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Bonnie S. Sigmon, Student

Dr. Rebekah Epps, Major Professor

Dr. Rosalind Harris, Director of Graduate Studies

EFFECTIVENESS OF A FARM FIELD TRIP

THESIS

A thesis submitted in partial fulfillment of the
requirements for a degree of Master of Science in the
College of Agriculture, Food and Environment.

By

Bonnie S. Sigmon

Lexington, Kentucky

Director: Dr. Rebekah Epps, Assistant Professor of Agricultural Education

Lexington, Kentucky

2014

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ABSTRACT OF THESIS

EFFECTIVENESS OF A FARM FIELD TRIP

The annual Sigmon Farm Tour was started in 1992 as an agricultural education program where students could experience being on a farm with the goal of increasing the agricultural literacy levels of the participants. Every year the entire 4th grade student population of Rockcastle County spends the day touring the farm and participating in experiential mini lessons given by the cooperating farm service and health agencies. The program has continued for 20+ years without an evaluation as to whether it is achieving its objectives. This evaluation will also exhibit the programs strengths and weakness so it can continue to improve. This study utilized the pretest, posttest and delayed posttest to ascertain the agricultural literacy level of the student before the fieldtrip, after participating in the field trip and again 90 days later.

KEYWORDS: Agricultural Literacy, Field Trip, Experiential Learning, Fourth Grade, Farm Tour

Bonnie S. Sigmon

March 28, 2014

EFFECTIVENESS OF A FARM FIELD TRIP

By

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Director of Thesis

Dr. Rosalind Harris
Director of Graduate Studies

March 28, 2014

Dedicated to my parents, Bill and Nancy Sigmon whose love of children and agriculture has reached students for over 20 years and taught me that once you get dirt in your boots it is impossible to get it out. To my husband and sister who are my partners through the droughts and floods. To my daughters who have learned the hard way that you do what you have to do, when you have to do it but also have learned to love this truly God given way of life.

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In addition to the technical and instrument assistance above, I received equally important assistance from family and friends. I wish to thank the tour organizers, presenters, and volunteers that have ever assisted in making the farm tour a success, whether they drove tractors, flipped hamburgers or gave monetary donations. Finally, I want to thank the school superintendents, principals, teachers and students who have participated in the farm tour for making this process simple and enjoyable.

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CHAPTER ONE: INTRODUCTION

BACKGROUND

In 1992 Tom Mills, the University of Kentucky County Cooperative Extension Agent for Agriculture, came to the Sigmon farm to do a farm visit. He and Dad talked about the fact that farmers were getting older, that most of the younger generations had never been on a farm and that even less understood that agriculture was where their food came from. My father wanted to give students the chance to experience being on a farm so he offered our farm to be used as a location for an agricultural education program. It was from that conversation that the annual Sigmon Farm Tour came into existence. The tour has changed and developed over the last twenty years but the main goal of the tour was and still is to educate students about the importance of agriculture and natural resources.

The first year 180 5th graders from all three of the county elementary schools loaded onto farm wagons for a hayride around the farm with stops at different locations for 20 minute mini lessons from the Kentucky Department of Fish and Wildlife, United States Department of Agriculture Natural Resource Conservation Service, Kentucky Department of Forestry and the University of Kentucky Extension Service. The students brought their own bagged lunches and enjoyed a picnic on the farm. Today the students that attend are 4th graders; they still take a hayride around the farm stopping for mini lessons. We have added stops about nutrition, by the local health department; hospital and beekeeping along with an observation hive by the local beekeepers association. The lunch is now prepared on the farm with the stops directly referencing the items on the menu to the crops the children see.

Every year we ask the same question at some point, “What is something you eat or wear that does not come from a farm?” The answers vary from the extreme nothing to any type of food and clothing imaginable. The one food that has remained a constant on the list of foods that do not come from a farm is pizza. Students seem more apt at understanding that unprocessed food items such as tomatoes and corn come from a farm but when you start to process those basic ingredients into other forms and combine them into common foods the connection is lost. There seems to be an ever widening gap in perception between what parents and guardians purchase at the store and where food and clothing comes from.

Agriculture is defined as the cultivation of animals, plants, fungi, and other life forms for food, fiber, biofuel, drugs and other products used to sustain and enhance human life (Agriculture, 2014). This definition is generally accepted by most people without another thought as to the impact those 25 words has on each of us every day. Hunting and gathering was the only sources of food and substance for man before agriculture. Agriculture provides us with our food to nourish our body, fiber for our clothing, materials for our shelter and raw materials for manufacturing. This important economic, political and life–sustaining system’s foundation is and will remain the farm. There are over 308 million people living in the United States (United States Census Bureau 2010). Of that population, less than 1% claim farming as an occupation and about 2% actually live on farms (United States Environmental Protection Agency, 2013).

The concept of agricultural literacy was introduced in “Understanding Agriculture – New Directions for Education” (Committee on Agricultural Education in Secondary Schools, 1988). The committee developed the goal “agricultural literacy” for agricultural

education. There has been a lot of work done concerning the idea of agricultural literacy. The committee recommended that every student should receive, beginning in kindergarten or first grade all the way through twelfth grade, some systematic agricultural instruction (Council, 1988). Frick, Kahler and Miller in 1991 stated: "Agricultural literacy can be defined as possessing knowledge and understanding of our food and fiber system. An individual possessing such knowledge would be able to synthesize, analyze, and communicate basic information about agriculture."(p.52).

"As our global population grows to a projected nine billion people by 2050, the non-agriculture population has little to no understanding of the complexities involved with sustaining a viable agriculture system" (Doerfert, 2011, p. 8). An agriculturally literate population helps in ensuring intelligent and informed decisions concerning agricultural policies are made that benefit society (Pope, 1990). Without the basic knowledge of how all aspects of agriculture are linked together and the science and technology that makes up the worlds food system how can we as a society sustain our world food system?

Food deserts are defined as places without ready access to fresh, healthy, and affordable food; a one-mile distance to healthy food access was used (Food Deserts, 2013). There are an estimated 23.5 million people in the U.S. living in food deserts with more than half of those people (13.5 million) being low income according to the United States Department of Agriculture's Economic Research Service (2013). To further refine the actual number of people affected by food deserts in rural areas, a 10- mile marker is used to consider food access instead of one-mile. In rural areas the population is more sparsely distributed and vehicle ownership is higher than in urban areas. In rural areas 2.3 million people live in low-income areas that are more than 10 miles from a

supermarket (Michele Ver Ploeg, 2009). “Millions of Americans living in food deserts also face higher levels of food insecurity, increasing the number of low- and moderate-income families without access to enough food to sustain healthy, active lives” (Creating Access to Healthy, Affordable Food, 2010).

Residents of these communities are typically served by fast food restaurants and convenience stores that offer little to no fresh food. Health food options are hard to find or are unaffordable frequently in these communities (Michele Ver Ploeg, 2009). Healthier foods are generally more expensive than unhealthy foods, particularly in food deserts. For instance, while the overall price of fruits and vegetables in the US increased by nearly 75 percent between 1989 and 2005, the price of fatty foods dropped by more than 26 percent during the same period (Walsh, 2008).

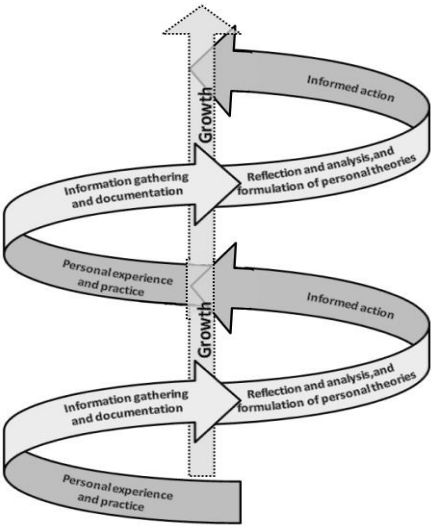
Our current food system relies heavily on America’s infrastructure and their trade policies. The food that we enjoy on our plate has traveled on average 1,500 miles from the producer to your home with some traveling from foreign countries (Pirog, 2001). In America we enjoy the safest and cheapest food supply in the world. We can travel to the local supermarket and enjoy a wide array of fresh fruits and vegetables and aisle after aisle of convenient processed foods from around the world. This diversity and convenience does come cheap but it comes at a price of lower nutritional value. Fresh foods are harvested before optimum ripeness and nutritional value so it can be transported to the processing center to be processed into convenient ready use products or to your supermarket (Mesenburg, 2013).

The knowledge to be able to grow and produce your own fruits and vegetables used to be a skill passed on from generation to generation. The population as a whole is two to three generations removed from the ultimate source of their food and clothing, a farm (Doerfert, 2011). Fifty years ago, students were expected to help on the family farm during the summer months so public school years' vacations were scheduled around agriculture. Students helped on the family farm providing labor and in return learned science and biology fundamentals through that experience. The general population of today lacks the knowledge and skills to grow their own food. The square foot gardening technique, vertical gardening and patio container gardens address the lack of property to raise your own food but little has been done to address the lack of skill. The ability to plant a seed and grow your own food is a need for all people to be able to make the link between us as humans and nature as a whole. We take for granted the natural processes that allow us to thrive while we are busy manipulating every other aspect of the world around us. Over the past 100 years the importance of our natural resources, there connection to agriculture and our ultimate connection to earth have slowly slipped from our view. Programs that strive to increase the agricultural literacy of students make every effort to highlight the interconnectedness of agriculture and our technologically advanced society that relies on agriculture.

Banking or "student-as-sponge" model is the more traditional theory to teaching and learning but it marginalizes knowledge stemming from personal life experiences (Jakubowski, 2003). It has been said that all learning is experiential (Dewey, 1963). Parents all over the world have told their children in some terms or another "Don't touch that it's hot", but can we really understand "hot" if we never experience it for ourselves?

Science education is full of opportunities for experiential learning. Experiential learning emphasizes the role that experience plays in the learning process, an emphasis that differentiates it from other learning theories. Experiential learning theory defines learning as "the process whereby knowledge is created through the transformation of experience" (Kolb, 1984, p. 38). Experiential Learning Theory (ELT) has steadily gained acceptance and popularity in education and serves as an invaluable resource for teaching and learning (Kolb, 2006). Experiential learning is a process that is on-going in a spiral-like pattern.

Figure 1.1: Cyclical and spiral experiential learning framework (based on the model illustrated in Knowles & Cole, 1996).



Experiential learning begins with an initial focus of the learner, followed by the initial experience. Learners then reflect on their observation or experience and formulate generalizations. Using these generalizations, the learner eventually has the experience again and tests these generalizations with experimentation. The learner then further reflects and revises the generalizations leading to further experimentation (Roberts, 2006). The point is to place students in a direct relationship with the material being

studied. Students rather than being told the answers to questions are actively engaged exploring things for themselves. A student being actively engaged does not necessarily mean that they are up running around and doing. It means that the mind is actively engaged. Not all experiences are physical activities.

> "Good experiential learning combines direct experience that is meaningful to the student with guided reflection and analysis. It is a challenging, active, student-centered process that impels students toward opportunities for taking initiative, responsibility, and decision making. …Experiential education engages the learner emotionally" (Chapman, 1992, p. 20).

Based upon the model of experiential learning context field trips can be an effective experiential learning activity (Roberts, 2006).

The field trip is one of the most complex and expensive activities in the educational system. A field trip should be planned as an integral part of the curriculum rather than as an isolated activity (Orion, 1994). Recent studies (Gretzel, 2008; Wong, 2008; Sanders, 2008) have reported fieldtrips to have enhanced students' learning and increased their practical knowledge. The role of field trips in the learning process is beneficial, especially when concrete learning experiences are combined with higher levels of cognitive learning. Field trips can provide direct sensory motor experiences to help students with the construction of abstract concepts and can enhance meaningful learning (Orion, 1993). A study of the cognitive impact of a field trip that was part of an integral science curriculum, found that students gained in knowledge. Even more impressive was that there was less than a half-point loss in the mean score after retesting the students three months later (Morrell, 2003).

In the natural progression of the annual Sigmon Farm Tour, I have evolved into the coordinator role not only due to the age of my father, but I am now a University of Kentucky Cooperative Extension Service Agent. In my role as an extension agent, it has become clear that the program cannot continue to ask for support, funding, and resources without a program evaluation justifying the results. Can a field trip to a farm increase the agricultural literacy of a fourth grade student? It is important to know if what we have been doing for 20 years has had an effect on the students that participate and if not, what we can modify to see that it does. This research study will evaluate the effect of the trip on students' agricultural literacy levels and it will give much needed feedback to the organizers, sponsors, and presenters on the true value of the program. We cannot improve until we know where we are in the effectiveness of the program.

There are two research objectives for this study. They are as follows:

1. Determine the cognitive effects of the field trip experience on the participating students by their scores on an agricultural literacy test.

2. Determine what aspects of the field trip need to be redesigned to be a more effective field experience for fourth graders on fiber and food products.

CHAPTER TWO: LITERATURE REVIEW

This quasi-experimental study's purpose is to evaluate if the experiential learning activities during a farm field trip have a cognitive effect on the participating 4th grade students agricultural literacy level. Once this is determined the findings will be used to assess the field trip and recommendations given that may improve the students' learning. This literature review will cover studies that have been conducted since the publication of Understanding Agriculture-New Directions for Education (1988) that recognized the need for some form of agricultural education for all students from K-12.

AGRICULTURAL LITERACY

The concept of agricultural literacy was introduced in "Understanding Agriculture – New Directions for Education" (Council, 1988). The committee was established at the request of the U.S. Secretaries of Agriculture and Education by The National Research Council. The purpose of the council was to assess the contributions of education in agriculture to the maintenance and improvement of U.S. agricultural productivity and economics competitiveness here and abroad. The committee was assigned the task of offering recommendations regarding: goals for the instruction of agriculture, the subject matter and skills that should be stressed in curricula for different groups of students; and policy changes needed at the local, state and national levels to facilitate the new revised agricultural education programs in secondary schools (Council, 1988). The committee developed the goal for students to reach an "agricultural literacy" level for education about agriculture. The committee declared that educating just a small percentage of students who were interested about agriculture was leaving students grossly lacking in the knowledge of agriculture. Agriculture was too important of a topic. The committee recommended that every student should receive, beginning in kindergarten or first grade

all the way through twelfth grade, some systematic agricultural instruction (Council, 1988).

The goal of agricultural education was now being defined as agricultural literacy. Stewart (1989) and Russell, Miller and McCracken (1990) stated that the substantive nature of the term was yet to be established and questioned how much of what information made one agriculturally literate. Frick, Kahler and Miller (1991) surveyed 100 faculty members of land-grant universities and compiled their responses into a definition of agricultural literacy until a consensus was reached. The panelists' definition of agricultural literacy follows:

> "Agricultural literacy can be defined as possessing knowledge and understanding of our food and fiber system. An individual possessing such knowledge would be able to synthesize, analyze, and communicate 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." (p. 52).

In 1999, the National Council for Agricultural Education (1999) defined goals for literacy in terms of a person becoming "conversationally" literate about agriculture, while Meischen and Trexler (2003) broadened the definition of agricultural literacy to include science and technology related concepts "required for personal decision making, participation in civic and cultural affairs, and economic productivity" (p. 44) manifested through public debate. As the definition of agricultural literacy continues to evolve, so shall its content and concepts.

With a generally accepted definition of agricultural literacy, research began to be conducted, and has continued for over two decades. Research has targeted two emergent theme populations in its synthesis: students and teachers. The highest frequency of teachers studied has been elementary or K-12 teachers. Agriculture literacy research studies targeted more elementary students than middle or high school students.

Barton, Koch, Contento and Hagiwara's 2005, "From Global Sustainability to Inclusive Education: Understanding Urban Children's Ideas about Food Systems" noted that most children gained their knowledge and understanding of the food system from the television or home rather than school. As Moore (1995) illustrates, children will be the ones making the decisions in the future so they must be taught the "daily lessons of nature" (p.68).

Studies have shown that elementary school students are at the age that is most likely to be receptive to influence of their beliefs and attitudes about agriculture and the food system (Balschweid, 2002; Braverman, 1991; Hubert, 2000). According to Eric Erikson's Theory of Psychosocial Development, school aged children (6-10 years old) experience task identification, are enthusiastic learners, and are inquisitive about everyday surroundings and events (Erikson, 1968). "K-3 are probably the most influential" according to Hubert's (2000) study about agricultural literacy in the classroom from grades K-12 (p. 530). Studies by Monk, Norwood, and Guthrie (2000), Morrell (2003), and Luthman, Ewing, and Whittington (2007) found that elementary students who participated in experiential agricultural events made significant increases in agricultural literacy after participation. These findings are supported by Ricketts and

Place (2005), who reported that hands-on activities make students more receptive to learning.

The development of The Food and Fiber Systems Literacy Framework by Liesing and Zilbert (1994) explained the knowledge that an agriculturally literate high school graduate should possess. The Food and Fiber System used standards in five thematic areas gleaning components necessary for understanding the way food and fiber systems affect daily life. The standards were broken down into benchmarks for grade groups: K-1, 2-3, 4-5, 6-8, providing a systematic route of agricultural literacy. The Food and Fiber System Literacy Framework was designed to infuse agricultural concepts into existing curriculum through science and social connections. It is important that students not only learn about agricultural production and earth science but also agricultural technologies, alternative production methods, and local and urban agriculture (Luckey, 2013).

Two research studies have shown that students who received instruction in science using agricultural and natural resource examples performed equally or better than students taught using traditional science examples (Enderlin, 1991; Whent, 1988). Though these studies have shown that we are increasing agricultural literacy a study by Pense and Leising (2004) assessed the agricultural literacy of Oklahoma high school students using the Food and Fiber System Literacy Framework found that students remain agriculturally illiterate. This study also found that students attending rural schools scored lower than the urban or suburban students in three of the five standards. According to these studies all schools rural, urban and suburban are still failing at achieving agriculturally literate students.

Educating students in agricultural literacy ultimately begins with the teacher. A teachers' attitude, knowledge, skill, and confidence with the curriculum have a positive correlation with the use of the curriculum (Rudd, 1995). Malecki, Isreal, and Toro (2004) defined integration of agricultural literacy into the curriculum as "the purposeful integration of agricultural topics into the mandated curriculum…as natural interdisciplinary linkages" (p. 2). Integration of agricultural material into existing curricula is hindered because of the staff's inexperience and unfamiliarity with agriculture and teaching "outdoors" (Trexler, 2001). The experiences of teachers directly influence the information that is taught and presented to students (Humphrey, 1994). Teachers need more professional development opportunities on how to develop activities, identify resources, and connect agricultural topics to learning standards to feel more comfortable integrating agriculture (Knobloch, 2003).

Many educators including elementary educators agree that agriscience and natural resources are excellent examples to use when teaching science (Knobloch, 2000). Even with such positive attitudes toward integrating agriscience and natural resources into traditional science curriculum, studies still show that instructors integrated agricultural lessons into existing coursework less than 20 times a year (Bellah, 2007). Conflicting studies on the correlation between the number of connections to agriculture made by teachers and the agricultural literacy of students have been found. Igo, Leising, and Frick (1999) found a positive relationship between increased student knowledge and the number of connections to agricultural literacy, while Leising, Pense, and Igo (2001) found no correlation using much the same framework. Enderlin and Osborne (1991) compared middle school students' science achievement with traditional science instruction and an agricultural laboratory approach. The agricultural laboratory approach

students received higher scores than the traditional students. Rasmussen, Spielmaker, Warnick, and Monhardt (2008) summed it up, "In an era of school accountability and high stakes testing it can be challenging for teachers to incorporate any curriculum not specified by their school into their classes" (pg. 2).

EXPERIENTIAL LEARNING

Experience is an important component of constructivist theories of learning. Constructivists suggest that learners are "adapting to their environment in terms of their understanding of a phenomenon or changes in their social world" (Fenwick, 2003, p. 46) Social constructivism states that learners are their own creators of knowledge and reality from experience within a social, interactive environment. The same is true for transformational learning (Mezirow, 1978) where the catalyst in an "interaction" is the learner's past experiences. It is from this framework that researchers have learned that experiences can be extremely different and irrational. This erratic individualization of experiences is why critical reflection and dialogue are necessary tools for constructivism and the creation of knowledge through learner experiences (Mezirow, 1991).

Prior experiences are building blocks for learning in both andragogy and self-directed learning theories (Knowles, 1980). However some types of experiences have little to no use in learning transactions (Dewey, 1938, Mezirow, 1995). Experience can either be "the shapeless, per-linguistic product of unmediated sensory input" or a socially constructed outcome (Michelson, 1996). Research on automaticity, conducting daily activities on "auto pilot" without conscious awareness or intention, helps to explain why all experiences are not educational (Bargh and Chartrand, 1999). Dewey (1938) also warned that not all experiences educate and that some experiences "mis-educate" and "distort growth" which "narrows the field of further experiences" (Dewey 1938, p. 13).

Dewey argues that learning experiences must exhibit two properties: (a) “continuity”, that consists of experiences that have come previously and which affect the experiences that come in the future, and (b) “interaction”, that occurs between the surroundings and an individual (Dewey, 1938, p. 41)

Experiential learning theory defines learning as "the process whereby knowledge is created through the transformation of experience. Knowledge results from the combination of grasping and transforming experience" (Kolb 1984, p. 41). An individual’s learning is affected by one’s culture, social setting, or community. Experiential education leaders believe that learning cannot be understood outside of its context (Fenwick, 2003). According to one experiential theory, situational theory believes that learning is anchored in the “situation” in which the experience is occurring but other experiential learning theories assign more importance on the individual (DiFrancesco, 2011). Knowledge for the learner, according to transformational learning theory “does not exist in books or in the experience of the educator, it exists only in the learner’s ability to construe and reconstrue the meaning of an experience in his or her own terms” (Mezirow, 1991, p. 45).

Experiential education is not simply an activity but directly and enthusiastically engages the student in real learning. This requires students being actively engaged, exploring things for themselves, in a direct relationship with the material not just being told the answers. Bailey et al. (2004) stated “the person does not simply undergo an experience, but participates in it, constructing meaning as it evolves” (p. 30). Experiential learning can be regarded as a continuous cycle. Learners are engaged in learning followed by a concrete experience upon which they develop observations and reflections. Following this reflective observation period learners construct abstract

concepts to guide future actions. Once developed, the learners actively test their constructs in new experiences that renew the learning cycle (Barker, 2002). The teacher takes on the role of coach and is asked to believe that the students can draw valid and meaningful conclusions from their own experiences (Chapman, 1992). When a teacher directs student reflection by telling the students what they learned, they are not required to or expected to think for themselves about the experience. Therefore, they are not empowered to learn how to learn from their experiences (Estes & Tomb, 1995). Students need experiences outside of the classroom to motivate a more active learning process and a love of learning (Garrity, 2010). Gardner (1991) stated

> "In the course of their careers in the American schools of today, most students take hundreds, if not thousands, of tests. They develop skill to a highly calibrated degree in an exercise that will essentially become useless immediately after their last day in school" (p. 216).

INFORMAL EDUCATION

Informal education is generally defined as learning that occurs outside of the school setting. Different types of informal learning include field trips, students projects, service learning, community based projects, casual visits to learning centers, and the press and electronic media (Hofstein, 1996). Informal education that involves an individual's interaction with his/her environment is sometimes more efficient than formal education in the process of behavior change and acquiring new behaviors (Wellington, 1990). Informal learning environments are effective in helping students gain cognitive, emotional and psychomotor behaviors (Tal, 2009; Ballantyne, 2009). Learners in informal settings are involved frequently in inquiry-based active learning situations that focus on student-centered critical thinking and problem solving tasks. Learners play a lead role in knowledge construction (Meiers, 2010).

FIELD TRIPS

Fieldtrips are an important part of informal education. They help students explore their environment and establish links between the information learned in the classroom and the real world. Students use all their senses during fieldtrips, the learning becomes more permanent (Balliel, 2011). Fieldtrips provide the most realistic means for meeting in their actual environments, new organisms. Students are able to gain first-hand information, and employ various senses to see, touch, and feel what they have read and heard about in the classroom (Patrick, 2010). Mader (2000) and Ajaja (2007) state that scientists look at the world in observation to determine principles of how it works much like the observation during a fieldtrip. Fieldtrips can enhance understanding of subject materials that attributes to positive pedagogical outcomes for students (Pawson, 2002). It has been proven that significant cognitive learning can and does occur on science field trips and that the information is not immediately forgotten and may be remembered for a long time (Hofstein, 1996). A key benefit in fieldtrip learning is the transfer of knowledge between students. Students with prior experiences share their knowledge with other students and the experiences serves to connect the group (Goh, 2011).

Field trips that include agricultural education seem to increase the agricultural literacy of student participants. A recent study assessing the impact of an AgVenture program at the 2011 Houston Livestock Show and Rodeo revealed a significant change in knowledge at the .006 level after a paired sample t-test. The perceptions of the same participants concerning the agricultures affecting their daily lives and the belief that agriculture was important to their community both had a positive increase of 27% (Luckey, 2013). The University of Maine Cooperative Extension's 3 a Day Dairy Project focused on the entire dairy production process, from farm to table, including field

trips to a dairy farm and agriculture day at the local county fair. The participating students exhibited a 70% improvement in their ability to identify three healthy benefits of consuming three servings of dairy foods daily. Student also demonstrated an increase in the ability to identify dairy production techniques (Savoie, 2006).

The Sigmon Farm Tour is definitely an experiential learning field trip where that the students get to use all of their senses to experience a farm. The students get to spend time observing, touching, and smelling the different farm animals. For most of the students is a new experience in itself. The aroma of the barn lot area is always an intense discussion among the students. It does not take long for the students with more experience around farm animals to warn the students around them to watch where they step or to answer another student's question or correct them when they are discussing what they are doing. For example most children believe that if a cow has horns it must be a bull so when our Jersey milk cow, with horns, comes up to eat corn out of the children's hands there is always a remark about a bull. The experienced students are always quick to explain that because it has horns does not mean it is a bull. I have observed this transfer of knowledge between students every year and the way it elevates the confidence level of those students with agricultural knowledge.

Rockcastle County by all definition is a rural community with a population of 17,006 in 2012 (United States Census Bureau, State and County QuickFacts, 2014). Agriculture still plays a major role in the county with 94,186 acres reported in agricultural production according to the 2006 Kentucky Agriculture Statistics. With the acres of land in agriculture more than five times greater than the population of the county one would assume that the agricultural literacy level of our students would be

exceptional. The purpose of this study is to assess the agricultural literacy level of students before the Sigmon Farm Tour and after participation to determine the cognitive effect of the field trip experience on the students' scores posttest and delayed posttest. These findings will be used to address the effectiveness of the fieldtrip and identify weaknesses in the program so weaknesses can be improved.

CHAPTER THREE: METHODOLOGY

The purpose of this thesis is to evaluate the effect of an agricultural farm tour on the agricultural literacy level of the participants. The farm tour is a unique opportunity for agriculture and natural resource related service organizations to educate the youth in our community about the importance of agriculture. The results of the evaluation will be used to improve the efficiency of the tour for future participants. The farm tour after twenty years has become an anticipated event for the students, teachers, and the community volunteers alike. During this time there have been numerous teacher evaluations, but there has never been a study to determine what students are gaining from the experience.

The effectiveness study of the farm tour will determine whether the objectives of the program are being met. The Natural Resource Conservation Service, Sigmon Farms, the Cooperative Extension Service and other contributing organizations put much time and effort in making the farm tour as educating and meaningful as possible for the students. This evaluation will assess the level the objectives are being accomplished.

In addition to those planning the farm tour benefiting from an evaluation, those that sponsor the event will see that their donations are beneficial. Local businesses and organization contribute personnel, time, and money so 4th graders get to experience and gain a better understanding of agriculture. An evaluation will help to ensure the continuous contributions from those currently contributing and will be advantageous in the recruitment of contributors in the future.

Aside from planning and financial advantages to conducting this research, the knowledge of the current agricultural literacy level of students is essential in reaching the

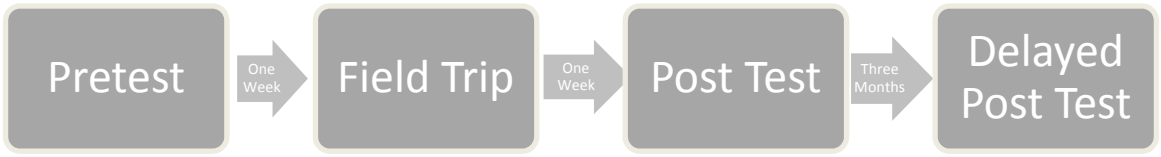
goal of an agriculturally literate population. It is important to assess the current level of their agricultural knowledge in order to have a better grasp of where to begin this enormous task. Assessing the effectiveness of agricultural literacy programs and assessing agricultural literacy levels of the population are important goals in order to determine the next steps in agricultural literacy.

TIMELINE

The project started in early August 2012 during the beginning of the Sigmon Farm Tour planning stages. The program always had the objective of increasing the agriculture literacy of participants but the program lacked the organization of a common logic model. The contributing agencies that present at the farm tour sat down and developed a logic model (Appendix A). The logic model was used as a guide to develop the evaluation instrument. The teachers, who all have participated in the farm tour before, were contacted and asked if they would be willing to give their students a pretest, post-test and delayed post-test so that the program could be evaluated. The teachers all agreed and were excited to see the results. The University of Kentucky's Institutional Review Board (IRB), which governs research on human subjects, gave approval to conduct this study (Appendix B). A visual representation of the flow of events for the research can be seen in figure 3.1. The pretest was emailed to the teachers the week before the farm tour with instructions to administer the test during the week before the farm tour and bring the tests with them to the farm tour. The pretests were collected from the teachers as the students climbed on wagons to begin the farm tour. The farm tour took place on October 17th from 8 a.m. to 2:30 p.m. The posttest was emailed to the teachers along with a teacher evaluation on October 24th to be administered before October 26th. The posttests and evaluations were picked up at the schools on October

29th. Teachers were emailed the delayed posttest on January 26th. Teachers were instructed to give the test to students during the following week. Snow days delayed the researcher from picking up the completed tests until February 12th.

Figure 3.1: Flow Chart of Events



POPULATION

The evaluation included the entire population of Rockcastle County 4th graders participate in the Sigmon Farm Tour. Students from the three elementary schools in Rockcastle County: Mt. Vernon, Brodhead and Roundstone participated. Fourth graders were selected because the farm tour aligned with the common core standards for science and fourth grade students are assessed in science. In accordance to the Institutional Review Board requirements the students signed an assent form (Appendix C) and the parents/guardians signed a permission form (Appendix D).

INSTRUMENT

The effectiveness of the program was evaluated using a pretest, posttest and delayed posttest design (see appendix E). The tests were all anonymous in that the only identifier on the test was the teachers name so that each class' scores on all three tests could be compared. The questions on the two posttests are identical to those on the pretest, and tested the students on every station visited. The instrument was designed

using questions from the Food and Fiber Systems Literacy Test for students in grades 4-5 (Igo, 1999) and the National Ag in the Classroom's Ag-knowledge test for grades 3-5. The Food and Fiber systems Literacy Test with the grade grouped tests had reliability coefficients ranging from 0.7763 to 0.9469. The National Ag in the Classroom's Ag-knowledge test had no information available as to its reliability coefficient (Teacher Center Ag-Knowledge 3-5).

The test consists of 30 multiple choice questions that cover 6 agriculture constructs food, fiber, business, natural resources, crops and historical trends (Appendix F). The constructs were used to guide the discussion at the correlating fieldtrip stations. For example, the natural resources construct questions were covered by the National Resource Conservation Service station, and health and nutrition construct by the Rockcastle County Health Department and Rockcastle Regional Hospital.

The science educators and presenters worked together to modify the instruments so that test questions focused solely on concepts and materials presented during the field trip. In order for the results to be accurately applied and interpreted it was vital that the test be valid. The instrument then went to a panel of experts who also declared the test valid (Appendix G). The science educators visited each station to ensure that the content for each question was covered during the field trip thus further ensuring the validity of the test instrument.

Reliability of the instrument refers to the repeatability or consistency of the instrument to give us the same results over and over again assuming that what we are measuring is not changed. The reliability of the instrument in this research is a limiting factor in the generalization of this research. This instrument is specialized to measure

this experience. The objectives of this research study are to measure the cognitive effects of this experience on students that participate and to use the information to improve this field trip.

The students, as part of the field trip, had the opportunity to taste different foods that directly related to the crops and livestock that the students experienced. This was funded by the United States Department of Agriculture's Supplemental Nutrition Assistance Program Education (S.N.A.P. Ed) in Rockcastle County. In order to give the S.N.A.P. Ed. Coordinators some feedback for their reports three questions regarding whether they tried a new food, if they liked it and would they be eating it at home was added. Questions were also added to the delayed posttest asking students if they have been eating the new foods at home and if they have been trying new foods since the field trip experience. The researcher also wanted to see if the experience had changed the way students thought about agriculture so the researcher added these two questions to the delayed posttest. Has your thinking about agriculture changed as a result of the fieldtrip? If so how has it changed?

DATA ANALYSIS

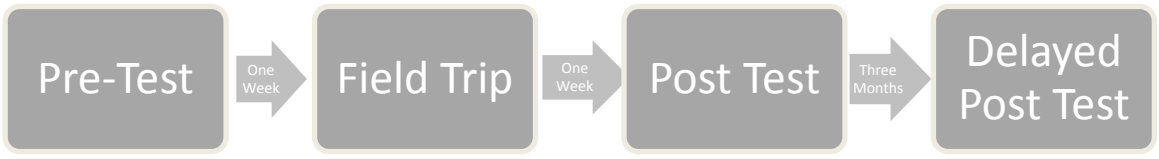
After administration, the completed tests were scored. The literacy tests were not measured on a graded scale, but quantitatively as acquired knowledge. Each class's mean pretest, posttest and delayed posttest scores were compared to determine if knowledge was gained and if so whether that knowledge persisted. No comparisons were made between individuals, classes or among schools. IBM's SPSS Statistics 20 predictive analytics software was used for analyzing procedures to determine differences in pretest, posttest and delayed posttest knowledge scores.

CHAPTER FOUR: RESULTS

INTRODUCTION

The data collected from participants were used to determine if the annual Sigmon Farm Tour was achieving its objective of increasing the agricultural literacy of students. The data were collected through the use of a pretest, posttest and delayed posttest. The tests were scored with each correct answer receiving 1 point, the total of 39 points possible. The pretest had 183 participants, the posttest 187 and the delayed posttest 163. The tests were completely anonymous so there was no way of determining if 100% of the students actually participated in the farm tour or if a small percent were taking the tests that did not participate. The drop in response rate from the pretest to the posttest was contributed to several tests being thrown out due to being incomplete. Figure 4.1 is a visual representation of agricultural literacy assessment events.

Figure 4.1: Flow Chart of Events



The mean test scores of the pretest was 20.53 with a standard deviation of 4.57 with 182 test scored. The Posttest mean with 180 tests scored was a mean of 25.64 and standard deviation of 4.58. This was an increase of 5.12 in the mean score. The delayed posttest score mean was 24.71 with a standard deviation of 5.07 and 163 tests scored. This was still an increase of 4.18 in test score means compared to the pretest and this was a minimum of 90 days after the fieldtrip. The results can be seen in Table 4.1.

Table 4.1

Test Score Means and Standard Deviation

Test	N	Mean	Standard Deviation
Pretest	182	20.53	4.57
Posttest	187	25.64	4.58
Delayed Posttest	163	24.71	5.07

The results when comparing the means of the pretest and posttest show an increase in student agricultural knowledge after attending the fieldtrip. The fieldtrip participation is a contributing cause for this increase. The retained agricultural knowledge after 90 days has a slight limiting factor when wanting to attribute the results to participating in the fieldtrip. There are no data on whether the class received any further agricultural instruction in the classroom during the delay or if students' interest in agriculture increased leading to them searching out knowledge on their own or if the fieldtrip is the only contributing factor.

The purpose of the study is to determine if the field trip increased the agricultural literacy of these students so effect sizes are sufficient and suitable since this research is not concerned with generalizability. Effect size is the magnitude, or size of an effect between two groups. The effect size is a standard measure by which all outcomes can be assessed and is not dependent upon sample size as is significance (Effect size, 2014). Ultimately, what matters most is not statistical significance but whether the size of effect is meaningful in a practical sense. Cohen's effect size is used as a general rule of thumb for interpreting

effect sizes: a “small” effect size is .20, a “medium” effect size is .50 and a “large” effect size is .80. The results can be seen in Table 4.2.

Table 4.2

Effect size of pre/post/delay tests

	Pretest	Posttest	Delayed Posttest
Pretest		Cohen’s d: 1.12	
Posttest			Cohen’s d: 0.19
Delayed Posttest	Cohen’s d: 0.87		

Cohen’s effect size value (d=1.12) suggests a very high practical significance between the pretest and posttest. The low Cohen’s effect size (d= 0.19) between the posttest and delayed posttest is positive in that it suggests a small practical significance of agriculture knowledge lost during the 90 days between the posttest and the delayed posttest. The Cohen’s effect size value (d= 0.87) between the pretest and the delayed posttest suggests a large practical significance in the agricultural knowledge gained between the pretest and the 90 day follow up posttest.

The tests were broken down into 6 constructs that coincided with the fieldtrip stations. The station was responsible for teaching the students about the particular construct. The percentage of students who answered each construct question correctly was averaged into a construct group percentage. The results can be seen in Table 4.3.

Table 4.3

Percentage of constructs correct on pre/post/delayed tests

Construct	Pretest % Correct (n=183)	% Change	Posttest % Correct (n=198)	% Change	Delayed Posttest % Correct (n=163)
Food	51.36%	44.14%	74.03%	9.44%	67.04%
Fiber*	84.7%	4.18%	88.24%	2.9%	90.8%
Business	39.81%	63.89%	65.24%	4.35%	62.4%
Natural Resources	52.64%	16.19%	61.16%	10.8%	54.55%
History/Trends	38.62%	47.93%	57.13%	10.15%	51.33%
Crops	60.48%	13.33%	68.54%	0.8%	67.99%

* Fiber construct limiting factor only one question on agricultural literacy test.

The percentage correct increased when comparing both the posttests to the pretest across all constructs with an increase of slightly over 25 percentage points in the business construct. The delayed posttest percentage decreased when compared to the posttest in all constructs except fiber. Even though the percentages decreased in the delayed posttest they were still higher when compared to the pretest. Fiber is the only construct that if put on a graded scale the students' scores on pretest, posttest and delayed posttest would be passing. The limitation to this result is that there was only question regarding fiber on the tests. Using this information it is easy to ascertain the agricultural literacy levels of these students are fairly low.

According to the test results the fieldtrip was a contributing factor in increasing agricultural knowledge on all constructs. These results also establish that there is a lot of room for improving the fieldtrip. The fieldtrip, however helpful for increasing the

agricultural literacy of the students, should not stand alone as the only agriculture education these students receive during the year.

The United States Department of Agriculture's Supplemental Nutrition Assistance Program Education (S.N.A.P. Ed.) funded the student's opportunity to taste different foods that directly related to the crops and livestock the students experienced. The S.N.A.P. Ed. Coordinators asked for an evaluation as well. The questions asked if the students tried a new food, if the students liked it, and would the students be eating it at home. The delayed posttest asked if the students had been eating the new foods at home and if the students have been trying different foods since the field trip. The results are listed in Table 4.4.

Table 4.4

S.N.A.P. Ed. Question Results

	Yes		No	
S.N.A.P. Ed questions	n	%	n	%
Did you try a new vegetable or food during the field trip?	95	51%	44	24%
Did you like the new vegetable or food you tried?	76	41%	20	11%
Will you be eating the new vegetable or food you tried at home?	65	35%	31	17%
Have you been eating the new food you tried during the field trip at home?	101	54%	55	30%
Have you been trying more different foods since the field trip?	127	68%	29	16%

According to these results the efforts spent to prepare and distribute the food samples was time well spent. Three out of every four students tried a new food with 51% of those liking the new food and 35% willing to eat the new food again. At the 90

day delayed posttest 54% students reported they have eaten the new food since the field trip and 68% students reported they have been trying more different foods since the field trip.

The researcher also wanted to know if the experience had changed the way the students thought about agriculture. The delayed posttest ask the students if their thinking about agriculture changed as a result of the field trip and if so how? Seventy four students took the time to express how their thinking changed. The answers were broken down into the 6 test construct area and a general knowledge of agriculture was increased. The results are listed in table 4.5.

Table 4.5

How Thinking Was Changed

	n	%
Agricultural knowledge increased or learned more about agriculture	26	35%
Importance of food, eating healthy or nutrition	25	34%
Natural resources, soil, or water conservation	11	15%
Crop production, bees, corn	6	8%
Business, byproducts	2	3%
Trends and history	2	3%
Fiber	2	3%

Increased their knowledge of agriculture, realized the importance of agriculture or they even learned what agriculture was included in 35% of student responses. The importance of agriculture because it provided food was included in 34% of student responses. The students discussed the need for eating healthy, and they were trying different foods. The conservation of soil, water and farmland was referenced by 15%

students. The fact cotton provided people with clothing, the number of farmers and farms were decreasing, and farms provide products that get turned into other products were all referenced 3%.

CHAPTER FIVE: CONCLUSION, RECOMMENDATIONS, AND IMPLICATIONS

The purpose of this study was to determine the cognitive effects of the annual Sigmon Farm Tour on the agricultural literacy levels of participants and what aspects of the field trip needed to be redesigned to be more effective. By conducting this study, the cognitive effects of the field trip were determined. The results of this study will allow the organizers to modify the field trip to optimize the cognitive effects.

The Sigmon Farm Tour did increase the agricultural literacy levels of the participating students. The increase is not as large as the researcher expected but these findings make a strong argument as to why the program should continue. The breakdown of test scores into the 6 constructs illustrated that there is a great deal of room for improvement. The efforts of the S.N.A.P. Ed. Coordinators to fix samples of different vegetables and fruits resulted in 75% students trying a new food and 41% of them liking it. The most encouraging result was that 68% of the students said they are now trying different foods. The food tasting has helped to add that extra connection between what the students seen growing on the field trip and the food they eat.

CONCLUSION

The Sigmon Farm Tour did increase the agricultural literacy levels of the participating students. The students' pretest scores on the agricultural literacy test with a mean of 20.53 when converted to a standard grade scale had a score of 52.64%, a failing score. The researcher expected a higher score when considering the rural and agricultural nature of Rockcastle County. The posttest scores did increase to a mean of 25.64. This increase was of very high practical significance when converted into Cohen's effect size.

The agricultural literacy test was divided into 6 constructs: food, fiber, business, natural resources, history/trends and crops. The percent correct in each construct did increase after participation in the field trip. The fiber construct was the highest score but that construct due to oversight by the research design only had one question on the agricultural literacy test that dealt with the fabric being made from cotton. This is a limiting factor as to the validity and reliability of the score. The lowest scoring constructs were business, followed slightly by history/trends. These results demonstrate that there is a need to improve the effectiveness of all stations.

The S.N.A.P. Ed. element of the field trip added a great linkage between crops and foods eaten. The results from the evaluation were all incredibly positive. The students tried, liked and are willing to keep trying different foods. Several students also made comments about eating healthier since the field trip on the short answer question at the end of the delayed posttest.

RECOMMENDATIONS

It is recommended the station teaching about fiber have examples of the different fabrics and what farm product the fabrics are made from. For example cotton t-shirt with a cotton plant that students can feel, leather boots with a piece of cow hide, a wool sweater and a sheep that students can interact with. Incorporating the manufacturing process would be ideal with someone spinning wool into yarn and then someone knitting the yarn into a scarf for the students to see.

History/trends construct had the lowest pretest score with 38.62% correct. This construct dealt with the history of agriculture from hunting and gathering of food to the need to increase agricultural production in the future to supply the world with food and

products. Students do not understand the important role agriculture has played in the history of the United States and the World and its crucial role in the future. The researcher recommends a more visual representation of some of the important aspects of this construct. The fact that one farmer feeds 155 people, the teacher will chose one child to be the farmer and have the farmer hand out 155 bags of a certain kind of potato chips to the students. While the students eat lunch explain how the one farmer grew enough potatoes to provide those students with the chips. The teachers could begin a discussion about what happens if that one farmer gets injured and has to stop growing. Breaking down some of these statistics into visual representations that the students can understand and grasp will help to convert that knowledge into concrete learning. A display of antique farm equipment paired up with the newer version would assist the students in grasping how technology and mechanization has spurred on higher agricultural production.

The business construct was scored slightly above the history/trends with a score of 39.81%. Agriculture is big business when you include all the processors, distributors and services that support agriculture. As a way to explain how many jobs and industries are connected to agriculture a little role playing activity would be appropriate. The presenter chooses one student to play the farmer. The farmer then chooses what they produce and comes to the front of the group. The presenter then asks another student, "What is something that the farmer is going to need to produce that product?" The answer could be anything from machinery, seed, fertilizer etc. The presenter gives that student a piece of red yarn 4 feet long. The farmer holds onto one end and that student hold on to the other. The presenter then asks the next student, "What is the farmer going to do with what he produces?" The answer will be some form of selling it to a buyer.

That student will come down and be given a green piece of yarn the same length. The red strings will represent the inputs a farmer purchases and the green string represents the outputs. The farmer then holds onto to one end and that student holds the other. The presenter starts asking questions like what is the buyer going to do with what he just bought, what other things the farm needs to purchase, where does the seeds come from, and etc. With each answer another student and string is added to the activity until every student is involved in the web like representation of how other industries are tied into agriculture.

The crop construct was one of the higher scored constructs with 60.48% correct. The students seem to understand that crops are raised for food but not that they are used for energy, byproducts, and feed for livestock. An activity that would allow for students to be broken into small teams of 4-5 students where the students could identify the farm crop and the different ways it is used would be appropriate. For example, corn is used for food, animal feeds, ethanol, and several byproducts. Each student on a team would be given a crop such as corn, wheat, soybean, rice, and barley. The students would have 3 minutes to collect the correct products that each crop is associated with. Each crop would have one product in each of the following categories: foods people eat, food livestock eat, a byproduct of the crop, and the country or state that produces most of the crop.

The food construct dealt with where your food comes from and nutrition. The students had a difficult time identifying the six basic food nutrients and the raw food that processed food is derived from. They did enjoy learning that a tomato is actually fruit, why it is categorized as a fruit, and getting to grind corn into corn meal. This activity could be improved upon by having fresh corn bread salad for the students to taste. Corn

bread salad contains 5 of the 6 basic food nutrients: cornbread- carbohydrate, bacon-protein, tomato and onion- vitamins, milk-minerals, mayonnaise-fat. Ask the students if they can identify the 5 nutrients and the source. The students also enjoy trying to figure out what they eat that does not come from a farm. It is very interesting to watch the students dissect the answers of fellow students.

The natural resources construct had a 52.64% correct. Natural resources play a key role in agriculture and sustaining human life. The students need to be able to recognize natural resources and be able to analyze what natural resources are used in the production of food, clothing and shelter. The use of eco-scapes and ground water models demonstrate how water can be contaminated both by point source pollution and run off. This could be expanded to include what practices agriculture has in place to protect natural resources such as the development of disease resistant plants, no till planting, plasticulture, drip irrigation etc. An activity that explains these practices then lets the students discuss what natural resources the activity protects and what natural resources the activity relies on to produce the agricultural product would be effective.

The cooperation of S.N.A.P. Ed. Coordinators has added a wonderful aspect to the field trip. The students get to taste foods they can directly link to the crops seen growing on the farm. Getting the students to sample the different foods is quite difficult at times. A small contest among the students would be helpful in getting some of the pickier eaters to try the different foods. A "Try-Athlon" where the students are encouraged to "Go for the Gold" may be helpful. The students who try every sample food would receive a gold medal, if students most of the samples they would receive silver, and if they try a few a bronze. This would play on the competitive nature of kids.

IMPLICATIONS

Based upon this study and the major finding of this research, it is recommended that the Sigmon Farm Tour not be a standalone event but unit of study with the actual farm tour as the culminating event. Collaboration among the teams of 4th grade educators and the event organizers, with a small effort among the agricultural professionals, can make this more than a one day event. It can become an efficient and effective agricultural literacy program. Orion and Hofstein (1994) studied factors that influenced learning during science field trips and found preparation for the field trip to be one of the most influential factors. The knowledge the students acquired before the field trip related to the students' cognitive readiness for the learning event. Using an "overview" approach, students are presented with the key concepts, terms and principles that they are likely to encounter on their fieldtrip (Gennaro, 1981).

The agricultural professionals can advise the educational professionals on areas and ways to infuse agriculture into their core content. The use of agriculture to teach science and mathematics concepts addresses the students question of why do I need to know this; it gives them practical uses for that knowledge like perimeter, area, and the water cycle. The agriculture professionals can help to develop real life scenarios the teachers can use in the classroom. Social studies can be incorporated by illustrating the way American culture changed with the advancement of agriculture. Literature can possibly include the reading of experts from the book Grapes of Wrath.

During the week leading up to the field trip, the presenters could talk to the classes about what their job entails, how they help agriculture, and what special training or schooling is necessary. This will help the students feel more comfortable with these

presenters and topics during the field trip. Students who feel more comfortable are more engaged and ask more questions. This interaction with agricultural and science professionals could ignite an interest in those careers. As Rudman (1994) suggested, "Field trips can create relevancy to science classroom learning when connected to the outside world encouraging science interests and possibly increasing student aspirations for science-related careers" (p.139).

Pre-trip orientations assist in balancing the novelty of the field trip. Research has been conducted that studied the interaction between the novelty of the instructional material and the novelty of the setting, and how much cognitive learning resulted. Lubow, Rifkin, and Alck in 1976 conducted a study with children and rats that found that both groups learned best when either new material was presented in a familiar environment or familiar material was presented in a novel environment.

The educators can assist the presenters in improving their presentations by helping them organize their presentations and adapt them to the 4^{th} grade level. The presentations are very haphazard in that the presenters do not have a set lesson plan or outcome in mind. They tend to "shoot from the hip". The presenters sometimes use terms and words that are unfamiliar to students. The presenters also have a difficult time explaining the technical ideas to students. The teachers could help the presenters break these down into kid friendly pieces.

The program should be organized around a program such as the Food and Fiber Systems Literacy Framework or the Farm to School Curriculum. The program should have scheduled evaluations so the program can improve instead of remain static. The evaluations should include not only the pretest and posttest design but teacher and presenter evaluations that include suggestions on improving the program.

The conclusion of this study showed that a farm tour can increase the agricultural literacy levels of participants and students living in rural, agricultural areas are indeed agriculturally illiterate. Discussions among agricultural professionals, agricultural educators, contributing agencies and local educators must focus on agricultural literacy as the common goal. Implementing an entire unit of study to increase the agricultural literacy of students should be cooperative effort between educators, administrators, parents and tour organizers. The tour should be utilized as a connection between the in class learning and the real world reality.

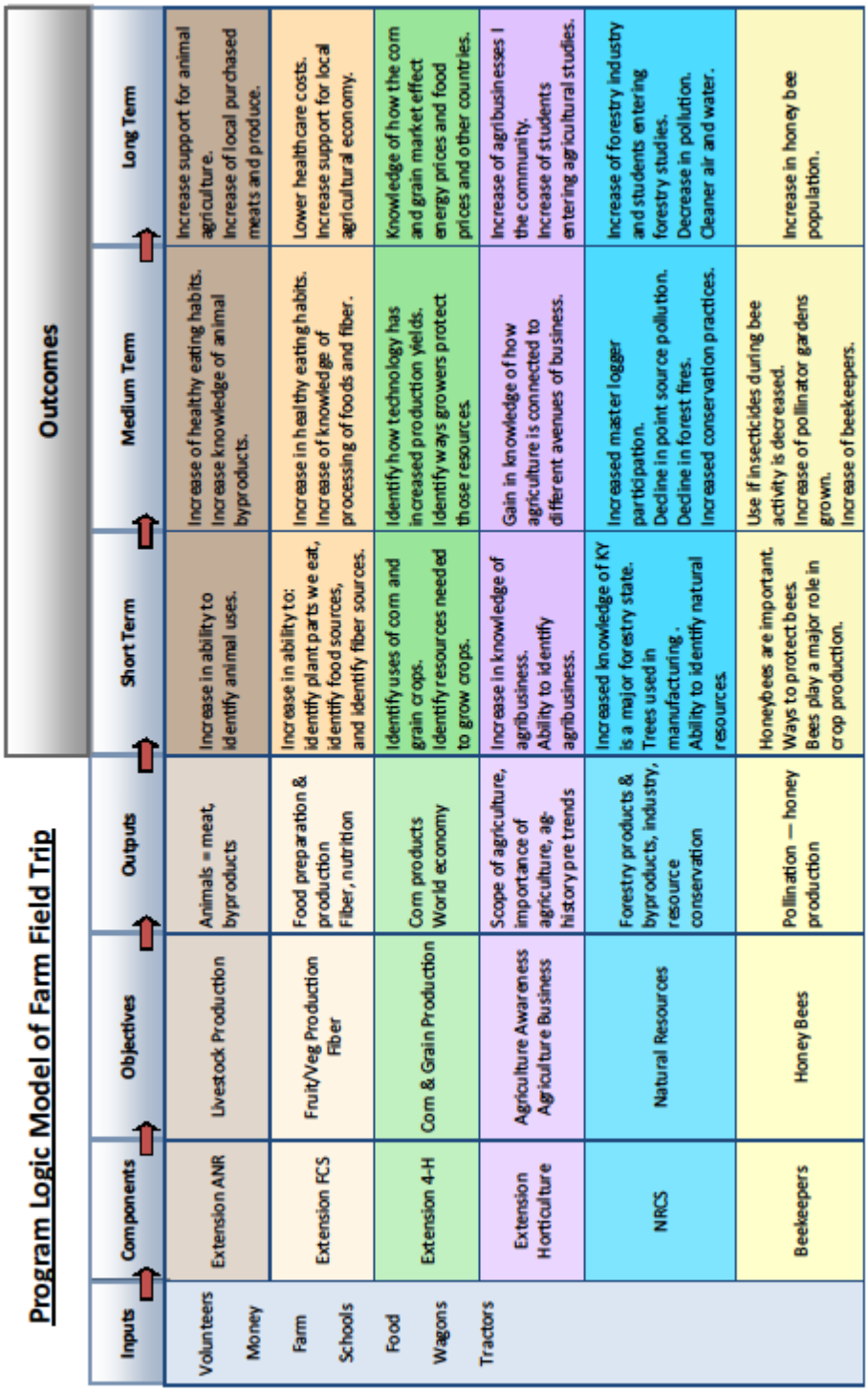
The Sigmon Farm Tour showed the effectiveness of activities that engage all the students' senses where the students get to touch, hear, smell, see and taste what they are learning about. The knowledge gained through these experiential activities is more concrete learning and harder to lose. The results from the delayed posttest showed that there was a small practical significance of loss of knowledge after more than 90 days following the farm field trip.

This pilot study was implemented to look at retention of information one week and 3 months following an experiential field trip for agricultural literacy. This investigation is a first step in determining what students gain from this informal experience. This study should be the beginning of many program evaluations to maximize the effectiveness of the farm tour.

Agriculturally literate students grow up to become agriculturally literate citizens. An agriculturally literate population can identify the connection between agriculture and their daily lives. These adults recognize the source of their food, clothing and shelter. They realize the vast amount of byproducts that the industry supplies us with every day. Agriculture is far more than just the farmer down the road. It is a driving force of the

U.S. economy and employees millions of people. Agriculturally literate adults support their local farmers and have the knowledge to understand how political issues that affect agriculture, affect them.

APPENDIX A: LOGIC MODEL



APPENDIX B: IRB APPROVAL

UNIVERSITY OF KENTUCKY

Office of Research Integrity
IRB, IACUC, RDRC
315 Kinkead Hall
Lexington, KY 40506-0057
859 257-9428
fax 859 257-8995
www.research.uky.edu/ori/

EXEMPTION CERTIFICATION

MEMO: Bonnie Sigmon
708 Garrigus Bldg.
Campus 0215
PI phone #: (606)864-4167

FROM: Institutional Review Board
c/o Office of Research Integrity

SUBJECT: Exemption Certification for Protocol No. 12-0803-X4B

DATE: November 5, 2012

On November 2, 2012, it was determined that your project entitled, *Effectiveness of a Farm Fieldtrip*, meets federal criteria to qualify as an exempt study.

Because the study has been certified as exempt, you will not be required to complete continuation or final review reports. However, it is your responsibility to notify the IRB prior to making any changes to the study. Please note that changes made to an exempt protocol may disqualify it from exempt status and may require an expedited or full review.

The Office of Research Integrity will hold your exemption application for six years. Before the end of the sixth year, you will be notified that your file will be closed and the application destroyed. If your project is still ongoing, you will need to contact the Office of Research Integrity upon receipt of that letter and follow the instructions for completing a new exemption application. It is, therefore, important that you keep your address current with the Office of Research Integrity.

For information describing investigator responsibilities after obtaining IRB approval, download and read the document "PI Guidance to Responsibilities, Qualifications, Records and Documentation of Human Subjects Research" from the Office of Research Integrity's Guidance and Policy Documents web page [http://www.research.uky.edu/ori/human/guidance/htm#PIresp]. Additional information regarding IRB review, federal regulations, and institutional policies may be found through ORI's web site [http://www.research.uke.edu/ori]. If you have questions, need additional information, or would like a paper copy of the above mentioned document, contact the Office of Research Integrity at (859) 257-9428.

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APPENDIX C: ASSENT FORM

ASSENT FORM

Effectiveness of a Farm Fieldtrip

The University of Kentucky and Bonnie S. Sigmon are interested in learning about children and agriculture. We are asking you and a lot of other students to help us find out about it. We need your help since you will be going to the 4th grade farm fieldtrip. If you agree you will take three tests, one before you go on the fieldtrip, one after the fieldtrip and one 3 months later.

These are not a test like you usually take in school. You won't be graded on anything you do and the results will not affect your school grade. All you do is answer the questions the best you can.

Your teacher and parents and the other students will not know how you do. You will not put your name on the test just your teachers' name will be on the test. There is no way for anyone to know which test is yours.

If something makes you feel bad while you are in the study, please tell your teacher. If you decide at any time you do not want to take the test, you may stop whenever you want.

You can ask your teacher or Ms. Bonnie Sigmon questions any time about anything in this study.

Signing this paper means that you have read this or had it read to you, and that you want to be in the study. If you do not want to be in the study, do not sign the paper. No one will be mad if you do not sign this paper or even if you change your mind later. You agree that you have been told about this study and why it is being done.

_____ _____

Signature of Person Agreeing to be in the Study Date Signed

APPENDIX D: PARENTAL PERMISSION

PARENTAL PERMISSION

The University of Kentucky Cooperative Extension Service is conducting a research study to find out how effective the annual 4th grade farm fieldtrip is on teaching students about the importance of farming and agriculture.

With your approval your child will be participating in a program evaluation research study to gauge the effectiveness of the farm fieldtrip through the use of pre and posttests. The students will take a short test before the fieldtrip, the day after the fieldtrip and 3 months after the fieldtrip to see how much the students learned. The test will not have any names on them so the student's results will be completely unidentifiable. The tests will have no bearing on your student's grades but the results will help to improve the effectiveness of this fieldtrip and other fieldtrips. The involvement in the study is voluntary and may be discontinued at any time. There is no penalty for not participating in the study; your child will still participate in the fieldtrip.

____ Yes my child may participate in the research study.

____ No my child may not participate in the research study.

_____ _____

Parent/Guardian's Signature *Date*

Please return this form to your child's teacher.

APPENDIX E: LITERACY INSTRUMENTS

Farm Field Trip
How much ag-knowledge do ewe have?

Teachers Name_____

Circle the correct answer.

1. Pork comes from what animal?

   Cattle Sheep Hogs Chickens

2. Which one of the main ingredients in bread is made of wheat?

   Sugar Salt Yeast Flour

3. What fabric contains a farm product?

   Nylon Polyester Cotton Acrylic

4. What animal does hamburger come from?

   Cattle Sheep Hogs Chicken

5. What part of the plant do we eat as food?

   Root Stem Seed Leaves Fruit All of these

6. _____is the only food which contains every nutrient that a human needs to survive, including water content.

   Egg Tomatoes Hamburger Honey Corn

7. Circle the job that is related to food and fiber systems.

   Movie Producer Minister Grocery Clerk Librarian

8. Nomadic societies relied on _____ and _____ for their food.

   Gardens and crops farmers and ranchers

   hunting and gathering milking cows and raising chickens

9. Circle four agribusinesses in the list below.

   Floral Shop Bakery Church Detective Agency

   Pet Store Jewelry Store Law Firm Lawn Service

10. From the list below, circle the three natural resources used in the production of food, clothing, and shelter.

Air	Rubies	Mountains	Water
Soil	Uranium	Machinery	Computers

11. Which country produces the most food?

Mexico	Iraq	Russia	United States	Canada

12. Which of these crops are produced in the United States?

Corn	Rice	Wheat	Soybeans	All of them

13. One farmer produces enough food for about how many people?

10	25	90	155	300

14. During the past 50 years, the number of farms in the U.S. has?

Increased	Decreased	Stayed about the same

15. Out of every 100 people in the U.S., how many are farmers?

1-2 people	5-7 people	25-30 people	50-65 people

16. Which of the following has allowed farmers to increase production during the past 100 Years?

Larger farms	Computers	Farm machinery such as tractors
Pesticides	All of these	

17. Erosion of the soil is:

Soil which crumbles easily

Controlled by using lots of fertilizer

The wearing away or loss of the land

Controlled by allowing cattle to graze the land in unlimited numbers

All of the above

18. Circle the product that is **not** made from trees.

Coffee	Crayons	Lipstick	Leather
Paper	Carpet	Film	Peaches

19. We call insects that transfer pollen from plant to plant_____.

Good guys	Pollinators	Pests	Entomologists

20. What part of the plant contains the genetic information to produce a new plant?

Seed	Stem	Leaves	Roots

21. Kentucky ranks_____ nationally in hardwood production.

2nd	25th	30th	53rd

22. Honey bees contribute over $_____ to the value of U.S. crop production.

1 trillion	7 million	14 million	2 billion

23. World food production in the future will need to _____ to feed everyone on the planet.

Increase	Stay the same	Decrease

24. _____ is the only insect that produces a food eaten by man.

House fly	June bug	Preying mantis	Honey bee

25. Circle the answer that is not one of the six basic food nutrients.

Carbohydrates	Protein	Water
Fats	Sugar	Vitamins

26. What does agriculture provide for people?

Food, fiber and shelter	Entertainment	Minerals
Automobiles	Computers	Cell phones

27. Food and agriculture systems rely on which natural cycle?

    Political Heat Water Marine

28. The two most common agricultural commodities produced in the United States are:

    Oats and Pigs Wheat and Cattle

    Rice and Chickens Barley and Sheep

29. Circle the five natural resources listed below.

    Rivers Crops Soil Forests Rangeland

    Labor Oceans Machinery Corn Computers

30. Agriculture includes food and fiber production, processing, sales, farm equipment sales, and other areas close to farming. With that in mind, how many people out of every 100 people work in some phase of agriculture?

    5 people 15 people 25 people 45 people

Farm Field Trip—Post Test
How much ag-knowledge do ewe have?

Teachers Name_____

Circle the correct answer.

1. Pork comes from what animal?

   Cattle Sheep Hogs Chickens

2. Which one of the main ingredients in bread is made of wheat?

   Sugar Salt Yeast Flour

3. What fabric contains a farm product?

   Nylon Polyester Cotton Acrylic

4. What animal does hamburger come from?

   Cattle Sheep Hogs Chicken

5. What part of the plant do we eat as food?

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6. _____is the only food which contains every nutrient that a human needs to survive, including water content.

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7. Circle the job that is related to food and fiber systems.

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18. Circle the product that is **not** made from trees.

Coffee	Crayons	Lipstick	Leather
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19. We call insects that transfer pollen from plant to plant_____.

Good guys	Pollinators	Pests	Entomologists

20. What part of the plant contains the genetic information to produce a new plant?

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22. Honey bees contribute over $_____ to the value of U.S. crop production.

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24. _____ is the only insect that produces a food eaten by man.

House fly	June bug	Preying mantis	Honey bee

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Labor Oceans Machinery Corn Computers

30. Agriculture includes food and fiber production, processing, sales, farm equipment sales, and other areas close to farming. With that in mind, how many people out of every 100 people work in some phase of agriculture?

5 people 15 people 25 people 45 people

Bonus Questions

Did you eat a new vegetable or food during the fieldtrip?

YES NO

Did you like the new vegetable or food you tried?

YES NO

Will you be eating the new vegetable or food you tried at home?

YES NO

Farm Field Trip—Delayed Test
How much ag-knowledge do ewe have?

Teachers Name_____

Circle the correct answer.

1. Pork comes from what animal?

   Cattle Sheep Hogs Chickens

2. Which one of the main ingredients in bread is made of wheat?

   Sugar Salt Yeast Flour

3. What fabric contains a farm product?

   Nylon Polyester Cotton Acrylic

4. What animal does hamburger come from?

   Cattle Sheep Hogs Chicken

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30. Agriculture includes food and fiber production, processing, sales, farm equipment sales, and other areas close to farming. With that in mind, how many people out of every 100 people work in some phase of agriculture?

5 people 15 people 25 people 45 people

Bonus Questions

Have been eating the new foods you tried during the fieldtrip at home?

YES NO

Have you been trying more different foods since the fieldtrip?

YES NO

Has your thinking about agriculture changed as a result of the fieldtrip?

YES NO

How?

_____

_____

_____

_____

APPENDIX F: CONSTRUCT QUESTIONS

Test Constructs	Correlating Questions
Food Construct	Questions: 1,2,4,5,6,11,25
Fiber Construct	Questions: 3
Business Construct	Questions: 7,9,16,21
Natural Resources Construct	Questions: 10,17,18,27,29
History/Trends Construct	Questions: 13,14,15,23,26,30
Crops Construct	Questions: 12,19,20,22,24,28

APPENDIX G: PANEL OF EXPERTS

4th Grade Educators: Julie Dowell Asher
Deborah Cummins
Cloia Collins
Thomas Coffey
Kristi Parkey
Krystal Gatliff
Brittany McClure
Robin Bowman
Breanna Adams
Patsy Alcorn

University of Kentucky Career and Leadership Development
Dr. Rebekah Epps
Dr. Stacy Vincent
Dr. Richard Maurer

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