Perceptions of middle, high school and community college agricultural teachers in Iowa regarding agricultural awareness concepts and activities in the middle school curriculum: Grades 7-9

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Perceptions of middle, high school and community college agricultural teachers in Iowa regarding agricultural awareness concepts and activities in the middle school curriculum: Grades 7-9

by

Abisoye Odubanjo

A dissertation submitted to the graduate faculty
in partial fulfillment of the requirements for the degree of

DOCTOR OF PHILOSOPHY

Major: Agricultural Education and Studies (Agricultural Extension Education)

Program of Study Committee:
Robert Martin, Major Professor
   Gail Nonnecke
   John Lawrence
   Scott Smalley
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The student author, whose presentation of the scholarship herein was approved by the program of study committee, is solely responsible for the content of this dissertation. The Graduate College will ensure this dissertation is globally accessible and will not permit alterations after a degree is conferred.

Iowa State University
Ames, Iowa
2018

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DEDICATION

I dedicate my dissertation to God Almighty, the source of strength and pillar of support for the completion of my doctoral program.
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ABSTRACT

Teachers are relied upon to teach basic agricultural knowledge among young learners who are devoid of real-world agricultural experiences. The middle school serves as a tool for achieving this goal because self and environmental awareness, and career choices begin at this educational stage. Since agricultural teachers are the major driver of agricultural education program in the middle school, their perceptions regarding this program are important. The purpose of this study was to determine the perceptions of agricultural teachers regarding teaching agriculture and selected course content in the middle school. The Theory of Planned Behavior was used as a theoretical framework to predict teachers’ perceptions regarding teaching agriculture in the middle school. Questionnaires were sent to middle school, high school, and community college agriculture teachers in Iowa through Qualtrics. The results of the study showed that agriculture teachers in Iowa had positive and strong perceptions toward teaching agriculture in the middle school. In addition, agricultural teachers in Iowa indicated selected content of the Agriculture, Food, and Natural Resources curriculum developed by the National Association of Agricultural Education should be taught to a limited or great extent. Similarly, agricultural teachers in Iowa believed teaching agricultural education in the middle school will develop students’ leadership skills and assist students in making informed career choices in agricultural industry. Based on the findings of this study, the cyclical model was developed as a guide for curriculum development, and planning of instructional activities. Teaching agriculture in the middle school develops, trains, and motivates young students to become responsible citizens and capable future policy makers. Participation in curricular and non-curricular agricultural activities could promote the development of student leadership skills. The positive perceptions of agriculture teachers regarding teaching agriculture in the middle school indicate its sustainability and positive impacts on students.
CHAPTER I. INTRODUCTION

Background Information

The significance of agriculture in the economy and survival of the American populace is evident in their daily utilization of agricultural products for several purposes. Agriculture serves as the source of food, clothing and shelter. It generates income for individuals and the nation through export of cash crops and finished products. In fact, most developing nations rely on agriculture as a major source of employment (Cervantes-Gody & Dewbre, 2010). In the United States, agriculture has tremendously contributed to the growth of the economy over the past years, and it is still actively promoting national development. In 2015, eleven percent of the United States population was employed in agriculture-related industries and many manufacturing industries depend on agriculture for raw materials (USDA, 2017). Despite the importance of agriculture in our society, it is faced with many challenges which threaten its development.

Several changes in climate, crop genomes, soil characteristics and other factors promoting agricultural productivity and accessibility of food, clothing and shelter have occurred. For decades, farmers in the United States were successful at providing surplus food for the nation; this surplus reduced profit on farm produce, and subsequently resulted in a decrease in the population of farmers (Birkenholz, 1990; Spielmaker & Leising, 2013). Currently, less than two percent of the American population are actively engaged in farming (Womochil, 2007). The gradual shift of focus from agricultural production and processes by majority in the United States has consequently resulted in low knowledge of agriculture in the society (Luckey, Murphrey, Cummins & Edwards, 2013; Raven, 1994). Furthermore, due to increased rural-urban migration, with urban centers expanding to the borders of the rural communities, many arable lands are being converted to buildings used for commercial purposes other than agriculture. The resultant effects
of climate change, urban migration coupled with low agricultural knowledge have caused
diverse national problems that challenge agricultural development. The knowledge of agriculture
is very essential in this present age where children, youth and adults display insufficient
understanding of the basic concept areas of agriculture. For instance, the study conducted by
Howell & White (1996) reported most of the radio reporters in Oklahoma do not have requisite
experiences in agriculture even though they disseminate agricultural information to the public. The
Bureau of Labor Statistics and the United States Department of Agriculture forecast increased job
openings due to retirement and job gap in the labor market and agricultural industry between year
2012 and 2022 (Goecker, Smith, Fernandez, Ali & Theller, 2015). However, the future policy
makers—the youth, are not sufficiently exposed to agricultural production and processes. This is
evident in the description of agriculture by these students. The younger generation perceives and
describes agriculture using terms such as farmer, cow and tractor (Blackburn, 1999), and the
farmer is further portrayed as one who "wears bib overalls and chews on straw" (Holz-Clause
& Jost, 1995).

Currently, not all K-12 students are being exposed to agricultural knowledge due to non-
inclusion of agricultural knowledge in some middle school and high school curricula. Frick,
Birkenholz &Machtmes (1995) reported high school students who have some agricultural
knowledge were not familiar with certain concepts of agriculture. In comparing the past with the
present level of active involvement of American populace in active farming, the American Farm
Bureau Federation (2002) concluded elementary school pupils are devoid of basic agricultural
knowledge and experiences. The consequences of gaps in agricultural knowledge on the society is
reflected in the economy, youth development, policy making and education. Since the population
of farm families is currently decreasing, the chances of youth developing a firsthand experience of
agriculture in their homes is very slim (American Farm Bureau Federation, 2002). In addition, students who are enrolled in schools where agriculture is not included in the curriculum may not have the opportunity to gain sufficient knowledge of agriculture elsewhere. This lack of knowledge and experience of agriculture may result in little or no career plans in agriculture among such students (Talbert, 1996). Some youth will eventually become policy makers in the future and be responsible for making salient decisions about agriculture for the nation. For these future policy makers to make good decisions about agriculture, they must be versed and updated about the current happenings in this industry. In addition, one of the major sources of agricultural information for farmers is the media. A journalist who does not have basic knowledge of agriculture and its concept areas may not comprehensively disseminate its news (Hillgren, 1989; Howell & White, 1996; Terry, 1994). Therefore, it is important to intensify efforts at disseminating agricultural knowledge among youth and the society.

The National Research Council (1988) recommended agricultural literacy among youth to promote careers in agriculture, good policy making, and agricultural development. A society that is literate on agricultural issues is updated and capable of addressing current problems facing agricultural and national development (Kovar & Henry, 2013). Furthermore, the Agricultural Literacy Special Interest group of the American Association for Agricultural Education (AAAE) identified qualities of an agricultural literate person. This includes demonstration of fundamental agricultural knowledge that promote engagement in intellectual discussions on agriculture, thus making relevant decisions that are of great benefit to the society at large (Powell, Agnew & Trexler, 2008). The report of Frick (1990) identified an agricultural literate person as “an individual who would be able to synthesize, analyze, and communicate basic information about agriculture” (p. 52). Like the description of American Association for Agricultural Education
(AAAE), the level of agricultural knowledge possessed by students can also be used to identify
them as being agriculturally aware or literate. Agricultural awareness is conceptualized as
“experiencing or exploring agriculture as it relates to the subject matter being studied or context
of life being lived and the ability to identify the connections of agriculture to areas of study or life”
(Knobloch & Martin, 2000, p. 14). Agricultural awareness involves having fundamental
knowledge of agricultural products and processes, policies, career opportunities and related
business organizations (American Farm Bureau Foundation for Agriculture, 2012). In contrast,

Agricultural literacy entails knowledge and understanding of agriculturally related
scientific and technologically-based concepts and processes required for personal
decision making, participation in civic and cultural affairs, and economic
productivity. At a minimum, if a person were literate about agriculture, food,
fiber, and natural resource systems, he or she would be able to a) engage in social
communication, b) evaluate the validity of media, c) identify local, national, and
international issues, and d) pose and evaluate arguments based on scientific
evidence. (Meischen & Trexler, 2003, p. 44)

Before the National Research Council’s recommendation on agricultural literacy among
K-12 students, dissemination of agricultural knowledge was limited to few groups of students in
high school. Since the inception of agricultural literacy, broad dissemination and increase in
agricultural knowledge and skills in the society have been encouraged (Frick et al., 1995).
Agricultural education in the middle school commenced in 1988 when it was largely advocated by
researchers for the purposes of career and life goals development (Anderman & Maehr, 1994), and
employment and career training (Hughes & Barrick, 1993). In the middle school, students are
taught basic knowledge of agriculture to promote agricultural awareness, personal interest and
career decisions related to agriculture among students (Frick, 1993). The middle school is a unique
level of education where students experience several developmental changes that result in self-
consciousness and awareness of their environment (National Middle School Association, 2010).
The characteristics of the middle school students show that they can understand basic agricultural
knowledge and form their perceptions around it. Middle school students are qualified to know about agriculture and its interrelationship with society and its economy (Flanders & Bell, 2005). It is obvious the middle school is a very crucial level of education where fundamental agricultural knowledge effectively can be disseminated and understood by young students. For agricultural knowledge to be effectively disseminated with resultant increased interest among students, certain factors should be established and considered including curriculum, teaching methods, and needs of students (The National Middle School Association, 2003).

Teachers in different educational institutions of the country are relied on to promote agricultural education among students (Balschweid, Thompson & Cole, 1998; Malecki, Israel & Toro, 2004). The middle school agricultural teachers form an integral component of the educational system. Twenty-eight percent of the agricultural educators in the United States are middle school teachers (Kantrovich, 2010). They are different from other groups of educators because their students possess important unique characteristics that affect their teaching and learning methods (Golden, Parr & Peake, 2014). Trainings, workshops and professional development programs have been recommended and organized for agricultural teachers in the middle and high schools. These trainings are aimed at increasing teachers’ agricultural knowledge and infusion of agricultural concepts into their curriculum (Balschweid, et al., 1998; Harris & Birkenholz, 1996; NRC, 1988). Similarly, to achieve the learning outcomes among middle school students, educational curricula that appropriately address their needs are important.

Statement of Problem

The dearth of agricultural knowledge of the youth is revealed in their description of farming and other agricultural processes (Blackburn, 1999; Holz-Clause & Jost, 1995). Many people in the society lack sufficient knowledge on the importance of agriculture to daily living
(Goecker, Smith, Smith, & Goetz, 2010). Per the study conducted by Alexander & Trexler (2011), many K-12 students have low involvement in agricultural production, low knowledge of food processing, and the sources of food they consume every day. Even though Frick (1993) identified middle school agriculture as effective in promoting agricultural literacy and awareness among students, teaching agriculture in the middle school is not prevalent in all school districts. While some school districts excel in teaching agriculture in middle school, others are lacking in this regard.

The curriculum of the agricultural education program in the middle school is of great importance in promoting agricultural awareness among students. The curriculum serves as a framework which guides teachers in the teaching and learning processes. The agricultural education program curriculum of the middle school is designed to promote the dissemination of agricultural knowledge, personal development, and address other misconceptions about agriculture (Anderman & Maehr, 1994; Hughes & Barrick, 1993). For instance, the middle school agricultural education curriculum developed by the Georgia Department of Education (1998) was designed to educate students about their environment, agriculture and related careers. The National Council for Agricultural Education (2015) has designed a career cluster that is composed of content standards in agriculture, food and natural resources. The purpose of the career cluster is to provide guidelines for agricultural educators in the design of curriculum for each component of the three-cluster model – classroom and laboratory instruction, supervised agricultural experience, and FFA. The career cluster is very detailed as it contains suggested topics and subtopics that are categorized under eight career pathways. The eight career pathways include Agribusiness Systems, Animal Systems, Biotechnology Systems, Environmental Service, Food Products and Processing Systems, Natural Resource Systems, Plant Systems, and Power, Structural and Technical Systems.
While some important topics in the career cluster can be covered within the limited time allotted to teaching agricultural education in the middle school program, others require longer periods. In addition, there are other topics that match the interest of the students but are not included in the career cluster of the National Council for Agricultural Education. Therefore, the need arises for agricultural educators to select a few topics that can be covered within the limited time allotted to teaching agriculture in middle school classes. Selected topics must be carefully chosen to ensure effective teaching that address the needs and interests of the students as agricultural education classes in middle school are taught in units, that is, they are not full semester courses. From the definition of Knobloch & Martin (2000), agricultural topics in the middle school curriculum should promote agricultural awareness, which involves having basic agricultural knowledge with supporting real world experiences.

To promote effective agricultural awareness programs in middle school, it is important to review the agricultural education course content of middle school curriculum. Since agricultural educators are heavily relied upon in promoting agricultural awareness among middle school students, their opinions regarding teaching agriculture in middle school are important. What are the perceptions of agricultural educators regarding teaching agriculture in middle school and the duration for teaching selected curriculum contents? What are other topics that should be included in the current middle school curriculum and for how long should they be taught?

**Purpose and Objectives**

The purpose of this study was to determine the perceptions of agricultural educators in middle, high school and community colleges regarding the middle school agricultural curriculum. Based on this purpose, the study focused on the following specific research objectives:
• Identify selected demographic data of middle school, high school and community college agricultural teachers and their programs.

• Identify agricultural teachers’ opinions about teaching agriculture in the middle school.

• Identify perceptions of agricultural teacher regarding teaching selected agricultural course content in the middle school.

• Compare demographic data with the opinions of teachers about teaching agriculture in middle school and teaching selected course content in the middle school.

• Develop a model for delivery of an agricultural awareness program in the middle school curriculum.

**Significance of the Study**

The importance of possessing adequate and accurate knowledge of agriculture by youth cannot be overemphasized because they are the potential future policy makers of agriculture. Possession of agricultural knowledge is essential for addressing challenges facing agriculture in the society (Frick, et al., 1995). Furthermore, agricultural literacy throughout communities is critical today due to increasing demand for workers who possess requisite knowledge and skills required in agricultural, food and natural resources industries (Borck & Bell, 2010). A clear understanding of the deficiencies in agricultural awareness and its associated activities in the middle school curriculum will promote curriculum design and effective teaching among teachers. Agricultural awareness in the middle school will further increase students’ interests and participation in agricultural activities and promote career decisions in agriculture. The result of this study is expected to provide reliable information on participants’ perceptions regarding curriculum design, teaching and facilitation of agricultural activities in middle school programs. Findings from study this will inform scholars on the benefits of agricultural awareness in the
middle school including its potential to promote agricultural literacy at higher educational levels. In general, the study shows the importance of agricultural awareness among middle school students, and why it requires full attention of agricultural educators.

**Need for the Study**

Several interventions have been employed to ensure effective dissemination of agricultural knowledge among students. Research studies have advocated the inclusion of agricultural concepts in the classroom teaching and in other educational programs (Balschweid, et al., 1998; Frick, et al., 1995; Luckey, et al., 2013). Positive perceptions of teachers regarding teaching agriculture in the classroom have been established (Elliot, 1999; Harris & Birkenholz, 1996; Osborne & Dyer, 1995). In fact, non-agricultural teachers also are incorporating agricultural concepts into their classroom activities (Balschweid, et al., 1998). However, the knowledge of agriculture displayed by middle and high school students is still low in specific concept areas (Pense & Leising, 2004). Certain characteristics of teachers determine the learning outcome of their students. The perception of teachers about the teaching and learning process, the characteristics of their students, and nature of learning content can determine the learning outcome. Therefore, the opinions of agricultural teachers in teaching and conducting agricultural activities need to be ascertained to promote agriculture awareness among middle school students. Similarly, agricultural literacy interventions organized for teachers will remain effective when they can address their specific needs. An awareness of agricultural teachers’ perceptions regarding their teaching methods and curriculum will promote such programs.
Definition of Selected Terms

Agricultural awareness: “Experiencing or exploring agriculture as it relates to the subject matter being studied or context of life being lived; the ability to identify the connections of agriculture to areas of study or life” (Knobloch & Martin, 2000, p. 14).

Agricultural literacy: “Agricultural literacy entails knowledge and understandings of agriculturally related scientific and technologically based concepts and processes required for personal decision making, participation in civic and cultural affairs, and economic productivity” (Meischen & Trexler, 2003, p. 44).

Middle school: These are schools that serve as intermediary between elementary and high school. They include seventh and eighth grades while ninth grades are also included in some school districts.

Perception: Involves awareness and reaction to environmental stimuli through human senses (Cherry, 2017).

Curriculum: Refers to the means and materials with which students will interact for achieving identified educational outcomes (Ebert II, Ebert, & Bentley, 2013).

Basic agricultural knowledge: “the production of plant and animals’ 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, the public agricultural policies, the global significance of agriculture, and the distribution of agricultural products” (Frick & Miller, 1991, p. 52).

Agricultural educators: Instructors who teach agriculture at different levels of education.
CHAPTER II. REVIEW OF LITERATURE

The review of the literature explored the history, components and benefits of middle school to the young generation and society at large. This continued with an analysis of middle school agricultural education content using findings from previous studies. In addition, the theory of planned behavior was used as a theoretical base to predict teachers’ perceptions regarding the teaching of agriculture in middle school. Relevant research questions which support the purpose and objectives of the study were developed with a summary of knowledge gap derived from previous studies. The following are the specific research objectives of this study:

- Identify selected demographic data of middle, high school and community college agricultural teachers and their programs.
- Identify agricultural teachers’ opinions about teaching agriculture in the middle school.
- Identify perceptions of agricultural teachers regarding teaching selected agricultural course content in the middle school.
- Compare demographic data with the opinions of teachers about teaching agriculture in middle school and teaching selected course content in the middle school.
- Develop a model for delivery of an agricultural awareness program in the middle school curriculum.

Middle School

In the K-12 school system, the middle school is the academic level before high school. Depending on each state, middle school classes are referred to as the 6th, 7th, 8th and 9th grade. In this study, middle classes were referred to as 7th, 8th and 9th grade. Grades 7-9 link middle school
to high school as high school grades in Iowa start from the 9th grade. Although different from elementary and high school, middle school prepares elementary school graduates for high school (Rayfield & Croom, 2010). “Middle school is the threshold between elementary and high school, between childhood and adulthood, middle school provides a significant opportunity for the development of knowledge, skills, attitudes, and awareness that are the foundation for the next stage of life” (Kerka, 2000, p. 1). Prior to the creation of middle school, the junior high school served as the intermediate stage between elementary school and high school. However, junior high school was criticized for not meeting the expectations of educators and the society on students. Alexander and George (1981) described the weakness of junior high school:

Unequivocally, many junior high schools became in time almost duplicate copies of their senior high schools in terms of credit and grading systems, methods of teaching, time schedules and students’ activities, so that sixth graders in June became high school students in September without adequate readiness or maturity. (p. 11)

Other similar criticisms rooted in the results of sociological and psychological researchers indicated that junior high schools were incompetent in addressing the needs of students in their early adolescent age (Anfara, 2001). The similarities in the criticisms and complaints about junior high schools led to educational reform that created middle school. Middle schools were established more than 4 decades ago when educators identified the importance of independent school system that address early adolescent needs in students (George & Alexander, 2003; Lounsbury, 2009). Although a part of the K-12 system, middle school is unique in its operation because it provides fundamental knowledge that prepares students for their future. The major responsibility of middle school is to help students become responsible adults who are skillful and display socially accepted behaviors (National Middle School Association, 2010). Even though junior high schools were condemned for their inadequacies, some school districts did not eliminate their junior high schools
after the establishment of middle schools (Anfara, 2001). The creation of middle school led to modification in the structure of classes in the elementary school and high school. The National Middle School Association (1995) described the middle school as “mainly 6-8 schools, but also 5-8, 5-7, and 7-8, based on developmental needs (social and academic) of young adolescents, organized by interdisciplinary teams, with flexible organizational structures, using varied learning and teaching approaches” (p. 1). The National Middle School Association (2003) states that the major areas of middle school program include curriculum, instruction, and assessment; leadership and organization; and culture and community.

**Middle School Students**

Middle school students are usually between the ages of 10 and 15. Common among middle school students are developmental changes at puberty, which lead to early adolescence. The noticeable changes of early adolescence are reflected in their relationship with peers, choices, interests, and quest for life. Middle school students experience physical, psychological, social-emotional, intellectual and moral changes that prepare them for the success or failure in their adult life (National Middle School Association, 2010). The physical growth involves visible changes in the bodies of boys and girls that are associated with puberty. Boys and girls experience hormonal changes which lead to growth spurt of 6 inches and 2-6 inches, respectively (National FFA Organization, 2006). Changes in the physical appearance of middle school students also affect their emotions as they become aware of their self-esteem, orientation to life, and environment.

The self-awareness in middle school students generate questions that challenge their status quo and future endeavors. The visible changes noticed in these young adolescents cut across every area of their lives. During this stage, students identify career interests and goals (Hughes & Barrick, 1993), engage in self-discovery, develop self-esteem, and personal concepts (Fritz & Moody, 1993).
Hanover Research (2012) explained that career exploration and discovery of personal interest in relation to skill acquisition are the major foci of middle school programs. Because middle school is a stage where students experience life transforming changes, its teaching method differs from elementary and high school. Middle school students receive instructions through experiential learning methods that expose them to the real world around them (National FFA Organization, 2006).

**Middle School Curriculum**

The middle school curriculum is different from that of the elementary and high school because of its goals and learning outcomes. The National Middle School Association (2010) described middle school curriculum as learning content that combines students’ interests with societal expectations while empowering students intellectually. Learning is tailored towards helping students acquire requisite skills and knowledge needed for achieving future goals. Because middle school students are increasingly becoming aware of their environment and the world around them, activities which address their questions would be relevant in their curriculum. The National Middle School Association (2003) indicated students’ success at middle school can be enhanced through curriculum which addresses students’ developmental needs and interests.

Powell and Allen (2001) reported existing debates and arguments about the content of the middle school curriculum. Anfara (2001) identified appropriate “educational environment and curricula” as the basic weaknesses of the middle school. Furthermore, Johnston and Williamson (1998) reported parents were concerned about the middle school curricula. Parents described middle school curricula as “trivial,” “disjointed” and “lacking rigor.” Several factors identified as responsible for the weakness of the curricula include lack of competent middle school teachers, less detailed textbook content, program implementation at the national level, and the nature of the
middle school structure (Anfara, 2001). The findings of the Third International Mathematics and Science Study also showed a weak curriculum contributed to the U.S Eight graders’ low performances in Math and Science as compared to some other countries (Schmidt, McKnight, & Raizen, 1997). The issues regarding the middle school curriculum can also be addressed by scrutinizing the learning content of other subject areas especially vocational subjects like agricultural education.

**History of Middle School Agricultural Education Program**

Since its inception, agriculture education in the middle school has remained an integral component of school-based agriculture. National FFA Organization (2006) identified middle school agriculture science as relevant in helping students acquire requisite skills. Young students become familiar with agriculture-related jobs, careers and industries through middle school agricultural education programs (National Council for Agricultural Education, 2002). Vocational courses, which included agricultural education gained support after the passage of the Smith-Hughes National Vocational Education Act of 1917. Thus, vocational courses were treated as a separate subject matter in most public schools’ curricula and this further enhanced acquisition of agricultural knowledge among high school students. The Smith-Hughes act promoted the development and dissemination of agricultural knowledge to interested students in formal settings (Golden, Parr & Peake, 2014).

However, during this period, agricultural education was limited to high school students, especially boys who were aspiring to become farmers. In 1988, the National Research Council advocated for wider dissemination of agricultural knowledge starting from kindergarten to the last grade in high school. In the same year, the National FFA organization approved middle school students’ membership to foster increased interest and enrollment in agricultural classes at high
school (Rossetti, Padilla & McCaslin, 1992). Agricultural education in middle school has continued to experience notable growth. In 1991, nearly 53,000 students were enrolled in middle school agricultural education programs in 30 states in the United States (Rossetti, Padilla & McCaslin, 1992). In 2001, 573 agricultural science teachers taught only middle school while 1,491 taught both middle school and high school (National FFA Organization, 2006). Kantrovich (2007) noted, between 2004 and 2006, 26% of the agricultural teachers in the United States taught only middle school students. Subsequently, the numbers of agricultural teachers who taught only middle school students between 2006 and 2009 increased by 3% (Kantrovich, 2010). National FFA Organization (2002) reported about 30,000 out of 70,000 middle school students who were enrolled in agricultural science program were FFA members. Per National FFA Organization (2015), more than 800,000 students from seventh grade upwards participated in school based agricultural programs within the United States and its territories.

The increased students’ enrollment in the middle school agricultural education program shows its contribution to the dissemination of agricultural knowledge among youth. Rayfield and Croom (2010) identified the middle school as the fundamental stage for students who are interested in agriculture. Even though middle school agriculture has been in existence for a few decades, Golden, Parr & Peake (2014) reported it remains a new component of school-based agricultural education. Conversely, Hillison (1994) asserted the rapid growth of middle school agricultural education is higher than other areas of agricultural education. Teaching agricultural education in middle school was adopted in many states in the United States when it was initially introduced. However, a few states did not adopt this innovation due to the similarities between the middle school and high school curriculum. Rossetti, Padilla & McCaslin (1992) noted Ohio was one of the states that did not adopt the teaching of agricultural education in the middle school at its
inception. Over the years, experts had advocated for a well-rounded curriculum that uniquely addressed the needs of middle school students.

**Middle School Agricultural Education Curriculum**

The curriculum of middle school agricultural education program, among other courses promotes the achievement of learning outcomes and program goals. “Developing a framework for a middle school agricultural education curriculum is the first step in furthering the continuity and focus of middle school agricultural education programs” (Frick, 1993, p. 77). School administrators and agricultural educators at different levels have designed and used the curriculum to implement teaching and learning activities within and outside the classrooms.

The middle school curriculum is divided into two parts – core and exploratory courses. The core subjects include mathematics, science, social studies, and language art. Other subjects taught in the middle school are categorized as exploratory courses and this is the category to which agricultural education belongs. Agricultural education is one of the exploratory courses students take within a short period in the school calendar year (Flanders and Bell, 2005). Even though agricultural education is taught in many middle schools as an exploratory course, Rossetti and McCaslin (1994) have argued it should be integrated into the core courses of middle school curriculum. Based on the recommendation of The Task Force of the Middle School Agricultural Education, the agricultural education curriculum of middle school is further divided into agricultural literacy and agricultural exploratory topics (Frick, 1993).

The inclusion of exploratory courses in middle school curriculum stemmed from their perceived positive contributions to the success of the middle school program. These include participatory learning that promotes students’ engagement and self-development through assignment of challenging tasks (Brazee, 2000). The three-component model of agricultural
education – classroom and laboratory instruction, work-based learning (internship, supervised agricultural experience), career and technical student organization showcase the essence of exploratory courses in middle school programs. The classroom and laboratory instruction involves teaching basic knowledge of different areas of agriculture within the classroom and laboratory. Work-based learning exposes students to real world experiences in the field of agriculture. The career and technical student organization equips students with leadership and other requisite workplace skills through participation in student organizations like 4-H and FFA. The three-component model of agricultural education are strategic teaching methods that focus on hands-on and experiential learning (National FFA Organization, 2006). These teaching methods combine intellectual knowledge with real world experiences for total development of middle school students. The National Middle School Association (1995) identified three major benefits of exploratory curriculum in middle school. This includes discovery of talents and inherent abilities for self-development, execution of expected roles in the society, and opportunities for engagement in student-centered activities that address needs and interest of the students. The goals of the three-component model of agricultural education are in congruent with the identified benefits of middle school exploratory curriculum. National FFA Organization (2006) noted the integrated model of agricultural education distinguished it from other core and exploratory courses in middle school. “Through agricultural education, students are provided opportunities for leadership development, personal growth and career success” (National FFA Organization, 2015).

**Instructional Time Allotment in the Middle School Agricultural Education Curriculum**

Because agricultural education is taught in the middle school as an exploratory course, the time allotted to its teaching varies among states and schools. While exploratory courses are taught in some schools on a weekly, biweekly or monthly basis, others devote a full semester to teaching
these courses (Brazee, 2000; Epstein & Mac Iver, 1990). The effect of allotted time to teaching exploratory courses in middle school cannot be overlooked as it determines the quality and quantity of instructional contents that are made available to the students. Brazee (2000) posited that many middle school students are deprived of the tangible experiences from exploratory courses due to inadequate time allotted to teaching these courses. Rossetti and McCaslin (1994) recommended that agricultural education topics should be taught as mini courses two or three times on a weekly basis within a short class time of about 30 minutes per teaching session. Flanders and Bell (2005) however suggested a longer period of teaching agricultural education in the different grades of middle school. They suggested teaching agricultural education in the sixth and seventh grades for at least 45 hours within a semester and 90 hours for eighth grade. National FFA Organization (2006) noted that agricultural education is taught in some 6th grades for 11 days as part of “rotational wheel:” and 7th and 8th grades for 18 weeks. The variance in the suggested period allotted to teaching agricultural education in middle school shows that there is no standard time for teaching agricultural education in the middle school. In fact, Flanders and Bell (2005) acknowledged that their suggestion may not be feasible in some middle schools as there were other factors which affect time allotment to teaching and learning. It is important to dedicate more time to teaching agriculture in middle school as many middle school students have been identified with inadequate agricultural knowledge. “Most of American school children enter middle school knowing little about agriculture and leave only slightly better informed” (Rossetti & McCaslin, 1994, p. 30).

**Instructional Content of the Middle School Agricultural Education Curriculum**

The instructional content of the middle school curriculum is equally as important as the time allotted to teaching and learning. Middle school has been described as a strategic time for
self-development, career exploration, interest discovery and training for leadership. Therefore, the content of the curriculum should be tailored to achieve these goals among students. The agricultural education curriculum consists of different instructional content that addresses the desired goals in middle school students. Flanders and Bell (2005) stated the goals of agricultural education in middle school include agricultural career awareness, agricultural career exploration, reinforcement of academic skills, leadership and personal development, consumer awareness, agricultural and environmental literacy, technological literacy, and orientation to agricultural education. However, the perceived instructional content of the agricultural education of the middle school curriculum varies among agricultural educators. Frick (1993) illustrated ten subject areas that should be included in the middle school agricultural education curriculum. These subject areas were further divided into four agricultural literacy subject areas and six exploratory subjects. These subject areas include; societal significance of agriculture, global significance of agriculture, agriculture’s relationship with natural resources, agriculture’s relationship with the environment, food safety and consumer, leadership and human relations, careers and future of agriculture, agricultural science and experimentation, agricultural vocabulary, and agricultural benefits to world. Flanders and Bell (2005) suggested that the instructional content of sixth and seventh grades should focus on introduction to agriculture, career exploration and food, fiber, and environmental systems. They further suggested a comprehensive curriculum, which further develop the knowledge gained from sixth and seventh grade for eighth grade curriculum. The National FFA Organization (2006) noted that sixth grade instructional content include agricultural literacy and general exposure to agriculture while seventh grade include exposure to agricultural content using consumer perspective as reference. Eighth grade instructional content includes career exploration, technical content, and hands-on activities. Since there is no general standard for instructional
content of middle school agricultural education curriculum, agriculture science teachers, districts and states develop their instructional content.

**National Agriculture, Food and Natural Resources Career Cluster Content Standards**

The National Agriculture, Food and Natural Resources (NAFNR) career cluster content standards inform agricultural educators about the instructional content of the curriculum for school-based agricultural education programs. It serves as a guide and provides suggestions for the development of a well-rounded curriculum that includes the three main components of agricultural education – classroom and laboratory instruction, supervised agricultural experience, and student organizations. In 2009, the NAFNR career cluster content standards consisted of more than three hundred careers and seven career pathways (National FFA Organization, 2009). Upon revision of the NAFNR career cluster content standards in 2015, an additional career pathway was included in the career cluster content standards. The career pathways include agribusiness systems, animal systems, biotechnology systems, environmental service systems, food product and processing systems, natural resource systems, plant systems, and power, structural and technical systems (The National Council for Agricultural Education, 2015). Each of these career pathways consists of topics, subtopics, and associated activities recommended for in and out of classroom learning for middle school and higher levels. While the content of the AFNR career cluster content standards might be useful to students, only few topics can be selected because of the time allotted to teaching these topics.

**Teaching Agricultural Education in the Middle School**

In the middle school, agricultural educators collaborate with other core subject teachers or solely teach agricultural education as a separate exploratory subject. Rossetti and McCaslin (1994) posited that content of agricultural education can be integrated into the middle school curriculum
and taught by other teachers that are not agricultural educators. They further argued that the minimum real-life agricultural experience was enough to teach agricultural topics in core subject classes. Even though collaborative teaching of agricultural education is feasible in the middle school, certain barriers are inevitable with this practice. Brazee (2000) identified lack of communication and cooperation between core and exploratory teachers as a barrier to integration of exploratory subjects. Furthermore, the style of grading exploratory subjects when they are integrated with core subjects or not grading them at all is also a lingering issue in the middle school program (Brazee, 2000). Due to other factors that determine the operation of middle school programs, the choice of exploratory subjects included in the middle school curriculum is limited (Jackson & Davis, 2000). Brazee (2000) posited that emphasis on students’ safety and excellent performance at national assessment tests may be responsible for limited choice on exploratory subjects included in middle school curriculum. Currently, middle school agricultural educators teach either middle school exclusively or both high and middle schools. The perceptions of agricultural educators on whether to teach agriculture in middle school are important as they are majorly responsible for teaching agricultural knowledge to these young students. Trexler, Johnson, & Heinze (2000) reported that elementary school teachers’ perceptions towards including agriculture, food and natural resources curriculum content in the school program was positive. Furthermore, the inclusion of agricultural content in the middle school curriculum is dependent on other teacher characteristics including level of knowledge, belief, and attitude towards teaching. The level of agricultural knowledge of middle school teachers is also an important factor that determines integration of agricultural topics into the curriculum (Rudd & Hillison, 1995). Talbert, Vaughn, Croom and Lee (2007) also explained the importance of qualified agricultural educators in the success of school-based agricultural education programs:
Agricultural education in the local school community will be only as successful as the skills and abilities of the agriculture teacher will allow. The teacher is essential to the success or failure of the program and must be highly qualified, well trained, and enthusiastic about the profession of teaching. Teachers must not only master the art and practice of teaching, but they must also stay current in the technical content of the profession. Teachers must have professional development plans that allow them to stay abreast of recent developments in the field of agriculture. Even the best teachers become ineffective when the technical content of their lessons become outdated. (p. 57)

Rationale for Teaching Agricultural Education in the Middle School

Basic agricultural knowledge has remained relevant even in the face of other competing discoveries promoted by science and technology. Agricultural knowledge is applicable in real life situations and promotes survival. Knobloch, Ball & Allen (2007) noted that teaching agriculture in elementary and middle school promotes real-life learning. However, many young students have demonstrated little or no knowledge of agriculture despite its relevance to humans. This may be due to limited exposure to real life agricultural experiences both at the home front and school premises. To address this issue, more teaching and learning activities about agriculture need to be organized in schools, especially middle school. Trexler, Johnson, & Heinze (2000) reported elementary and middle school teachers’ positive perceptions about the relevance of school in teaching agricultural knowledge to young students. Furthermore, agricultural educators identified middle school as a tool for promoting FFA membership and engagement in agricultural classes (Rossetti, 1992). Rayfield & Croom (2010) posited that students’ engagement in middle school agricultural classes can further encourage enrollment in high school agricultural classes.

Many students become aware of their career choices and opportunities in middle school. Making career choices for these young students requires exposure to relevant information for proper guidance. The middle school agricultural education program provides career awareness in the agriculture industry to students (National Council for Agricultural Education, 2002). Rossetti
McCaslin (1994) noted that students who take agricultural classes in middle school display more knowledge about agriculture and its industry than their counterparts. Rayfield & Croom (2010) recommended middle school students take classes focused on career awareness in agricultural industry for clearer understanding. Agricultural teachers have identified career awareness as one of the reasons for teaching agricultural education in middle school (Rossetti, Padilla & McCaslin, 1992). Similarly, Rossetti & McCaslin (1994) identified career awareness, agricultural awareness and hands-on learning as advantageous features of agricultural education in the middle school. Teaching agricultural education in middle school can help students make informed decisions about their future career early in life.

Many middle school students start to develop their leadership skills as they transit to adulthood. The leadership component of the agricultural education program in middle school instructs students to achieve this purpose. 4-H and FFA are leadership organizations in agricultural education which train students to develop leadership skills. Skelton et al. (2014) identified the development of leadership skills in addition to other components of agricultural education program in the middle school. Allen, Ricketts, & Priest (2007) posited that students who participated in FFA and or 4-H organizations were more likely to assume leadership positions in agricultural and non-agricultural student organizations in the college. Park & Dyer (2005) noted that many college students have gained leadership experiences prior to college enrollment. More so, the result of their study showed increased participation in college leadership roles among former FFA members than those who were not. Former FFA members in the college achieve academic excellence and participate in extracurricular activities than their peers (Balschweid & Talbert, 2001). Preparing middle school students for current and future leadership roles provides more reasons for teaching agricultural education in the middle school.
Early exposure to the world of agriculture at elementary and middle school levels could promote enrollment in agricultural education program at high school and post-secondary levels. However, Meyers, Dyer & Breja (2003) noted inconsistency in the enrollment in agricultural education programs at post-secondary levels. Presentations using instructional media could be used to arouse the interest of elementary and middle school students, and in agricultural education programs (Meyers, Dyer & Breja, 2003; Nierman & Veak, 1997). Furthermore, middle school serves as a valuable source of agricultural knowledge for students who attend high schools where agricultural education is not included in the curriculum (Flanders & Bell, 2005). Because middle school agricultural education includes varieties of learning activities, students can acquire real life experience that are applicable at post-secondary levels. Middle school students who have developed career interests in agriculture can engage in out-of-school activities that promote their interests.

The nature of agricultural education program at middle school level supports its operation. Middle school agricultural education program may be taught solely or combined with high school program (National FFA Organization, 2009). Similarly, school-based agricultural education teachers are either teaching only middle school or both middle school and high school students. The structure of middle school agriculture education program promotes flexibility and sustainability of program goals up to high school. Middle school structure includes student-centered classrooms, teachers working in teams, and student participation (Lounsbury & Vars, 2003). Even though agricultural education programs are not present in all high schools, their connection between middle school and high school promotes continuity.

The goals of middle school agricultural education program in providing basic knowledge for career awareness, leadership training, agricultural literacy, and personal development
showcases its relevance among students. Teaching agricultural education in middle school is important because it spurs interest and provides background for career pursuits in agriculture. Hands-on activities, experiential learning, classroom and laboratory instructions delivered in middle school agricultural education program foster development of students’ intellectual skills.

**Theoretical Framework**

The theoretical framework for this study was based on the principles of the Theory of Planned Behavior. The Theory of Planned Behavior was developed by Icek Ajzen in 1988 when the principle of behavioral control was included in the Theory of Reasoned Action. The Theory of Planned Behavior can be used for predicting individual behaviors and behavioral intentions. Behavioral intentions can be determined by three basic factors which include attitude towards behavior, subjective norms, and perceived behavioral control (Ajzen, 1988). The attitude towards behavior shows the extent to which personal examination of the behavior yield positive or negative response. The subjective norms include social factors (especially peer pressure) that influence the intention to perform the behavior. Perceived behavioral control is the belief about other factors that promote or hinder the intention to perform the behavior. These factors may include past experiences and other future relevant occurrences (Ajzen, 1991).
The perceptions of agricultural educators regarding teaching agricultural education in middle school can be predicted based on the elucidated determinants of behavioral intentions (Ajzen, 1991). Agricultural educators can either support or oppose the inclusion of agricultural content in the middle school curriculum based on personal beliefs and evaluation of its relevance. Similarly, expectations and influence of other core subject teachers, school administrators, and students can affect the choice of agricultural educators on curriculum content and instructional time allotment. Past experiences of agricultural educators at teaching and learning are also factors that can predict their intended behavior towards teaching agriculture in the middle school.

**Research Questions**

The perceptions of agricultural educators in the middle and high school, and community colleges regarding teaching agriculture in the middle school may determine the level of implementation of its instructional activities. Using the theoretical basis for this research—the
Theory of Planned Behavior, relevant questions that concern teachers’ perceptions about middle school agricultural education can be elicited. The curriculum content, time allotment to instructional activities, and selection of agricultural education as an exploratory subject in cases of limited choices can be explained from the opinions of the teachers. In view of these facts, what are the perceptions of Iowa middle, high school and community college agricultural teachers regarding:

- Teaching agricultural education as an exploratory course in middle school; should agriculture education be taught in middle school or not?
- Topics and subtopics of the AFNR career cluster content standards; should the topics and subtopics be included in the middle school curriculum?
- The duration of teaching an agricultural education curriculum in the middle school in a school year?

Chapter Summary

The relevance of middle school in the current educational system, lives of students, and the society at large explains the reason for its existence. Agricultural education as well as other exploratory courses is included in the middle school curriculum even though this is not true in all middle schools. Agricultural educators and researchers have advocated teaching agricultural education either as a separate exploratory course or as an integrated course in core subject classes. However, there is no agreement among agricultural educators and scholars on time allotment and curriculum content for teaching agricultural education in middle school. It is therefore imperative to ascertain the perceptions of agricultural educators in middle and high school, and their counterparts in community college on these issues.
CHAPTER III. METHODS AND PROCEDURES

This chapter explained the procedures for conducting the study and was further subdivided into eight parts. These include research objectives, research design, population, instrumentation, data collection, data analysis, assumptions for the study and limitation of the study. This was survey research which involved the development and distribution of the study instrument to the target population. The data collected was analyzed based on the research objectives.

Agricultural teachers’ attitudes and decisions on teaching content and teaching methods are major factors that determine the development of agriculture literacy in the society (Malecki, et al., 2004).

The expected outcome of this study is the opinions and attitudes of agricultural teachers toward the inclusion of agricultural awareness concepts in the middle school curriculum. To promote agricultural awareness in the middle school, the study sought teachers’ opinions regarding topics to be included in the middle school curriculum and the allotted time for teaching these topics.

Purpose and Objectives of the Study

The purpose of the study was to determine the perceptions of middle, high school, and community college agricultural educators regarding agricultural awareness concepts and activities in the middle school curriculum. The specific research objectives for this study include

- Identify selected demographic data of middle, high school, and community college agricultural teachers and their programs.
- Identify agricultural teachers’ opinions about teaching agriculture in the middle school.
- Identify perceptions of agricultural teachers regarding teaching selected agricultural course content in the middle school.
- Compare demographic data with the opinions of teachers about teaching agriculture in the middle school and teaching selected course content in the middle school.
• Develop a model for delivery of an agricultural awareness program in the Iowa middle school curriculum.

**Research Design**

The study was conducted using a descriptive survey research design. The research design for this study was applicable because it determined teachers’ perceptions, curriculum topics, and duration of teaching (Ary, Jacobs, & Razavieh, 2002). Prior to the main study, a pilot study which involved thirty agricultural teachers was carried out. The participants of the pilot study were randomly selected from the target population. The researcher collected data using web-based survey for easy access to the study participants (Dillman, Smyth, & Christian, 2009). Prior to carrying out the study, findings that support the study were identified through literature review. Construct validity of the instrument was established by generating variables from the literature and agricultural publications similar to the study. These include Frick (1993), Knobloch & Martin (2000) and Flanders & Bell (2005).

**Subjects for Data**

The Department of Agricultural Education at Iowa State University provided the updated contacts of the target population (N = 292). Thirty agricultural teachers were randomly selected from the target population to participate in the pilot study. The subjects of the main study consisted of Iowa agricultural educators in middle school, high school and community college who did not participate in the pilot-study. The total number of subjects for the main study was two hundred and sixty-two (n = 262). The subjects of the study were chosen to gather detailed information about teaching agriculture education in the middle school. The researcher minimized frame error by ensuring non-duplication of subjects’ names on the contact list of study participants provided.
Instrumentation

The instrument for this study was a questionnaire. A panel of Agricultural Education professors, graduate students and staff in the Department of Agricultural Education and Studies in Iowa State University scrutinized the instrument for construct, content and face validity, and thus prevented the influence of researcher’s bias during the study. The data collected from the pilot-study were used to calculate the reliability coefficient. The researcher determined the reliability of the instrument by computing the Cronbach’s alpha coefficient for the opinion section ($\alpha=0.74$). The survey instrument consisted of four sections-demographics, opinions of the subjects about teaching agriculture in the middle school, opinions regarding teaching selected course content in the middle school, and comments and suggestions. Section one consisted of questions about the demographic information of the subjects. The questions included gender, years of teaching experience, schools where respondents taught, number of unduplicated students in agricultural program, highest level of education, and other subjects taught beside agricultural education.

In section two, opinions of the subjects regarding teaching agriculture in the middle school were measured using a five-point Likert-type scale. Participants indicated their level of agreement with each opinion statement using the Likert-type scale: 1. SD=Strongly Disagree, 2. D=Somewhat Disagree, 3. N=Neutral, 4. A=Somewhat Agree, 5. SA=Strongly Agree. Nineteen opinion statements which included four negative statements were measured.

Section three consisted of opinion statements regarding teaching selected course content in the middle school curriculum. The selected subtopics were sourced from the eight career pathways developed by the National Council for Agricultural Education. The career pathways include Food Products and Processing systems, Agribusiness Systems, Environmental Science Systems, Plant Systems, Animal Systems, Natural Resource Systems, Power, Structural and Technical Systems,
and Biotechnology Systems. Participants were asked to indicate their opinions on the extent to which each selected subtopic should be taught in the middle school using a three-point Likert-type scale: 1=should not be taught in the middle school, 2=should be taught to a limited extent, 3=should be taught to a great extent. Four subtopics were measured under each career pathway while other suggested topics were elicited from the subjects.

Section four consisted of an open-ended question which sought subjects’ suggestions on other agricultural topics that should be included in the middle school curriculum.

**Data Collection**

The researcher commenced data collection after receiving the approval of the research proposal from the Institutional Research Board (IRB) at Iowa State University. The survey instrument was developed and distributed online through Qualtrics. The researcher adopted the web-based method for data collection (Dillman et al., 2009). The informed consent letter was attached to the survey instrument in Qualtrics. The content of the informed consent letter included the purpose of the study, confidentiality, potential usefulness of the study, selection to participate in the study, freedom to withdraw from the study at any time, consent details, and risks associated with participation in the study. Consent was determined based on participation in the study. Regarding the recommendation of Dillman et al. (2009) on appropriate time frame for data collection, the researcher gathered data during the school session when subjects were readily available.

The survey link, which included the informed consent letter was sent to the subjects via email during the first contact. Three weekly follow-up emails were sent to the subjects as reminders for completing the survey. The total valid response gathered from the data collection process was (n=123) at a response rate of 47%. All data were stored within Qualtrics. When response rate is
low, an additional research method that prevents nonresponse error - a threat to external validity is necessary (Linder, Murphy & Briers, 2001). In this study, comparison between early respondents and late respondents was used to control for nonresponse error as suggested by Miller and Smith (1983). The variables used to control for nonresponse error include “years of teaching experience,” the level of agreement with the perception statement - “the latest communication technologies should be used for teaching in agricultural classes,” and opinions about teaching “horticulture” in the middle school curriculum. An independent sample t-test was conducted to determine significant differences between early and late respondents using these variables. There was no significant difference between early and late respondents at .05 level. This result showed that nonresponse error is not a threat to the external validity of this study. The result of the independent sample t-test is presented in table 1 below.

Table 1
Comparison between Early and Late Respondents on Selected Demographic Variables and Opinion Statement

<table>
<thead>
<tr>
<th>Variable</th>
<th>Early Respondents</th>
<th>Late Respondents</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>Mean</td>
<td>SD</td>
</tr>
<tr>
<td>Years of teaching experience</td>
<td>24</td>
<td>11.33</td>
<td>12.039</td>
</tr>
<tr>
<td>The latest communication technologies should be used for teaching in agricultural classes.</td>
<td>25</td>
<td>3.96</td>
<td>.978</td>
</tr>
<tr>
<td>Horticulture</td>
<td>25</td>
<td>2.36</td>
<td>.569</td>
</tr>
</tbody>
</table>
Statistical Data Analysis

Descriptive Statistics

The choice of the statistical techniques used to analyze the data depended on the objectives of the study. Descriptive statistics and inferential statistics were used to analyze the data. The demographic section (research objective one) was analyzed using means, standard deviations, frequencies and percentages.

Inferential Statistics

Agricultural educators' perceptions about teaching agriculture in the middle school (research objective two) were analyzed using t-test and descriptive statistics. Similarly, percentages, means, standard deviations, and independent sample t-tests were used to analyze agricultural educators' perceptions regarding teaching selected agricultural course content in the middle school (research objective three).

To analyze objective four, correlation analyses were conducted

- To predict a relationship between selected demographic characteristics and agricultural educators' perceptions regarding teaching agriculture in the middle school.
- To predict a relationship between selected demographic characteristics and agricultural educators' perceptions regarding teaching selected agricultural course content in the middle school.

The demographic characteristics used in predicting these relationships included years of teaching experience and numbers of unduplicated students in agricultural education program. The demographic characteristics were the independent variables while the overall perceptions of each agricultural educator were the dependent variable.
Similarly, linear regression analyses were performed to determine models predicting the total perceptions regarding teaching agriculture, and selected course content in the middle school. The following demographic data were included as independent variables in the regression analyses: gender, years of teaching experience, number of unduplicated students, highest level of education, types of schools taught, and other subjects taught beside agricultural education. The dependent variables were the overall perceptions regarding teaching agriculture and selected course content in the middle school. Similar responses to the open-ended question in the fourth section of the study instrument were grouped under assigned themes with corresponding frequencies.

The results of the analyses of objectives one to four was used to develop a model for the delivery of an agricultural awareness program in the middle school curriculum. Data from the completed questionnaire was analyzed using Statistical Package for the Social Sciences (SPSS version 23.0). The level of significance for the t-test and regression analysis was set at .05.

Assumptions of the Study

The following assumptions were made regarding the study:

- Each participant of the study was a high school, middle school or community college educator.
- The subjects willingly participated in the study and followed stated instructions.
- The instrument developed for this study was reliable, valid and appropriate for fulfilling the research objectives.
- All participants have a fundamental knowledge about teaching and developing agricultural curriculum.
Limitations/Delimitations

- The study was limited to middle school, high school and community college agricultural educators in Iowa.
- More attention was given to the overall perceptions of study participants than individual perceptions.
- The response rate of the study (47%) may hinder the researcher from generalizing across other states in the United States.

Summary

The study instrument was developed in Qualtrics based on the purpose and objectives of the research study. The pilot and main study were conducted after the questionnaire had been validated, and IRB approval received. The study participants were middle school, high school and community college agricultural educators in Iowa. The researcher collected data using online method by creating a study link sent to participant via email. A total of 47% responses were collected and analyzed in SPSS using descriptive and inferential statistics. Similar responses to the open-ended question in the study instrument were grouped under assigned themes. The results of each analysis were presented in chapter four.
CHAPTER IV. FINDINGS

The purpose of this study was to determine the perceptions of middle, high school and community college agricultural educators regarding agricultural awareness concepts and activities in the middle school curriculum. The specific research objectives for this study include

- Identify selected demographic data of middle, high school and community college agricultural teachers and their programs.

- Identify agricultural teachers’ opinions about teaching agriculture in the middle school.

- Identify perceptions of agricultural teachers regarding teaching selected agricultural course content in the middle school.

- Compare demographic data with the opinions of teachers about teaching agriculture in the middle school and teaching selected course content in the middle school.

- Develop a model for delivery of an agricultural awareness program in the middle school curriculum.

This chapter contains the analyses of the data collected during the study. The data collected were analyzed based on the objectives of the study using the Statistical Package for the Social Sciences (SPSS® version 23). The results of each analysis in relation to the research objectives were presented as findings from the study.

Reliability Test Result

The data collected during the pilot study (n=6) were used to determine the reliability of the study instrument by computing the Cronbach alpha coefficient. In the second section of the instrument, nineteen perception statements which included four negative statements were
measured on a five-point Likert-type scale. The researcher recoded the negative statements into positive statements before calculating the Cronbach alpha coefficient. The Cronbach alpha coefficient, \( \alpha \), for the 19 perception statements was 0.74. George and Mallery (2003) recommended the following rule of thumb for the values of Cronbach alpha coefficient: “\( \_ > .9 \) – Excellent, \( \_ > .8 \) – Good, \( \_ > .7 \) – Acceptable, \( \_ > .6 \) – Questionable, \( \_ > .5 \) – Poor, and \( \_ < .5 \) – Unacceptable” (p. 231). Therefore, the Cronbach alpha coefficient of the study instrument was acceptable.

**Findings Related to Research Objective One: Identify Selected Demographics of Respondents**

The first objective of this study was to identify selected demographic data of middle, high school and community college agricultural teachers and their programs. The selected demographic characteristics of the respondents that were elicited during the study included gender, years of teaching experience, type of school where respondents taught, number of unduplicated students in their agricultural program, respondent’s highest level of education, and other subjects taught beside agricultural education. Means, standard deviations and frequency distributions were used to analyze each of these selected demographic characteristics.

**Gender**

Out of the respondents that participated in the study, 65 were male (53\%) and 57 were female (46\%). Figure 2 below shows the distribution of respondents by gender.
Figure 2. Distribution of respondents by gender.

**Years of teaching experience**

The years of teaching experience of respondents are presented in table 2 below. The average years of teaching experience of respondents was 13.76 years ($SD = 12.07$). Forty-two percent of the respondents had between 0 and 5 years of teaching experience while 9% had between 6 and 10 years of teaching experience. Twenty-two percent of the respondents had taught between 11 and 20 years, 10% of the respondent had between 21 and 30 years teaching experience, and 16% of the respondents had taught for more than 30 years.
Table 2
*Respondents' Years of Teaching Experience*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Categories (years)</th>
<th>Frequency</th>
<th>Percent (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0-5</td>
<td>52</td>
<td>42</td>
</tr>
<tr>
<td></td>
<td>6-10</td>
<td>7</td>
<td>9</td>
</tr>
<tr>
<td>Years of teaching experience</td>
<td>11-20</td>
<td>26</td>
<td>22</td>
</tr>
<tr>
<td></td>
<td>21-30</td>
<td>12</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>&gt;30</td>
<td>19</td>
<td>16</td>
</tr>
</tbody>
</table>

*Note.* n = 116

Schools where respondents taught

As illustrated in Table 3 below, the types of school where respondents taught varied. Some respondents taught in only one school while others taught in multiple schools. Most of the participants taught in both middle and high schools (n = 59, 48%), other participants taught exclusively middle school (n = 1, 1%); exclusively community college (n = 10, 8%); exclusively high school (n = 46, 37%); community college and high school (n = 1, 1%); and middle school, high school, and community college (n = 6, 5%).
Table 3
Schools Where Respondents Taught

<table>
<thead>
<tr>
<th>Variable</th>
<th>Categories</th>
<th>Frequency</th>
<th>Percent (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Schools where respondents taught</td>
<td>Middle and high</td>
<td>59</td>
<td>48</td>
</tr>
<tr>
<td></td>
<td>Only middle school</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Only community college</td>
<td>10</td>
<td>8</td>
</tr>
<tr>
<td>Schools where respondents taught</td>
<td>Only high school</td>
<td>46</td>
<td>37</td>
</tr>
<tr>
<td></td>
<td>Community college and high school</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Middle, high, and community college</td>
<td>6</td>
<td>5</td>
</tr>
</tbody>
</table>

*Note. n = 123*

**Number of unduplicated students in the agricultural education program**

The number of unduplicated students in the respondents’ agricultural program are shown in table 4. The mean of unduplicated students in the respondents’ agricultural education program was 99.58 (SD = 87.59). Agricultural Education program with less than 100 unduplicated students was 76 (65%) while those with 100 to 200 unduplicated students were 37 (32%). Only 4 agricultural education programs (3%) had more than 200 unduplicated students.
Table 4

*Number of Unduplicated Students in Respondents’ Agricultural Education Program*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Categories</th>
<th>Frequency</th>
<th>Percent (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unduplicated students</td>
<td>&lt;100</td>
<td>76</td>
<td>65</td>
</tr>
<tr>
<td></td>
<td>100-200</td>
<td>37</td>
<td>32</td>
</tr>
<tr>
<td></td>
<td>&gt;200</td>
<td>4</td>
<td>3</td>
</tr>
</tbody>
</table>

*Note. n = 117*

**Highest level of education**

As illustrated in table 5, most of the agricultural teachers 77 (63%) had a Bachelor’s degree, 43 (35%) had a Master’s degree while 2 (2%) had a doctoral degree.

Table 5

*Respondents’ Highest Level of Education*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Categories</th>
<th>Frequency</th>
<th>Percent (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Highest Degree</td>
<td>B.A./B.S.</td>
<td>77</td>
<td>63</td>
</tr>
<tr>
<td></td>
<td>M.A./M.S.</td>
<td>43</td>
<td>35</td>
</tr>
<tr>
<td></td>
<td>Ed.D./Ph.D.</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

*Note. n = 122*

**Other subjects taught beside agricultural education**

Other subjects taught beside agricultural education are listed in table 6. Out of the 44 agricultural teachers who indicated other subjects taught in addition to agricultural education, 28 (64%) taught Science, 1 (2%) taught Social Studies, 1 (2%) taught Math, and 14 (32%) taught other subjects. The subjects indicated in the "others" category included computer aided drafting, construction and mechanics, computer networking, leadership, industrial tech, PLTW and
Table 6
Other Subjects Respondent Taught beside Agricultural Education

<table>
<thead>
<tr>
<th>Variables</th>
<th>Categories</th>
<th>Frequency</th>
<th>Percent (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Science</td>
<td>28</td>
<td></td>
<td>64</td>
</tr>
<tr>
<td>Social Studies</td>
<td>1</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Math</td>
<td>1</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Others</td>
<td>14</td>
<td></td>
<td>32</td>
</tr>
</tbody>
</table>

Note. n = 44

Objective 2: Identify agricultural teachers’ opinions about teaching agriculture in the middle school

The second objective of this study was to identify agricultural teachers’ opinions about teaching agriculture in the middle school. Table 7 shows the means, standard deviations, and the frequency distributions for each perception statement. The means of the positive statements ranged from 3.47 to 4.57 while the means of the negative statements ranged from 1.73 to 2.80. These results showed that agricultural teachers have strong positive perceptions about teaching agriculture in the middle school. Most respondents (104, 86%) agreed to strongly agreed with the statement “agriculture should be a major component of middle school curriculum.” Most of the respondents (105, 90%) agreed to strongly agreed with the statement “teaching agriculture in the curriculum promotes learning.” Similarly, most respondents (102, 84%) strongly agreed with the statement “agricultural content is easy to incorporate into the ‘middle school curriculum.’” 108 respondents (90%) also agreed to strongly agreed with the statement “agricultural knowledge promotes career choice among middle school students,” and 114 respondents (94%) agreed to
strongly agreed with “knowledge of agriculture helps students become aware of their environment.” For the negative perception statement, only very few respondents, 34 (28%) agreed to strongly agree with “many middle school students are not interested in taking agricultural classes.” Similarly, very few respondents, 24 (20%) agreed to strongly agree with “agricultural knowledge is difficult to communicate to students in the middle school.” Furthermore, only 8 respondents (7%) agreed to strongly agree with “students should be left to seek agricultural knowledge and skills by themselves,” and only 11 respondents (9%) agreed to strongly agree with “agricultural classes are not as important as other courses in the middle school.”

Table 7  
Frequency Distributions, Means and Standard Deviations of Agriculture Teachers’ Perceptions regarding Teaching Agriculture in the Middle School

<table>
<thead>
<tr>
<th>Perception statement regarding teaching about agriculture in the middle school</th>
<th>$f$</th>
<th>$M$</th>
<th>$SD$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture should be a major component of middle school curriculum.</td>
<td>4</td>
<td>5</td>
<td>8</td>
</tr>
<tr>
<td>Teaching agriculture in the curriculum promotes learning.</td>
<td>2</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Agricultural content is easy to incorporate into the middle school curriculum.</td>
<td>2</td>
<td>7</td>
<td>10</td>
</tr>
<tr>
<td>Agricultural knowledge promotes career choice among middle school students.</td>
<td>2</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>Many middle school students are not interested in taking agricultural classes.</td>
<td>16</td>
<td>33</td>
<td>38</td>
</tr>
</tbody>
</table>
Table 7 continued

Knowledge of agriculture helps students become aware of their environment.  

<table>
<thead>
<tr>
<th></th>
<th>2</th>
<th>1</th>
<th>4</th>
<th>41</th>
<th>73</th>
<th>4.50</th>
<th>.754</th>
</tr>
</thead>
</table>

All middle school students should be taught agriculture regardless of their career choices.  

<table>
<thead>
<tr>
<th></th>
<th>3</th>
<th>6</th>
<th>9</th>
<th>40</th>
<th>63</th>
<th>4.27</th>
<th>.975</th>
</tr>
</thead>
</table>

Agriculture’s image should be addressed in the middle school.  

<table>
<thead>
<tr>
<th></th>
<th>2</th>
<th>4</th>
<th>11</th>
<th>37</th>
<th>67</th>
<th>4.35</th>
<th>.901</th>
</tr>
</thead>
</table>

Agricultural knowledge is difficult to communicate to students in the middle school.  

<table>
<thead>
<tr>
<th></th>
<th>35</th>
<th>43</th>
<th>18</th>
<th>20</th>
<th>4</th>
<th>2.29</th>
<th>1.15</th>
</tr>
</thead>
</table>

Agricultural classes are not as important as other courses in the middle school.  

<table>
<thead>
<tr>
<th></th>
<th>42</th>
<th>51</th>
<th>17</th>
<th>6</th>
<th>5</th>
<th>2.02</th>
<th>1.03</th>
</tr>
</thead>
</table>

Students should be left to seek agricultural knowledge and skills by themselves.  

<table>
<thead>
<tr>
<th></th>
<th>62</th>
<th>39</th>
<th>11</th>
<th>6</th>
<th>2</th>
<th>1.73</th>
<th>.943</th>
</tr>
</thead>
</table>

Middle school agricultural classes should cover areas of agriculture, food and natural resources.  

<table>
<thead>
<tr>
<th></th>
<th>5</th>
<th>1</th>
<th>6</th>
<th>46</th>
<th>63</th>
<th>4.33</th>
<th>.934</th>
</tr>
</thead>
</table>

Contents of agricultural classes should include hands-on activities that promote student participation.  

<table>
<thead>
<tr>
<th></th>
<th>2</th>
<th>3</th>
<th>2</th>
<th>31</th>
<th>83</th>
<th>4.57</th>
<th>.794</th>
</tr>
</thead>
</table>

Students who take agricultural classes in middle school are likely to enroll in agricultural classes in high school.  

<table>
<thead>
<tr>
<th></th>
<th>2</th>
<th>1</th>
<th>9</th>
<th>60</th>
<th>49</th>
<th>4.26</th>
<th>.772</th>
</tr>
</thead>
</table>

Selection of topics for agricultural classes in middle school should be based on students’ interests.  

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>20</th>
<th>32</th>
<th>57</th>
<th>11</th>
<th>3.47</th>
<th>.904</th>
</tr>
</thead>
</table>

Agricultural knowledge should be taught in non-agricultural classes in middle school.  

|                                | 4  | 15 | 34 | 50 | 18 | 3.52 | 1.00 |
Table 7 continued

| Current events in agriculture should be discussed in middle school agricultural classes. | 1 | 4 | 15 | 61 | 40 | 4.12 | .808 |
| Middle school agricultural classes should be updated regularly. | 1 | 2 | 11 | 63 | 44 | 4.21 | .744 |
| The latest communication technologies should be used for teaching in agricultural classes. | 1 | 5 | 19 | 64 | 32 | 4.00 | .816 |

Note. n=121. Original Scale: 1=Strongly Disagree (SD), 2= Disagree (D), 3=Neutral (N), 4=Agree (A) and 5=Strongly Agree (SA)

Objective 3: Identify perceptions of agricultural teachers regarding teaching selected agricultural course content in the middle school

The third objective of this study was to identify agricultural teachers’ opinions regarding teaching selected agricultural course content in the middle school. The selected course content was sourced from the eight career pathway content areas designed by the National Council for Agricultural Education. The opinions of respondents regarding teaching selected course content in the middle school curriculum was measured on a three-point Likert-type scale. Illustrated in table 8 are means, standard deviations, and frequency distributions for each course content. The means of the opinions of respondents regarding extent to which selected course content should be taught in middle school ranged from 1.49 to 2.53. This result indicated that most of the respondents felt the selected course content should be taught to a limited or great extent.

1. Food products and processing Systems: The selected course content under this career pathway include food safety and sanitation, principles of food product development, food processing and
storage, and historical current developments in food industry. More than half of the respondents 75 (64%) indicated that food safety and sanitation should be taught to a limited extent while 38 (32%) respondents believed that it should be taught to great extent. Similarly, 75 (64%) respondents indicated that principles of food product development should be taught to a limited extent while 31 (26%) indicated that it should be taught to great extent. The respondents that indicated that food processing and storage should be taught to a limited and great extent were 85 (72%) and 23 (20%), respectively. Furthermore, 73 (62%) respondents indicated that historical and current developments in the food industry should be taught to a limited extent while 27 (23%) indicated that it should be taught to great extent.

2. **Agribusiness Systems**: The selected course content under the agribusiness systems career pathway include marketing and sales development, business plan development, budget management, farm accounting and record keeping. While 76 (65%) respondents indicated that marketing and sales development should be taught to a limited extent, 32 (27%) indicated that it should not be taught in the middle school. 58 respondents (49%) indicated that business plan development should not be taught in the middle school while 54 (46%) indicated that it should be taught to a limited extent. Conversely, 59 (50%) respondents indicated that budget management should be taught to a limited extent while 36 (31%) indicated that it should not be taught in the middle school. While 56 (48 %) respondents indicated that farm accounting and record keeping should not be taught in the middle school, 45 (38%) indicated that it should be taught to a limited extent, and 17 (14%) indicated that it should be taught to great extent.

3. **Environmental Systems**: The selected course content under the environmental science career pathway include impact of the environment on production agriculture, application of scientific
principles in solving environmental issues, tools, equipment, and machinery and technology common to tasks in environmental systems, and impact of public policies on the environment. More than half of the respondents, 64 (55%) indicated that impact of the environment on production agriculture should be taught to great extent while 51 (44%) indicated that it should be taught to a limited extent. Conversely, more respondents, 73 (62%) indicated that application of scientific principles in solving environmental issues should be taught to a limited extent while 32 (27%) indicated that it should be taught to great extent in the middle school. In addition, 74 (63%) respondents indicated that tools, equipment, and machinery and technology common to tasks in environmental systems should be taught to a limited extent while 31 (26%) indicated that it should not be taught in the middle school. While 49 (42%) respondents indicated that impact of public policies on the environment should be taught to a limited extent, 44 (38%) indicated that it should not be taught in the middle school.

4. **Plant Systems**: The selected course content under the plant systems career pathway include plant propagation techniques, horticulture, crop production and management, and plant anatomy and physiology. Seventy-seven (65%) respondents indicated that plant propagation techniques should be taught to a limited extent while 29 (25%) indicated that it should be taught to great extent. The respondents that indicated that horticulture should be taught to a limited and greater extent were 66 (56%) and 47 (40%), respectively. While 78 (66%) respondents indicated that crop production and management should be taught to a limited extent, 24 (20%) indicated that it should not be taught at middle school. Furthermore, 70 (59%) respondents indicated plant anatomy and physiology should be taught to a limited extent while 36 (31%) indicated that it should be taught to great extent.
5. **Animal Systems**: The selected course content under the animal systems career pathway include animal nutrition, animal anatomy and physiology, animal reproduction, and animal husbandry and welfare. While 81 (69%) respondents indicated that animal nutrition should be taught to a limited extent, 26 (22%) indicated that it should not be taught in the middle school. More than half of the respondents, 67 (57%) indicated that animal anatomy and physiology should be taught to a limited extent while 33 (28%) indicated that it should be taught to great extent in the middle school. 70 (59%) respondents indicated that animal reproduction should be taught to a limited extent while 38 (32%) indicated that it should not be taught in the middle school. The respondents that indicated that animal husbandry and welfare should be taught to a limited and great extent were 46 (39%) and 64 (54%) respondents, respectively.

6. **Natural Resource Systems**: The selected course content under the natural resource systems include analysis of relationship between natural resources and humans, management of natural resources, sustainability of natural resources, and conservation of natural resources. More respondents, 61 (53%) indicated that analysis of the relationship between natural resources and humans should be taught to limited extent than 47 (41%) who indicated that it should be taught to great extent. In addition, the respondents who indicated that management of natural resources should be taught to limited and great extent were 72 (62%) and 36 (31%) respectively. While 72 (62%) respondents indicated that sustainability of natural resources should be taught to limited extent, 33 (28%) indicated that it should be taught to great extent. 75 (64%) respondents indicated that conservation of natural resources should be taught to limited extent while 38 (33%) indicated that it should be taught to great extent.
7. **Power, Structural and Technical Systems**: The selected course content under the power, structural and technical systems include application of engineering principles in solving agriculture, food and natural resource problems, operation and maintenance of agriculture, food and natural resource systems, service and repair of agriculture, food and natural resource systems, planning and building of agriculture, and food and natural resource structures. More than half of the respondents, 66 (56%) indicated that application of engineering principles in solving agriculture, food and natural resource problems be taught to a limited extent while 35 (30%) indicated that it should not be taught in the middle school. Similarly, 65 (55%) respondents indicated that operation and maintenance of agriculture, food and natural resource systems be taught to a limited extent while 35 (30%) indicated that it should not be taught in the middle school. Furthermore, 57 (48%) respondents indicated that service and repair of agriculture, food and natural resource system should be taught to a limited extent while 48 (41%) indicated that it should not be taught in the middle school. The respondents who indicated that planning and building of agriculture, food and natural resource structure be taught to limited extent and should not be taught at all were 71 (60%) and 35 (30 %), respectively.

8. **Biotechnology Systems**: The selected course content under the biotechnology systems career pathway included study of genetic engineering, measurement and calibration of instruments used in biotechnology research, study of recombinant DNA, and application of biotechnology to solve problems in agriculture, food and natural resource systems. 56 (48%) participants indicated that study of genetic engineering should be taught to a limited extent while 52 (44%) indicated that it should not be taught in the middle school. More than half of the respondents, 63 (53%) indicated that measurement and calibration of instruments used in biotechnology research should not be taught in the middle school while 50 (42%) respondents indicated that it should be taught to a
limited extent. Similarly, 62 (53%) respondents indicated that study of recombinant DNA should not be taught in the middle school while 51 (44%) indicated that it should be taught to a limited extent in the middle school. In addition, 63 (53%) respondents indicated that application of biotechnology to solve problems in agriculture, food and natural resource systems should be taught to a limited extent while 42 (36%) indicated that it should not be taught in the middle school.

Table 8
Frequency Distributions, Means and Standard Deviations of Agriculture Teachers’ Perceptions regarding Teaching Selected Course Content in the Middle School

<table>
<thead>
<tr>
<th>Selected course content</th>
<th>f</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Should not be taught</td>
<td>Should be taught to a limited extent</td>
<td>Should be taught to a great extent</td>
</tr>
<tr>
<td>Food Products and Processing Systems</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Historical and current development in food industry</td>
<td>18</td>
<td>73</td>
<td>27</td>
</tr>
<tr>
<td>Food processing and storage</td>
<td>10</td>
<td>85</td>
<td>23</td>
</tr>
<tr>
<td>Principles of food product development</td>
<td>12</td>
<td>75</td>
<td>31</td>
</tr>
<tr>
<td>Food safety and sanitation</td>
<td>5</td>
<td>75</td>
<td>38</td>
</tr>
<tr>
<td>Agribusiness Systems</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Business plan development</td>
<td>58</td>
<td>54</td>
<td>6</td>
</tr>
<tr>
<td>Farm accounting and record keeping</td>
<td>56</td>
<td>45</td>
<td>17</td>
</tr>
<tr>
<td>Marketing and sales development</td>
<td>32</td>
<td>76</td>
<td>10</td>
</tr>
<tr>
<td>Budget management</td>
<td>36</td>
<td>59</td>
<td>22</td>
</tr>
</tbody>
</table>
Table 8 continued

**Environmental Science Systems**

<table>
<thead>
<tr>
<th>Category</th>
<th>Rating</th>
<th>Difficulty</th>
<th>Score</th>
<th>CR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Impact of public policies on the environment</td>
<td>44</td>
<td>49</td>
<td>24</td>
<td>1.83</td>
</tr>
<tr>
<td>Tools, equipment, and machinery and technology common to tasks in environmental systems</td>
<td>13</td>
<td>74</td>
<td>31</td>
<td>2.15</td>
</tr>
<tr>
<td>Application of scientific principles in solving environmental issues</td>
<td>13</td>
<td>73</td>
<td>32</td>
<td>2.16</td>
</tr>
<tr>
<td>Impact of the environment on production agriculture</td>
<td>2</td>
<td>51</td>
<td>64</td>
<td>2.53</td>
</tr>
</tbody>
</table>

**Plant Systems**

<table>
<thead>
<tr>
<th>Category</th>
<th>Rating</th>
<th>Difficulty</th>
<th>Score</th>
<th>CR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crop production and management</td>
<td>16</td>
<td>78</td>
<td>24</td>
<td>2.07</td>
</tr>
<tr>
<td>Plant propagation techniques</td>
<td>12</td>
<td>77</td>
<td>29</td>
<td>2.14</td>
</tr>
<tr>
<td>Plant anatomy and physiology</td>
<td>12</td>
<td>70</td>
<td>36</td>
<td>2.20</td>
</tr>
<tr>
<td>Horticulture</td>
<td>5</td>
<td>66</td>
<td>47</td>
<td>2.36</td>
</tr>
</tbody>
</table>

**Animal Systems**

<table>
<thead>
<tr>
<th>Category</th>
<th>Rating</th>
<th>Difficulty</th>
<th>Score</th>
<th>CR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Animal reproduction</td>
<td>38</td>
<td>70</td>
<td>10</td>
<td>1.76</td>
</tr>
<tr>
<td>Animal nutrition</td>
<td>26</td>
<td>81</td>
<td>11</td>
<td>1.87</td>
</tr>
<tr>
<td>Animal anatomy and physiology</td>
<td>18</td>
<td>67</td>
<td>33</td>
<td>2.13</td>
</tr>
<tr>
<td>Animal husbandry and welfare</td>
<td>8</td>
<td>46</td>
<td>64</td>
<td>2.47</td>
</tr>
</tbody>
</table>

**Natural Resource Systems**

<table>
<thead>
<tr>
<th>Category</th>
<th>Rating</th>
<th>Difficulty</th>
<th>Score</th>
<th>CR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sustainability of natural resources</td>
<td>12</td>
<td>72</td>
<td>33</td>
<td>2.18</td>
</tr>
<tr>
<td>Management of natural resources</td>
<td>9</td>
<td>72</td>
<td>36</td>
<td>2.23</td>
</tr>
<tr>
<td>Conservation of natural resources</td>
<td>4</td>
<td>75</td>
<td>38</td>
<td>2.29</td>
</tr>
<tr>
<td>Analysis of the relationship between natural resources and humans</td>
<td>8</td>
<td>61</td>
<td>47</td>
<td>2.34</td>
</tr>
</tbody>
</table>
Table 8 continued

**Power, Structural and Technical Systems**

<table>
<thead>
<tr>
<th>Service and repair of agriculture, food and natural resource systems</th>
<th>48</th>
<th>57</th>
<th>13</th>
<th>1.70</th>
<th>.658</th>
</tr>
</thead>
<tbody>
<tr>
<td>Planning and building of agriculture, food and natural resource structures</td>
<td>35</td>
<td>71</td>
<td>12</td>
<td>1.81</td>
<td>.603</td>
</tr>
<tr>
<td>Application of engineering principles in solving agriculture, food and natural resource problems</td>
<td>35</td>
<td>66</td>
<td>17</td>
<td>1.85</td>
<td>.649</td>
</tr>
<tr>
<td>Operation and maintenance of agriculture, food and natural resource systems</td>
<td>35</td>
<td>65</td>
<td>18</td>
<td>1.86</td>
<td>.657</td>
</tr>
</tbody>
</table>

**Biotechnology Systems**

| Study of recombinant DNA | 62 | 51 | 3 | 1.49 | .552 |
|---------------------------------------------------------------|----|----||      |  |
| Measurement and calibration of instruments used in biotechnology research | 63 | 50 | 5 | 1.51 | .581 |
| Study of genetic engineering | 52 | 56 | 10 | 1.64 | .634 |
| Application of biotechnology to solve problems in agriculture, food and natural resource systems | 42 | 63 | 13 | 1.75 | .640 |

*Note. n=111. Original Scale: 1 = should not be taught, 2 = should be taught to a limited extent, 3 = should be taught to a great extent*

**Objective 4:** Compare demographic data with the opinions of teachers about teaching agriculture in the middle school and teaching selected course content in the middle school

The fourth objective of this study was to compare selected demographic data with the opinions of teachers about teaching agriculture and selected course content in the middle school. T-test, correlation, and regression analyses were used to determine significant differences, linear
relationships and predictions among the dependent (total perceptions) and the independent (selected demographic data) variables respectively.

**T-test**

The researcher conducted t-tests to determine mean differences between the groups of agricultural teachers on their overall perceptions about teaching agriculture, and selected course content in the middle school. The overall perceptions about teaching agriculture and selected course content in the middle school were derived from the total responses of each respondent on the Likert-type scale. The groups of respondents included agricultural teachers teaching exclusively in community college \((n = 10, 8\%)\); exclusively in high school \((n = 46, 37\%)\); exclusively in middle school \((n = 1, 1\%)\); middle school and high school \((n = 59, 48\%)\); high school and community college \((n = 1, 1\%)\); and middle school, high school, and community college \((n = 6, 5\%)\). Due to the group sizes and composition, the researcher combined small and similar groups. All groups were collapsed into two—those who taught at one school level, and those who taught at more than one school level. An independent sample t-test was conducted to determine mean differences in the perceptions of teachers who taught at one school level and those who taught at more than one school level. As illustrated in table 9, there was no significant difference in the perceptions of agricultural teachers who taught at one school level \((M = 71.83, SD = 7.50)\) and those who taught at more than one school level \((M = 72.14, SD = 8.39)\); \(t(116) = -.208, p > 0.05\).
Table 9
Result of T-test and Descriptive Statistics for Perceptions regarding Teaching Agriculture in the Middle School by Groups of Agriculture Teachers

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Group</th>
<th>95% CI for Mean Difference</th>
<th>t</th>
<th>df</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>aOne school level</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>bMore than one school levels</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perceptions</td>
<td>71.83 7.50 54</td>
<td>72.14 8.39 64</td>
<td>-3.23, 2.62</td>
<td>.208 116</td>
</tr>
</tbody>
</table>

*Note:* a teachers who taught at one school level b teachers who taught at more than one school level

The result of the t-test of perceptions of agricultural teachers regarding teaching selected course content in the middle school and the groups of agricultural teachers is shown in table 10. Regarding teaching selected course content in the middle school, there was no significant difference in the perceptions of agricultural teachers who taught at one school level ($M = 64.38, SD = 9.67$) and those who taught at more than school level ($M = 64.0, SD = 9.72$); $t(109) = .208, p > 0.05$.

Table 10
Result of T-test and Descriptive Statistics for Perceptions regarding Teaching Selected Course Content in the Middle School by Groups of Agriculture Teachers

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Group</th>
<th>95% CI for Mean Difference</th>
<th>t</th>
<th>df</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>aOne school level</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>bMore than one school levels</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perceptions</td>
<td>64.38 9.67 52</td>
<td>64.00 9.72 59</td>
<td>-3.27, 4.04</td>
<td>.208 109</td>
</tr>
</tbody>
</table>

*Note:* a teachers who taught at one school level b teachers who taught at more than one school level

**Correlations**

Linear relationships between the continuous variables in the demographic data and each perception statement in the section 2 of the questionnaire were determined. Similarly, the
correlations between continuous variables in the demographic data and each course content in the section 3 of the questionnaire were determined. Among the demographic data, only two are continuous variables. These are the years of teaching experience and number of unduplicated students. The magnitude of relationships was determined using Davis’ (1971) rules. The following are the magnitude of correlation coefficients: .01 to .09 – Negligible association, .10 to .29 – Low association, .30 to .49 – Moderate association, .50 to .69 – Substantial association, .70 and higher – Strong association (Davis, 1971). As shown in tables 11 and 12, results of the Pearson correlation between selected demographic data and perception statements indicated that there was a positive but weak relationship between “years of teaching experience” and the perception statement “agricultural knowledge promotes career choice among middle students,”  \( r (112) = .22, p = 0.02. \) In addition, there was an inverse relationship between “years of teaching experience” and the perception statement “selection of topics for agricultural classes in middle school should be based on student interest,”  \( r (112) = -.20, p = 0.03. \) There was an inverse relationship between “number of unduplicated students” and the perception statement “agriculture’s image should be addressed in middle school,”  \( r (113) = -.18, p = 0.05. \) In addition, there was an inverse relationship between “number of unduplicated students” and the perception statement “middle school agricultural classes should cover areas of agriculture, food and natural resources,”  \( r (113) = -.2.3, p = 0.01. \)
Table 11
*Pearson’s Product-Moment Correlations between Perceptions regarding Teaching Agriculture in the Middle School and Years of Teaching Experience*

<table>
<thead>
<tr>
<th>Perception statement</th>
<th>Teaching Experience</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perception statement 1</td>
<td>$r$ 1 .22*</td>
</tr>
<tr>
<td>$p$</td>
<td>.02</td>
</tr>
<tr>
<td>$n$</td>
<td>112 112</td>
</tr>
<tr>
<td>Perception statement 2</td>
<td>$r$ 1 -.20*</td>
</tr>
<tr>
<td>$p$</td>
<td>.03</td>
</tr>
<tr>
<td>$n$</td>
<td>112 112</td>
</tr>
</tbody>
</table>

Note. *Perception statement1= “agricultural knowledge promotes career choice among middle students. *Perception Statement 2 = “selection of topics for agricultural classes in middle school should be based on student interest”. $r =$ Pearson correlation coefficient. Magnitude: .01 $\geq r \geq .09 =$ Negligible, .10 $\geq r \geq .29 =$ Low, .30 $\geq r \geq .49 =$ Moderate, .50 $\geq r \geq .69 =$ Substantial, r $\geq .70 =$ Very Strong (Davis, 1971). *$p < .05$.

Table 12
*Pearson’s Product-Moment Correlations between Perceptions Regarding Teaching Agriculture in the Middle School and Number of Unduplicated Students*

<table>
<thead>
<tr>
<th>Perception statement</th>
<th>NOUS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perception statement 1</td>
<td>$r$ 1 .18*</td>
</tr>
<tr>
<td>$p$</td>
<td>.05</td>
</tr>
<tr>
<td>$n$</td>
<td>113 113</td>
</tr>
<tr>
<td>Perception statement 2</td>
<td>$r$ 1 -.23*</td>
</tr>
<tr>
<td>$p$</td>
<td>.01</td>
</tr>
<tr>
<td>$n$</td>
<td>113 113</td>
</tr>
</tbody>
</table>

Note. NOUS = Number of Unduplicated Students, *Perception statement1= “agriculture’s image should be addressed in middle school”; *Perception Statement 2 = “middle school agricultural classes should cover areas of agriculture, food and natural resources”. $r =$ Pearson correlation coefficient. Magnitude: .01 $\geq r \geq .09 =$ Negligible, .10 $\geq r \geq .29 =$ Low, .30 $\geq r \geq .49 =$ Moderate, .50 $\geq r \geq .69 =$ Substantial, r $\geq .70 =$ Very Strong (Davis, 1971). *$p < .05$.
The results of the Pearson correlation between selected demographic data and perceptions regarding teaching selected course content are reflected in tables 13 and 14. There was a positive but weak relationship between “years of teaching experience” and the course content “marketing and sales development,” $r (109) = .23, p = .02$. There was an inverse relationship between “number of unduplicated students” and the course content “food processing and storage,” $r (109) = -.22, p = .02$. There was also an inverse relationship between “number of unduplicated students” and the course content “conservation of natural resources,” $r (109) = .20, p = .03$. However, there was a positive relationship between number of unduplicated students” and the course content “measurement and calibration of instruments used in biotechnology research,” $r (110) = -.19, p = .05$.

Table 13
Pearson’s Product-Moment Correlations between Perceptions regarding Teaching Agriculture in the Middle School and Years of Teaching Experience

<table>
<thead>
<tr>
<th>Course Content1</th>
<th>Teaching Experience</th>
</tr>
</thead>
<tbody>
<tr>
<td>$r$</td>
<td>1</td>
</tr>
<tr>
<td>$p$</td>
<td>.23*</td>
</tr>
<tr>
<td>$n$</td>
<td>109</td>
</tr>
</tbody>
</table>

Note. Course content1 = “marketing and sales development”. $r = $ Pearson correlation coefficient. Magnitude: .01 ≥ $r$ ≥ .09 = Negligible, .10 ≥ $r$ ≥ .29 = Low, .30 ≥ $r$ ≥ .49 = Moderate, .50 ≥ $r$ ≥ .69 = Substantial, $r$ ≥ .70 = Very Strong (Davis, 1971). *p < .05.
Table 14

Pearson's Product-Moment Correlations between Perceptions regarding Teaching Agriculture in the Middle School and Number of Unduplicated Students

<table>
<thead>
<tr>
<th>Course Content1</th>
<th>Course Content2</th>
<th>Course Content3</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>r</strong></td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td><strong>p</strong></td>
<td>-0.22*</td>
<td>-0.20*</td>
</tr>
<tr>
<td><strong>n</strong> 109</td>
<td>109</td>
<td>109</td>
</tr>
</tbody>
</table>

Note. NOUS = Number of Unduplicated Students, Course Content1 = "food processing and storage", Course Content2 = "conservation of natural resources", Course Content3 = "measurement and calibration of instruments used in biotechnology research", $r$ = Pearson correlation coefficient. Magnitude: $0.01 \geq r \geq 0.09 =$ Negligible, $0.10 \geq r \geq 0.29 =$ Low, $0.30 \geq r \geq 0.49 =$ Moderate, $0.50 \geq r \geq 0.69 =$ Substantial, $r \geq 0.70 =$ Very Strong (Davis, 1971). *$p < 0.05$.

Regression analyses

Multiple linear regression analyses to determine a model predicting the total perceptions regarding teaching agriculture, and teaching selected course content in middle school from the demographic data were conducted. The demographic data included gender, years of teaching experience, number of unduplicated students, highest level of education, type of school taught, and other subjects taught beside agricultural education. The dependent variables were the overall perceptions regarding teaching agriculture and selected course content in the middle school while
the independent variables were the demographic data. The nominal variables in the demographic data were dummy coded to dichotomous variables. After dummy coding the nominal variables, the new list of the independent variables included gender, years of teaching experience, number of unduplicated students, “whether or not possess a bachelor’s degree,” “whether or not teach in community college,” and “whether or not teach science beside agriculture.” Table 15 presents the result of the multiple linear regression analysis. The result showed that none of the independent variables was a significant predictor of the perceptions regarding teaching agriculture in the middle school (F (6, 98) = 1.64, p > 0.05.

Table 15
Multiple Linear Regression Analysis of the Overall Perceptions regarding Teaching Agriculture in the Middle School and Selected Demographic Characteristics

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regression</td>
<td>6</td>
<td>84.72</td>
<td>1.63</td>
<td>.145</td>
</tr>
<tr>
<td>Residual</td>
<td>98</td>
<td>51.73</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>104</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

As shown in table 16, none of the independent variables was a significant predictor of the perceptions regarding teaching selected course content in the middle school (F (6, 91) = 1.25, p > 0.05.

Table 16
Multiple Linear Regression Analysis of the Overall Perceptions regarding Teaching Selected Course Content in the Middle School and Selected Demographic Characteristics

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regression</td>
<td>6</td>
<td>96.31</td>
<td>1.07</td>
<td>.381</td>
</tr>
<tr>
<td>Residual</td>
<td>90</td>
<td>89.26</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>96</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Suggestions of Iowa Agricultural Teachers regarding Teaching Agriculture in the Middle School

Suggestions of the respondents regarding teaching agriculture in the middle school were elicited in the fourth section of the questionnaire. A total response (n = 48, 39%) were received on the open-ended question: “What suggestions do you have for agriculture being taught in the middle school?” The suggestions of respondents were summarized in table 17 below. All the responses to the open-ended questions of the section four of the questionnaire were listed in Appendices C and D.

Table 17  
*Summary of Comments regarding Teaching Agriculture in the Middle School*

<table>
<thead>
<tr>
<th>Comments</th>
<th>f</th>
<th>Percent (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Comments indicating benefits of teaching agriculture in the middle school</td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td>Comments on the needs of agriculture teachers in the middle school</td>
<td>6</td>
<td>12</td>
</tr>
<tr>
<td>Comments on the duration of class instructions</td>
<td>8</td>
<td>17</td>
</tr>
<tr>
<td>Comments on topics, instructional content, and activities</td>
<td>30</td>
<td>63</td>
</tr>
</tbody>
</table>

*Note. n =48*

Suggestions of Iowa Agricultural Teachers Regarding Teaching Selected Course Content in the Middle School

In the fourth section of the questionnaire, respondents were asked to indicate other suggested topics that should be taught in the middle school. Table 18 presents the list of suggested agricultural topics for the middle school curriculum. A total response (n =23, 18%) were received on the open-
ended question: “other suggested topics.” All the responses to the open ended-questions of the third section of the questionnaire were listed in Appendices C and D.

Table 18
*Summary of Suggested Agricultural Topics for Middle School Curriculum*

<table>
<thead>
<tr>
<th>Suggested Topics</th>
<th>$f$</th>
<th>Percent (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cooking</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Landscaping</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Pet care basics</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Importance of agriculture</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>General agriculture and state information</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>FFA history and knowledge</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Impact of agriculture</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>History of agriculture</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Agricultural technology</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Basics of agriculture</td>
<td>2</td>
<td>9</td>
</tr>
<tr>
<td>Energy</td>
<td>2</td>
<td>9</td>
</tr>
<tr>
<td>Farm and agricultural safety</td>
<td>2</td>
<td>9</td>
</tr>
<tr>
<td>Leadership</td>
<td>3</td>
<td>13</td>
</tr>
<tr>
<td>Career</td>
<td>5</td>
<td>22</td>
</tr>
</tbody>
</table>

*Note. n = 23*

**Summary**

Results of statistical tests and analyses were reported in this chapter based on the objectives of the study. The report included figure, tables, and numbers used to illustrate the trends of relationships, predictions, and opinions of respondents regarding teaching agriculture and selected
course content in the middle school. The interpretation of these results will be elaborated in the next chapter.
CHAPTER V. DISCUSSION

The purpose of this study was to determine the perceptions of middle, high school, and community college agricultural educators regarding agricultural awareness concepts and activities in the middle school curriculum. The specific research objectives for this study include

- Identify selected demographic data of middle, high school, and community college agricultural teachers and their programs.
- Identify agricultural teachers’ opinions about teaching agriculture in the middle school.
- Identify perceptions of agricultural teachers regarding teaching selected agricultural course content in the middle school.
- Compare demographic data with the opinions of teachers about teaching agriculture in the middle school and teaching selected course content in the middle school.
- Develop a model for delivery of an agricultural awareness program in the middle school curriculum.

The findings of the previous chapter are interpreted in this chapter to provide further understanding on the importance of teaching agriculture in the middle school. While the findings are based on the perceptions of different groups of agriculture educators, they support existing literatures and create new knowledge. The interpretation of the findings provides a holistic view of agricultural awareness in the middle school and how it can be conducted effectively.

Demographics of Respondents

The respondents of this study included agricultural educators teaching middle school, high school, and community college. Out of the 262 agricultural educators contacted for participation
in this study, 123 responded. Among respondents, 54% were male and 46% were female. This data is comparable to the national population of agriculture teachers; 43% female, 57% male (Foster, Lawver, & Smith, 2014). There is a considerable number of agriculture teachers who are new to the profession in the state of Iowa. The findings of this study show that both highly and less experienced Iowa agriculture teachers taught in the middle school. Only a few agriculture teachers who have teaching experience ranging between 6 and 10 years taught in the middle school. The shortage in this category of teachers may be due to teacher attrition prevalent in the teaching profession (Ingersoll, 2003). However, more experienced agriculture teachers taught in the middle school than their less experienced counterparts. Most of the agriculture teachers have a Bachelor’s degree as their highest level of education even though more than one third have an additional Master’s degree. The statistics of Bachelor’s degree holders may be related to the considerable number of agriculture teachers who are new to the profession.

The types of schools where respondents taught varied. Many respondents taught at more than one school levels (n = 66, 64%). Most of the agriculture teachers taught at both middle and high school levels (n = 59, 48%). However, many agriculture teachers taught exclusively at the high school level (n = 46, 37%). In addition, few agriculture teachers taught at three school levels (n = 6, 5%). Even though there is an increase in the number of agriculture teachers who taught only middle school from a previous study by Kantrovich (2010), most of the agriculture teachers taught both middle and high school.

In addition to agricultural education, few agriculture teachers taught other subjects. These included science, animal science, landscaping, social studies, and math, among others. More agriculture teachers taught science than any other subject. This supports the report of Hillison (1998) agricultural content can be integrated into other non-agricultural classes. This finding also
partly supports the argument of Rossetti and McCaslin (1994) that agriculture content should be integrated into the core courses of the middle school curriculum.

Even though agriculture education classes are offered as electives in most middle and high schools, the numbers of students who register for these classes are considerably high. More than one-third of the respondents have between 100 and 200 unduplicated students in their agricultural programs. This indicates a moderate level of student interest in agriculture as there were other electives that could be chosen in lieu of agricultural education. This finding is congruent with the assertion of Rayfield and Croom (2010) that middle school serves as a fundamental stage for students who are interested in agriculture.

The professional characteristics of the respondents show that the middle school agriculture education program is conducted by teachers who can promote its effectiveness. This is contrary to one of the reasons identified by Anfara (2001), who identified a lack of competent teachers as reducing the quality of middle school programs. The presence of young teachers who are new to the profession can promote use of recent technologies that support teaching methods. More so, the highly experienced agriculture teachers can provide guidance and support for the less experienced teachers through collaborative teaching and professional development. Having young agriculture teachers in the middle school can foster more teacher-student relationship as students may be more comfortable talking to young teachers. The young teachers can also serve as role models for middle school students who were interested in pursuing careers in the agricultural industry. The presence of new agriculture teachers who are well educated in the middle school classroom can further eliminate common misconceptions about agriculture as reported by Blackburn (1999) and Holz-Clause & Jost, (1995).
Opinions about Teaching Agriculture in the Middle School

Opinions about teaching agriculture in the middle school were identified by measuring nineteen perception statements on a five-point Likert-type scale. Even though the opinions of agriculture teachers regarding teaching agriculture in the middle school varied, they have a moderately high average score on the positive statements. Similarly, the low average scores on the negative statements indicated agricultural teachers’ positive perceptions regarding teaching agriculture in the middle school. These findings support the report of Trexler et al. (2000). Beside elementary school teachers, other agriculture teachers also have positive perceptions regarding teaching agriculture in the middle school. Particularly, most of the agriculture teachers are highly supportive of integration, teaching, and perceived benefits of agriculture in the middle school curriculum. In addition, most of the agriculture teachers differ with the negative perception statements that indicated “low student interest in agriculture education,” “incomprehensible course content,” “low relevance of agriculture in the curriculum,” and “carelessness about teaching agriculture in the middle school.” In fact, the perception statement “students should be left to seek agricultural knowledge and skills by themselves” had the lowest mean score among the nineteen perception statements. The combined responses of agricultural teachers to the perception statements showed that middle school agricultural education program is fully supported by its instructors. Furthermore, the responses of agricultural teachers on selected perception statements corroborated assertions about middle school agriculture in the literature. For instance, most of the agriculture teachers believed that agricultural education promotes student career choice and environmental awareness just as it was posited by National FFA Association (2015).

Although only very few agriculture teachers supported the statement that “many middle school students are not interested in taking agricultural classes,” many teachers were indifferent
about this opinion. The level of student interest in agriculture may be affected by different factors that include family background, where they live, gender, membership in social organizations among other factors. The neutral responses of agriculture teachers to this perception statement stems from their teaching experience. While some teachers have more students taking agricultural education classes, others have very few students as reflected in the data collected for this study. However, there is a considerable population of agricultural students in many schools where respondents taught.

The positive perceptions of teachers regarding teaching agriculture in the middle school is a strong foundation for increased agricultural awareness efforts in the middle school. Since teachers are being looked upon to address misconceptions about agriculture common among young students, their positive perceptions will promote this effort. Per Ajzen’s theory of planned behavior, the perceived behavioral intentions of agriculture teachers as indicated in these findings support agricultural awareness in the middle school. Furthermore, the perceived behavioral control, which determine individual responses to a cause, is affected by past experiences and future relevance of the cause. Consideration of agricultural awareness using agriculture teachers’ experiences showed that more highly and less experienced agriculture teachers have indicated their support towards this cause. The future relevance of effective agricultural awareness program among middle school students is unquantifiable. Most of the agriculture teachers believed that agricultural awareness at the middle school level promote student career interest in agriculture while developing their intellectual skills.

**Opinions about Teaching Selected Agricultural Course Content in the Middle School**

The National Council for Agricultural Education has developed an Agriculture, Food, and Natural Resources (AFNR) Career Cluster. The eight career pathways in the AFNR cluster consist
of suggested agricultural topics and subtopics that can be included in the school-based agricultural curriculum. Few topics from the AFNR cluster were selected, and the opinions of agricultural teachers regarding the degree to which these topics should be taught were measured on a three-point Likert-type scale. The range of the average scores of the agriculture teachers showed that participants felt most of the selected courses should be taught to a limited or great extent. In other words, agriculture teachers have moderate to high positive perceptions regarding teaching selected course content of the AFNR cluster in the middle school.

Under each career cluster, four topics were selected to determine agriculture teachers’ perceptions regarding these topics. Most of the agriculture teachers indicated that all the selected topics under the Food Products and Processing Systems should be taught to a limited extent in the middle school curriculum. The selected topics include food safety and sanitation, principles of food product development, food processing and storage, and historical current developments in food industry. While some agriculture teachers indicated that these topics should be taught to great extent, only very few indicated that it should not be taught at all in the middle school. These findings partly support the suggested list of agricultural topics that should be taught in the middle school as proposed by Frick (1993).

There were more diverse opinions regarding teaching selected topics under the Agribusiness Systems career pathways. The selected topics under this pathway include marketing and sales development, business plan development, budget management, farm accounting, and record keeping. Most of the agriculture teachers indicated that marketing and sales development, and budget management should be taught to great extent. However, some teachers indicated that these topics should not be taught at all in the middle school. Furthermore, most teachers indicated that business plan development, and farm accounting and record keeping should not be taught at
all in the middle school. In addition to the lists of Frick (1993), the findings of this study show that marketing and sales development, and budget management should be taught in the middle school.

Most of the respondents indicated that impact of the environment on production agriculture should be taught to great extent in the middle school. Even though past studies (Flanders & Bell, 2005; Frick, 1993) emphasized inclusion of environmental studies in the middle school curriculum, very few agriculture teachers perceived that impact of public policies on the environment should be taught to great extent in the middle school. More so, agriculture teachers believed that application of scientific principles in solving environmental issues, and tools, equipment, and machinery and technology common to tasks in environmental systems should be taught to a limited extent.

Most of the agriculture teachers indicated that topics under Plant Systems should be taught to a limited extent in the middle school. These topics include plant propagation techniques, horticulture, crop production and management, and plant anatomy and physiology. Most agricultural teachers indicated that horticulture should be taught to great extent than other topics. Only very few teachers indicated that selected topics under the Plant Systems should not be taught at all in the middle school. The comprehensive curriculum for eighth grade suggested by Flanders and Bell (2005) was likely to contain some of these topics.

Like Plant Systems career pathway, agriculture teachers indicated that most of the topics under Animal Systems career pathway should be taught to a limited extent. However, most agriculture teachers indicated that animal husbandry and welfare should be taught to great extent in the middle school. The frequent teaching of this topic in the middle school informs students about pet keeping, animal farming, and their associated logistics. Many agriculture teachers also indicated that animal reproduction should not be taught at all in the middle school. Even though
the reason for this observation among agriculture teachers was not clear, it may be due to the needs of the middle school students. Furthermore, most of the agriculture teachers indicated that topics under the Natural Resource Systems career pathway should be taught to a limited extent in the middle school curriculum. However, many agriculture teachers indicated that analysis of the relationship between natural resources and humans should be taught to great extent than other topics under the Natural Resource Systems career pathway. Like some of the career pathways, only few agriculture teachers indicated that topics under Natural Resource Systems should not be taught at all in the middle school. This finding is congruent with part of the lists of agricultural topics Frick (1993) suggested should be taught in school-based agricultural education programs.

Unlike some other career pathways, more agriculture teachers indicated that selected topics under Power, Structural and Technical Systems should not be taught at all in the middle school. Three out of the four topics under this career pathway had the same number of teachers indicating that they should not be taught at all in the middle school. Even though the National FFA (2006) recommended teaching technical content to eighth grade students, many teachers indicated that service and repair of agriculture, food and natural resource systems should not be taught at all in the middle school.

Biotechnology Systems, a new career pathway, consist of the following selected topics; study of genetic engineering, measurement and calibration of instrument used in biotechnology research, study of recombinant DNA, and application of biotechnology to solve problems in agriculture, food and natural resource systems. Most of the agriculture teachers indicated that measurement and calibration of instruments used in biotechnology research, and study of recombinant DNA should not be taught at all while the other two topics should be taught to a limited extent in the middle school. Teaching science related courses in the agricultural education
classes shows that agriculture content can be integrated into other related subjects as proposed by Rossetti and McCaslin (1995). Early introduction of middle school students to science and engineering related topics in the agricultural education class can also promote career interest in these fields.

Most of the topics that can be taught to a limited or great extent in the middle school as indicated by agriculture teachers support the three-circular model of agriculture education. While some of these topics require hands-on teaching methods in the laboratory, others are learned through in-class instructions or supervised agricultural experience. In most middle schools, agricultural classes are taught within a very short period, and teachers are limited on their choice of topics. The agreement of agriculture teachers on the instructional content of the middle school curriculum will promote its effectiveness. Furthermore, it will promote the development of curriculum that provides equal exposure to agriculture among middle school students. Teaching appropriate course content in the middle school agricultural classes enhances the effective use of allotted time. While some studies have advocated for prolonged agricultural education program in the school year, the quality of the teaching contents is also important. One of the reasons agriculture teachers indicated that some courses should not be taught at all in the middle school could be due to limited instructional time. Therefore, to achieve the learning outcomes, the instructional time allotted to agricultural classes in the middle school should match learning content.

**Comparisons among Agriculture Teachers**

To further understand the perceptions of agriculture teachers regarding teaching agriculture and selected course content in the middle school, several statistical tests were conducted. T-tests were performed to determine the existence of significant differences between two groups of
agriculture teachers regarding teaching agriculture and selected course content in the middle school. The two groups included teachers who taught at one school level and those who taught at more than one school level. There was no significant difference between these two groups of agriculture teachers on their perceptions regarding teaching agriculture in the middle school. Even though the mean score of teachers who taught at more than one school level was slightly higher than those who taught at one school level, the mean difference was not statistically significant. Similarly, the result of the t-test regarding teaching selected course content in the middle school showed that there was no significant difference in the perceptions of agriculture teachers. These results showed that most agriculture teachers have strong and positive perceptions and similar opinions regarding teaching agriculture and selected course content in the middle school curriculum.

Furthermore, linear relationships between selected demographic characteristics and each perception statement were studied using the Pearson product moment correlations. The independent variables were years of teaching experience, and number of unduplicated students while perception statements and selected course content were the dependent variables. There were some levels of association between years of teaching experience and some perception statements. Firstly, highly experienced agriculture teachers strongly agreed that “agricultural knowledge promotes career choice among middle students.” This supports the assertion of Rossetti, Padilla and McCaslin (1992). However, highly experienced agriculture teachers indicated low perceptions regarding “selection of topics for agricultural classes in middle school should be based on student interests.” This may be due to the perceptions of teachers regarding the maturity of middle school students at making quality choices. Furthermore, highly experienced agriculture teachers supported frequent teaching of marketing and sales development in the middle school curriculum.
Based on the number of unduplicated students, teachers who have more unduplicated students in their agricultural program agreed with the statement “agriculture’s image should be addressed in middle school.” They also agreed that measurement and calibration of instruments used in biotechnology research should be taught to a limited or great extent in the middle school. According to table 7 in chapter 4, these teachers are among the 55 teachers who supported teaching measurement and calibration of instruments used in biotechnology research in the middle school. However, some of these agriculture teachers indicated low or neutral perceptions regarding the perception statement, “middle school agricultural classes should cover areas of agriculture, food and natural resources.” In addition, they indicated that food processing and storage and conservation of natural resources should be taught to a limited extent in the middle school.

To determine any significant predictors of the overall perception of agriculture teachers regarding teaching agriculture or selected content in the middle school, regression analyses were conducted. The predictors were the demographic characteristics of the agriculture teachers. Among the demographic characteristics, there was no significant predictor of the overall perceptions of agriculture teachers regarding teaching agriculture and selected course content in the middle school. Even though the overall perception score of agriculture teachers regarding teaching agriculture and selected courses in the middle school slightly varied, they cannot be explained by their demographic characteristics. These include gender, years of teaching experience, schools where respondents taught, number of unduplicated students, highest level of education and other subjects taught beside agriculture.

Suggestions regarding Teaching Agriculture in the Middle School

In addition to the responses indicated on the Likert-type scale, respondents were asked for personal suggestions regarding teaching agriculture in the middle school. Forty-eight agriculture
teachers provided suggestions on teaching agriculture in the middle school. Suggestions were further categorized based on similarities, and themes were assigned. The assigned themes included

- Comments on the duration of class instructions
- Comments on topics, instructional content, and activities
- Comments regarding the benefits of teaching agriculture in the middle school

**Comments on the duration of class instructions**

Eight agriculture teachers commented on the duration of agricultural education class instruction. The suggested durations for agricultural education program in the middle school include 6 weeks, 7 weeks, 9 weeks and 18 weeks. The reasons for these suggested durations include “increased student knowledge,” “collaboration with core subjects,” “support teachers schedule,” “opportunity for students to take other electives,” and “meeting the needs of students.” Rossetti and McCaslin (1994) recommended that agricultural education classes should be taught two to three times on a weekly basis within a short class time of about 30 minutes per teaching session. However, one of the teachers complained about inadequate time to teach agricultural topics comprehensively in many schools even though classes were held three times a week. Contrary to the suggestion of Flanders and Bell (2005), most of the teachers did not support teaching agriculture education classes all year round.

**Comments on topics, instructional content, and activities**

Thirty agricultural teachers commented on the topics, instructional content, and activities of the middle school agricultural education classes. They suggested that middle school instructional content and activities should include *career awareness, basics and importance of agriculture, hands-on activities, leadership from FFA, communication and team work skills,*
introduction to general agriculture, introduction to AFNR, history of agriculture, and learned-centered activities. Specifically, one of the teachers communicated the following suggestions:

Make the course work enjoyable, hands-on, relevant, but also challenging. Try to show them as many new and cool things in agriculture to keep them inspired. Partner with other teachers in the building to see what they are doing to add on to existing curriculum. Focus on building the students as leaders and prepare them for high school. I stress soft skills rather than content to ready them for the agriculture program in high school. Identify where there are gaps in curriculum at the junior high and fill those gaps. Use "One Less Thing" curriculum for middle school as a foundation for the class.

The outlined topics and instructional activities suggested by the agriculture teachers corroborate the suggestions of Flanders and Bell (2005) and National FFA Organization (2006). More so, some of these suggested topics serve as important addition to the list of AFNR career cluster content standards.

Comments regarding the benefits of teaching agriculture in the middle school

The benefits of teaching agriculture in the middle school sourced from the agriculture teachers’ comments include “career orientation and exposure to agricultural industry,” “enrollment in high school agricultural classes,” and “early exposure to agriculture.” These benefits support the rationale for teaching agriculture in middle school as posited by Rayfield & Croom (2010); and Rossetti & McCaslin (1994). Because many students make career decisions in the middle school, early exposure to the agricultural industry is essential. Students who have wrong opinions about agriculture and its industry may not consider it as an option in their choice of career. Therefore, having fundamental knowledge about agriculture and its industry in middle school helps students understand their environment and discover potential opportunities. One of the
teachers expressed his/her perception regarding the benefit of teaching agriculture in the middle school: “I think the middle school age is good to expose kids to agriculture and let them know what options they have.” The impact of agricultural education classes in the middle school lasts beyond its limited class periods. Therefore, more teachers should be encouraged to commence an agricultural education program in schools where they are not currently offered.

**Comments on the needs of agriculture teachers in the middle school**

In addition to suggestions on allotted time, instructional content, and benefit of teaching agriculture in the middle school, some needs of middle school agriculture teachers were mentioned. These include “lack of state wide curricula,” “lack of teachers,” and “lack of funds.” A state-wide agricultural education curriculum will support agricultural teachers in planning and teaching instructional content. It will also ensure that all middle school students are engaged in the same level of instructional activities regardless of school location. The needs of agriculture teachers in the middle school must be met to ensure effective teaching and achievement of set goals.

**Suggested Topics for the Middle School Curriculum**

Agriculture teachers were asked to suggest other topics that can be included in the middle school curriculum in addition to the ANFR topics. The most suggested topic was *agricultural careers* followed by *leadership*. Other topics include *basics of agriculture, farm and agricultural safety, importance of agriculture*, among others. The emphasis on agricultural careers among middle school students illustrate its relevance. Beside cultivation of crops and rearing of animals, there are other agricultural careers that match students’ interests. However, students need more orientation about these careers to make informed decision about their future ambitions. Similarly, Park & Dyer (2005) reported that assumption of leadership roles at college level were more
common among FFA members than those who were not. This further indicates that teaching agriculture in the middle school prepares and trains future leaders for tomorrow’s challenges.

The Cyclical Model for the Delivery of Agricultural Awareness Program in the Middle School

The fifth objective of this study was to develop a model for the delivery of agricultural awareness program in the middle school curriculum. The cyclical model for teaching agricultural education in the middle school consists of four parts which include input, output, context, and outcome. The model was developed based on the findings of this study in relation to other past findings in the literature. Each part of the model further consists of construct that provide clearer understanding of the model. These include teacher characteristics, instructional content and allotted time, middle school agriculture education program, and desired student characteristics.

The first part of this model is the input, which contains teacher characteristics. Balschweid et al. (1998) identified teachers as important channels for promoting agriculture education among students. The professional characteristics of teachers will determine the extent to which they can achieve the learning goals of the agricultural education program in the middle school, and other school-based programs (Talbert et al., 2007). Based on these findings, the following teacher characteristics are important for achieving success in the middle school agricultural education program.

- High positive perceptions about teaching agriculture and its instructional content
- High self-efficacy
- High knowledge of technical content
Figure 3. The proposed cyclical model for teaching agricultural education in the middle school.
The professional characteristics of the agriculture teachers in this study as shown in the findings indicate that they can promote agriculture education in the middle school and achieve its learning goals.

The second part of the model, output, consists of the instructional content and allotted time. This is an important part of the middle school curriculum. Even though there is no state-wide curriculum for teaching agricultural education programs, teachers’ perceptions have provided some guidelines. Based on the findings of this study, teachers have indicated selected topics of the AFNR curriculum that should be taught to limited and greater extent in the middle school. Agriculture teachers have also identified agricultural career, leadership, basics of agriculture, and farm safety as topics that should be included in the middle school curriculum. Furthermore, agriculture teachers indicated the durations for teaching agriculture in the middle school to include 6, 7, 9 or 18 weeks depending on the grade level. No agriculture teacher indicated that agriculture education program in the middle school should be taught for one academic year.

The context, which is the third part of the model, is the middle school agricultural education. The middle school agriculture education has been identified as an important part of school-based agriculture education program because of its worth (Rayfield and Croom, 2010). The three-circular model of agricultural education, which provides contextual learning, work-based learning, and leadership in student organizations promote effective teaching of agriculture in the middle school. Many agriculture teachers in this study have indicated hands-on, experiential learning, and student-centered activities as appropriate methods for teaching middle school. These teaching methods are employed in conducting the instructional activities associated with the three-circular model of agriculture in the middle school.
The combination of the first three parts of the model produce the fourth part, which is the outcome. The outcome contains the desired student characteristics. Middle school students are expected to exhibit some learning outcomes after taking agricultural classes for certain periods. These include

- Increased interest in agriculture and agricultural industry
- Increased fundamental knowledge of agriculture
- Increased enrollment in high school agricultural classes
- Assumption of leadership roles prior, during, and after college
- Increased career choices in agricultural fields.

It is believed that the adoption of this model in the middle school and other school-based agricultural programs will promote agricultural literacy and awareness. Agriculture teachers can use the model for developing curriculum and planning class instructions. Similarly, they can use the model as an assessment tool for evaluating levels of student achievement based on the outcomes. Agriculture teachers can also use the model for self-assessment to determine possession of professional qualities that promote their job. Employment of this model in planning class instruction will inform teachers on the content of the curriculum that should be taught effectively within a stipulated period. This model is cyclical in nature as every part of the model is interrelated and dependent on one another. Therefore, the cyclical model for teaching agriculture in the middle school is an important teaching tool that can be employed in the school-based agricultural education program.

The four components of the cyclical model – input, output, context and outcome could be used as template for planning, implementing and evaluating agricultural extension youth development programs. The outcome section could be used to set the program goals and objectives as it includes
the desired result of the program. During program evaluation, the outcome could be used as yardstick for measuring the extent to which the program goals and objectives were achieved. Both human and non-human resources needed to carry out the program could be included in the input section. The details of program activities, durations and assigned facilitators could be included in the output section. The venue of the program, sitting arrangement for each activity, nature of program participants, and assigned locations for different program activities could be included in the context section.
CHAPTER VI. SUMMARY, CONCLUSIONS, IMPLICATIONS, AND RECOMMENDATIONS

Introduction

A brief overview of this research study with its significance to the field of agricultural education and extension are presented in this chapter. In addition, conclusions developed from the interpretation of the findings and suggestions for further studies are also provided. In response to the conclusions drawn from this study, appropriate actions to be taken in improving middle school agricultural education are also presented.

Summary

One of the current challenges facing agriculture and agricultural industry is the low basic knowledge of agriculture common among young learners (Blackburn, 1999). The increasing decline in the population of farm families has hindered acquisition of first-hand knowledge of agriculture at the home front. Therefore, the school, especially middle school is being relied upon among other interventions to provide fundamental knowledge of agriculture to the younger generation. Even though the school serves as learning center for acquiring agricultural knowledge, not all schools are currently offering agricultural education programs. However, the National Research Council (1988) recommended unlimited dissemination of agricultural knowledge among youth. Agricultural teachers are largely responsible for providing fundamental agricultural knowledge to young students. Besides their teaching assignment, they also develop curriculum that guide instructional activities. For further development of agricultural awareness among young learners, especially middle school students, the opinions of their teachers are important. Ajzen’s Theory of Planned Behavior (1988) was used as a frame work to determine agriculture teachers’ opinions regarding agricultural awareness concepts and activities in the middle school curriculum.
The findings in the literature show that teaching agriculture in the middle school promotes student development and establishment of future ambitions. Many scholars have identified middle school agriculture as beneficial in providing orientation, training, and support for self and career development. Agricultural education classes in the middle school are offered in units as exploratory courses within a limited period. They are offered between 6 and 18 weeks while selected agricultural topics are taught. There is no consensus among scholars on the duration and contents of instructional activities in the middle school agricultural education program. The National Council for Agricultural Education has developed a career cluster that serves as teachers' guide for the development of curriculum and instructional activities. The National Agriculture, Food, and Natural Resources (AFNR) career cluster consists of eight career pathways with topics and subtopics. However, only selected topics in the AFNR curriculum can be taught within the allotted time of middle school instructions. Therefore, it is important to determine teachers' opinions regarding teaching selected topics and the degree to which they can be taught.

The participants of the study included middle school, high school, and community college agriculture teachers in Iowa. Out of the 262 agriculture teachers contacted to participate in this study, 123 agriculture teachers completed the survey. Sections of the survey were demographics, opinions regarding teaching agriculture in the middle school, opinions regarding teaching selected course content, and suggestions for teaching agriculture in the middle school. Nineteen opinion statements were measured on a five-point Likert scale while the opinions regarding teaching selected course content were measured on a three-point Likert scale. The validity and reliability of the study instrument were established and data was collected after receiving IRB approval. The data was analyzed using the Statistical Package for the Social Sciences (SPSS) software version 23. Data analyses performed were the frequency, mean, standard deviation, t-test, Pearson moment
correlation, and regression analysis. Similar responses to open-ended questions were categorized under assigned themes.

The results of the data analyses showed that a considerable number of agriculture teachers teaching middle school were female. Both highly and less experienced agriculture teachers taught in the middle school. A large proportion (32%) of students were registered in agriculture classes in the middle school, high school and community college. Many of the agricultural teachers teaching middle school have both Bachelor’s and Master’s degree. Majority of the agriculture teachers taught at more than one school level while a few taught more than one subject. Many agriculture teachers taught science in addition to agricultural education. The responses to the perception statements indicated that agriculture teachers had positive perceptions regarding teaching agriculture in the middle school. Similarly, agriculture teachers indicated that majority of the selected course content of the AFNR cluster should be taught to a limited or greater extent. They further suggested agricultural career, leadership and farm safety as additional topics that should be included in the middle school agriculture curriculum. They also suggested student-centered teaching methods that are hands-on, fun-filled, expository, and experiential in nature. Most of the agriculture teachers suggested that middle school agriculture education should last for 6, 7, 9 or 18 weeks depending on the grade level.

The findings of this study corroborate previous findings in the literature and provided new knowledge. The benefits of teaching agriculture in the middle school were indicated in the findings of this study just as it was posited by some scholars. Similarly, the suggested duration for middle school agricultural program in this study are like those in existing literature. However, no teacher suggested that middle school agricultural education program should last for one year as suggested by Flanders and Bell (2005). Contrary to the report of Anfara (2001), the professional
characteristics of the study participants showed that they were competent to teach middle school. More so, the findings of this study showed that agricultural concepts can be integrated into other non-agricultural classes as many agriculture teachers taught other subjects besides agriculture in the middle school. The result of the comparisons among teachers showed that there was statistical significant difference in their opinions regarding teaching agriculture and selected content in the middle school. Some weakly positive and negative levels of association were identified between selected demographic characteristics of the teachers and perception statements. These associations further explained the perceptions of teachers regarding teaching agriculture in the middle school. However, no demographic characteristics of the agriculture teacher was found to be a significant predictor of their perceptions regarding teaching agriculture in the middle school.

In addition to the suggestions provided regarding teaching agriculture in the middle school, few teachers indicated some challenges of teaching agriculture in the middle school. These include lack of funds, lack of assistant teachers, students’ misconceptions about agriculture and agriculture industry, and absence of statewide curriculum. Students’ misconceptions about agriculture and agricultural industry could be a reason for low number of unduplicated students in some of the agricultural education program indicated in this study. Furthermore, teacher attrition, common in the teaching profession, was noticed among these groups of agriculture teachers. Only very few agriculture teachers had teaching experience of 6 – 10 years. The challenges of teaching agriculture in the middle school as indicated in the findings of this study provide more information about teaching agriculture in the middle school.
Conclusions

The following conclusions were drawn from the findings of this study

• A considerable number of Iowa agriculture teachers are female. Agriculture teachers’ perceptions and attitudes affect the development of agricultural awareness in the middle school. Iowa agriculture teachers have strong and positive perceptions regarding teaching agriculture and selected course content in the middle school. Iowa middle school agriculture education program is being managed by instructors who can serve as role models to young students. Because most Iowa agriculture teacher teach at more than one school level, they can encourage more middle school students to enroll in agricultural classes when they get to high school.

• Agriculture content could be integrated into non-agriculture classes because agriculture teachers taught other subjects besides agriculture. Selected contents of the AFNR curriculum could be included in the middle school agriculture curriculum. Inclusion of selected topics under Biotechnology Systems in the middle school curriculum could increase students’ interest in ASTEM careers. However, most of these contents can only be taught to a limited extent in the middle school because middle school agricultural education program can be offered within few weeks but not all year long. In addition to the contents of AFNR, agricultural career, leadership, and basics of agriculture should be taught at all middle school grade level. The three-model of agriculture supported suggested instructional content of the middle school curriculum.

• Teaching agriculture in the middle school promotes self-awareness, career development, leadership training, and experiential learning. Because of its relevance in student development, agricultural education program should be initiated in schools where it is not
currently offered. Well-organized middle school agricultural education program could increase students’ enrollment in high school agricultural classes. New and well-educated agriculture teachers could integrate recent technologies in their classrooms while they motivate students to consider career choices in agricultural industry. The learning outcome of middle school agriculture education program could be assessed using level of students’ academic achievements.

- Agriculture teachers teaching middle school encounter certain challenges that affect the quality of their jobs. Agricultural education program in Iowa is affected by teacher attrition. Collaboration between new and more experienced agriculture teacher in teaching middle school agriculture could promote its growth.

**Recommendations**

The following recommendations were made based on the findings and conclusions of this research study.

- The Department of Agricultural Education and Studies should include college level courses that focus on teaching agriculture in the middle school in their teacher education program. School district, faculty and school administrators should encourage young agriculture teachers to teach in the middle school. School administrators should encourage collaboration between new and highly experienced teachers including agriculture and non-agriculture teachers in the building to foster integration of agricultural concepts into non-agricultural classes. School administrators and school districts should organize regular interventions that include professional development, workshop, and mentoring programs for agricultural teachers that are new to the teaching profession.
• School district should encourage and empower middle schools that are currently not offering agricultural education programs to start one while statewide agricultural curriculum specifically designed for teaching middle school students be developed. School district should organize workshops and trainings that inform school administrators on the importance of teaching agriculture in the middle. Agriculture teachers, school district and school administrators should conduct continuous assessment of the middle school agricultural education program to identify strengths and weaknesses of the program. In collaboration with the school administrators and agricultural teachers, the school district should address the challenges of teaching agriculture education in the middle school. School administrators and agriculture teachers should sensitize parents on the benefits of taking agricultural classes at middle school so that they can encourage their children to enroll in those classes. School district should organize agricultural career orientation and counseling in schools where agricultural education is not currently offered.

• Agriculture teachers should include content of the AFNR career clusters and other suggested topics in the middle school curriculum while the curriculum is updated regularly. Agricultural teachers should adopt student-centered teaching methods that promote student engagement during class instructions in the middle school agricultural education program. Agriculture teachers and school administrators should ensure that the time allotted to teaching instructional activities in the middle school curriculum match the scope of the learning content. Agricultural teachers should conduct regular formal and informal student assessment to determine their level of agricultural knowledge. Agricultural teachers should
encourage students to apply technical skills gained in the classroom in real life situations, especially during supervised agricultural experience.

- Agriculture teachers, school administrators, and parents should encourage more middle school students to participate in youth organizations that train and develop their leadership skills. Agriculture teachers should encourage youth organizations like 4-H and FFA to include in their programs agricultural career and other agricultural activities that promote acquisition of basic agricultural knowledge among students. Agriculture teachers and extension personnel could adopt the cyclical model developed in this study in planning, implementing and evaluation of instructional activities in the middle school and youth extension programs, respectively.

**Recommendations for Further Research**

The following recommendations were indicated for further research

- Similar studies on agriculture awareness in the middle school should be conducted in other states while a national study which focuses on the development of agriculture education curriculum for middle school should be carried out.

- Middle school students’ perceptions regarding taking agricultural classes in the middle school should be examined.

- Further studies on the challenges of teaching agriculture in the middle school should be conducted.

- A study on the perceptions of middle school administrators regarding agricultural literacy and awareness in the middle school should be conducted.
The perceptions of faculty in the college of agriculture regarding teaching agriculture and selected course content in the middle school curriculum should be examined.

Implication and Significance to Agricultural Education and Extension

Agricultural awareness in the middle school serves as a form of intervention that fosters dissemination of basic agricultural knowledge among young learners. The positive perceptions of agriculture teachers regarding teaching agriculture in middle school indicate its potential for sustainable development across the nation. While many young students lack agricultural experience in their locality, qualified and enthusiastic agriculture teachers address their needs in the classroom and other similar contexts. More so, the cyclical model, developed based on the perceived curriculum content indicated in this study provide guidelines for curriculum development in school-based agricultural education program.

Students’ career decisions at middle school influence the types of classes and courses they take at higher educational levels. Career decision is partly affected by level of students’ interest and information about the chosen field. Having middle school students who are well informed about the basics of agriculture and its industry can promote career choices in this field. Young students will be able to explore opportunities in agricultural field instead of choosing careers that do not match their interests. This will further address part of the challenges facing the future of agriculture and agricultural education in the nation.

Furthermore, 4-H Extension Youth development, and National FFA organization could employ some of the findings of this study in their program planning. Particularly, leadership skills have been identified as a requisite skill acquired through participation in agricultural youth organizations. Youth organizations can develop strategies for recruiting more middle school students to engage them in activities that develop their leadership skills. Similarly, some of the
appropriate teaching methods for carrying out instructional activities suggested in this study could be applied.

The value of basic agricultural knowledge among young learners in this current generation cannot be overlooked. Students’ interest in a subject or field of study is sometimes influenced by the teacher teaching that subject. Positive agriculture teacher’s influence can produce increased students’ interest in agriculture. Therefore, the cyclical model could be adopted by college students in teacher education program to conduct their student teaching project.
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APPENDIX A. INSTITUTIONAL REVIEW BOARD APPROVAL FORM

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OF SCIENCE AND TECHNOLOGY

Institutional Review Board
Office for Responsible Research
Vice President for Research
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Ames, Iowa 50011-2207
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FAX 515-294-4167

Date: 5/2/2016
To: Abisoye Odebanjo
135A University Village
Ames, IA 50010

From: Office for Responsible Research

Title: Perceptions of Middle, High School and Community College Agricultural Teachers Regarding Agricultural Awareness Concepts and Activities in the Middle School Curriculum: Grades 7-9

IRB ID: 16-181

Study Review Date: 5/2/2016

The project referenced above has been declared exempt from the requirements of the human subject protections regulations as described in 45 CFR 46.101(b) because it meets the following federal requirements for exemption:

- (2) Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey or interview procedures with adults or observation of public behavior where
  - Information obtained is recorded in such a manner that human subjects cannot be identified directly or through identifiers linked to the subjects; or
  - Any disclosure of the human subjects' responses outside the research could not reasonably place the subject at risk of criminal or civil liability or be damaging to their financial standing, employability, or reputation.

The determination of exemption means that:
- You do not need to submit an application for annual continuing review.
- You must carry out the research as described in the IRB application. Review by IRB staff is required prior to implementing modifications that may change the exempt status of the research. In general, review is required for any modifications to the research procedures (e.g., method of data collection, nature or scope of information to be collected, changes in confidentiality measures, etc.), modifications that result in the inclusion of participants from vulnerable populations, and/or any change that may increase the risk or discomfort to participants. Changes to key personnel must also be approved. The purpose of review is to determine if the project still meets the federal criteria for exemption.

Non-exempt research is subject to many regulatory requirements that must be addressed prior to implementation of the study. Conducting non-exempt research without IRB review and approval may constitute non-compliance with federal regulations and/or academic misconduct according to ISU policy.

Detailed information about requirements for submission of modifications can be found on the Exempt Study Modification Form. A Personnel Change Form may be submitted when the only modification involves changes in study staff. If it is determined that exemption is no longer warranted, then an Application for Approval of Research Involving Humans Form will need to be submitted and approved before proceeding with data collection.

Please note that you must submit all research involving human participants for review. Only the IRB or designee may make the determination of exemption, even if you conduct a study in the future that is exactly like this study.

Please be aware that approval from other entities may also be needed. For example, access to data from private records (e.g., student, medical, or employment records, etc.) that are protected by FERPA, HIPAA, or other confidentiality policies requires permission from the holders of those records. Similarly, for research conducted in institutions other than ISU (e.g., schools, other colleges or universities, medical facilities, companies, etc.), investigators must obtain permission from the institution(s) as required by their policies. An IRB determination of exemption in no way implies or guarantees that permission from these other entities will be granted.
Informed Consent Letter

Dear Agriculture Educators:

We would like to seek your participation in a study that focuses on opinions of agriculture educators regarding teaching about agriculture in the middle school, and the agriculture content courses of the middle school curriculum. The National Council for Agricultural Education has developed content areas in eight Agriculture, Food, and Natural Resource career pathways to serve as a guide for designing curriculum. These include agribusiness systems, animal systems, biotechnology systems, environmental service systems, food products and processing systems, natural resource systems, plant systems, power, structural and technical systems. The study also seeks to identify the extent to which subtopics under each of these career pathways should be taught in the middle school. Your participation in this study is of great value because you will provide relevant information that will help to improve teaching about agriculture in the middle school. The study will be used as part of the requirement for completion of a Ph.D. degree in agricultural education.

The data gathered from this study will be treated with utmost confidentiality, as only the researchers (doctoral student and major professor) will have access to them. Names of study participants will not be revealed and data will be kept in a safe storage. Participation in this study is voluntary and participants are free to opt out of the study at any point in time. There is no risk associated with this study. The results of this study will be used to inform educators, administrators, and agricultural stakeholders on the need for agricultural classes in the middle school. In case you have any questions regarding this study, you can contact the researchers using the contact details below:

Dr. Robert Martin
drmartin@iastate.edu  515-294-0896
Abisoye Odubanjo
odubanjo@iastate.edu  515-441-5209

We look forward to your anticipated support of this study through your participation.

Thanks!

- ☐ Agree
- ☐ Disagree

Section I:

Demographic Information

Please answer the following questions by filling the blank or clicking the options that best describe you and your program.

Gender
Male
Female

Years of teaching experience

Where do you teach? (please select all that apply)

- Middle school
- High school
- Community college

Number of unduplicated students in your agricultural program

Highest level of education

- B.A./B.S.
- M.A./M.S.
- Ed.D./Ph.D.

Other subjects taught besides Agricultural Education (Please select all that apply)

- Language Arts
- Social Studies
- Art
- Math
- Science
- Music
- Others

Section II:
Opinions about teaching agriculture in middle school

Please use the answer keys below to indicate your opinions regarding teaching about agriculture in middle school (6th to 8th grades).
1. SD = Strongly Disagree
2. D = Somewhat Disagree
3. N = Neutral
4. A = Somewhat Agree
<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly disagree</th>
<th>Somewhat disagree</th>
<th>Neither agree nor disagree</th>
<th>Somewhat agree</th>
<th>Strongly agree</th>
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</thead>
<tbody>
<tr>
<td>Agriculture should be a major component of middle school curriculum.</td>
<td>☐</td>
<td>☐</td>
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<tr>
<td>Teaching agriculture in the curriculum promotes learning.</td>
<td>☐</td>
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<td>Agricultural content is easy to incorporate into the middle school curriculum.</td>
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<td>Agricultural knowledge promotes career choice among middle school students.</td>
<td>☐</td>
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<tr>
<td>Many middle school students are not interested in taking agricultural classes.</td>
<td>☐</td>
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<tr>
<td>Knowledge of agriculture helps students become aware of their environment.</td>
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<tr>
<td>All middle school students should be taught agriculture regardless of their career choices.</td>
<td>☐</td>
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<td>Agriculture's image should be addressed in middle school.</td>
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<td>Agricultural knowledge is difficult to communicate to students in middle school.</td>
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<tr>
<td>Statement</td>
<td>Strongly disagree</td>
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<td>Somewhat agree</td>
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<td>Agricultural classes are not as important as other courses in middle school.</td>
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<tr>
<td>Students should be left to seek agricultural knowledge and skills by themselves.</td>
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<tr>
<td>Middle school agricultural classes should cover areas of agriculture, food and natural resources.</td>
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<td>Contents of agricultural classes should include hands-on activities that promote student participation.</td>
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<td>Students who take agricultural classes in middle school are likely to enroll in agricultural classes in high school.</td>
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<tr>
<td>Selection of topics for agricultural classes in middle school should be based on student interest.</td>
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<td>Agricultural knowledge should be taught in non-agricultural classes in middle school.</td>
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<td>Current events in agriculture should be discussed in middle school agricultural classes.</td>
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<tr>
<td>Middle school agricultural classes should be updated regularly.</td>
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</table>
The latest communication technologies should be used for teaching in agricultural classes.

Section III:

Opinions regarding teaching selected course content in middle school

Below are the eight career pathway content areas and subtopics designed by the National Council for Agricultural Education. Please indicate your opinions regarding the extent to which these subtopics should be taught as units in the middle school curriculum.

1 = should not be taught in middle school
2 = should be taught to a limited extent
3 = should be taught to a great extent

**Food Products and Processing Systems**

<table>
<thead>
<tr>
<th>Subtopic</th>
<th>1</th>
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</thead>
<tbody>
<tr>
<td>• Food safety and sanitation</td>
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<td>• Principles of food product development</td>
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<tr>
<td>• Food processing and storage</td>
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<tr>
<td>• Historical and current development in food industry</td>
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</tbody>
</table>
Agribusiness Systems

1.
- Marketing and sales development

2.
- Business plan development

3.
- Budget management

- Farm accounting and record keeping

Environmental Science Systems

1.
- Impact of the environment on production agriculture

2.
- Application of scientific principles in solving environmental issues

3.
- Tools, equipment, and machinery and technology common to tasks in environmental systems

- Impact of public policies on the environment
Plant Systems

- Plant propagation techniques
- Horticulture
- Crop production and management
- Plant anatomy and physiology

Animal Systems

- Animal nutrition
- Animal anatomy and physiology
- Animal reproduction
- Animal husbandry and welfare

Natural Resource Systems
• Analysis of the relationship between natural resources and humans

• Management of natural resources

• Sustainability of natural resources

• Conservation of natural resources

Power, Structural and Technical Systems

• Application of engineering principles in solving agriculture, food and natural resource problems

• Operation & maintenance of agriculture, food and natural resource systems

• Service and repair of agriculture, food and natural resource systems

• Planning and building of agriculture, food and
natural resource structures

Biotechnology Systems

- Study of genetic engineering
- Measurement and calibration of instruments used in biotechnology research
- Study of recombinant DNA
- Application of biotechnology to solve problems in agriculture, food and natural resource systems

Other suggested topics

Section IV:

Comments/Suggestions

What suggestions do you have for agriculture being taught in the middle school?
APPENDIX C: SUGGESTIONS REGARDING TEACHING AGRICULTURE IN THE MIDDLE SCHOOL

Section IV: Comments/ suggestions

Note: 48 of 123 (39%) agriculture teachers responded with the following comments:

1. Teaching Ag in Middle School needs to be a way for the industry to get the word out about what we really are about, and give them a "taste" of careers, and educational pathways in agriculture for their future.

2. Cover the basics and focus on the importance of agriculture.

3. I think it needs to be the basics and diversified with the facts and not an agenda so to speak

4. It needs to happen in all schools that get state or federal funding

5. Middle school needs to include hands-on activities that give the students a taste of all agriculture has to offer. Hopefully, this will inspire them to learn more in a high school ag class.

6. Broad content, engaging activities, Environmentally focused

7. Make it mandatory that all students need to have at least 9 weeks- ours who have it better understand some many things they need in life.

8. 7 weeks is what we have for each 8th grade rotation. Must have some ties to core, etc.

9. Fun, fast moving, focused on career exploration. Need to teach some hands-on skills.

10. Careers in ag, leadership from FFA

11. Use activities and teach basic communication and team work skills.

12. Keep it simple and Fun with lots of activities to get the concept across

13. State-wide curricula being available for the already busy Ag teacher
14. I have short exploratory classes. I suggest a small taste of everything: career exploration, plant science, animal science, state commodities, respect for nature, etc. Then they are better able to choose which high school classes they want.

15. Students just need a better idea of what agriculture really is. They only think of it has farming and do not understand what actually goes into farming. Even freshman in high school don't know where their food comes from besides the grocery store...there needs to be something done about that.

16. More funding for schools to afford a second teacher. I already have 7 preps I teach at the high school so I do not have time to even consider a middle school program.

17. We teach groups of 10-20 students for 6-week rotations in the middle school. This seems to work great and allows us to pick a select amount of curriculum that will cover that time frame.

18. I personally love teaching Middle School because they have great energy and are the most shocked about where our food comes from. It’s also a great introduction and motivator for them to get into agriculture in high school.

19. I think the middle school age is good to expose kids to agriculture and let them know what options they have.

20. I like the exploratory set up where every kid gets Ag for 6-8 weeks and then they rotate to other CTE and Elective Courses.

21. One of the main obstacles to overcome is to have students comprehend that agriculture involves so much more than farming. As many hands-on activities with ties to the everyday life of students will be the best form of presenting agricultural education knowledge.
22. Keep it simple and hands on.

23. I think it should be career oriented. Focus on what the jobs are and expose the students to as many jobs as possible.

24. It needs to be promoted more with administration in hopes that it would become more common.

25. If you are a CASE school, maybe consider starting to introduce AFNR;

26. I feel that there needs to be a source for teachers to use to find curriculum to use for this area of ag ed.

27. Career exploration in Ag, Technology application in Ag, Agricultural Leadership

28. We have to entertain.

29. Teaching exploratory classes are a good way to introduce middle school students to agriculture in 6-9-week courses.

30. Communication and Leadership

31. Basic FFA knowledge, history of agriculture, Careers

32. History of Agriculture.

33. Introductory items have been my main route.

34. I think students in middle school should be taught the basics of agriculture. It needs to be fun topics to keep them engaged and interested in the agriculture curriculum. Also, the curriculum should be things that they understand and not too hard that they get frustrated learning things.

35. Agriculture in middle school doesn't necessarily need to be a full semester. I believe that all students should learn the basics of what agriculture is and its importance to our world.
I believe that high school are specialized so that middle school students can take further education in topics that they find enjoyable in a middle school exploratory.

36. Should cover a broad area and be sustainable with current budget limitations.

37. Introducing many concepts to spark interest in taking high school Ag classes. Many schools only have middle school exploratory classes on a 9 week or quarter rotation. And even then, only have them 3 days a week because of PE. No time to go in-depth on any topic

38. Middle school Ag programs MUST be fun or high school Ag programs fail.

39. Allow students to teach themselves in this area and they will become more of a problem solver.

40. Students should be given a very broad variety of topics that you teach at the surface level. Most schools offer middle school agriculture for a very short amount of time so variety is key.

41. I believe it needs to be illustrated as fun and opportunities however it also needs to cover main ideas of the industry

42. Needs to be a large portion of hands on activities or other components that get the kids moving and interested in the topic which can help them learn. Lecture should be a small part of the class.

43. I don't really have many suggestions, I think that there should be a course offered to take in college to prep you for the level at which you have to teach middle school however. I was very caught off guard by the level of knowledge middle schoolers have.

44. Make the course work enjoyable, hands-on, relevant, but also challenging. Try to show them as many new and cool things in agriculture to keep them inspired. Partner with
other teachers in the building to see what they are doing to add on to existing curriculum. Focus on building the students as leaders and prepare them for high school. I stress soft skills rather than content to ready them for the agriculture program in high school. Identify where there are gaps in curriculum at the junior high and fill those gaps. Use "One Less Thing" curriculum for middle school as a foundation for the class.

45. It would be much simpler on the educator if there was a national or state curriculum to utilize or adapt to local needs. At the school, the schedule should accommodate needs of the learners - meeting students every other day is not beneficial to middle school students. 9 weeks or 18-week (Quarter or Semester) periods are more beneficial in my experience than an all-year course. A facility or classroom with windows, sink, and easy access to outdoors is beneficial to give students the opportunity to for more hands-on experiences without disrupting nearby classes.

46. Careers in all areas mentioned in the previous questions.

47. Focus on character, basic leadership, and speaking

48. Keep it simple and interactive. Relate and apply information to their prior and current knowledge.
APPENDIX D: OTHER SUGGESTED TOPICS THAT SHOULD BE TAUGHT IN THE

MIDDLE SCHOOL

Section III: Other Suggested topics

Note: 19 of 123 (15%) agriculture teachers responded with the following comments:

1. Cooking
2. Leadership, Public Speaking, Teamwork
3. Basics of all agriculture areas
4. Energy
5. Energy, landscaping
6. Pet care basics
7. General career options Leadership in Agriculture
8. These topics seem quite advanced for middle school students. I only teach high school students so my knowledge of their abilities is limited
9. Classifications and taxonomy.
10. Careers in Agriculture, Importance of the Agricultural Industry, Farm & Agricultural Safety
11. General ag State information of Iowa and other states in what they are known for in ag commodities
12. Available careers in agriculture
13. FFA history and knowledge; basic shop safety introduction to basic tools, hand and power
14. Vet science topics unless that is covered in the animal science portion.
15. what is agriculture, possible careers, how to raise your own food, terminology, the VERY basics, and gain interest/have fun
16. Origin of Food Careers in Agriculture Leadership Communications Impact of Agriculture on local community and state Define agriculture

17. Ag Technology, GPS equipment, Data Management (Dairy Farms, Yield Maps)

18. Agricultural History (Smith-Hughes Act, US Commodities, Land-Grant Colleges, Farm Crisis, etc.)

19. Agricultural Careers