took agriculture course(s) in high school	3	5.88	11	11.96	.2417
Took agriculture course(s) in college	3	5.88	6	6.52	.8801

TABLE III (Continued)

Characteristic	Institute teachers		Non-institute teachers		χ^2 p-value
	N	%	N	%	
Community in which school is located:					
Rural (<2000)	20	40.00	34	36.96	.8874
Small town (2001 to 15000)[a]	20	40.00	22	23.91	.0448*
Large town (15001 to 45000)	3	6.00	13	14.13	.0924
City (45001 to 75000)	3	6.00	10	10.87	.3365
Large city (>75000)	4	8.00	13	14.13	.2825
Community in which respondent grew up:					
On a farm/ranch	18	36.00	24	26.97	.2469
Rural (<2000)	9	18.00	17	17.10	.6367
Small town (2001 to 15000)	12	24.00	19	21.35	.7185
Large town (15001 to 45000)	4	8.00	14	15.73	.1927
City (45001 to 75000)	3	6.00	9	10.11	.4074
Large city (>75000)	4	8.00	6	6.74	.7829
Level of education					.5621
Bachelors	33	64.71	55	59.78	
Masters	18	35.29	37	40.22	
Doctorate	0	0.00	0	0.00	
Agriculture production/business is a major source of income for respondent and/or family	25	49.02	36	39.14	.2521
Involvement in agricultural organizations[b]	21	41.18	19	20.65	.0088*

*significant at α=.05

In comparing the demographic characteristics of institute and non-institute teachers, significant differences were found in teachers teaching in a small town community, and affiliation with agricultural organizations. More institute teachers taught

in small towns and were involved in agricultural organizations than were the non-institute teachers.

Findings Related to Objective Two

Objective Two was to describe and determine differences in topics related to agriculture that teachers who have been introduced to AITC are teaching. Table IV and V contain the summaries of data obtained from institute teachers and non-institute teachers, respectively. Comparisons were then made between the two teacher groups.

Respondents were asked to indicate from a list of topics related to agriculture those topics that they taught. A majority of institute teachers indicated that 13 of the 14 topics listed were taught. The most commonly taught topic by this group was farm animals (92.16%). Six other topics were taught by over 80% of the respondents. Those topics were plant growth and development (90.20%), nutrition and proper food selection (88.24%), insects (86.27%), sources of food (84.31%), wildlife (84.31%), and gardening (82.35%).

TABLE IV

AGRICULTURAL TOPICS TAUGHT BY INSTITUTE TEACHERS

Topic	N	Percent
Farm Animals	47	92.16
Plant growth and development	46	90.20
Nutrition and proper food selection	45	88.24
Insects	44	86.27
Sources of food	43	84.31
Wildlife	43	84.31
Gardening (floral and/or vegetable)	42	82.35
Ecology and environmental management	39	76.47
Role of agriculture in our economy	33	64.71
Agriculture in our history	30	58.82
Small animal and pet care	29	56.86
Sources of fiber (for clothing, building, etc.)	28	54.90
Agricultural careers	28	54.90
Composition of soils	18	35.29

Non-institute teachers were asked to indicate topics related to agriculture taught in their classrooms from the same list of topics as institute teachers. More than half of the non-institute teachers indicated they taught 9 of the 14 topics listed. The five most commonly taught topics were nutrition and proper food selection (83.87%), sources of food (80.65%), plant growth and development (78.50%), wildlife (75.27%), and insects (73.12). Some respondents listed additional topics in the "other" area. These topics were animal growth and development and hatching chicken eggs. These data are summarized in Table V.

TABLE V

AGRICULTURAL TOPICS TAUGHT BY NON-INSTITUTE TEACHERS

Topic	N	Percent
Nutrition and proper food selection	78	83.87
Sources of food	75	80.65
Plant growth and development	73	78.50
Wildlife	70	75.27
Insects	68	73.12
Farm Animals	61	65.59
Ecology and environmental management	60	64.52
Gardening (floral and/or vegetable)	53	56.99
Role of agriculture in our economy	52	55.91
Agriculture in our history	46	49.46
Sources of fiber (for clothing, building, etc.)	45	48.39
Small animal and pet care	41	44.09
Agricultural careers	39	41.94
Composition of soils	20	21.51

Teachers in both groups were asked to indicate the topics related to agriculture used in teaching from a list of 14 topics. Chi-square analysis was used to compare groups. Of the 14 topics, 2 were found to have statistical differences between institute teachers and non-institute teachers. Those topics were farm animals and gardening - floral and/or vegetable. In both cases, institute teachers used each topic significantly more than did the non-institute teachers. Table VI summarizes the comparison of use of topics related to agriculture.

TABLE VI

COMPARISON OF USE OF TOPICS RELATED TO AGRICULTURE BETWEEN INSTITUTE AND NON-INSTITUTE TEACHERS

Topic	df	Chi square	Chi square p-value
Farm Animals	1	12.397	.0004*
Gardening (floral and/or vegetable)	1	9.439	.0021*
Insects	1	3.298	.0693
Composition of soils	1	3.224	.0726
Plant growth and development	1	3.143	.0762
Agricultural careers	1	2.226	.1357
Ecology and environmental management	1	2.191	.1388
Small animal and pet care	1	2.152	.1423
Wildlife	1	1.595	.2066
Agriculture in our history	1	1.158	.2819
Role of agriculture in our economy	1	1.053	.3049
Sources of fiber (for clothing, building, etc.)	1	.5590	.4545
Nutrition and proper food selection	1	.5040	.4779
Sources of food	1	.3000	.5841

*Significant at α=.05

Findings Related to Objective Three

Objective Three was to describe and determine differences in use of resources related to agriculture by teachers who have been introduced to AITC. Table VII and VIII were developed to report frequency of use of resources related to agriculture by institute and non-institute teachers, respectively.

Institute teachers were asked to indicate sources of teaching materials related to agriculture used in the classroom from a list of 20 sources. Of the 20 sources, 7 sources were used by over half of the respondents. Agriculture in the Classroom materials were used by 100% of the institute teachers. Other commonly used sources of teaching materials related to agriculture were chapters in text books (66.67%), the Cooperative

Extension Service (64.71%), dairy associations or groups (62.75%), United State Department of Agriculture (62.75%), articles about agriculture in newspapers and/or magazines (60.78%), and Project Wild (60.78%).

Non-institute teachers were asked to indicate sources of teaching materials related to agriculture used in the classroom from the same list of 20 sources. Of the 20 listed, 5 were used by more than half of the respondents. Agriculture in the Classroom materials were used by slightly more than 80% of the non-institute teachers. Other common sources of teaching materials related to agriculture were chapters in text books (64.52%), Project Wild (62.37%), articles about agriculture in newspaper and/or magazines (50.54%), and the Cooperative Extension Service (50.54%).

TABLE VII

RE SOURCES RELATED TO AGRICULTURE
USED BY INSTITUTE TEACHERS

Source	N	Percent
Agriculture in the Classroom	51	100.00
Chapters related to agriculture in text books	34	66.67
Cooperative Extension Service	33	64.71
Dairy associations or groups	32	62.75
United States Department of Agriculture	32	62.75
Articles about agriculture in newspaper and/or magazines	31	60.78
Project Wild	31	60.78
4-H school enrichment programs	25	49.02
Environmental associations or groups	22	43.14
Animal associations or groups	20	39.22
Project Learning Tree	19	37.25
Flower and plant associations or groups	16	31.37
Meat associations or groups	12	23.53
Materials from local high school agriculture program	8	15.69
Seed and grain associations or groups	8	15.69
National FFA Organization	7	13.73
Farm Bureau	5	9.80
Food for America	5	9.80
Vegetable associations or groups	5	9.80
Fruit associations or groups	3	5.88

Comparisons were made between institute teachers and non-institute teachers and their use of resources related to agriculture. Chi-square analysis was used to compare groups. Significant differences were found in use of 4-H school enrichment programs, Agriculture in the Classroom materials, and United States Department of Agriculture materials. Institute teachers used these three sources significantly more than did the non-institute teachers. Table IX reports the findings for all sources.

TABLE VIII

RESOURCES RELATED TO AGRICULTURE USED BY NON-INSTITUTE TEACHERS

Sources	N	Percent
Agriculture in the Classroom	77	82.80
Chapters related to agriculture in text books	60	64.52
Project Wild	58	62.37
Articles about agriculture in newspaper and/or magazines	47	50.54
Cooperative Extension Service	47	50.54
Dairy associations or groups	43	46.24
Environmental associations or groups	39	41.94
United States Department of Agriculture	39	41.94
Animal associations or groups	32	34.41
4-H school enrichment programs	25	26.88
Flower and plant associations or groups	24	25.81
Project Learning Tree	23	24.73
Materials from local high school agriculture program	18	19.36
Meat associations or groups	13	13.98
Seed and grain associations or groups	13	13.98
Fruit associations or groups	10	10.75
Food for America	9	9.78
Farm Bureau	8	8.60
Vegetable associations or groups	8	8.60
National FFA Organization	7	7.53

TABLE IX

COMPARISON OF USE OF RESOURCES RELATED TO AGRICULTURE BETWEEN INSTITUTE AND NON-INSTITUTE TEACHERS

Sources	df	Chi square	Chi square p value
Agriculture in the Classroom	1	9.871	.0017*
4-H school enrichment programs	1	7.122	.0076*
United States Department of Agriculture	1	5.437	.0197*
Dairy associations or groups	1	3.597	.0579
Cooperative Extension Service	1	2.678	.1018
Project Learning Tree	1	2.501	.1138
Meat associations or groups	1	2.094	.1479
National FFA Organization	1	1.442	.2298
Articles about agriculture in newspaper and/or magazines	1	1.393	.2379
Fruit associations or groups	1	.9510	.3294
Flower and plant associations or groups	1	.5090	.4757
Animal associations or groups	1	.3300	.5657
Materials from local high school agriculture program	1	.3000	.5841
Seed and grain associations or groups	1	.0770	.7812
Chapters related to agriculture in text books	1	.0670	.7954
Vegetable associations or groups	1	.0580	.8098
Farm Bureau	1	.0580	.8098
Project Wild	1	.0350	.8518
Environmental associations or groups	1	.0190	.8890
Food for America	1	.0010	.9967

*Significant at α=.05

Findings Related to Objective Four

Objective Four was to describe and determine differences in the number of lessons taught using topics and/or examples related to agriculture in core area subjects by teachers who have been introduced to AITC. Core area subjects were outlined in the Oklahoma Priority Academic Student Skills (PASS) manual prepared by the Oklahoma Department of Education (revised 1997). Institute teachers indicated that science was the core area in which the most topics and/or examples related to agriculture were used

followed by math, language arts, social studies, information skills, and visual arts, respectively. Non-institute teachers reported that the most lessons they taught using a topic and/or example related to agriculture was in the core area of language arts followed by social studies, information skills, math, visual arts, and science, respectively.

Data on number of lessons taught using a topic and/or example related to agriculture in different core areas were analyzed by using analysis of variance. Analysis included data from all respondents for each group regardless of grade level taught. Analysis of variance showed significant differences in two of the six core areas. Those two core areas were language arts (p=.0350) and information skills (p=.0407). In both cases, institute teachers taught more lessons using an agricultural topic and/or examples in those core areas. Table X summarizes these data.

TABLE X

NUMBER OF LESSONS USING AN AGRICULTURAL TOPIC AND/OR EXAMPLE IN CORE AREA SUBJECTS BY INSTITUTE AND NON-INSTITUTE TEACHERS

Core Area	Institute Teachers	Non-institute Teachers	ANOVA p-value
	Mean # of lessons	Mean # of lessons	
Science	81.85	63.94	.3479
Math	76.42	70.35	.8487
Language Arts	64.98	24.33	.0350*
Social Studies	36.21	26.16	.3018
Information Skills	24.40	8.57	.0407*
Visual Arts	22.56	10.39	.1673

*significant at α=.05

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

The purpose of this chapter was to present a review and summary of this study. Conclusions and recommendations were based on an analysis and interpretation of the data presented.

Problem Statement

The problem was to determine the value of the Oklahoma Agriculture in the Classroom (AITC) summer institute as a means to introduce and increase Oklahoma elementary school teachers' use of agriculture in their teaching.

Purpose of the Study

The purpose of this study was to determine whether the AITC summer institutes have influenced teachers' use of topics related to agriculture in their teaching.

To accomplish the purpose of this study, the following objectives must be met:

1) Describe and determine differences in selected demographic characteristics of teachers who have been introduced to AITC.
2) Describe and determine differences in topics related to agriculture that teachers who have been introduced to AITC are teaching.

3) Describe and determine differences in use of resources related to agriculture by teachers who have been introduced to AITC.

4) Describe and determine differences in the number of lessons taught using topics and/or examples related to agriculture in core area subjects by teachers who have been introduced to AITC.

Summary

All people are affected by the agriculture industry, from the food we eat, the clothes we wear, the relationship of agriculture and the environment, policies that affect the production of food products, land uses, and employment opportunities (Pope, 1990). Mawby (1984) indicated that by "educating Americans in the wise management of food supplies and related renewable resources, we can anticipate more knowledgeable decision-making about agriculture in the future" (p. 72).

A general lack of knowledge about agriculture by the general public has been documented (Horn & Vining, 1986, Williams & White, 1990, Birkenholz, Frick, Gardner, and Machtmes, 1994, Terry, Herring, & Larke, 1992, Cox, 1994, Wright, Stewart, & Birkenholz, 1994, Frick, Birkenholz, and Machtmes, 1995a, Frick, Birkenholz, and Machtmes 1995b). Because of the importance of agriculture, the Committee on Agricultural Education for the National Research Council recommended providing education "about" agriculture to improve the agricultural literacy of students (NRC, 1988). One effort directed at increasing education "about" agriculture is AITC (Traxler, 1991).

To familiarize teachers with the use of agriculture as a vehicle to teach core area subjects and increase education about agriculture, teacher development opportunities have been developed. Several states such as California, Idaho, Montana, Michigan, New Mexico, Oregon, and Oklahoma provide teacher workshops to familiarize teachers with the use of agriculture to teach core areas (Emery & Linder, 1993, Pals & Waitley, 1996, Lombardi & Malone, 1990, Moore, 1993, Dormody & Shanks, 1992, Balschweid, Thompson, & Cole, 1998, Wilhelm, Cox, & Terry, 1998). In these states, the workshops received positive acclaim by the teachers who attended.

In Oklahoma, AITC instructional materials and teacher institutes are available. Little is known about the effectiveness of efforts to facilitate the teaching about agriculture in Oklahoma. Because of this, there is a need to examine the effectiveness of Oklahoma AITC program teacher development efforts that are designed to increase the use of agriculture by teachers as a vehicle to teach core areas.

The population used in this study was all teachers introduced to the Oklahoma AITC program. That population was divided into two groups based on the type of teacher development experience received.

One group consisted of the 92 Oklahoma elementary teachers who had attended one of the first three summer institutes offered at Oklahoma State University. These teachers taught in grades ranging from kindergarten to sixth. The population was identified by using rosters from the first summer institutes conducted. The second group consisted of teachers who had been introduced to Oklahoma AITC but had not attended a summer institute. The target group was those teachers on the mailing list for the

Oklahoma Agriculture in the Classroom newsletter, The Corner Post, who taught grades kindergarten through sixth.

The current mailing list consisted of 826 Oklahoma teachers. Teachers who had attended a summer institute were removed from the mailing list leaving a list of 734 eligible teachers. From this list, a sample of 250 teachers was selected. Random sampling procedures were used. A four-part, mailed questionnaire was used to collect data. An initial mailing and two follow-up attempts were made. Data were analyzed using the data analysis tools of Stat View™ software and Microsoft Excel. Chi-square procedure was used to analyze questions that required a categorical response of yes or no in order to look at differences between the two population groups. On questions that called for number responses, analysis of variance (ANOVA) was used to compare differences between the two population groups.

These findings should be considered in light of the limitations of this study. Those limitations are the use of a mailed questionnaire and the non-response technique used. The findings are cautiously inferred to the larger population of this study.

Major Findings of the Study

Findings Related to Objective One

Objective One was to describe and determine differences in selected demographic characteristics of teachers who have been introduced to AITC.

1. Institute teacher respondents were female, nearly 44 years of age, and had nearly 15 years of teaching experience. Eighty percent of the teachers taught in communities classified as rural and small towns.

2. More than 50% percent of institute teachers had been a member either 4-H or FFA programs. Slightly more than 11% had ever taken an agriculture course in either high school and/or college. Nearly half of these teachers indicated that agricultural production or an agricultural business had been a major source of income for them and/or their family. Slightly more than 40% of these teachers indicated involvement with agricultural organizations.

3. Nearly 96% of the non-institute teachers were female. They were approximately 43 years of age with an average of nearly 16 years teaching experience. These teachers taught at schools located in a wider range of sizes of communities with 85% teaching in communities classified as rural, small towns, and large towns.

4. More than 50% of non-institute teachers had been a member of either 4-H or FFA programs. Slightly more than 18% had ever taken an agriculture course in either high school and/or college. Less than 40% of non-institute teachers reported that agricultural production or an agricultural business had been a major source of income for them and/or their family. Slightly more than 20% of these teachers reported involvement with agricultural organizations.

5. Compared to non-institute teachers, institute teachers are significantly different in type of community where they taught and involvement with agricultural organizations. Significantly more institute teachers taught in small towns and were more significantly involved with agricultural organizations than non-institute teachers.

Findings Related to Objective Two

Objective Two was to describe and determine differences in topics related to agriculture that teachers who have been introduced to AITC are teaching.

5. More than half of the institute teachers indicated teaching 13 of the 14 topics related to agriculture listed. More than 80% of these teachers indicated they taught topics of farm animals, plant growth and development, nutrition and proper food selection, insects, sources of food, wildlife, and gardening.

6. More than half of the non-institute teachers indicated teaching 9 of the 14 topics related to agriculture listed. Topics of nutrition and proper food selection and sources of food were taught by more than 80% of non-institute teachers.

7. Significantly more institute teachers taught the topics of farm animals and gardening than did non-institute teachers.

Findings Related to Objective Three

Objective Three was to describe and determine differences in use of resources related to agriculture by teachers who have been introduced to AITC.

8. Institute teachers used 4-H school enrichment programs, Agriculture in the Classroom materials, and United States Department of Agriculture materials more significantly than did non-institute teachers.

9. From a list of 20 agricultural resources, more than half of the institute teachers indicated they used 7 of the sources while over half of the non-institute teachers reported using 5 sources.

10. One hundred percent of the institute teachers used Oklahoma Agriculture in the Classroom materials in their teaching while slightly more than 80% of non-institute teachers use those materials.

Findings Related to Objective Four

Objective Four was to describe and determine differences in the number of lessons taught using topics and/or examples related to agriculture in core area subjects by teachers who have been introduced to AITC.

11. In the core areas of language art and information skills, institute teachers indicated significantly more use of agricultural topic and/or examples than did non-institute teachers.

Conclusions

Based on the findings of this study the following conclusions were made:

1. Demographic characteristics of institute and non-institute teachers were quite similar.

2. Teachers who attended the summer institute tend to have a vested interest in agriculture. Nationally, 20% of people are involved in the agriculture industry (Glickman, 1996). Based on the findings of this study, nearly 40% of non-institute teachers and nearly 50% of institute teachers indicated that agriculture was a major source of income.

3. Teachers who have attended an Oklahoma AITC summer institute teach more topics related to agriculture than do their counterparts who have not attended an AITC summer institute.

4. Teachers who have attended an Oklahoma AITC summer institute use a greater variety of resources to teach about agriculture than do their counterparts who have not attended an AITC summer institute.

5. Based on teachers' responses, AITC materials are popular resources used by both institute and non-institute teachers although used significantly more by institute teachers.

6. Institute teachers tend to use topics related to agriculture in teaching the core areas of language arts and information skills than do their counterparts who have not attended an AITC summer institute.

7. The Oklahoma summer institute is beneficial in helping teachers use concepts related to agriculture in their teaching.

Recommendations

The following recommendations were made based on the findings of this study and the conclusions that were reached:

1. It is recommended that Oklahoma AITC coordinators increase efforts to attract a diverse group of teachers to the summer institute, specifically, more male teachers, more teachers who teach in urban areas, and more teachers without a vested interest in agriculture.

2. Institute teachers use more topics and resources related to agriculture to teach core areas subjects. Therefore, it is recommended that summer institutes continue to be conducted in order to introduce more teachers to the use of agriculture as a vehicle to teach core area subjects.

3. Since only 40 teachers per year are able to receive the intensive summer institute experience, it is recommended that additional methods of intensive teacher development should be provided to reach a greater number of teachers.

4. Longitudinal research should be conducted on teachers who have taken part in institutes to determine how they are using concepts related to agriculture in their teaching.

5. Research should be conducted on students of institute participants to assess their awareness and perceptions about agriculture.

6. A study similar to this should be conducted to compare teachers who have been introduced to Oklahoma AITC to those who have not.

7. The focus of the Oklahoma AITC has been on professional development of experienced teachers. As recommended by other researchers (Humphrey, Stewart, &

Linhardt, 1994), pre-service opportunities should be provided to prepare future teachers with necessary skills to use agriculture as a vehicle to teach core subjects and alleviate the barrier of lack of confidence in the use of agriculture.

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APPENDICES

APPENDIX A

COVER LETTERS

Oklahoma Cooperative Extension Service
Division of Agricultural Sciences and Natural Resources
Oklahoma State University

Department of Agricultural Education, Communications, and 4-H Youth Development
205 Poultry Science • Stillwater, Oklahoma 74078-6063 • (405) 744-5390 • Fax (405) 744-6522

March 9, 1998

«Fname» «Lname»
«Address2»
«city», «state» «zip»

Dear «Fname»,

We are contacting you today seeking your participation in a study regarding the Oklahoma Ag in the Classroom program. As an elementary teacher, you have been selected as a participant in this study. Whether you are familiar with the Ag in the Classroom program or not, your participation is important. *It is important to have input from all individuals regardless of their experience with Ag in the Classroom.* As Ag in the Classroom is a program important to education, we need your input to assist us in further improvement of the program. **If you are not currently teaching at the elementary level, please note that on the top of the questionnaire and return it uncompleted.**

The enclosed questionnaire includes questions regarding the use of agricultural topics in the classroom, how those topics are used, use of agricultural teaching resources, and any training sessions you may have attended about Ag in the Classroom. It will take approximately 10 minutes to complete the questionnaire. Simply read the directions at the beginning of the questionnaire. You will not be personally identified by your questionnaire. All information obtained from this study will only be reported as aggregate data, not individually.

We appreciate your willingness to participate in this study. Please return your completed questionnaire in the self-addressed envelope provided by **March 31st**. Once again, thank you for your time and participation.

Sincerely,

Anissa Wilhelm
Extension Graduate Assistant
Oklahoma Cooperative Extension Service
4-H Youth Development

Charles Cox
State Extension Specialist and
Program Leader
4-H Youth Development

Oklahoma Cooperative Extension Service
Division of Agricultural Sciences and Natural Resources
Oklahoma State University

Department of Agricultural Education, Communications, and 4-H Youth Development
205 Poultry Science • Stillwater, Oklahoma 74078-6063 • (405) 744-5390 • Fax (405) 744-6522

March 9, 1998

«Fname» «Lname»
«Address2»
«city», «st» «zip»

Dear «Fname»,

We are contacting you today seeking your participation in a study regarding the Oklahoma Ag in the Classroom program As a past participant in a Ag in the Classroom Summer Institute, you have been selected as a participant in this study. Ag in the Classroom is a program important to education. Therefore, we need your input to assist us in further improvement of the program.

The enclosed questionnaire includes questions about the use of agricultural topics, how those topics are used, and use of agricultural teaching resources. It will take approximately 10 minutes to complete the questionnaire. Simply read the directions at the beginning of the questionnaire. You will not be personally identified by your questionnaire. All information obtained from this study will only be reported as aggregate data, not individually.

We appreciate your willingness to participate in this study. Please return your completed questionnaire in the self-addressed envelope provided **by March 31st**. Once again, thank you for your time and participation.

Sincerely,

Anissa Wilhelm
Extension Graduate Assistant
Oklahoma Cooperative Extension Service
4-H Youth Development

Charles Cox
State Extension Specialist and
Program Leader
4-H Youth Development

APPENDIX B

QUESTIONNAIRE

In an effort to determine if or how agricultural concepts are being used in Oklahoma classrooms, we are asking that you complete this questionnaire. As an elementary teacher, we need your input. *It is important to have input from all individuals.* Questionnaires have been coded for research purposes only. Individual names will not be associated with the study in any way.

Directions: Please read each question completely. Answer each of the questions to the best of your ability. Thank you for your participation.

Part I: Demographic Information

1. At what grade level are you teaching? _____
2. Number of years of teaching experience (including current year) _____
3. What is your gender? (circle one) female male
4. What is your age? _____
5. Number of students in your class: _____

If you teach more than one class, please list the grade and number for each class.

6. Indicate the type of community in which your school is located.

   Rural (<2000) _____
   Small town (2001 to 15000) _____
   Large town (15001 to 45000) _____
   City (45001 to 75000) _____
   Large city (>75000) _____

7. Indicate the type of community in which you grew up.

   On a farm/ranch _____
   Rural-not on farm/ranch (<2000) _____
   Small town (2001 to 15000) _____
   Large town (15001 to 45000) _____
   City (45001 to 75000) _____
   Large city (>75000) _____

8. Were you a member of FFA? (circle one) Yes No If yes, how many years? _____
9. Were you a member of 4-H? (circle one) Yes No If yes, how many years? _____
10. Did you take agriculture courses in high school? (circle one) Yes No
11. Did you take one or more agriculture courses in college? (circle one) Yes No
12. What is the highest educational degree you have completed? (circle one)

    Bachelors Masters Doctorate

13. Has agricultural production or an agricultural business ever been the major source of income for you and/or your family? (circle one) Yes No

14. Please list any agricultural organizations in which you are currently involved (e.g. FFA Alumni, 4-H leader, a farmers' cooperative, parents or boosters clubs, etc.)?

Part II: Agricultural Related Topics and Resources

1. Fill in the bubble to indicate **all** of the agricultural related topics that you teach.

Topics	YES, I teach this topic	NO, I do not teach this topic
Agricultural careers	O	O
Agriculture in our history	O	O
Composition of soils	O	O
Ecology and environmental management	O	O
Farm animals	O	O
Gardening (floral and/or vegetable)	O	O
Insects	O	O
Nutrition and proper food selection	O	O
Plant growth and development	O	O
Role of agriculture in our economy	O	O
Small animal and pet care	O	O
Sources of fiber (for clothing, building materials, etc.)	O	O
Sources of food	O	O
Wildlife	O	O

List other agricultural topics you teach that are not on this list:

2. Fill in the bubble to indicate **all** sources of agricultural teaching materials that you use.

Materials	I USE materials from this source	I DO NOT use materials from this source
4-H School Enrichment programs	O	O
Ag in the Classroom	O	O
Animal associations or groups	O	O
Articles about agriculture in newspapers and/or magazines	O	O
Chapters related to agriculture in text books	O	O
Cooperative Extension Service	O	O
Dairy associations or groups	O	O
Environmental associations or groups	O	O
Farm Bureau	O	O
Flower and plant associations or groups	O	O
Food for America	O	O
Fruit associations or groups	O	O
Materials from local high school agriculture program	O	O
Meat associations or groups	O	O
National FFA Organization	O	O
Project Learning Tree	O	O
Project Wild	O	O
Seed and grain associations or groups	O	O
United States Department of Agriculture	O	O
Vegetable associations or groups	O	O

List other materials you use that are not on this list:

Part III. Amount of Time Spent on Agriculturally Related Topics

1. ***Estimate*** **the** ***number*** of planned lessons per school year in which an agricultural topic/example is used to teach in each of the listed topics. If a topic is not listed, write in that topic by "other."

Example:

Language Arts:	*In the area of reading, five lessons included the use of an*
5 Reading	*agricultural topic and/or example.*

Math:

_____ Sort/match objects into sets
_____ Counting
_____ Writing numbers
_____ Problem-solving/reasoning
_____ Written expression of mathematical
_____ Verbal expression of mathematical
_____ Math in daily lives
_____ Numbers and numeration
_____ Computation
_____ Estimation
_____ Geometric shapes
_____ Measurement/graphing
_____ Statistics and probability
_____ Fractions
_____ Decimals
_____ Algebraic Concepts (using tables, graphs)
_____ Use of variables
_____ Other: _____

Science:

_____ Plant and animal needs for growth
_____ Weather/climate
_____ Classifying objects
_____ Life cycles
_____ Basic human needs
_____ Environment
_____ Simple experiments
_____ Observing/describing objects, organisms and events
_____ Classifying/establishing order
_____ Scientific discovery/inquiry
_____ Predicting
_____ Presenting ideas through oral & written expression
_____ Safety in science
_____ Other:

Language Arts:

_____ Reading
_____ Writing
_____ Listening
_____ Speaking
_____ Literature
_____ Other: _____

Social Studies:

_____ Common occupations in local area
_____ Citizenship
_____ Oklahoma History
_____ Oklahoma Geography & mapping
_____ Economics
_____ US History
_____ US Geography & mapping
_____ World Geography & mapping
_____ World Cultures
_____ Written and verbal expression of historical information
_____ Other: _____

Visual Arts:

_____ Creation/Arrangement of original art work
_____ Principles of design
_____ Purpose of art in history
_____ Recognition of a variety of art forms
_____ Cultural/ethnic influences on visual art
_____ Color
_____ Cultural styles of music
_____ Folk, ethnic, classical, & Contemporary forms of music
_____ Other: _____

Information Skills:

_____ Information-seeking strategies
_____ Evaluation and interpretation of information
_____ Record & organize information
_____ Written & verbal expression of information
_____ Other: _____

2. List examples of the agricultural topics/examples you use to teach the core areas.

Example: *If you used an agricultural topic/example in a core area, write that topic/example.*

Social Studies:
Regions where agricultural products are grown.
Science:
Growth cycle of a plant using an agriculture commodity.
Math:

Science:

Language Arts:

Social Studies:

Visual Arts:

Information Skills:

Part IV. Ag in the Classroom

1. How did you become familiar with Oklahoma Ag in the Classroom materials: Check all that apply.

_____ Summer Institutes
_____ Mini-workshops (by Department of Education)
_____ Workshop led by 4-H personnel/Extension educator
_____ Trade shows, booths. OEA, etc.
_____ Materials dropped off at your school
_____ Materials ordered through the *Corner Post* newsletter
_____ Other, please list _____
_____ I am not familiar with the Ag in the Classroom materials

Please add any additional comments.

**If you would like a summary of the findings from this study, complete the blue slip of paper and return it with your questionnaire.
(Data will be reported in aggregate form only. No individual names will appear in the study.)

Thank you for your participation!

APPENDIX C

REMINDER CARD – SECOND MAILING

We are attempting to conclude our study regarding the Oklahoma Ag in the Classroom program and we need your input.

You should have received a questionnaire packet approximately 2 weeks ago. As of this date, we have not received your completed survey. If it has not been misplaced, please take a few minutes to complete it and return it as soon as possible. If you did not receive a packet or it has been misplaced, please call (405) 744-7960 to request a new one.

While your many responsibilities keep you very busy, your assistance may help direct future efforts in agricultural literacy for elementary students. Thank you for help in completing our study.

Sincerely,

Anissa Wilhelm
Extension Graduate Assistant
Oklahoma Cooperative Extension Service
4-H Youth Development

APPENDIX D

THIRD MAILING COVER LETTERS

Oklahoma Cooperative Extension Service
Division of Agricultural Sciences and Natural Resources
Oklahoma State University

Department of Agricultural Education, Communications, and 4-H Youth Development
205 Poultry Science • Stillwater, Oklahoma 74078-6063 • (405) 744-5390 • Fax (405) 744-6522

April 14, 1998

«Fname» «Lname»
«address1»
«Address2»
«city», «st» «zip»

Dear «Fname»,

Several weeks ago you should have received a letter and questionnaire asking for your assistance in a study concerning the teaching of agricultural concepts in elementary schools. As a past participant in an Ag in the Classroom Summer Institute, you have been selected as a participant in this study. Ag in the Classroom is a program important to education. Therefore, we need your input to assist us in further improvement of the program.

As of this date, I have not received your completed questionnaire. While I know you are busy with your many responsibilities, returning your completed questionnaire may help direct future efforts in the area of agricultural literacy for elementary students. As Ag in the Classroom is a program important to education, we need your input to assist us in further improvement of the program. **If you are not currently teaching at the elementary level, please note that on the top of the questionnaire and return it uncompleted.**

It will take approximately 10 minutes to complete the questionnaire. Simply read the directions at the beginning of the questionnaire. . Questionnaires have been coded for research purposes only. You will not be personally identified by your questionnaire. All information obtained from this study will only be reported as aggregate data, not individually.

We appreciate your willingness to participate in this study. Please return your completed questionnaire in the self-addressed envelope provided **by April 30th**. Once again, thank you for your time and participation.

Sincerely,

Anissa Wilhelm
Extension Graduate Assistant
Oklahoma Cooperative Extension Service
4-H Youth Development

Charles Cox
State Extension Specialist and
Program Leader
4-H Youth Development

Oklahoma Cooperative Extension Service
Division of Agricultural Sciences and Natural Resources
Oklahoma State University

Department of Agricultural Education, Communications, and 4-H Youth Development
205 Poultry Science • Stillwater, Oklahoma 74078-6063 • (405) 744-5390 • Fax (405) 744-6522

April 15, 1998

«Fname» «Lname»
«address1»
«Address2»
«city», «state» «zip»

Dear «Fname»,

Several weeks ago you should have received a letter and questionnaire asking for your assistance in a study concerning the teaching of agricultural concepts in elementary schools. You are one of 300 elementary teachers in Oklahoma randomly selected for this study. *It is important to have input from all individuals regardless of their experience with Ag in the Classroom.*

As of this date, I have not received your completed questionnaire. While I know you are busy with your many responsibilities, returning your completed questionnaire may help direct future efforts in the area of agricultural literacy for elementary students. As Ag in the Classroom is a program important to education, we need your input to assist us in further improvement of the program. **If you are not currently teaching at the elementary level, please note that on the top of the questionnaire and return it uncompleted.**

It will take approximately 10 minutes to complete the questionnaire. Simply read the directions at the beginning of the questionnaire. Questionnaires have been coded for research purposes only. You will not be personally identified by your questionnaire. All information obtained from this study will only be reported as aggregate data, not individually.

We appreciate your willingness to participate in this study. Please return your completed questionnaire in the self-addressed envelope provided **by April 30th**. Once again, thank you for your time and participation.

Sincerely,

Anissa Wilhelm
Extension Graduate Assistant
Oklahoma Cooperative Extension Service
4-H Youth Development

Charles Cox
State Extension Specialist and
Program Leader
4-H Youth Development

APPENDIX E

ADDITIONAL COMMENTS BY TEACHERS

Institute teachers:
Additional comments written verbatim

"I encourage teachers in my school to attend the summer institute."

"Every year our students spend a lot of time encouraging others to get involved in community recycling. We order and distribute pine seedlings for Earth Day and we stress the importance of 'making a difference' in our environment."

"I have not gotten to teach AITC as much as I wanted to this year but intend to teach it more next year. I feel this is important for students to learn."

"This is an excellent program."

"I feel it was a very informative and enjoyable workshop. I would be interested in attending a more advanced workshop."

"Anything that deals with Ag, I would love any information!"

"Before going to Ag in the Classroom last summer, I would have said I didn't do much in my classroom. This year I have become more aware of it and I really do a lot. When we teach a large Indian unit for 5 weeks, we relate several different areas. In my aerospace unit (star base) there is a section on plants and how drugs affect plants and us. It is an 8 week course. So when I have come across these activities I pull out my ag in the classroom activities. It was great."

"You are wonderful! We need this to help teach OK agriculture. I'm thinking about taking your summer institute again."

"I bought the sample of ag products and really enjoy using them in the classroom. With kindergarten, a lot of our learning is incidental. But attending the summer institute has definitely influenced my classroom teaching. What fun!"

"I really enjoy Ag in the Classroom."

"Ag in the Classroom is a pleasure to teach in the classroom. It's fun and the students love it."

"As I sat down to try to list how and where I used all the "ag" info I learn; I decided it was impossible to do. It fits into so many areas so easily. And the material is so adaptable. The kids love it and so do I. Thanks!!"

"I love your summer workshop. It plus my individual love of agriculture are perfect for me. However the past three years of teaching first grade leaves little time for what I wish I had more time to do – hands on science. As long as we are "testing" first grade and are dedicated to state mandate requirements rather then guide lines, this unfortunately limits what I would otherwise spend more time with!"

"Excellent worksheets that are put together in binder form. Have encouraged lots of fellow educators to take the workshop."

"I have utilized many of the Ag in the Classroom ideas and materials. I value this effort to help us help children learn greatly!"

"Ag in the Classroom was first introduced through County agent then district workshops and then summer institute."

"I received the puzzle/booklet for Ag Day. It was excellent – I'd use it every year."
"Just like our students – teachers need to use "manipulation, models, known facts, properties, and relationships" in learning. Incorporate more opportunities to use specific and lots of Ag lessons. After we've done them ourselves, they are easier to do with our students."

Non-Institute teachers:
Additional comments written verbatim

"I have enjoyed everything I have tried from Ag in the Classroom."

"I have not participated in any extension projects but would welcome information for my students."

"I love Ag in the Classroom projects and materials. Please keep me on the list."

"I need more "easy" exposure to Ag in the Classroom. Only seen quick review."

"I teach a gifted program called SEARCH and teach units of study rather from textbooks. Some of the units I've taught are ecology, endangered animals, economics, Titanic, rain forest, environment-recycling, etc. Since textbooks aren't used, I use everything I can find from magazines, newspapers, media center materials, internet materials, etc."

"Thank You"

"I have enjoyed the program that you have sent to me. I have taught 22 years and will retire in May, 1998."

"The calendars and posters are outstanding. Our "big city" kids – even in Tulsa – need a lot of help with studies on agriculturally related topics."

"This study was somewhat hard to complete. In 1st grade topics are presented in units lasting from 4 to 10 days. When new units are presented children are asked to draw on previous topics much contrast & compare. Not all of this is written into a formal lesson plan."

"I have the book Ag in the Classroom, and I think it's very good- but I haven't really applied it through my lessons. Hopefully in the future, I can attend the workshop in this area."

"Ag in the Classroom is an important area and needs to be developed at all stages of learning."

"Ag in the Classroom is great! Great resources!"

"Do you have a home web page on the internet?"

"I have not used materials in my classroom."

"It is really hard to write down a number or how many times you use Ag in the Classroom. It is a vital part of our lives."

APPENDIX F

INSTITUTIONAL REVIEW BOARD

OKLAHOMA STATE UNIVERSITY
INSTITUTIONAL REVIEW BOARD
HUMAN SUBJECTS REVIEW

Date: March 6, 1998 **IRB #:** AG-98-033

Proposal Title: THE TEACHING OF AGRICULTURE IN ELEMENTARY CLASSROOMS

Principal Investigator(s): William Weeks, Anissa Wilhelm

Reviewed and Processed as: Exempt

Approval Status Recommended by Reviewer(s): Approved

ALL APPROVALS MAY BE SUBJECT TO REVIEW BY FULL INSTITUTIONAL REVIEW BOARD AT NEXT MEETING, AS WELL AS ARE SUBJECT TO MONITORING AT ANY TIME DURING THE APPROVAL PERIOD.
APPROVAL STATUS PERIOD VALID FOR DATA COLLECTION FOR A ONE CALENDAR YEAR PERIOD AFTER WHICH A CONTINUATION OR RENEWAL REQUEST IS REQUIRED TO BE SUBMITTED FOR BOARD APPROVAL.
ANY MODIFICATIONS TO APPROVED PROJECT MUST ALSO BE SUBMITTED FOR APPROVAL.

Comments, Modifications/Conditions for Approval or Disapproval are as follows:
The proposed study represents minimal or no risks to the subjects. The subjects will receive a mail questionnaire and their participation in completing it is entirely voluntary. The principal investigators have taken the necessary precautionary measures to assure confidentiality of the data collected. Permission should be granted for this study to proceed as planned.

Signature: _____ Date: March 10, 1998

Chair of Institutional Review Board

cc: Anissa Wilhelm

VITA

Anissa Diane Wilhelm

Candidate for the Degree of

Doctor of Philosophy

Dissertation: COMPARISON OF ELEMENTARY TEACHERS'USE OF AGRICULTURE IN THEIR TEACHING

Major Field: Agricultural Education

Biographical:

Personal Data: Born in Westminister, California on April 24, 1967, the daughter of Earl and Belen Wilhelm.

Education: Graduated from Atascadero High School, Atascadero, California in June, 1985; received Bachelor of Science degree in Agricultural Education from University of California at Davis, Davis California in December 1990. received Master of Science degree in Agricultural Education from Oklahoma State University in December, 1996. Completed Doctor of Philosophy in Agricultural Education at Oklahoma State University in July, 1998.

Professional Experience: Extension Research Assistant and Teaching Assistant, Department of Agricultural Education, Oklahoma State University, May 1996 to present; Teaching Assistant, Department of Biosystems and Engineering, Oklahoma State University, August 1995 to May 1996; High School Agriculture Instructor, Atwater High School, Atwater, California, July 1992 to June, 1995; Temporary High School Agriculture Instructor, Armijo High School, Fairfield, California, April 1992 to June 1992; Student Teacher, Atwater High School, Atwater, California, August 1991 to December 1991.

Professional Memberships: American Vocational Association, California Agriculture Teachers Association, Oklahoma Vocational Agriculture Teachers Association, National Association of Colleges and Teachers of Agriculture, American Association for Agricultural Education, Gamma Sigma Delta, Agricultural Education Graduate Student Association.