AGRICULTURE: WHAT DO CHILDREN REALLY KNOW?

by

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(Under the Direction of Maria Navarro)

ABSTRACT

Major advances in technology have led to more focus being given to nonagricultural majors and careers, with less focus on knowledge of agriculture and agricultural sciences. As a result, society has become further removed from agriculture. This disconnect has resulted in failure to gain knowledge about agriculture by society as a whole, but most visibly amongst American youth. The purpose of this study was to identify and analyze third, fourth, and fifth grade students' knowledge of agriculture. The data collected for this study was obtained from seven third, fourth, and fifth grade students who communicated their agricultural knowledge and understanding through oral responses during a semi-structured interview conducted by the researchers. The study revealed that most third, fourth, and fifth grade students possess only basic knowledge and understanding of agriculture and in this study, those who lived in city settings had comparatively higher knowledge and better understanding of agriculture.

INDEX WORDS: agriculture, agricultural literacy, perceptions of agriculture, agricultural knowledge, children, agricultural awareness

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DEDICATION

This work is dedicated to my mother and sister, the driving forces behind everything I do and the reasons for why I am the man that I am today.

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CHAPTER 1

INTRODUCTION

Earth's rapidly growing population and finite resources remind us how important agricultural sustainability is for our future. While agriculture has undoubtedly played a pivotal role in the establishment and history of The United States of America, it has lost esteem amongst Americans, especially the younger generations of Americans. Additionally, "as the number of people directly involved in agriculture has decreased, the general public's basic understanding of the food and fiber industry has declined" (Trexler & Meischen, 2002, p. 68). In *Episode #1.2: "Week 2"* of *Food Revolution,* the reality television show of renowned British celebrity chef Jamie Oliver, Jamie walks into a first grade classroom in Huntington, West Virginia with the intent of determining whether or not the students knew what fresh foods look like (Smith, 2010). To Jamie's surprise, most of the students could not identify basic food items such as tomatoes and potatoes, however, the students readily identified chicken nuggets, pizza, French fries, and hamburgers (Smith, 2010). Much to Jamie's, and the researcher's, chagrin, the harsh reality of today's society is that many of our youth, not just the first graders of Huntington, West Virginia, can't identify fruits and vegetables nor can they connect the fact that raw food items are used in the production of their favorite food items to eat. Today's youth believe that food, clothing, and other items come from the store and have no idea of the processes these items go through before their consumption or use. "The Agriculture Council of America (ACA) is an organization uniquely composed of leaders in the agriculture, food and fiber communities dedicated to increasing the public awareness of agriculture's vital role in our society" (Agricultural Council of

America, 2012a). According to the ACA, "products we use in our everyday lives come from plant and animal byproducts produced by America's farmers and ranchers" (Agricultural Council of America, 2012b). Among those products are, but are not limited to: healthcare products such as pharmaceuticals and ointments; construction products such as lumber and paints; transportation products such as fuel and tires; manufacturing products such as adhesives and solvents; printing products such as paper and ink; personal care products such as shampoo and toothpaste; education products such as pencils and paper; and sports products such as uniforms and shoes (Agricultural Council of America, 2012b). Because of the major role agriculture plays in the production of these products, it is important that society reestablishes the significance of agriculture and teaches it to today's youth so that they can fully understand that agriculture is not only the source of their food, but also the source of clothing, medicine, and countless other necessities used in their daily lives. Understanding what and how children know about agriculture will help educators enhance the curriculum about food, agricultural, and environmental sciences.

Statement of the Problem

Major advances in technology have led to more focus being given to nonagricultural majors and careers, with less focus on knowledge of agriculture and agricultural sciences. Unfortunately this trend has also led a greater portion of the population to settle in urban settings as opposed to those of rural, farm settings. As a result, society has become further removed from agriculture. The most prominent result of this disconnect has been a failure to gain knowledge about agriculture by society as a whole, but most predominantly amongst American youth because of the level of interest and/or perceptions of agriculture held by those charged with

teaching them, in addition to the method of delivery in which agricultural concepts are taught to students. According to Bellah & Dyer, "the challenge facing teachers is not a lack of available curriculum resources; rather, the challenge lies in how to mold these components into a deliverable, student-centered package" (2009, p. 13). Improving on agricultural literacy amongst our youth "depends on the mainstream educational system" and more "particularly on the awareness and attitudes of teachers as they make decisions about what and how to teach the future citizenry of the U.S." (Malecki, Israel, & Toro, 2004, p. 1).

As of late, agricultural related majors and careers have consistently been atop "Most Useless" degree/job lists composed and dispersed worldwide. Yahoo's Terence Loose (2012) recently featured agriculture, animal science, and horticulture in his top five most useless degrees, with agriculture ranking number one. This is a prime example of the backseat agriculture has taken in today's society. In addition to topping lists of most useless degrees, agriculture has taken more public hits which have positioned people against agricultural practices. In recent history, the general public's perceptions of agriculture took major hits with the publishing of books such as *Fast Food Nation: The Dark Side of the All-American Meal* (Schlosser, 2002) and *The Omnivore's Dilemma: A Natural History of Four Meals* (Pollan, 2006). More recently, public opinion has been challenged by "pink slime." Public outcry over the safety of "pink slime" reached national attention in the media and amongst the general public in 2011 after Chef Jamie Oliver demonstrated the process of how "pink slime" is produced on his nationally televised show *Food Revolution*. According to Jamie Oliver's Food Revolution Team (2012):

> 'Pink Slime' has been objected to because it is not believed, by microbiologist Gerald Zirnsterin and another USDA scientist Carl Cluster, to actually be 'meat.' It contains

> connective tissues instead of muscles and the product is not nutritionally equivalent to ground beef, it is instead highly processed 'meat' rather than actual real food for kids. (Pink Slime – The Story So Far section, 2012, para. 2)

Despite the United States Department of Agriculture's approval of "pink slime," also known as Lean Finely Textured Beef (LFTB), safety for human consumption, there has been petitioning of the United States Department of Agriculture, as well as, inquiries into the safety of beef products for human consumption. Such petitions and inquiries have undoubtedly led to further problems of stereotypes and problems of misconceptions associated with agriculture.

Increasing society's knowledge about agriculture would allow for problems of stereotypes and misconceptions to be addressed more easily. With such a high level of stereotypes and misconceptions about agriculture by society, a question must be raised, has agricultural literacy also decreased among members of society?

According to research, there is a lack of agricultural literacy amongst a large portion of school-aged students, college-aged students, and the general public (Birkenholz, 1992; Birkenholz, Harris, & Pry, 1994). In 1988, The National Academy of Sciences - National Research Council reported "the majority of American children know little about agriculture upon entering school and show little improvement in agricultural literacy by the time they graduate."

The purpose of this study was to assess the knowledge of agriculture among third, fourth, and fifth grade students and to provide insight into how to most efficiently develop and deliver curriculum for their optimum understanding of agriculture. According to Brophy, Alleman, & O'Mahony (2003), "their knowledge is usually based on observations of conventional behavior within their cultures, and does not include scientific concepts or principles" (p. 13). Therefore, because third, fourth, and fifth grade students are impressionable and likely draw their

knowledge and perceptions from those around them, the study examines how from where/whom they receive their knowledge of agriculture affects their knowledge level and perceptions of agriculture.

Purpose of the Study

The purpose of this study was to identify and analyze third, fourth, and fifth grade students' knowledge of agriculture. In addition to identifying the knowledge of agriculture possessed by these students, the information sources for this knowledge also needed to be identified. To accomplish this purpose, these objectives were identified: 1) determine if students can provide an operational definition of agriculture which encompasses more aspects than simply farming; 2) determine if students can identify what products agriculture serves as a source for; 3) determine if students can identify the difference between various types of agricultural products (fruits, vegetables, grown above ground, grown below ground, etc.); 4) determine sources of students' agricultural knowledge [school (teachers/administrators), home (family), books, TV.)]; 5) determine if student demographics (location, parent occupation, etc.) influence their knowledge and/or perception of agriculture.

Significance of the Study

This study will contribute to the increase of our (researchers, educators, and curriculum developers) knowledge of third, fourth, and fifth graders' knowledge of agriculture, common misconceptions they may have, and where and how these children learn about agriculture. This information may help enhance curriculum about agriculture for third, fourth, and fifth graders (i.e., 4-H, Agriculture in the classroom, programs in zoos and youth camps) and help improve

youth knowledge about agriculture and its significance in society. It is critical that researchers, educators, and curriculum developers determine the knowledge of agriculture held by third, fourth, and fifth graders to address any misconceptions or inaccuracies before it is too late.

Operational Definitions

Agriculture in the Classroom

The United States Department of Agriculture (USDA) Agriculture in the Classroom program provides a network of support for state programs which strives to improve agricultural literacy by implementing curriculum on agricultural awareness and knowledge in PreK-12 classrooms (About Agriculture in the Classroom, 2012)

Agriculture

The science and practice of producing animal and crop products for the sustainment of life; including, but not limited to cultivation of soil for crop growth and raising of animals for food and other products

Agricultural Sciences

Sciences dedicated to the study and understanding of agriculture/agricultural practices; including but not limited to: agricultural business, agricultural economics, animal science, environmental science, food science, horticulture, plant science, and soil science

FFA

The National FFA Organization is an organization dedicated to positively improving students' lives by helping them develop in the areas of leadership, personal growth, and career success through agricultural education (National FFA Organization, 2012a).

4-H

The largest out of school youth program in the United States, which boasts more than seven million members. 4-H is controlled by the United States Department of Agriculture's National Institute of Food and Agriculture. 4-H focuses primarily on their three mission mandates: science, engineering and technology; healthy living; and citizenship (National 4-H Headquarters, 2012).

Stereotype

An overly simplified and often inaccurate opinion of something or someone.

Limitations of the Study

The researcher identified the principal limitation of this study to be the small sample size of seven. However, the researcher would like to acknowledge that this was an exploratory study in which the researcher wanted to initiate understanding some of the issues surrounding students' knowledge about agriculture. Hence, the results are not representative of any particular group of students' knowledge of agriculture.

The timing of the interview also contributed to the small sample size and served as a limitation. Interviews were conducted in the late spring/early summer so students targeted for the interviews were already out of school for the summer. Students already being out of school for the summer made scheduling interviews much more difficult.

Leading questions were also identified as limitations of this study. Multiple questions were arranged in an order which the researcher felt led students to the correct answer to the subsequent portions of the question. Hence, the results of the study are very limited because they

may not be fully representative the knowledge of agriculture held by third, fourth, and fifth grade students' knowledge of agriculture.

CHAPTER 2

REVIEW OF LITERATURE

In 1988 the National Research Council (NRC), whose "mission is to improve government decision making and public policy, increase public understanding, and promote the acquisition and dissemination of knowledge in matters involving science, engineering, technology, and health" (National Research Council, 2012), conducted a research study to determine just how much knowledge and awareness American's had of the significance of agriculture. Researchers such as Birkenholtz (1994) and Herren & Oakley (1995) found significance in the NRC's recommendations and made reference to them in support of their own studies. Birkenholtz (1994), based on the findings of the NRC suggested that "most Americans, whether they be young or old, have limited knowledge of agriculture" (p. 5). Herren & Oakley (1995) cite the NRC's research study as recommended that "all students should receive at least some systematic instruction about agriculture beginning in kindergarten and first grade and continuing through twelfth grade" (p. 26). In addition to those supported by Birkenholtz (1994), Herren & Oakley (1995), the NRC made several other recommendations in regard to agricultural literacy including the facts that "the subject matter of instruction about agriculture and instruction in agriculture must be broadened" and "teacher preparation and in-service education programs must be revised and expanded to develop more competent teachers and other professional personnel to staff, administer, and supervise educational programs in and about agriculture" (The National Academy of Sciences - National Research Council, 1988, p 18). However, the NRC's recommendations were not the first of their kind. Much prior to the NRC's findings, initiatives

such as Agriculture in the Classroom, the National FFA organization, and 4-H were all created with the intent to spread knowledge of agriculture and the agricultural sciences to youth.

Agriculture in the Classroom (AITC) was formed by the United States Department of Agriculture (USDA) in 1981 after inviting very active agricultural groups and agricultural education representatives to a meeting in Washington, D.C., where they discussed the significance of agricultural literacy (History of Agriculture in the Classroom section, 2012). A task force was formed and "representation came from agriculture, business, education, and governmental agencies, some of whom were already conducting educational programs in agriculture" (Agriculture in the Classroom, 2012). According to the Agriculture in the Classroom (2012) website,

> This task force recommended that the USDA be the coordinator for national agricultural classroom literacy and that it sponsor regional meetings to help states organize their own programs. They also urged the department to encourage the support of other national groups. Since that time, significant progress has been made through these partnerships of agriculture, business, education, government and dedicated volunteers (para. 6, 2012).

AITC is "aimed at providing training and teaching materials for elementary teachers to incorporate agricultural concepts into their instruction (Herren & Oakley, 1995). Because there is no universal method to manage the AITC program, the success of the program is largely contributed to the "combined efforts of volunteers and professional staff" (Agriculture in the Classroom, 2012). According to the Agriculture in the Classroom (2012) website,

> In some cases, an all-volunteer network is responsible for teacher education and materials distribution. States have formed educational nonprofit organizations which have the benefits of a tax-deductible status. In some states leadership is provided through the

> departments of education, agriculture or other government agencies; in other states through agriculture organizations or commodity groups; some through universities or colleges; and in some cases through the dedicated efforts of one or two individuals. (2012, para. 7)

AITC is present in every state and each state's AITC program meets agricultural education goals by catering to the specific needs of that state.

In the state of Georgia, the largest impact of the AITC Program comes from the Georgia Farm Bureau Federation. The Georgia AITC "mission is achieved through the activities of county Farm Bureau volunteers in their local communities and through teacher training courses held throughout the state" (Georgia Farm Bureau, 2012a). As a part of the AITC Program in Georgia, Georgia Farm Bureau offers PLU courses for teachers during the summer which are "hands-on and teacher-centered" courses which are "matched to state standards and are interdisciplinary" (Georgia Farm Bureau, 2012b). The courses provide classroom resource material, include field trips to agricultural sites in the area, and are designed to provide teachers with "tools to make [their] classroom more dynamic and relevant to [their] students' everyday lives" (Georgia Farm Bureau, 2012b).

The National FFA Organization, formerly known as Future Farmers of America, was founded in 1928 by young farmers with the mission "to prepare future generations for the challenges of feeding a growing population" (National FFA Organization, 2012a). The founding of National FFA Organization by that young group of farmers was critical to the history of this country because "they taught us that agriculture is more than planting and harvesting—it's a science, it's a business, and it's an art" (National FFA Organization, 2012a). While time has taken its toll on the reputation of agriculture, National FFA Organization still strives to teach

agriculture is more than planting and harvesting. The "Food for America" program, established in 1975, is one of many FFA programs designed to incorporate elementary agricultural skills in educational activities in order to promote all aspects of agriculture (Department of Agriculture, 1983). The "Food for America" program focuses on agricultural literacy in elementary schools and surrounding communities by allowing FFA members and agricultural education students to develop leadership skills by educating others about the world of agriculture" (National FFA Organization, 2012b). As part of the "Food for America" program, high school FFA members and agricultural education students deliver three types of lessons to grades K-6: 1) primary lessons for K-3 students; 2) upper elementary lessons for grades 4-6; and 3) demonstration plans, which are hands-on activities to get students of all ages to learn by doing (National FFA Organization, 2012b). Supporters of the National FFA Organization believe it "is an integral and intra-curricular component of the agriculture education program, providing incentives and awards to students based on performance" (Gibbs, 2005, p. 30).

The 4-H program is the largest out of school youth program in the United States, which boasts more than 7 million members. The 4-H program is controlled by the United States Department of Agriculture's National Institute of Food and Agriculture and focuses primarily on their three mission mandates: science, engineering and technology; healthy living; and citizenship (National 4-H Headquarters, 2012). The 4-H program officially began as a part of the Cooperative Extension Service of the United States Department of Agriculture (USDA) in 1914 and started as a program designed to help the rural youth of America. Because adults in farming communities were not readily accepting of new agricultural practices, land-grant college and USDA researchers reached out to youth because of their likelihood to incorporate new ideas and share their experiences with adults (National 4-H Headquarters, 2012).

The 4-H program acknowledges the modern advances in science and technology which have allowed for the inclusion of new areas of research and investigation in the field of agriculture. Accordingly, 4-H has made sure that "the 4-H AgriScience curriculum fuses the emerging fields of biotechnology and business/economics with the agriculture industry through hands-on experiential learning activities and online learning courses for youth" (4-H, 2012). In addition to its agriscience curriculum, 4-H features a veterinary science series which "includes three youth guides that are developmentally appropriate for grades 3-5, 6-8, and 9-12" (4-H, 2012). According to their website, the "National 4-H Veterinary Science Curriculum covers basic animal anatomy, normal and abnormal animal conditions, veterinary careers, and other topics that help youth learn more about veterinary science" (4-H, 2012). In addition to its curriculums on agriscience and veterinary science, 4-H also offers curriculum titles which include beef, dairy cattle, dairy goat, meat goat, poultry, sheep, and swine (4-H, 2012).

Agricultural Literacy

Understanding Agriculture: New Directions for Education, published in 1988 by National Research Council (NRC), is the report on agricultural education which first coined the term "agricultural literacy." According to the NRC,

> the committee envisions that an agriculturally literate person's understanding of the food and fiber system includes its history and current economic, social, and environmental significance to all Americans. This definition encompasses some knowledge of food and fiber production, processing, and domestic and international marketing. (1988, p. 1)

In its report, the NRC described Americans' lack of agricultural literacy and knowledge in the most basic of concepts. It reported "most Americans know very little about agriculture, its social

and economic significance in the United States, and particularly, its links to human health and environmental quality" (The National Academy of Sciences - National Research Council, 1988, p. 9). Additionally, the report discussed the inferior state and quality of educational efforts incorporated into curriculum to address agricultural literacy. According to the NRC,

> Few systematic educational efforts are made to teach or otherwise develop agricultural literacy in students of any age. Although children are taught something about agriculture, the material tends to be fragmented, frequently outdated, are usually only farm oriented, and often negative or condescending in tone. (1988, p. 9)

This statement further supports that levels of agricultural literacy are low and need to be addressed. However, since *Understanding Agriculture: New Directions for Education* was published in 1988, the term "agricultural literacy" has evolved and what it means for an individual to be agriculturally literate has been further developed. Likewise, the quality of educational efforts to address agricultural literacy integrated into curriculum have also been further refined with advancements in the Agriculture in the Classroom, National FFA Organization, and 4-H programs.

In 1991, Frick, Miller, and Kahler (1991) utilized the Delphi technique to inquire into what agricultural concepts were important and necessary to achieve standard literacy of agriculture. In coordination with a panel of agricultural professionals, Frick, Miller, and Kahler (1991), defined agricultural literacy as:

> …possessing knowledge and understanding of our food and fiber system. An individual possessing such knowledge would be able to synthesize, analyze, and communicate basic information about agriculture. Basic agricultural information includes: the production of plant and animal products, the economic impact of agriculture, its societal significance,

> agriculture's important relationship with natural resources and the environment, the marketing of agricultural products, the processing of agricultural products, public agricultural policies, the global significance of agriculture, and the distribution of agricultural products. (1991, p. 52)

It is evident that without knowledge of agriculture and agricultural literacy, individuals are incapable of making conscious decisions about agricultural issues.

Trexler (2000b) said "it is important to note that through the use of language, most often through talk, that we link the cognitive with the social" (p. 5). The definition of agricultural literacy was further refined when Meischen & Trexler (2003) expanded the definition to merge "both agriculture content and linguists' definition of literacy relative to culture" (p. 44). The proposed definition is:

> 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 conversation, b) evaluate the validity of media, c) identify local, national, and international issues, and d) pose and evaluate arguments based on scientific evidence. Because agriculture is a unique culture, an understanding of beliefs and values inherent in agriculture should also be included in a definition of agricultural literacy so people can become engaged in the system. (p. 44)

Trexler (2000b) also notes that as society and cultures progress, so do the definitions and goals for literacy. Trexler (2000b) exclaims "once these goals are more clearly defined, we can be

more focused in our efforts to foster agriculture, food, fiber, and natural resource systems literacy" (p. 5).

Student Knowledge and Perceptions of Agriculture

There are various sources of support on the lack of knowledge and misconceptions of agriculture of school students. These studies vary in topic and generally focus on specific areas of agricultural practices, including, but not limited to specific areas such as: 1) pesticides and pest management; 2) meat and livestock; 3) food and fiber systems.

Trexler (2000a) conducted a study which focused on the awareness of fifth grade elementary school students on methods of agricultural production and the accompanying environmental impacts associated with said methods. Specifically, Trexler (2000a) explored how well a small sample of 5th graders understood the concepts of crop protection and pesticides. Trexler (2000a), through use of in-depth interviews, found "elementary students were unable to convey an understanding of basic agricultural production" (p. 99). Trexler (2000a) went on further to state "students held little knowledge of weeds, and the majority did not understand that weeds compete with crops for sun, soil nutrients, space, and water" (p. 100). These findings highlight the need for the inclusion of these topics in elementary curriculum. In addition to these findings, the researcher determined urban students within the sample possessed a poorer understanding of the agricultural concepts, prompting the need for out of school food growing experiences to broaden students' perspectives and help develop their agricultural understanding (Trexler, 2000a, p. 99).

Additional research suggests topics in crop production and pesticides are not the only areas lacking in elementary curriculum. Meischen & Trexler (2003) set out to determine the

understandings of science and agricultural benchmarks related to meat and livestock by fifth graders in a rural Midwestern school. Through use of interviews and concepts mapping, Meischen & Trexler (2003) explored whether students' backgrounds and experiences increased their understanding of agricultural concepts. Researchers found that while students were aware food products produced for human consumption came from animals, they were not aware of the other products produced from animals were for human use. One of the most important findings was that although these students lived in rural areas, they were not farmers, so like urban/suburban youth, they also lacked understanding of agricultural concepts and benchmarks. "This, then, raises questions about agricultural education's primary focus of agriculture literacy for only urban and suburban students" (Meischen & Trexler, 2003, p. 52). These findings suggest that maybe we as a society are setting false precepts for students and other individuals from rural areas by assuming they know more about agriculture/agricultural concepts because they live in rural areas.

Brophy, Alleman, & O'Mahony (2003) conducted interviews with 96 K-3 students to test their knowledge of land-to-hand progressions, identification of products derived from farm animals, and identification of inventions which have helped modernize farming, among other issues related to agriculture. Overall, they found students knew more about the physical appearances and finished products than the processes used to create the products. In regards to the land-to-hand relationship in producing common foods, they found students display only basic understanding of the process and "in general the students displayed not only a lack of specific knowledge, but also a more fundamental lack of awareness of many of the land-to-hand progressions that bring foods to our tables, especially processes that occur on farms or in factories" (Brophy et al, 2003, p. 22). Additionally, they found that "most of what they knew

about cheese or hamburger meat began with purchase of these products in supermarkets, with little awareness of the processing involved in developing them from their bovine origins" (Brophy et al, 2003, p. 22). Brophy et al (2003) added "there was little or no mention of raising animals as a profit-making business or of tanning hides to create leather products" (p. 24). In several cases when discussing various types of meats "these students did not appear to have made the connection yet between the "chicken" they eat and the chickens in barnyards" (Brophy et al, 2003, p. 25). While interviewing students about the steps in growing corn, Brophy et al (2003) found "the most detailed knowledge had been acquired outside of school by students whose neighbors or relatives grew corn in gardens or on farms" (p. 30). Findings show that school garden programs have several benefits for the growth, both physically and mentally, of youth.

While conducting their study, Brophy et al. (2003) found that students had some misconceptions about agriculture:

> Misconceptions were infrequent, although several students thought that we have more types of animals now than they did in the past, one that there was more rain in the past, and one that all farmers at one time were Indians. More common than clear misconceptions were elaborations on valid ideas that included some invalid elements: Most farm work was done by slaves, all farms were the same size, farmers had to produce their own seeds because they lacked the money to buy seeds at a store, today's big farm machines are steam powered, farmers welcome rabbits and gophers because they eat chaff, farmers can get more land now because it is left by people who move to cities, and we need fewer farmers today because we import food from other countries (2003, p. 35)

Brophy et al (2003) mention that several of the misconceptions/ideas reflected by the students interviewed were attributed to images of farming depicted by children's literature.

Also in the realm of food origin, Hess & Trexler (2011) conducted a qualitative study which explored how well elementary students understood concepts of the agri-food system. The researchers used semi-structured interviews to prompt students' understandings. Hess & Trexler (2011) concluded students "lacked a basic understanding of food process, manufacturing and marketing" (p. 9). Additionally, the researchers noted students "held misconceptions that were in stark contrast to the expert conception" (Hess & Trexler, 2011, p. 9). An astonishing 72% of students held misconceptions as to the origin of common foods. They found these misconceptions to be most prevalent when students were asked to describe the origins of items such as the bun and pickle of a cheeseburger. Hess & Trexler (2011) reported students incorrectly identified which animals provided particular meat items, in addition to incorrectly identifying animals as the source of nonmeat animals.

Adult's Knowledge and Perception of Agriculture and their Influence on Student's Knowledge and Perceptions of Agriculture

Terry, Herring, & Larke (1992) credit Drake with saying "that the success of any program intended to teach children about agriculture depends upon the ability of the teacher" (p. 51). In that same study, Terry et al (1992) found nearly 75% of the 510 teachers in their study had unacceptably low knowledge of agriculture, and when asked what agriculture was, more than 90% responded that agriculture is limited to farming and ranching. Herren & Oakley (1995) conducted a study on Georgia's Agriculture in the Classroom (GAITC) program. The study was designed to evaluate the effectiveness of the curriculum featured in GAITC program at the

second and fourth grade levels. The study utilized a posttest only control group design, which at the completion of the six week program all students were given multiple choice exams which had been designed based on the standards for each grade level. The results of the study indicated that the curriculum of the GAITC program was indeed effective in teaching concepts of agriculture in both rural or city settings. However, "the program did not appear to make a difference among classes whose teachers were raised on a farm" (Herren & Oakley, 1995, p. 30). The lack of significant differences was likely attributed to the prior use of agriculture based examples by teachers raised on farms. Herren & Oakley's (1995) conclusion "implies that the knowledge level of the teacher is an important factor in the teaching of agricultural concepts" (Herren & Oakley, 1995, p. 31).

Frick & And (1995) examined the knowledge of rural and urban adults in a Midwestern state of the United States of America. The researchers sought out to discover what the knowledge and/or perceptions of agriculture amongst adults were and to determine if there was a correlation between the levels of knowledge or perceptions of agriculture each obtained dependent of their environment. The researchers found that adults living in rural and farming environments were more knowledgeable about agriculture than those living in urban areas (Frick & And, 1995). Additionally, they determined that individuals who were more highly educated knew more about agriculture than those who were not. Findings show that individuals with higher education have a better knowledge and understanding of agriculture (Frick & And, 1995). Therefore, students with parents who have higher education may possess a better understanding of agricultural concepts and the topics as they pertain to the interview questions developed by the researchers.

The findings of Terry et al (1992), Herren & Oakley (1995), and Frick & And's (1995) are relevant and essential in determining elementary students' knowledge and perception of

agriculture because they provide a better perspective of how students come to possess the basic knowledge of agriculture from the adults in their lives. Additional, and more recent, literature continues to support the influence adults have on the knowledge base and perceptions of students. Malecki, Israel, & Toro (2004) claim "educators play a key role" in the development of students' level of agricultural knowledge and perceptions "because they make decisions about the content and curricula taught in their classrooms" (p. 2). Given that adult knowledge and perceptions of agriculture affects those of the students they are responsible for teaching, the question must be raised, what are adults' (parents, guardians, mentors) in today's society knowledge levels and perceptions of agriculture?

Trexler, Johnson, & Heinze (2000) conducted focus groups with second-eighth grade educators in Michigan in order to evaluate their perceptions of the United States agri-food system. Trexler et al (2000) concluded educators were most knowledgeable on the nutritional and health aspects and were less knowledgeable on the agriculture aspects of the agri-food system. Additionally, they found the teacher's perceptions were shaped primarily by media (Trexler et al, 2000).

A more recent study, one of pre-service agriculture teachers had similar findings. Wingenbach, White, Degenhart, Pannkuk, & Kujawski (2007) set out to determine whether or not new agricultural science teachers were knowledgeable and comfortable with teaching necessary curricula as established by state standards. Wingenbach et al (2007) found teachers had "'adequate' to "low" knowledge and comfort for "general agricultural science and technology" areas" (p. 123). The findings suggest the pre-service teachers "needed more preparation in the eight areas essential to every agricultural education classroom" and "to increase their knowledge of the general agricultural science and technology areas, pre-service

teachers need additional coursework and mastery of the state-mandated objectives to increase their teaching comfort levels" (Wingenbach et al, 2007, p. 123-124). Given the findings of such studies, we should perhaps look less at what students know of agriculture and more aggressively contemplate what are teacher/educator knowledge levels and perceptions of agriculture, in addition to their methods of delivery of agriculture curricula to students.

CHAPTER 3

RESEARCH METHODS

The purpose of this study was to document third, fourth, and fifth grade students' knowledge of agriculture. This study examines the knowledge of agriculture of third, fourth, and fifth grade students at elementary schools in the neighboring counties of Athens-Clarke County. The objectives of this study were to: 1) determine if students can provide an operational definition of agriculture which encompasses more aspects than simply farming; 2) determine if students can identify what products agriculture is a source for; 3) determine if students can identify the difference between various types of agricultural products (fruit, vegetables, grown above ground, grown below ground, etc.); 4) determine sources of students' agricultural knowledge [school (teachers/administrators), home (family), books, TV); and 5) determine if student demographics (location, parent occupation, etc.) influence their knowledge of agriculture.

The Institutional Review Board (IRB) for research involving human subjects at the University of Georgia reviewed and approved all research involved in this study on January 11, 2012. All IRB approved documentation associated with the parental consent and child assent are included in Appendices B and C, respectively. Associated interview questions can be found in Appendix D.

Subjectivity Statement

I have been in or around agriculture and agricultural practices my entire life. I come from a small, largely agricultural-based, town in South Georgia. My grandfather was a farmer, all of his children at some point in their lives have worked in agricultural practices, and I have personally worked in several agricultural environments. I received a Bachelor of Science in Agriculture (BSA) degree in Avian Biology from The University of Georgia (UGA). During my time at The University of Georgia as both and undergraduate, and currently now as a graduate student, I have been actively involved in organizations such as Minorities in Agriculture, Natural Resources, and Related Sciences (MANRRS) and Ag Hill Council, both of which spread the word about and recruit students to agricultural majors and minors. In addition to serving at the local level, I went on to become the first student from The University of Georgia to serve as a national officer in MANRRS, serving as National Student Vice-President. The primary goal of all of these organizations is to disband false stereotypes associated with agriculture and provide accurate information regarding the opportunities students have in the various agricultural sciences. I chose to pursue a Master in Agricultural Leadership because I wanted to explore what was known about agriculture and opportunities in the agricultural sciences by students, of all ages, in order to address the problem of misrepresentation at its source.

With so much focus on technology, arts, and non-agricultural sciences in today's society, the significance of agriculture has diminished in the eyes of most. As of late, agricultural related majors and careers have consistently been atop "Most Useless" degree/job lists composed and dispersed by critics worldwide. As a result, there has been less focus and interests in the agricultural sciences by society as a whole, but more profoundly amongst school-age and university students. Being a member of student organizations within CAES at UGA which target

students for recruitment by informing them of the opportunities available to them through the agricultural sciences has given me the opportunity to explore just how much students know about the agricultural sciences and interact with and provide for them accurate information in an effort to improve their knowledge base of the agricultural sciences and in turn, increase their interests in pursuing agricultural degrees/jobs. Due to the majority of my experience being in the university setting, there may be difficulty in working with younger aged students as they are not as attentive and prove harder to keep on topic. However, I have confidence that my interpersonal skills and patience will prove to be beneficial to me.

It is my duty as a researcher to be aware of the subjectivities brought to the interview process. I must remain neutral in my thoughts and perceptions. For this research project, I will be interviewing third, fourth, and fifth grade students in the surrounding Athens-Clarke County area about agriculture. Being a graduate student with a vast difference in education, maturity, and attention levels than those of my interviewees will affect how I perceive the interviews and interview process. It is critical that I remain aware of my verbiage, tone, and level of attention provided to interviewees as these may largely affect the level of cooperation I'll receive from participants of such young age and low levels of maturity and attentiveness. I am most fearful of the inability of interviewees to remain attentive and focused on the task at hand. I am very attentive and obedient to schedules so it will prove difficult to remain or appear to remain calm if interviewees get off task.

Participants

For this research study, interviews were conducted with seven third, fourth, and fifth grade students. The selection of participants for this research study utilized volunteer sampling;

study participants were targeted based on their enrollment in elementary schools in the neighboring counties of Athens-Clarke County and their participation was completely voluntary. The researcher had no previous relationships with any affiliates of the schools targeted for research. Four elementary schools were chosen based on their proximity to the researcher's base at The University of Georgia campus in Athens, Georgia. The researcher assumed that the mixed demographics of the elementary schools in the surrounding counties of Athens-Clarke County would provide a sample population of students from both rural and suburban environments, providing the researcher with a mixed sample, allowing the researcher to compare and contrast environmental impacts on the students' knowledge and perceptions of agriculture. While race or ethnicity was not considered in the identification of students for participation, the majority of the students interviewed where Caucasian.

The researcher chose third, fourth, and fifth grade students because he decided these were the critical ages in which agricultural concepts and processes should be included in students' curriculum. It is during these grades that students start to develop their own ideas and opinions about topics they learn about so it is extremely important they are provided with accurate knowledge of agricultural concepts and practices so that they may make conscious decisions for the remainder of their life. Jean Piaget acknowledged the difference between how children and adults learn in his cognitive development theory (Flavell, 1963). Third, fourth, and fifth grade students fall into the concrete operative stage of development which is characterized by logical and rational thinking.

Students' participation in the research study was completely voluntary and they were informed of the option to end participation at any given time. Teachers' role in this research study was to distribute, collect, and return any signed parental consent forms to the front office

state of South Jackson Elementary School. Parents' role in this research study was to grant permission for their child to participate and coordinate a time and date for the interview with the researcher. Parents were informed the research study was completely voluntary and they or their child could end participation at any given time.

Research Design

There are two types of research, qualitative and quantitative. The major differences between qualitative and quantitative research is qualitative research sets out to understand behavior and the reasoning behind behavior while quantitative research uses quantifiable data to generalize results (McRoy, n.d.). In this study, the researcher inquired into the knowledge of third, fourth, and fifth grade students and how they come to possess that knowledge. Therefore, qualitative research approach was utilized for this research study. The qualitative research approach allowed participants to candidly discuss, in detail, their thoughts and/or opinions in response to questions asked. The qualitative research approach also allowed researcher to capture the students' thoughts and/or opinions in their own diction. A quantitative research approach would not have been useful in this research study because quantitative research practices would not allow subjects to respond to interview questions in their own words. A quantitative research approach would have consisted of a survey with predetermined responses, thus inhibiting any insight into the students' personalized information in regard to agricultural knowledge base and/or perceptions of agriculture. Additionally, a quantitative approach would not allow for clarification of questions, which is really important for the age group interviewed. While qualitative studies can have treatment groups, this research study does not. This research study

did not utilize a treatment group because it was an exploratory study exploring the knowledge and understandings of those involved as opposed to evaluating a specific treatment.

Interviews

This ex-post-facto qualitative research study collected data through a semi-structured interview. The participants were children in grades third, fourth, or fifth. The interviews were carried out in a time/place agreed upon with the parents (guardians) of the students (participants) to be interviewed and the researcher. The parents of the child interviewed were given the option for their child to be interviewed in locations such as, but not limited to the following: Erik Nkembe's office in the Agricultural Leadership, Education, and Communication Department at The University of Georgia Athens campus; the parent's (guardian's) home; or a public area such as a playground, library, or church.

An interview protocol with 16 questions was prepared for the research study. Erik Nkembe developed the interview protocol under the direction of major advisor, Dr. Maria Navarro. The interview protocol can be found in Appendix D. The interview questions were designed to evaluate each subject's knowledge and perception of agriculture. In addition to assessing the students' knowledge and perception of agriculture, the questions were designed to explore where each subject gained knowledge of agriculture. The sources of most interest include students' parents, teachers/educators, books read, and/or television programs watched. Additionally, subjects were asked to provide the careers of their parents.

Prior to administering the interview to the interviewees, schools had to be contacted. Initial contact with schools was made with a request for study site. The letter can be found in Appendix A. After a week the researcher contacted each school's principle to confirm they

received the request. After confirmation of receiving the letter, the researcher scheduled a time to drop parental permission forms off at schools. Each third, fourth, and fifth grade student was sent home with a parental consent form. The students' parents were presented with a parental permission form specifying the essentials of the research study and interview process. After receiving approval from the interviewees' parents, the researcher explained, in detail, the purpose and process of the interview with the interviewee. The researcher read, then inquired into and answered any questions the students may have had about the child assent form (see Appendix C) or the interview process. After explaining the research study and child assent form, each student acknowledged their understanding and signed the child assent form, after which the interview began. The researcher verbally presented students with each item of the interview protocol (see Appendix D), one at a time. Interview length ranged from 15 to 20 minutes dependent upon the students' responses to the interview questions. The initial interview questions addressed the interviewees' backgrounds [i.e. age, grade in school, locale of residence (city or country)]. The researcher used the third interview item to make the students feel comfortable and ease them into the more complex interview questions. By asking the students what their favorite food was and from where did the food come, the interviewer was able to both allow the child to feel more comfortable expressing their ideas to the researcher and allow the researcher to get an idea of how the child would answer the questions to come. The remaining interview items probed students' knowledge and understandings of agriculture.

The researcher took written notes during the interview as audiotaping and videotaping were not allowed. Audiotaping and videotaping were not allowed because the researcher did not receive IRB approval to audiotape or videotape interviews. The researcher did not pursue IRB approval to audiotape or videotape the interview because he thought it would be more difficult to

gain approval to interview the students participating in the study due to their age. While written notes are not as reliable as transcription from audio- and/or videotaping, the researcher did record everything the interviewee's said. To ensure responses were recorded accurately, the researcher often asked interviewees to repeat anything misunderstood and read responses back to interviewees for confirmation. This process is known as member-checking. The researcher utilized two strategies to ensure the trustworthiness of the research study. To address the issue of credibility, the researcher utilized "member checking" (Lincoln & Guba, 1985) with each participant. During the interviews, the researcher repeated interview questions to participants to ensure understanding of the question. The researcher then repeated the participants answer to ensure it was the response the interviewee intended to give. According to Lincoln & Guba (1985), "the member check, whereby data, analytic categories, interpretations, and conclusions are tested with members of those stake holding groups from whom the data were originally collect, is the most crucial technique for establishing credibility" (p. 314). The researcher also reflected on himself as a researcher, more commonly identified as "reflexivity" (Merriam, 2009, p. 219). The research employed a subjectivity statement to address the biases which could have influenced the interpretation of data. In the subjectivity statement, the researcher disclosed biases and aspects of his background which could influence the interpretations he made.

Data Analysis

Audiotaping and videotaping were not allowed for this research study so the researcher handwrote interviewees' answers onsite during each interview. To ensure the confidentiality of the subjects, the interviews were labeled by number of interviewee and there are no other

identifiers together with interview data. In addition, only the researcher and researcher's committee had access to the interview data.

Data analysis began during the interview process. The researcher began to notice commonalities within interviewees' responses during the interviews. At the conclusion of the interviews, the researcher reviewed the interviewees' responses to further decipher themes within them. Additionally, the researcher analyzed themes in comparison to those of the comprehensive notes taken by the researcher during the literature review process prior to and during the research study. The Key Words in Context (KWIC) technique was utilized to find themes. Using simple observation, the researcher identified a list of words and counted their frequencies. Those words with the highest frequency and relevance where chosen as themes. Comprehensive notes of research conducted in connection with the researcher's current research were taken during the literature review process in order to provide the researcher with an in-depth look at research previously and currently being conducted in the area. During the analysis, the researcher utilized an inductive approach, taking a "bottom-up" approach to the analysis. To complete the "bottom-up" approach, the researcher worked backwards, from specific observations to generalizations. The researcher reported information descriptively. Deciphering themes and coding student responses was the initial phase of data analysis. The researcher used "open-coding" (Corbin & Strauss, 2008) to identify emerging themes which were based on the level of students' knowledge and understanding of agriculture in their responses. The quality of said responses merited a specific code. Table 1 lists those codes. After student responses were coded, the researcher calculated percentages of students' knowledge and understanding based on the codes their responses were assigned.

Table 1

Codes for Student Knowledge and Understanding

Code	Description
HK (Higher Knowledge)	Students have knowledge that agriculture is not limited to farming and food; students correctly identify agricultural crops and/or products and provide details on the larger scope of agriculture
BK (Basic Knowledge)	Students have knowledge that agriculture is farming and/or that we get food products from agriculture; students correctly identify agricultural crops and/or products but provide no details on the larger scope of agriculture.
NK (No Knowledge)	Students do not respond, respond "I don't know," or responds incorrectly

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CHAPTER 4

RESULTS AND FINDINGS

Parental consent forms granting permission to interview children were returned by 28 parents. Of the 28 parental consent forms returned, only seven responded to the follow-up and allowed their child to be interviewed for this study.

There were five objectives identified in this study: 1) determine if students can provide an operational definition of agriculture which encompasses more aspects than simply farming; 2) determine if students can identify what products agriculture serves as a source for; 3) determine if students can identify the difference between various types of agricultural products (fruits, vegetables, grown above ground, grown below ground, etc.); 4) determine sources of students' agricultural knowledge [school (teachers/administrators), home (family), books, TV.)]; 5) determine if student demographics (location, parent occupation, etc.) influence their knowledge and/or perception of agriculture.

Demographics of Students

Of the seven interviewees' participating in the research study, the majority, 86% (6), were male and the remaining 14% (1) were female. In this study, 57% (4) of the interviewees lived in country settings while the remaining 43% (3) lived in city settings. All seven interviewees attended public schools. 29% of students were involved in the 4-H program. The participants' mothers had a narrow range of occupations: 43% (3) were teachers/professors (full-time/substitute); 29% (2) were nurses; 14% (1) was unemployed; and 14% (1) provided no

response. The participants' fathers had a slightly broader range of occupations: 29% (2) were teachers/professors (full-time); 29% (2) were landscapers; 14% (1) was a software specialist; 14% (1) was a farmhand; and 14% (1) was a truck driver. Table 2 represents demographic characteristics of students.

Table 2

Demographic Characteristics of Students

#	Gender	School	Location	Parents' Occupations
1	Male	Public	Country	Father: Professor Mother: Professor
2	Male	Public	Country	Father: Teacher Mother: Teacher
3	Male	Public	City	Father: Landscaper Mother: Nurse
4	Male	Public	City	Father: Landscaper Mother: Unemployed
5	Male	Public	City	Father: Software Specialist Mother: Substitute Teacher
6	Female	Public	Country	Father: Farmhand, part-time Mother: Nurse
7	Male	Public	Country	Father: Truck Driver Mother: No Response

Objective 1: Determine if Students can provide an Operational Definition of Agriculture

For the purposes of this item, a basic understanding of agriculture means the student has knowledge that agriculture is the physical act of farming and/or that we get food products from agriculture. There were several themes discovered in the students' operational definitions of agriculture. The first two themes discovered in student responses were *crop study* and *poverty study*. These themes were found out of a definition posed by two students. One student stated, "[Agriculture is] study of crops, poverty, and how to prevent poverty." An additional theme in

students' operational definitions of agriculture, was farming. Two students used defined agriculture, their statements are as follows: "(Agriculture is) about farming" and "agriculture is like farming and stuff"". A third theme was *eating*. The final theme is supported by a student's response that, "yes, agriculture is important because we get to eat. *Roots of life,* is another theme which was found. A student replied that agriculture is "very important because it is the roots of life." Findings show that 43% (3 of 7) students either had no knowledge or understanding of what agriculture or its importance was. Of the four remaining students, 43% (3) had a basic knowledge and understanding of what agriculture was and the remaining 14% (1) had a complex knowledge and understanding of agriculture and its importance. However, it is important to note the importance of one student's claim to not know what agriculture was specifically despite having a basic understanding of agriculture's importance. Table 3 represents students' abilities to provide an operational definition of agriculture.

Table 3

Can Students Provide an Operational Definition of Agriculture?

#	Code	Item 4 – Can you tell me what do you know about agriculture? How important do you consider agriculture? Why?
1	HK	"Study of crops, poverty, and how to prevent poverty. Very important because it's the roots of life."
2	NK	No response
3	BK	"About farming. I don't know, we haven't really studied agriculture. Yes, agriculture is important because you can learn about farming and know what to do."
4	BK	"Agriculture is like farming and stuff. Yes, agriculture is important because we get to eat."
5	BK	"Not really. Yes, because you're trying to learn stuff about vegetables, fruits, and other kinds of things."
6	NK	"I don't know."
7	NK	"I don't know what agriculture is."

This data suggests that elementary students (third, fourth, and fifth grade) cannot provide an operational definition for agriculture which encompasses more aspects than simply farming. Overall, 57% (4 of 7) of participants either indicated that they had no knowledge of what agriculture was, or gave no response at all. Basic knowledge and understanding of agriculture was held by 29% (2) of participants. The final 14% (1) of participants exhibited a much more advanced knowledge and understanding of agriculture. The participant understood that agriculture, while farming is a very large part of it, is much more than the act of farming and that it has effect on other aspects of our lives. The participants made connections between agriculture and poverty, agriculture as a way to prevent poverty.

Objective 2: Determine if Students can identify what Products Agriculture serves as a Source for

There were not many themes which emerged from this item because majority of students did not know what agriculture provides for us. When asked what agriculture provides for us, 57% (4) students replied that they did not know what agriculture provides for us. The remaining students had at least a basic understanding that agriculture provides food for them. There were two themes which emerged from their responses. The first theme, which all three students contributed to, was *food*. One of the more specific responses from students which contributed to this theme acknowledged that agriculture provided food, but specifically "fruits and vegetables." 29% (2) of students provided responses with a level of higher understanding that agriculture provides foods. The second theme was the most advanced. The researcher named the second theme *essentials*. The response from which this theme emerged indicated that agriculture

provides “food, water, nutrients.” The researcher called the theme *essentials* because of the connection made between food and its ultimate purpose as a source of nutrients for the body.

While it is evident some students possess a better understanding of what agriculture provides, the fact remains most of students are unable to identify what agriculture provides for us. Table 4 represents students’ ability to identify what agriculture can provide for us.

Table 4

Do Students Know What Agriculture Provides for Us?

#	Code	Item 5 – Do you know what agriculture provides for us?
1	HK	“Food; fruits and vegetables.”
2	NK	No
3	NK	No
4	BK	“Food and I don’t know”
5	HK	“Food, water, nutrients.”
6	NK	No
7	NK	No

House

The researcher asked students what their houses were made of and 57% respondents indicated that the products their homes were made of, specifically wood were a part of agriculture because trees are a part of agriculture. The remaining 43% (3) of respondents indicated the products their homes were made out of did not come from agriculture.

The data presented suggests third, fourth, fifth grade students know what their houses are made of and the majority of them know that the materials their homes are made of come from agriculture. Table 5 represents students’ ability to identify what their homes are made of and if it came from agriculture.

Table 5

House – What is it made of? Did it come from Agriculture?

#	Code	Item 12 – What is your house made of? Did that come from agriculture?
1	BK	"Wood"; "Trees come from agriculture."
2	NK	"Wood"; no response
3	BK	"Wood and bricks." "Yes, I think. Wood comes from agriculture, don't know about bricks."
4	BK	"Wood and bricks." "I know wood is trees."
5	NK	"Bricks." No
6	NK	"Brick." No response
7	BK	"Wood and plastic." Yes

Objective 3: Determine if Students Can Identify the Difference between Various Types of Agricultural Products

Vegetables

There were 86% (6) of respondents who had at least a basic knowledge and understanding that vegetables come from farms, 29% (2) of which possessed a higher knowledge and understanding of where vegetables come from. The two respondents who possessed a higher knowledge and understanding had a better grasp of various vegetable origins as well as their growing conditions (above ground, underground, under water). Findings suggest a large majority of third, fourth, and fifth grade students know/understand where vegetables come from. Table 6 represents students' ability to identify where vegetables come from.

Table 6

Do you Know Where Vegetables Come From?

#	Code	Item 6 – Do you know where vegetables come from?
1	HK	"Fruit, cranberries, and peaches – trees. Rice – under water. Broccoli – above ground."
2	NK	No
3	BK	"Farms"
4	HK	"The ground, like farming plantations."
5	BK	"Farms, grocery stores"
6	BK	"Off the trees"
7	BK	"Vegetables comes from fields"

Both peppers and potatoes were correctly identified by 71% (5 of 7) of students. When asked whether vegetables grow above or below ground, 57% (4 of 7) of respondents correctly identified that peppers grow above ground and that potatoes grow underground. Overall, the data proves the majority of elementary school students (third, fourth, and fifth grade) can correctly identify both peppers and potatoes and distinguish between whether they grow above or below ground. Table 7 represents the students' ability to identify peppers and potatoes and distinguish between whether they grow above or below ground.

Table 7

Potatoes and Peppers – Identification, Growth, Growth in Georgia

#	Code	**Item 7 – Do you know what this is? (Present child with a picture of potatoes and peppers) Do you eat these (potatoes/peppers? Do you know where these (potatoes/peppers) grow? (above or below ground) Can these grow in Georgia?**			
		Can student identify potatoes and peppers?	Does student eat potatoes and peppers?	Does student know where potatoes and peppers grow? (above or below ground)	Can potatoes and peppers grown in Georgia.
1	BK	Yes, both	Yes, both	Potatoes: below Peppers: above	Yes, peppers
2	BK	Yes, both	Yes, potatoes	Potatoes: No response Peppers: above	No response
3	BK	Yes, both	Yes, potatoes	Potatoes: above Peppers: below	Yes, peppers
4	HK	Yes, both	Yes, both. "They grow from a plant or vine."	Potatoes: below Peppers: above	Yes, potatoes. "Potatoes grown in Georgia, I know for a fact."
5	HK	Yes, both	Yes, both	Potatoes: below Peppers: above "Potatoes grow on farms under the soil and the peppers grown on farms also."	Yes, both
6	BK	"Vegetables"	Yes, potatoes	Potatoes: below Peppers: below	Yes, both
7	BK	Yes, potatoes but not peppers	Yes, potatoes but not peppers	Potatoes: no response Peppers: no response "Potatoes grow in potato fields."	Yes, both

Crops Grown in Georgia

All students were able to identify crops which are grown in Georgia. For the purposes of this study, the crops/produce identified as being grown in Georgia as follows: apples, arugula, asparagus, basil, beans (snap, pole and lima), beets, blueberries, bok choy, Brussels sprouts, cabbage, cantaloupe, carrots, cauliflower, celery, chard, collards, corn (sweet), cucumbers, eggplant, figs, garlic, grapes, kale, leeks, lettuce, mushrooms, mustard, okra, onions, peaches, peas (English and Field), pecans, peppers, plums, potatoes (Irish and sweet), pumpkins, radishes, spinach, squash, strawberries, tomatoes, turnips, and watermelon, and zucchini. 43% (3 of 7) of students indicated that some type of crop/produce grew near where they live. All respondents who indicated some type of crop/produce growing near where they live lived in country/rural environments.

71% (5 of 7) students named four or more crops (fruit or vegetable) grown in Georgia. Of those five students who correctly named four or more crops grown in Georgia, three of them live in city environments as opposed to country/rural environments. The theory or stereotype that individuals from country/rural environments know more about agriculture/agricultural crops grown in the state of Georgia is discredited by this data.

All three students who reside in city environments correctly identified four or more crops grown in Georgia. There was an even split between students country/rural environments. Half of the students living in country/rural environments correctly identified four or more crops grown in Georgia, and the remaining half only identified three or less crops grown in Georgia. Table 8 represents students' ability to identify crops grown in Georgia.

Table 8

Identification of Crops Grown in Georgia

#	Code	Item 8 – What crops are grown in Georgia? Do any crops grown near where you live?
1	BK	"Peppers, potatoes, carrots, spinach, corn, squash." Yes, crops grown near where lives
2	BK	"A lot. Broccoli, spinach, cabbage, peppers, tomatoes." Yes, crops grown near where lives
3	BK	"Lettuce, celery, potatoes, peppers, tomatoes." No response
4	BK	"Carrots, potatoes, tomatoes, cabbage." No crops grown near where lives
5	BK	"Corn, lettuce, onions, peanuts, tomatoes, cauliflower." No crops grown near where lives
6	BK	"Trees, leaves, apples on trees, grapes on trees, flowers." Yes, crops grown near where lives
7	BK	"Potatoes grow in Georgia." No crops grown near where lives

Milk

All students correctly identified both milk and cows as the source of milk. Additionally, one student identified goats as a source of milk. All students were able to identify products made with milk 43% (3of 7) of students were able to identify one product made with milk, while the remaining 57% (4 of 7) of students were able to identify two or more products made with milk, including the group "dairy." Table 9 represents third, fourth, and fifth grade students' ability to identify milk, its source, and identification of other products made of milk.

Table 9

Milk – Identification, Origin, and Products

#	Code	**Item 9 – Do you know what this is? (Present child with a picture of milk) Do you know where this (milk) comes from? (What animal does this come from?) Do you know what else is made out of this (milk)?**		
		Can student identify milk?	Does student know where milk comes from? (What animal)	Does student know what else is made out of milk?
1	BK	Yes	Yes, "cows"	Cheese, butter, yogurt, chocolate
2	BK	Yes	Yes, "cows"	Cheese
3	BK	Yes	Yes, "cows". "That's an easy question.	Ice cream, butter, whip cream
4	BK	Yes	Yes, "cows"	Ice cream, dairy products
5	HK	Yes	Yes, "cows and sometimes goats"	Dairy, cheese, yogurt
6	BK	Yes	Yes, "cows"	Chocolate
7	BK	Yes	Yes, "cows"	Cheese

Chicken

All seven students were able to correctly identify chickens. 57% (4 of 7) of respondents identified chickens as being a part of agriculture while the remaining 43% (3 of 7) stated that chickens are not a part of agriculture.

The large majority, 86% (6 of 7), of respondents indicated that chickens are important to agriculture while one stated that chickens were not important. The six respondents who indicated that chickens are important to agriculture and to humans indicated that they were important because they provide food for consumption.

The large majority, 86% (6 of 7), of respondents identified other animals as being a part of agriculture. While six respondents identified other animals in agriculture, only 71% (5 of 7) of

the respondents accurately identified other animals associated with agriculture. The respondents accurately identified the following: chickens, cows, horses, pigs, roosters, and sheep.

Animals which were incorrectly labeled by students as being agricultural were cats and dogs. Data supports that third, fourth, and fifth grade students can identify chickens and make the connections to their significance as sources of food. It also supports that third, fourth, and fifth grade students can identify other animals associated with agriculture. Table 10 represents students' ability to identify chickens and their roles in agriculture, as well as additional animals in agriculture.

Table 10

Chickens – Identification and Role/Importance in Agriculture

#	Code	Item 10 –What is this? (Present child with a picture of a chicken) Is this (chicken) a part of agriculture? Why are chickens important? Are any other animals a part of agriculture?			
		Can student identify chickens?	Does student recognize chicken as a part of agriculture?	Does student know why chickens are important?	Does student know if any other animals are a part of agriculture?
1	BK	Yes	Yes	"Eggs, chicken"	Pigs, horses, cows
2	BK	Yes	Yes	"Provide eggs for eating"	Cows
3	HK	Yes	Yes	"Gives us eggs and food because people kill them; have to cook them before you eat them"	Pigs, cows, chickens, roosters, sheep
4	BK	Yes	No	"Yes, important because food and because they lay eggs which is technically still food"	No response
5	BK	Yes	No	"Sometimes, it depends. Important when we can use their eggs to eat."	Dogs, cats
6	BK	Yes	No	"Aren't important."	Cows, cats, dogs
7	BK	Yes	Yes	"They give us food."	Cows, pigs

Cotton

When asked to identify clothing items, 86% (6 of 7) of students correctly identified both shirt and jeans and identified what they were made of but the final student had no response. The

cotton crop was correctly identified by 71% (5 of 7) of students. The two remaining students either had no response or did not know what the crop was. Other uses of the cotton crop were identified by 71% (5 of 7) of students. The final two students were unable to correctly identify the cotton crop.

The data provided suggests that third, fourth, and fifth grade students can identify clothing objects and make the connection that clothing items are made out of cotton. While the students proved they could identify clothing items and knew that they were made of cotton, the researcher wanted to explore whether the respondents could accurately identify the cotton crop prior to production of clothing products. The data shows that the majority of third, fourth, and fifth grade students in the study correctly identified the cotton crop, as well as other products made from the cotton crop. Table 11 represents students' ability to identify cotton and products made of cotton.

Table 11

Cotton – Identification of Cotton Crop and Products Made of Cotton

#	Code	Item 11 – (Present child with a picture of a shirt and/or jeans) Do you know what these are made of? Do you know this crop? (Present child with a picture of cotton) What is this crop used for?		
		Does student know what shirt and/or jeans are made of?	Can student identify cotton crop?	Can student identify what cotton crop is used for?
1	HK	Yes	Yes	Pillows, clothes, mattress
2	BK	No Response	Yes	clothes
3	HK	Yes; "Some are made from sheep; leather. Leather comes from cows."	Yes	"Cotton is used for clothes also."
4	HK	Yes, "clothe"	Yes	"Cotton is used for clothes and all types of stuff to make yarn."
5	BK	Yes, "They are made out of wool, cotton, and I think that's about it."	No Response	No Response
6	BK	Yes, "clothe"	No	"Cotton is white"
7	BK	Yes, "cotton"	Yes	"Clothes"

Objective 4: Determine the Source(s) of Students' Agricultural Knowledge

The researcher found that 71% (5) of students indicated learning about agriculture at school via teachers, one of which indicated learning about agriculture in 4-H. It should be noted that one of the five students indicating learning about agriculture at school stated only learning about agriculture at school "sometimes." Of the seven students interviewed for this study, only two were fifth grade students and of the two fifth grade students, only one indicated learning about agriculture in the 4-H program.

Findings show that 43% (3) of students indicated learning about agriculture at home via family (mom, dad, or brother). Also worthy of note is that all three students who indicated that

they learned about agriculture at home all had gardens. One of those students indicated redoing his yard with sod; the child's father is a landscaper.

Reading books was a source for 43% (3) of students learning about agriculture. Of the three students indicating learning about agriculture by reading books, two indicated learning about agriculture in science books. This is essential because the students made the connection that agriculture is a science.

Only 14% (1) of students indicated learning about agriculture via television programs and the final 14% (1) of students had no response at all. Table 12 represents where students learned what they know about agriculture.

Table 12

Sources of Students Agricultural Knowledge

#	Item 13 – Where have you learned these things about agriculture?
1	"4H, dad, mom, books. No TV." Student's family has a garden. Indicated science books as source of learning.
2	"Brother" Student's family has a garden
3	School. Home; "A little, redoing our yard with sod." Student's family has a garden.
4	School; books "Science"
5	"Books, TV, school sometimes"
6	"At School"
7	No response

Objective 5: Determine if Students' Demographics Influence Their Knowledge and/or Perception of Agriculture

Because all seven research participants attended public schools, there were no grounds of comparison. Location appeared to have an effect on the students' knowledge and perceptions of agriculture. While there was one less research participant from the city as opposed to the

country, all three students who lived in the city answered two or more interview items with higher knowledge and understanding. Only 25% (1) of the students who lived in the country answered interview items with higher knowledge and understanding; he answered four. Overall, students from the city collectively scored 93% of their responses within in the basic knowledge and higher knowledge categories, while only 75% of the students from the country scored within the basic knowledge and higher knowledge categories. The researcher could not conclusively determine any significance difference in students' knowledge and/or perception of agriculture based on parents' occupation. Table 13 reports demographics' effect on students' knowledge and understanding of agriculture.

Table 13

Demographics' Effect on Knowledge

				Code		
#	**Gender**	**Location**	**Parents' Occupations**	**HK**	**BK**	**NK**
1	Male	Country	Father: Professor Mother: Professor	4	5	
2	Male	Country	Father: Teacher Mother: Teacher		5	4
3	Male	City	Father: Landscaper Mother: Nurse	2	6	1
4	Male	City	Father: Landscaper Mother: Unemployed	3	6	
5	Male	City	Father: Software Specialist Mother: Substitute Teacher (Part-time)	3	5	1
6	Female	Country	Father: Farmhand, part-time Mother: Nurse		6	3
7	Male	Country	Father: Truck Driver Mother: No Response		7	2

CHAPTER 5

SUMMARY AND RECOMMENDATIONS

Agricultural literacy, unfavorable agricultural stereotypes, and misconceptions about agriculture continue to be a problem in the United States. Research studies such as this one provide agriculturalists, educators, and curriculum developers with a status report on the climate of agriculture within today's society.

Purpose and Objectives of Study

The purpose of this study was to document third, fourth, and fifth grade students' knowledge of agriculture. In addition to identifying the knowledge of agriculture possessed by these students, the information sources for this knowledge also needed to be identified. The objectives of this study were to: 1) determine if students can provide an operational definition of agriculture which encompasses more aspects than simply farming; 2) determine if students can identify what products agriculture serves as a source for; 3) determine if students can identify the difference between various types of agricultural products (fruits, vegetables, grown above ground, grown below ground, etc.); 4) determine sources of students' agricultural knowledge [school (teachers/administrators), home (family), books, TV.)]; 5) determine if student demographics (location, parent occupation, etc.) influence their knowledge and/or perception of agriculture.

Review of Research Design

A qualitative research approach was used because it allowed research subjects to candidly discuss, in detail, their thoughts and/or opinions in response to questions asked. A qualitative research approach also allowed the researcher to capture the students' thoughts and/or opinions in their own diction. While qualitative studies can have treatment groups, this research study did not. This research study did not utilize a treatment group because it was an exploratory study exploring the knowledge and understandings of those involved as opposed to evaluating a specific treatment.

Participants, Interviews, and Data Analysis

For this research study, interviews were conducted with seven third, fourth, and fifth grade students. The selection of participants for this research study utilized volunteer sampling. Study participants were targeted based on enrollment in elementary schools in the neighboring counties of Athens-Clarke County and their participation was completely voluntary.

Third, fourth, and fifth grade students were chosen because the researchers found these were the critical ages in which agricultural concepts and processes should be included in students' curriculum. Students' participation in the research study was completely voluntary and they were informed of the option to end participation at any given time. This ex-post-facto qualitative research study collected data through a semi-structured interview which was carried out in a time/place agreed upon with the parents (guardians) of the child (participants) to be interviewed and the researcher. An interview protocol (see Appendix D) with sixteen questions was prepared for the research study. The interview questions were designed to evaluate each

student's knowledge of and perception of agriculture. In addition to assessing the students' knowledge of and perception of agriculture, the questions were designed to explore where each student gained knowledge of agricultural concepts and practices. Interview length ranged from fifteen to twenty minutes dependent upon the students' responses to the interview questions. Students' responses were handwritten by the researcher during the interview because audiotaping and videotaping were not allowed.

As audiotaping and videotaping were not allowed for this study, the researcher collected students' answers onsite of each interview in the form of written notes. During the interview process, the researcher began to notice themes within interviewees' responses. The researcher analyzed themes in comparison to those of the comprehensive notes taken by the researcher during the literature review process prior to and during the research study. The researcher utilized an inductive approach for coding the interviews, taking a "top-down" approach to the analysis. Information was reported descriptively and the analysis was a two stage process. Students' responses were coded based on the quality of the knowledge and understanding of agriculture exhibited. After student responses were coded, the researcher quantified the results and calculated the percentages of each code. The researcher reported students overall knowledge and understanding of agriculture based on the percentages of students' coded responses.

Summary and Discussion of Findings

When asked to, in their own words, describe what agriculture is and indicate whether it was significant, it became clear that research participants had a basic understanding of agriculture, but were in need of more knowledge to construct an operational definition for agriculture which encompassed more aspects than simply farming. It became evident that most

students could not decipher the significance of agriculture to our survival. The research participants also lacked knowledge in regard to what products agriculture provides for us; however, most did have a basic knowledge and understanding of what products were used to build their homes and their connection to agriculture.

Findings suggest that students can identify the difference between various types of agricultural products such as fruits and vegetables and can also distinguish between whether they are grown above ground or below ground. Findings suggest that third, fourth, and fifth grade students have basic knowledge of vegetables and can correctly identify both peppers and potatoes, in addition to naming crops which are grown in the state of Georgia. In addition to identifying vegetables, they can identify milk as a product which comes from cows and is a main ingredient in several other products. Research participants were also able to identify chickens and other animals associated with agriculture. Research participants were even able to identify cotton and make the connection that it is used in products we used daily such as shirts and jeans.

Objective 4 was achieved by having research participants explain where they acquired their knowledge and perceptions of agriculture. Students declared they learned about agriculture at school, at home, and from books. Only one student indicated learning about agriculture from television. Researchers think it is important to note that all three students who declared learning about agriculture at home had a garden.

In regards to objective 5, demographic characteristics contributed to the knowledge and perception of agriculture by the research participants. While type of school attended and parents' occupation caused no significant differences in students' knowledge and understanding of agriculture, location did. Students who lived in the city had better understanding of agriculture overall.

Also, changes should be made to improve the interview protocol. The interview protocol should ask for identification of animals, crops, and products which are not as easily identifiable as those featured in the current interview protocol. Additionally, the question order and format should be improved. In hindsight, the researcher realized that some questions/question formats were leading. Particularly in the case of interview Question 11, in which the researcher had the students identify clothing items made of cotton, then proceeded to ask them to identify a cotton plant, and finally asking the students to identify products made from cotton. The researcher felt the order of the aforementioned questions may have directed the responses provided by the students. Alternatively the researcher could have the student identify the cotton plant first and then name, on their own, items which are products of the cotton plant. If the researcher further wants to include a portion in the interview protocol in which the students can identify products and the materials and/or crops they are made of, it could be included at the conclusion of the interview so the students' responses are not influenced by any associated portion of a question with the same subject matter. Additionally, the researcher should utilize real items for identification, as opposed to pictures of items. While presenting the students with pictures of the items for identification purposes worked well during this study, the researcher felt using real items and allowing students to explore them themselves could provide better insight into whether the students can readily identify the items in person or if they are simply identifying them by associating them with pictures they've previously seen. The same notion of leading applies for the interview question which pertains to chickens, Question 10. Rather than present the student with a picture of a chicken and inquire into its relevance to agriculture, the researcher felt the student should be asked to identify a chicken and then ask for students to detail everything they

know about chickens. This method could provide a more accurate description of the students' knowledge base on the subject matter because the question order/format does not lead responses.

While the researcher did a good job of capturing each student's responses, perhaps more specific quotes and responses could be obtained by one of two methods. The first of the two methods is to have an additional researcher accompany the primary researcher to the interviews and record (handwrite) each student's response while the primary researcher conducts the interview. The proposed method of data collection has several benefits including: 1) having an additional researcher take notes on the interview allows for more accurate responses and specific quotes from students; 2) it allows for the primary researcher to devote all of his/her attention to the student so he/she does not feel secondary to anyone or anything else present; and 3) it provides a second perspective and set of notes for the primary researcher to compare to his/her own notes for analysis purposes. The second method of collecting more specific responses is to gain permission to audiotape and/or videotape the interviews with each student. Audio taping and/or videotaping each interview would allow the researcher the opportunity to transcribe each interview word-for-word, leading to more specific responses and direct quotes for analysis.

Conclusions

The findings produced by this research study are summarized above and in the previous chapter. The findings have made it possible to develop several conclusions based on the objectives the researcher presented in the introduction. This exploratory study has provided the researcher with the data necessary to begin understanding what knowledge third, fourth, and fifth grade students possess about agriculture. The findings of this research indicate that third, fourth, and fifth grade students have a basic knowledge and understanding of agriculture. It was also

found that third, fourth, and fifth grade students cannot provide an operational definition of agriculture which encompasses aspects of agriculture other than farming. These findings are similar to those of Trexler's (2000a) who exclaims "without this initial structure, students cannot build a foundation for learning" (p. 99). Without the proper groundwork, it would be impossible to grasp the more complex concepts about agriculture.

Third, fourth, and fifth grade students are able to identify various crops, both food and fiber, distinguish between whether they're grown above or below grown, and identify which are grown in their home state of Georgia. Additionally, third, fourth, and fifth grade students can identify milk, can identify cows and in some cases goats, as milk's source, and can also identify other food items which are produced from milk. Students can also identify other animals used for agricultural purposes, including chickens. However, there is still much room for improvement. Although youth have knowledge of these basic concepts, they still lack knowledge of concepts which are important to them as future consumers and benefactors. A lot of that lack is in regards to the process necessary to get their food from the farm to their plates. Brophy et al. (2003) showed the need for this knowledge when they determined that "the students knew more about the physical appearances of things than their underlying natures, and more about the uses of finished products than about the land-to-hand transformations involved in creating those products" (p. 35). Several students in this study could identify their favorite food products but were unable to identify the individual items and source of items from which those food products were made.

It was concluded that third, fourth, and fifth grade students learn about agriculture from a variety of venues with the most common being school, home, and books. Findings from such a study would be very beneficial in deciphering problem areas in agriculture education. A study

like the proposed would be beneficial to researchers like Brophy et al. (2003) who addressed the misconceptions held by students due to inaccurate literature.

In the findings and discussion section, the researcher informed readers that only one of two students involved in the 4-H program indicated learning about agriculture from 4-H. This finding holds significance because in the state of Georgia, all fifth grade students are required to participate in 4-H. Yet, only 50% of the fifth graders participating in this study indicated learning about agriculture via 4-H or even mentioned 4-H.

Recommendations for Research

While research found that third, fourth, and fifth grade students were able to identify various crops, both food and fiber, specifically potatoes, peppers, and cotton, further research is needed to determine how many other crops students can readily identify. The same applies for identification of animals for agricultural use. The researcher felt that the crops, fibers, and animals chosen for identification purposes in this study may not have been difficult enough and that a true testament of third, fourth, and fifth grade students' knowledge and identification of crops, fibers, and animals associated with agriculture, would require the use of more challenging examples The researcher recommends repeating the study with a higher degree of difficulty and a broader range of questions.

Additional research is needed to determine exactly what agricultural elements students are learning from each of the following: school, home, and books. State Departments of Agriculture and Education need to conduct a study to determine what aspects of agriculture students learn from teachers, family, and literature they're required to read. With a better understanding of which elements of agriculture students are learning from each source,

researchers, teachers, parents, academic professionals, and curriculum developers could identify which aspects of each need to be improved in order to ensure that students are getting the best knowledge and understanding of agriculture. If necessary, they could make appropriate changes in teacher knowledge requirements and/or book lists.

The researcher recommends that teachers and local extension agents work in conjunction with one another to conduct an evaluation of agriculture curriculum. Together they should evaluate the curriculum based on agriculture benchmarks and the latest developments in agriculture for the state. If the evaluation produces evidence of a gap in the curriculum, benchmarks, and latest advancements, they must investigate the best approaches to ensure that curriculum and/or programs are enhanced to meet established qualifications. Improving students' knowledge and understanding of agriculture so that they can provide an operational definition for and understanding, that agriculture includes production of food and fiber, processing, sales, and other areas other than farming would allow for more conscious decisions on and perceptions about agricultural related issues.

Although, third, fourth, and fifth grade students have basic knowledge and understanding of agriculture, there is still room for significant improvement. There needs to be further research into why even with programs like National FFA Organization, 4-H, and Agriculture in the Classroom in place to educate the youth about agriculture, students still have only basic knowledge and understanding of agriculture. Curriculum should be complete, up-to-date, not solely farm oriented, and should not be negative or condescending in tone. The researcher acknowledges that all school systems and students may not have access to programs like National FFA Organization, 4-H, and Agriculture in the Classroom. Educators in locations without these programs should consult with their respective principals, superintendents, and

extension agents to discuss the possibility of bringing these programs into the school system. If bringing the programs into the school system is not possible, they should work in coordination with the extension agent to ensure that they are provided with the most current information about agriculture.

Overall, with a better understanding of what third, fourth, and fifth grade students know and understand about agriculture and the ways in which they came to know and understand concepts of agriculture, researchers could prepare a quantitative "test" of their knowledge and understanding. The test could be conducted via questionnaire. The interviews conducted in this research study were piloted with this intent. With the knowledge gained from the interviews in this study, the researcher can design quantitative questions such as those featured in Table 14 to quantitatively test students' knowledge and understanding of agriculture. Quantitative research studies are often very expensive so developing a quantitative study based on the findings of a qualitative study would allow the researcher to hone in on the targeted information from the qualitative study and ultimately save time and costs.

Table 14

Quantitative "Test" of Knowledge and Understanding

Quantitative "Test" of Knowledge and Understanding
1. Which of the following are provided by agriculture? a. Food b. Fiber c. Shelter d. All of the above
2. Which of the following animals does hamburger meat come from? a. Chickens b. Sheep c. Cows d. Pigs
3. Which of these crops are not produced in Georgia? a. Peaches b. Coffee Beans c. Cotton d. Cabbage

Recommendations for Practice

The researcher recognized the relationship between agricultural knowledge and understanding of students with firsthand experiences with agriculture via family gardens. Two of the three students in the study who indicated having a family garden which they worked in also exhibited high knowledge and understanding of agriculture. Parmer, Salisbury-Glennon, Shannon, & Struempler (2009) concluded "school-based gardening appears to be an effective intervention for increasing fruit and vegetable knowledge, preference, and consumption in young children" (p. 216). Graham, Beall, Lussier, McLaughlin, & Zidenberg-Cherr (2005) had similar findings in regards to life skills. Graham et al. (2005) also attest gardens "provide teachers with an excellent opportunity to teach nutrition, as well as other subject areas and important life

skills" (p. 147). Therefore, it is recommended that schools field-test gardens. Field-testing gardens in school settings will provide a better understanding of the effectiveness of firsthand experience with agricultural practices on the knowledge and understanding of agriculture by third, fourth, and fifth grade students.

Implications for Future Research

Based on the findings of this study, third, fourth and fifth grade students think that agriculture is just farming. These findings provide local extension agents with the information needed to improve curriculum and enhance efforts to educate youth about agriculture. Therefore, action should be taken by local extension agents. Local extension agents should make sure that the information they provide for students and schools are complete, current, not solely farm-oriented, and positive. Additionally, extension agents should improve efforts to define agriculture for students. Their efforts should stress the inclusion of non-farming aspects of agriculture. Efforts should also include a better overview of the land-to-hand process so that students understand the processes their food, clothing, and shelter items undergo before human use. Overall, efforts should stress agriculture's presence and significance in our daily lives. Students should be provided with the knowledge necessary to make conscious decisions about agricultural issues and discredit and misconceptions about agriculture themselves.

The researcher found that students who had gardens at home had slightly higher knowledge and understanding levels than other students. Previous studies support these findings. In addition to enhanced knowledge of agriculture, school gardens also benefit healthy lifestyles. Graham et al. (2005) found "school food service programs and gardens in schools offer an excellent avenue through which to educate students about healthful eating habits" (p. 147).

Therefore, school gardening programs should be implemented and practiced in schools with the ability.

The interviews for this study were conducted during the late spring and early summer terms of 2012, which means the students targeted for interviews were already out of school for summer break. Thus a smaller percentage of students were available for interviews to be conducted. Additionally, interviews were conducted at sites which were not the target students' school, making it slightly more difficult to arrange and conduct interviews. Some parents who previously consented for their child to be interviewed for the study but later declined indicated their decision was based on the fact that the interview was not being conducted at school, during school hours. To garner more responses, future interviews should be conducted during the fall or early spring at targeted students' schools. Arrangements should be made with participating school superintendents and principals well in advance so that interviews can be conducted at consenting schools during normal school hours. Additionally, the study should be broadened to include more schools which are located further outside of the Athens-Clarke County area. Researcher should perhaps target schools in the Atlanta area and in South Georgia area. The researcher should also target schools which have special interest programs, such as school gardens. Conducting interviews in a broader range of locations while classes are in session should provide researcher with a larger sample size, resulting in much more generalizable results.

The findings of this research showed that demographics can have an effect on the knowledge and understanding of agriculture for students. The sample for this study was very small and there was only one female interviewed. The researcher had some question about the

generalizability of the study findings given the lack of female representation in the study. The researcher should conduct the research study again with a more realistic representation of gender.

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APPENDIX A

LETTER TO STUDY SITE

To whom it may concern:

My name is Erik Nashawn Nkembe and I am a graduate student in the Department of Agricultural Leadership, Education, and Communication of the University of Georgia. I am currently completing my Master Agricultural Leadership under the supervision of Dr. Maria Navarro. My research focus is on what elementary school children (3rd to 5th grades) know about agriculture, and what are their information sources for this knowledge. This information may help enhance curriculum about agriculture for 3rd, 4th, and 5th graders (i.e., 4-H, Ag. in the classroom, programs in zoos and youth camps, etc) and help improve youth knowledge about agriculture and its implications in society. Concluding my research findings requires your assistance.

I am contacting you to request permission to give a flyer about my research and a parental consent form to each child (3rd to 5th grade) so he/she can take them home for their parents (guardians) to review. If the parents return the signed consent form to the school, I would kindly ask that you forward it to me (I can arrange to go to the school one day to pick them up).

This research uses interview methodology to gather data. If parents or guardians and children agree to participate in the study, I will discuss with the parents where to interview their children, and we will not require your school to provide the time or to arrange anything for us. All I am asking from the school is to help me distribute the information about the research, and collect and forward to me any signed consent forms.

The interviews will last about 20 minutes, and I am attaching all the information concerning the research for your information.

Any information obtained from students is for the sole purpose of research and the confidentiality of all involved is guaranteed. I hope that you can help me inform parents and children about this research.

Sincerely,

Erik Nashawn Nkembe
MAL Candidate

APPENDIX B

PARENTAL CONSENT FORM

Parental Permission Form

I agree to allow my child, _____, to take part in a research study titled, *"Agriculture: What do children really know?"*, which is being conducted by Mr. Erik Nkembe, a graduate student in the Department of Agricultural Leadership, Education, and Communication of The University of Georgia, under the direction of Dr. Maria Navarro. My child's participation is voluntary. I do not have to allow my child to be in this research study if I do not want to. My child can refuse to participate or stop taking part at any time without penalty or loss of benefits to which he/she is otherwise entitled. I can ask to have information related to my child returned to me, removed from the research records, or destroyed.

The purpose of the study is to determine what elementary school students (grades 3 to 5) know about agriculture, whether or not there are some common misconceptions, and where and how children learn about agriculture. My child will not benefit directly from this study. The researcher hopes the findings from this research study can help curriculum developers and educators enhance the curriculum about food, agricultural, and environmental sciences for elementary school children and beyond.

My child's participation will involve completing a short interview with Mr. Erik Nkembe or Dr. Maria Navarro, and should take approximately 20 minutes. During the interview, my child will be asked to identify various pictures and will have a discussion with the interviewer regarding various topics related to agriculture. The interview will have no right or wrong answers, and the interviewers will try to make it enjoyable for my child. I will be allowed to stay with my child during the duration of the interview if I choose to do so. After this interview, my child's participation in this research will be completed.

The research is not expected to cause any harm or discomfort. My child can quit at any time. While the results of the research project may be published, my child's name will not be used in any publications. My child's identity will be kept confidential, and all data will be kept in a secured location until completion of the project. Any information that can be used to link your child to his/her responses will be destroyed as soon as the data analysis is completed.

The researcher will answer any questions about the research now, or during the course of the project, and can be reached in room 129A of Four Towers, by telephone at 229.403.4247, or by email at nkembe1@uga.edu. I may also contact the professor supervising the research, Dr. Maria Navarro, by telephone at 706.583.0225, or by e-mail at mnavarro@uga.edu.

If I indicate interest to let my child be interviewed for this research study, I can contact directly the researchers or send this signed permission form back to the researchers and they will contact me to determine when AND where I prefer to have my child participate in the interview. Some potential locations include: an office or meeting room at the University of Georgia, a private room at your church, your child's after school program, or a public library.

I understand the study procedures described above. My questions have been answered to my satisfaction, and I agree to allow my child to take part in this study. I have been given a copy of this form to keep.

_____	_____	_____
Name of Researcher	Signature	Date
Maria Navarro (mnavarro@uga.edu)		
Erik Nkembe (nkembe1@uga.edu)		

University of Georgia
Institutional Review Board
Approved: 1-11-13
Expires 1-10-14

_____	_____	_____
Name of Parent	Signature	Date

Please sign both copies, keep one and return one to the researcher.

Additional questions or problems regarding your child's rights as a research participant should be addressed to The Chairperson, Institutional Review Board, University of Georgia, 629 Boyd Graduate Studies Research Center, Athens, Georgia 30602; Telephone (706) 542-3199; E-Mail irb@uga.edu.

APPENDIX C

CHILD ASSENT FORM

Child Assent Script/Form (Erik)

Hello, my name is Erik Nkembe and I am a student at the University of Georgia. I want to know if you would be willing to help me with a research project where I am trying to find out the things that kids know about agriculture, and how do they know these things. I will ask you questions, I will show you pictures, and we will talk about what you know and who you talk to when you talk about agriculture. This is different from what you do in school, because there are no right or wrong answers. I just want to know what you really think. Your participation in this project will not affect your grades in school.

If you decide to participate in the project with me, your answers will be kept just between you and me. I may not be able to keep this promise if you tell me that you or another child is being hurt in some way, or if a judge asks me for some information. If this happened, I would tell someone to help keep you or the other child safe. You can also decide to stop at any time or can choose not to answer questions that you don't want to answer.

Do you have any questions? Would you be willing to do the project with me?

_____

Child's signature

APPENDIX D

INTERVIEW PROTOCOL

Interview Protocol

Introduction and assent script

Are you ready to start?

1. How old are you?
2. Do you live in the city or the country?
3. What do you like to eat most? Do you know where these foods come from?
4. I am trying to find out what elementary school children know about agriculture? Can you tell me what do you know about agriculture? How important do you consider agriculture? Why?
5. Do you know what agriculture provides for us?
6. Do you know where vegetables come from?
7. Do you know what this is? (Present child with a picture of a potatoes and peppers) Do you eat these (potatoes/peppers)? Do you know where these (potatoes/peppers) grow? (above or below ground) Can these (potatoes/peppers) grow in Georgia?
8. What crops are grown in Georgia? Do any crops grow near where you live?
9. Do you know what this is? (Present child with a picture of milk) Do you know where this (milk) comes from? (What animal does this come from?) Do you know what else is made out of this (milk)? (Dairy products such as cheese, butter, yogurt, etc.)
10. What is this? (Present child with a picture of a chicken) Is this (chicken) a part of agriculture? Why are chickens important? Are any other animals a part of agriculture?
11. (Present child with a picture of a shirt and/or jeans) Do you know what are made of? Do you know this crop? (present child with picture of cotton) What is this crop used for?
12. What is your house made out of? Did that come from agriculture?
13. Where have you learned these things about agriculture? (school, home, books, TV, etc)
14. What are the jobs of the adults in your family? Do the adults in your family talk to you about agriculture?
15. Is there anything else you want to tell me about agriculture or anything else? Do you have any questions for me?
16. Thank you for your participation. Please do not hesitate to ask anything you want to know, or tell your family to contact me if they have any questions. Thank you!