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# Using a pen pal program to assess student learning through culture and school gardens

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**Using a pen pal program to assess student learning through culture and school gardens**

by

**Samantha Green**

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

MASTER OF SCIENCE

Major: Agriculture Education

Program of Study Committee:  
Michael Retallick, Major Professor  
Cynthia Haynes  
Thomas Paulsen

Iowa State University

Ames, Iowa

2016

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DEDICATION

“Any subject can be taught in the garden.”

- Dr. Cynthia Haynes

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NOMENCLATURE

EARTH	Education And Resiliency Through Horticulture
GBL	Garden Based Learning
GHS	Giffit Hill School
WL	West Liberty
USVI	United State Virgin Islands

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## ABSTRACT

Youth at two schools (St. John, USVI and West Liberty, IA) participated in the *Grow Culture Pen Pal Program*. The purpose of the 9-week program was to evaluate middle school student's increase in knowledge and confidence related to communicating local gardening, cultural understanding and sustainability. The collaborating schools were specifically chosen because they each meet the criteria of having a garden for middle school students to integrate English and science into their agriculture curriculum. The objectives of this program were to increase awareness of garden sustainability, understand place-based gardening and environmental sciences, while establishing a garden-based distance cultural relationship and practice communication technologies. The overarching goal was to increase confidence in knowledge of gardens and sustainability. The program was intended to support metacognitive communication skills, understanding of traditional cross-culture connections, and improved knowledge of garden diversity and practices. Pre- and posttests with multiple choice and open-ended responses were administered to evaluate knowledge gain and confidence. A suitcase of artifacts, brochures and videos were developed to evaluate perspectives on culture, agriculture and sustainability. The program resulted in a significant increase on posttest, leading us to conclude this program was effective.

## CHAPTER I: INTRODUCTION

### Purpose

School garden education is a growing practice that has been found to integrate multiple academic subjects for student engagement (Blair, 2009). However, there are many curriculum integrated subjects in the school garden and classroom that could still be developed. In this study, I designed an intervention called the *I Grow Culture Pen Pal Program* curriculum. A mixed-method research approach was used for a quasi-experimental and qualitative study with middle school students located in West Liberty, Iowa and St. John, United States Virgin Islands (USVI). Each school's garden was the main subject of communication between schools. I collected and analyzed data from a pre- and posttest, student work, and classroom observations.

### Background and Rationale

School gardens are designed to create a hands-on learning environment for students to learn outside of the classroom. Students are often confined to classrooms with narrow, standardized curricula and limited interactions with the outside environment, cultural surroundings, and learning independence (McCaffery, 2012; Wiener & Matsumoto, 2014). A school garden provides a learning atmosphere and creative resource to integrate many academic subjects. Teachers who use school gardens in a specific subject-based approach have helped students improve science and math scores (Klemmer, Waliczek, & Zajicek, 2005). School gardens promote an array of positive social and environmental behaviors (Blair, 2009). Recognizing the intellectual impact school gardens have on students has increased developing curricula that are more subject-specific, such as English and science communication.

Garden education diversity is a concept that can be used in the classroom to connect students to each other and to compare and contrast different environments and food production

systems. Not all gardens are created equal and are excellent teaching tools for youth. Utilizing these diverse tools, despite location differences, should not hinder gained learning experiences with the advancement of communication technology. Traditional curricula and place-based experiences are also important to exercise interaction and garden aptitude.

The EARTH (Education And Resiliency Through Horticulture) Program is a structured course of agriculture education taught at the Giffit Hill School (GHS) on St. John USVI. The Iowa State University (ISU) College of Agriculture and Life Sciences, EARTH Program is a study abroad service-learning opportunity for ISU students to teach horticulture in an outdoor classroom for grades K-12 at GHS. The EARTH program runs for 8-14 weeks and three to four students are accepted every semester. The accepted students have a variety of majors including; agriculture education, horticulture, environmental science, culinary science, human services, dietetics and etc. Students learn about a new culture and practice sustainable gardening, study a new environment and gain skills in lesson plan development and youth management.

The EARTH Program was founded in 2010 and continues to develop curriculum concerning tropical agriculture and teaching techniques. Some goals for the EARTH Program and the K-12 students are to incorporate curricula that increase environmental awareness and that establish relationships with other youth garden education programs. Curriculum already developed concerning these goals have been locally focused and enhanced over the five years since established.

Interventions, such as a pen pal program, are sought to create learning experiences for participants. Pen pal programs are known to increase knowledge for literacy (Rankin, 1992) and create a social relationship between pals (McMillion, 2009; Shandomo, 2009; Wiener & Matsumoto, 2014). There is also a strong learning outcome from pen pal programs for

knowledge gain of a new culture and learning more about an individual's own culture (Barksdale, Watson, & Parks, 2007).

Students in 7th and 8th grades participated from the GHS exploratory EARTH (Education and Resiliency Through Horticulture) class partnered with students from the 8th grade exploratory agriculture class from WL Middle School. Both schools have bountiful school gardens that are accessible to all students. The GHS garden is managed by service learning undergraduates from Iowa State University and maintained by GHS students during EARTH classes. The harvest from the garden primarily goes to the GHS school lunch. The WL garden is managed by the West Liberty FFA Chapter and is limited to only FFA members but with an occasional garden experience in the classroom during plant science lessons. The WL produce is sold to a local restaurant in town to raise money for the FFA chapter. Students may become FFA members in eighth grade. While their gardens are different based on a variety of factors (most notable is climate) both were used as a teaching model for generating reports and discussions.

### **Statement of the Problem and Objectives**

Does a school garden pen pal program for 7<sup>th</sup> and 8<sup>th</sup> grade students effectively increase knowledge about culture understanding, gardening and sustainability? Middle school student's understanding of culture, gardening and sustainability is collaborated together to create a pen pal program. Lessons in the classroom were incorporated with the science concepts and practice of basic fundamentals of gardening and local food production. The qualitative measurement of the relationship between the schools will be determined based on the level of attention and interaction being observed during the lessons in the classroom as well as a pre- and posttest each participating student will complete



The objectives for the *I Grow Culture Pen Pals* study were:

1. Determine if there is an increase in knowledge as a result of the program;
2. Determine the extent to which students can identify at least five artifacts that represent their pal's garden and culture;
3. Determine the extent to which students could design and demonstrate a script of a garden tour; and
4. Determine the extent to which students increase their confidence related to their understanding of garden and sustainability.

Outcomes for the *I Grow Culture Pen Pals* study were achieved through the utilization of hands-on lesson criteria, while using the garden as a tool for discussions and communication strategies. The goals of this program are that students increase their awareness of garden sustainable practices, understand place-based gardening and environmental sciences, while establishing a garden-based distance cultural relationship and practicing communication technologies to increase confidence in their knowledge of garden and sustainability. This increased awareness of diverse climate and environmental knowledge were to fortify the student's ability to enhance their desire to practice local gardening and ecosystem sustainability actions.

## CHAPTER II: LITERATURE REVIEW

This chapter provides an overview of the literature related to school gardens, middle school education, and culture and pen pal programs.

### **Garden Based Learning**

School gardens have been symbols of nature and education tools throughout America's history; weaved together by social movements, patriotic pride, and early education reform (Trelstad, 1997; Desmond et. al., 2002). What unifies America's history of school gardens is the shared landscape of the schoolyard and the connections amended by the landscape, the child, and the educator (Trelstad, 1997). Gardens have always been a sincere part of our education system that represents growing food and growing youth. Academic topics in the garden are as endless and bountiful as the harvest table produce. Desmond and others (2002) define Garden Based Learning (GBL) as an instructional strategy that utilizes a garden as a teaching tool.

GBL is a pedagogy that has potential to enrich basic education in all cultural settings (Desmond et. al., 2002). Teaching in a garden can be difficult because the distractions, but many techniques and strategies are available. The diverse environment of the garden comes with its own community and culture. Challenging students to work in the ever-changing environment of a school garden creates a routine that can be constantly reflected through student involvement of everyday activities. The skills learned in the garden are believed to be most effectively developed using place-based, experiential learning that involves real world expository practice (Cullin, 2002). A study review of 15 farm-to-school programs were evaluated by Joshi and others (2008) that recognized the need for more community involvement for school garden program. It was apparent that leadership is gained the most in a garden educational setting.

## **Experiential Learning and School Gardens**

American philosopher John Dewey, the father of experiential learning (Roberts, 2006), made the case for such real-life activities that utilized garden education. In John Dewey's book, *Experience Based Education* (1938), he described the need for organized education where students are removed from the standard curricula of a classroom and become an active part of the learning experience. A school garden is such an experience, but alone is not complete until followed up with sharing, processing, generalization and application (Mowen & Harder, 2005).

Kolb defines learning as "the process whereby knowledge is created through the transformation of experience. Knowledge results from the combination of grasping and transforming experience" (1984, p. 41). New experiences related to one's own senses are the most enhancing learning tools. Allowing students to explore new experiences in the environment utilizing multiple senses has proven to increase retention (Mowen et al., 2005). Since the senses are strongly tied to memory, GBL can lead to permanent retention of knowledge (Keating, 1967; Desmond, Grieshop & Subramaniam, 2002).

The school garden is an informal environment of nature that changes rapidly triggering attraction and encourages a child's attention (Kellert, 2002; Blair, 2009). Kellert recommended that cognitive development is rich during this occurrence that causes a creative inquiry to stimulate a child's mind. Experiential education, such as that taught in the garden, provides adolescents with the opportunity to actually carry out environmental actions, aiding greatly in the cultivation of a generation of environmentally minded individuals (Hudson, 2001).

According to Kolb's experiential learning model (Kolb, 1975; Desmond et. al., 2002) four phases of gained knowledge occurs; (1) learning a concrete experience leads to (2) observations and reflections that result in the formation of (3) abstract concepts and

generalization of these concepts as well as to use these concepts in (4) new situations. This model is consistent with the structure of human cognition and the stages of human growth and development.

### **Middle School Garden Education**

Early adolescents are at a crucial developmental period of life (Woolfolk, 2013) and the habits of thoughts are molded during this time to have long-term effects on continual learning, quality of life, and career success (Shernoff, Csikszentmihalyi, Schneider, & Schernoff, 2003; Sternberg 2001). According to Rathunde and Csikszentmihalyi (2005), middle school students may begin to doubt their ability to succeed. The research suggests a growing number of scholars agree the academic decreases is due to the students complication of immature adolescent's needs and nature of middle school classroom and culture. The suggested cure for the complication is to enhance student learning in the classroom and spark of intrinsic motivation (Steinberg, 2001). A meta-cognitive research study done by Hill and Tyson (2009) recognize based on the known characteristics of the developmental stage and tasks of middle school students, strategies reflecting academic socialization are most consistent with the developmental stage of early adolescence. Focusing students on lessons and activities that are motivating and diverse has shown to keep students academically on track.

According to Spielmaker and Leising (2013), scholars over the years have been shifting away from the specific knowledge-based understanding of agriculture to a more environmentally broad and global perspective. The course that most regularly grows and maintains school gardens is the agriculture or science classroom (Krasny & Tidball, 2009). The Agriculture Education standards and benchmarks in horticulture recognize the need to demonstrate a working knowledge of the relationship between global/cultural diversity and occupational success in

agriculture (Iowa Department of Education, 2013). This standard can be done through activities for middle school students in a garden environment to promote experiential learning by also gaining diverse skills. The benefits of middle school experiential education garden are curricula designed with more reflection and self-conceptual focus during hands-on activities (Roberts, 2006).

Both English and Agriculture national standards emphasizes competency for developing curriculum surrounding cross-cultural education. Therefore, integrating culture in a working garden curriculum is necessary to meet the national agriculture standards. According to The Iowa Policy Project, school garden spaces are mechanisms to teach nearly every core subject, and to perhaps even teach students more effectively than traditional methods (Ladd, 2014). Carly Fisher-Maltese (2013) notably states, “school gardens are a growing phenomenon; they are not merely a plot of land with plants growing, but a type of pedagogy.” Desmond and others (2002) shared that GBL programs are most effective when tied to a comprehensive and cohesive educational plan or curriculum that is ideally tied to local, state, or national education standards or need of certain grade levels. In conclusion, organizing curricula for middle school students that recognize standards and benchmarks using hands-on and collaborative activities create cognitive development benefits.

### **Informal Learning Environment**

Learning and teaching process is generally recognized to occur at school in a classroom setting. School environments do directly affect teaching and learning (Schneider, 2003) however, new surroundings stimulate senses (Kellert, 2002). Environments used in the daily life of teachers and learners engagement with educational activities at any place and time and not necessarily linked to an institution or certificate (Garcia-Penalvo, Johnson, Alves, Minovic, &

Conde-Gonzalez, 2014). With the absence of a formal classroom setting, learning under these circumstances outside of the classroom is known as informal learning. An informal learning environment is defined by Bell, Lewenstein, Shouse & Feder (2009) as a spontaneous learning environment generally outside of a regular classroom and 80 percent of learning tends to be taught in these types of environments.

School gardens are a place of constant change. According to Dorothy Blair (2009), school gardens cover a continuum of efforts to increase the horticulture complexity of the schoolyard, which means that the diversity of academic achievement has no limit. Multiple school garden studies reveal positive science academic impacts for students in elementary grades (Pre-K – 4<sup>th</sup>) (Blair, 2009; Klemmer, Waliczek, & Zajicek, 2005a, 2005b; Kim, Park, & Son, 2014; Rye, Selmer, Pennington, & Vanhorn, 2012) and few have reported similar results in higher-level grades (Carlone, Scott, & Lowder, 2014). One example of informal learning environments is that of a school garden (Bell, et al, 2009; Fisher-Maltese, 2013) in which people create and follow their own style of learning.

### **Sustainable Environment Education**

Environmental value defined by Brouwer (2000) as enjoyment or personal meaning of nature begins at a young age. Research has shown that children who are engaged with the environment tend to be more environmentally active and land stewardship minded as an adult (Dresner & Fischer, 2013; Thomashow, 1996). According to Stevenson (2014), solving ecological challenges requires environmentally literate citizens who are motivated to employ sustainable responsible behaviors. Providing a chance to obtain a sense of place within an educational setting encourages environmental and sustainable thinking for a student to make science connections and apply them back to their daily lives (Aucoin, 2011). Further, practicing

sustainable acts creates positive impacts in school activities and increases a more receptive audience wanting to learn more about the environment. Instead of scientific procedures in a lab, students practice sustainable responsibilities in a garden, such as creating a compost bin, to promote future thought of action. Of this engagement, students gain more responsible behaviors that encourage environmental actions because of observed reactions to environment they learned from working in a garden.

Educating environmental activities is more engaging to students by connecting and relating effectively through experiences that are meaningful and relevant to them (Barksdale, et al. 2007). Additionally, a social environmental atmosphere, meaning to work with other individuals in outdoor activities, has been noted to promote positive perception of the outdoor environment among students including more collaborative strategies gained through the experience (Stevenson, 2014). Data from a study analyzing a school garden program on students knowledge found an increase in responses regarding seasonality of foods and the ability to identify foods grown in the region after the educational program was implemented (Joshi, et al., 2008). Identify what one can grow in a local garden is a step closer for an individual to becoming more environmentally aware of their surroundings. Environmental responsibility is important for an individual's location but it is also significant to enhance ecological knowledge of other geographical locations (Thomashow, 1996). By broadening our place-based environmental knowledge, one can relate and correlate benefits of sustainable practices. Furthermore, Thomashow (1996) argues that the key challenge is to connect community minded groups with different missions and geographical locations so that they can create the potential to move society to more sustainable living practices. Environmental education, such as that taught outdoors in a school garden, is rewarding for youth to become more aware of their surroundings

because of their increase of outdoor activities and increased knowledge of local produce (Blair, 2009).

Environmental education has many subjects to teach in the garden. Science, math, and general physical education are a few that come to mind easily but one more challenging is literacy. The ability to read, write, listen, and speak is the definition of being literate (Rankin, 1992). Literacy education is a subject with a multitude of strategies and techniques, but it is a challenge for teachers to find a fit for every student (Lemkuhl, 2002). An informal learning environment, such as that of a school garden has been shown to improve science literacy (Fisher-Maltese, 2013). The study by Fisher-Maltese (2013) foster science literacy in the school garden resulted in student work revealing a number of affordances, including science learning, cross-curricular lessons in an authentic setting, a sense of school community, and positive shifts in attitude toward nature and working collaboratively with other students.

### **Culture of the Garden**

Cultivating knowledge and production practice is part of a garden atmosphere and place-based culture. Blair (2009) reports that seed and gardening styles are the stuff of local history and culture. Local costumes and religion have guided people's food choices, language, dress, festival and artistic expression that we see today referred to as culture (Spielmaker & Leising, 2013). However, there is no single definition of culture but rather an individual intellectualized concept that is shared with a group (Mulcahy, 2006; Wood, Erichson, & Anicha, 2013). While a group could be many things, the garden is a shared area for a group of individuals to grow and learn through experience. Speaking broadly from an education standpoint, cognitive development most readily occurs under the practical application of culturally based beliefs, values and attitudes (Trexler, 2000; Powell, Agnewm & Trexler, 2008; Spielmaker & Leising,



2013). Wood and others (2012) argue that as a community, we will not understand the teaching or learning of science until we attend to culture. Furthermore, the study finds students value their culture and a stronger engagement of learning is utilized when education is related to cultural topics. Many studies also emphasize the important knowledge of the diversity and value of cultures different of their own (Barksdale, Watson, & Park, 2007; McMillion, 2009; Wiener & Matsumoto, 2014; McCaffery, 2012; Shandomo, 2009). Gaining diverse cultural perspectives causes a deeper understanding of the history and methods of one's own culture. Realizing the place and purpose of garden culture bridges the gap of the underlying meaning of the most productive system. In other words, the culture of gardens depends on the place of existence and generations of passed down strategies for producing the most desired crops.

### **Social Cognitive Theory**

Learning culture is a human function embedded from the agented perspective called the social cognitive theory (Bandura, 2002). To fully participate in the theory, an agent is to intentionally influence one's learning or life circumstances. Bandura (2002) explains the social cognitive theory in relations to culture functions through three modes of agency: direct personal agency; proxy agency that relies on others to act on one's best to secure desired outcomes; and collective agency exercised through group action. Among the mechanisms of human agency none is more central or pervasive than beliefs of personal efficacy (Bandura, 1997).

Sharing beliefs with another person creates a trust and knowledge gaining companionship. The theory also encompasses perceived collective efficacy representing shared beliefs in the power to produce desired effects by collective action (Bandura, 2002). Because of the expanded conception of human agency, social cognitive theory is well suited to interpret human personal development, adaption, and change in diverse cultural education. A research

study by Pastorelli, Caprara, Barbaranelli, Rola, Rozsa, & Bandura (2001) examined the cultural habits and structure of children's perceived self-efficacy in Italy, Poland, and Hungary. What they found was although these societies represent quite different sociocultural systems, the factor structure of children's belief are replicated and demonstrate gained knowledge from each other. These factors include perceived efficacy to regulate one's own learning activities and master academic coursework through social development. Bandura (2008) once said, "Personal efficacy is valued, not because of reverence for individualism, but because a resilient sense of efficacy has generalized functional value regardless of whether activities are pursued individually or by people working together for a common cause" (p. 28).

Not only is the structure of efficacy beliefs comparable cross-culturally, but also are the functional properties the make cultures unique. America social system is perceived more individualistically oriented according to Bandura (2002). Zimmer and Bandura (1994) agree that self-efficacy to regulate one's learning and academic achievement is a good predictor of academic aspirations; however, social support has been shown to enhance psychosocial functions. Park and her associates (2000) examine the casual structure involving different sources of social support, perceived academic self-efficacy, life satisfaction, and academic achievement in American children at different age levels. This study reported over all the ages that social support raises perceived efficacy, which is accompanied by higher academic achievement and greater satisfaction with one's home and school life. The middle and high school level of social interactions concluded that teachers' support fades from the picture and the contribution of parental support declines and friendship support increases (Park et al, 2000). This is the time for children to establish social networks and etiquette to increase and maintain academic achievement (Bandura, 2002).

Cultures are no longer isolated and can be used in social academic connections through increased technology. With the advances and variety of telecommunication technology in the Internet world, people are even more heavily in global symbolic environments. Utilizing the social cognitive theory, culture and technology in the classroom develops a worldwide connectivity with a cross-cultural uniqueness. Technology communication with social interest center on how cultural and adolescents interact to shape and interpret each other's agency of personal efficacy.

### **Communication & Artifacts**

Quality communication is key to any education technique. Whether the communication is verbal, nonverbal, written or drawn; communication is essential for cognitive development. Collaboration with peers in a classroom setting is defined by Woolfolk (2013) as a way of working together with others to make relationships and is beneficial because students learn more through their interest and related issues. Furthermore, captivating social collaboration in educational communication creates a form of discussion to discover related interest from one another. Motivation for students to share interest can be expressed through not only letter writing but also other advances in technology such as video chat and pictures.

Artifacts illustrate concepts and stories in which interest students in major ideas embedded in topics of discussion and communication (2001). Goforth (1998) suggest that curriculum regarding cross-cultural connections should allow students to use artifacts in open-ended projects for diverse learners. Cultural artifacts are symbols with multiple meanings that through classroom discussion interpret broad-minded ideas. For the purpose of education, artifacts demonstrate evidence for broader thinking when introduced appropriately during a lesson (Goforth, 1998).

### **Pen Pal Programs**

Pen pal programs originated to improve literacy and fluency of foreign language and to promote cross-cultural relationships (Hughes, et al. 2014). Many studies have recognized the need for pen pal programs to assist with reading and writing instructions but also shown that they were enjoyable to students (Lemkuhl, 2002; McMuillion, 2009; McCaffery, 2012). Lemkuhl's (2002) study focused on the variety of core subjects that can be the point of a pen pal program. He found that reading was no longer just a second grade requirement but understanding the pen pal letters became more engaging to learn about another person and place. Communication with a pen pal is collaborative and requires equal attention from both parties. The innovative experimental atmosphere, like a local environment, could be used as a topic of discussion for middle school student's expression of vocabulary literacy. According to McCaffery (2012), pen pal programs demonstrate improved literacy, communication, and learning skills amongst participants as well as creating cultural education. Integrating garden education with Language Arts into a pen pal based curriculum encourages student's environmental actions within other locations.

Pen pal programs spark a sincere interest in learning. According to Garcia (2013), the implementation of a pen pal program has been shown to increase student's knowledge of and desire to have multicultural experiences. Shandomo (2009) identifies the objectives of pen pal programs to include writing and reading for genuine purpose for audiences to celebrate differences and similarities. Recent research suggests pen pal practices support, nurture and motivate early adolescence reading habits (Gambrell, 2015; Malloy & Gambrell, 2008). Students enjoy getting to know each other while experiencing an increase in cultural knowledge without forced effort from educators (Garcia, 2013). Collaborative efforts in the reading and writing of

pen pals benefit both the parties to include genuine engagement causing motivation to be relative (Barksdale, Watson & Park, 2007; Shandomo, 2009). With both pals contributing, discussion to each other's reading increases comprehension and motivates critical thinking (Malloy & Gambrell, 2008). Although, pen pal relationships are generally short lived (Hughes, 2014), it is an experience never forgotten and often reflected on through adulthood.

Pen pal programs for middle school education are generally designed in the English classroom and focused more for literacy practice (McMuillion, 2009). Schoorman (2002) conducted a study in which middle school students from a school with a high percentage of economic impoverished adolescence and diverse backgrounds exchange letters with pre-service teachers. Data analysis revealed both groups had shown improvements in their writing practice through the help of stages of writing process. This study demonstrates the successful ability to exchange writing to increase literacy in any personal setting. Gambrell (2015) expresses that reading and writing proficiency was linked to a better and more productive academic, social, and civic life.

### **Utilizing Technology for Education**

Technology in the classroom has become not just a need, but also a requirement. Computer and Internet are readily available in schools and is a reliable source for communication. Email, video chat, social media and many other outlets using technology are all sources of communication used in classroom across the country (Ribble, 2015). Advancements in technology have made it the necessity for education to use all kinds of technology resources as simple as a video presentations or to more elaborate lessons like the Flipped classroom concept (Aaron & Bergmana, 2013). The example of the flipped classroom is a student-centered approach to assigning students to watch videos and answer questions before entering the

classroom (Aaron & Bergmana, 2013). The improvements in technology create a forum for collaborate communication from great distances in faster speeds, are readily assessable and come in high quality (Lin & Atkins, 2007). Depending on the teacher's knowledge of technology, it can be easy to integrate into the classroom. Communicating to others has become relatively easy with technology advancements; however it is the ability to properly converse using appropriate methods that tends to be difficult (Ribble, 2015).

### **Summary of Literature Research**

Pen pal programs have proven to demonstrate improved literacy, communication, and learning skills amongst participants as well as creating important cultural connections (Rankin, 1992; Lemkuhl, 2002; Wiener & Matsumoto, 2014; McCaffery, 2012). It would seem logical to use these connections in a place where experiential learning occurs such as a school garden setting. Dorothy Blair (2009) evaluated several research studies focused on the benefits of school gardens and concluded that gardens are intensely local and provide experiential education to cause measurable changes in student achievement and behavior. While students may know a lot about their local gardening, explaining it to another person not of the same environment is the challenge for this study in the context of cross-cultural learning. By assisting middle school students through cooperative learning, such as a pen pal program, may reflect gained knowledge of participant's school garden environment and more about their own. Writing letters creates a forum for students to discuss relevant issues about their local environment, including garden responsibilities, food processing as well as share personal experiences and local traditions (Wiener & Matsumoto, 2014). Creating long distance relationships provoke students to deliberately become communicators while exercising technology literacy and collecting multiple Agriculture and English competency's.

### CHAPTER III: METHODS

The purpose of this study involving the *I Grow Culture Pen Pal Program* was to evaluate middle school student's increase in knowledge and confidence related to communicating local gardening, cultural understanding and sustainability. The specific objectives were to:

1. Determine if there is an increase in knowledge as a result of the program;
2. Determine the extent to which students increase their confidence related to their understanding of gardening and sustainability;
3. Determine the extent to which students can identify at least five artifacts that represent their pal's garden and culture; and
4. Determine the extent to which students could design and demonstrate a script of a garden tour.

This chapter describes the methods used to develop the instruments, collect, and analyze data. The research design, a description of the participants, a description of instruments, and a description of the procedures are explained. Reliability and validity analyses are also included in this chapter, along with assumptions and limitations.

#### Research Design

A mixed method research approach was conducted using a sample population of middle school student's participating in the *I Grow Culture Pen Pal Program*. The *I Grow Culture Pen Pal Program* is a combination of four lessons that include; emailing pals, collecting gardening samples, creating a poster, and making a video tour of the school garden. Using the school's garden as context for information sharing and student learning, students can connect with their surroundings, which foster conservation responsibility with local knowledge development. The *I*

*Grow Culture Pen Pal Program* was developed to connect garden and culture as a topic of discussion and sharing items for a middle school science and English curriculum. Two schools meet the criteria of having a school garden from different climate locations and cultures to use as learning points over the course of the intervention. Similarities in culture and exploratory learning systems from diverse regions of the Midwest to the Caribbean is used as the topic of discussion to connect students despite great distances.

To measure garden knowledge, awareness of sustainability, and communication confidence a pre- and posttest and classroom observations were used. The pre- and posttest measured what the students learned as a result of the pen pal program. The pre- and posttests were distributed to the middle school students through Qualtrics Survey Software on a computer. Classroom observations (video recording, field notes, etc.) were used to measure student engagement during the *I Grow Culture Pen Pal Program*.

### **Participants**

The intervention sample population was 7<sup>th</sup> and 8<sup>th</sup> grade students at the West Liberty (WL) Middle School in West Liberty, Iowa and the Gift Hill School (GHS) in St. John U.S. Virgin Islands (USVI). Both are communities of less than 4,000 persons and the schools each have a working garden. The frame of persons in the population is strictly based on the enrolled students from both schools. Over the 2014-2015 academic year, the entire 8<sup>th</sup> grade class at WL consisted of 84 students, 31 of which participated in this study. The entire 8<sup>th</sup> grade class at GHS consisted of 8 students and the 7<sup>th</sup> grade class had 18 students, 24 of which participated in this study. The total sample of participants for this study was 55 students.

Due to the small size of the 8<sup>th</sup> grade class from both schools, 7<sup>th</sup> grade was added into the program from GHS and a few students were paired with two pals. WL was anticipated to



have more than half the students of GHS, but last minute changes did occur causing an unequal amount of participants for letter exchanges. Of the 13 WL students, 9 of them wrote two separate letters to a 7<sup>th</sup> and 8<sup>th</sup> grade GHS pal.

Students in 7th and 8th grades participated from GHS through the exploratory EARTH (Education and Resiliency Through Horticulture) class to partner with students from the 8th grade exploratory agriculture class from WL Middle School. Both schools have bountiful school gardens that are accessible to all students. The GHS garden is managed by service learning undergraduates from Iowa State University but ultimately maintained by GHS students during EARTH classes. The harvest from the garden primarily goes to the GHS school lunch. The WL garden is managed by the West Liberty FFA Chapter and is limited to only FFA members but with the occasional garden experience in the classroom during plant science lessons. The WL produce is sold to a local restaurant in town to raise money for the FFA chapter. Students may become FFA members in eighth grade. While their gardens are vastly different based on a variety of factors, notably climate, both were used for generating reports and discussions.

The EARTH Coordinator, the two middle school English teachers and I instructed the 7th and 8th grade classroom during the months of February through April of 2015. The service learners and EARTH Coordinator continued with the EARTH curriculum for grades K-6 and Farm to Table. The 7th and 8th grade EARTH class meets once a week, to keep up with the time commitment of the Iowa school; the pen pal program was supported through the English classroom one other time during the week. The pen pal program supports the EARTH Programs goal to develop positive relationships with other school gardens by using various distance education technologies to facilitate dialogue and outreach.

The West Liberty agriculture program is a two-teacher program with one teacher that primarily instructs the middle school. The West Liberty agriculture program is for 8th grade to 12th grade students. The West Liberty Agriculture Program is also advised by the same cooperating teacher and accepts 8th grade students into the FFA Chapter. The FFA chapter has many horticulture opportunities including greenhouse management, garden production and floriculture competitions.

The 8th grade agriculture class is an elective that is divided into five sections (one quinmester is 7-8 weeks) throughout the year. The 8th grade class of 2014-2015 academic year was divided up into five sections (quinesters). Each quinmester students are introduced to another elective to experience. The agriculture elective during 8th grade is an introduction to agriculture and the FFA Organization. The agriculture teacher encourages students to join FFA and to learn more about classes offered through high school agriculture.

The fourth section of five quinesters in the 2014-2015 year was selected to participate in the *I Grow Culture Pen Pal Program*. The fourth section met on February 2nd through April 7th. A control group consisting of the fifth quinmester of the 8<sup>th</sup> grade exploratory agriculture class did not participate in the pen pal program but took the pre- and posttest. The pretest was administered on April 9<sup>th</sup> and the posttest on May 27<sup>th</sup>. The exploratory class met every day for 45 minutes during the first period.

However, since the Iowa school is split up into five 8<sup>th</sup> grade rotations over the course of the school year, a control group was accessed for the study. The last rotation of 8<sup>th</sup> grade agriculture class was the non-equivalent control group. The control group participated by taking the same pre- and posttest during their time in the agriculture elective class but did not participate in the intervention of the *I Grow Culture Pen Pal Program* curriculum. The idea of

the control was to see how effective the local garden and cultures were understood during the program and if the pen pal program is a more efficient way for middle school students to learn local gardening.

### **Design**

The purpose of this mixed methods study was to find out if a pen pal program could be successfully integrated into a school garden curriculum. A quasi-experimental approach of both qualitative and quantitative analysis was used to measure and collect data during the nine-week pen pal exchange. The experiment design was to use the 8<sup>th</sup> grade exploratory agriculture class of WL and the 7<sup>th</sup> and 8<sup>th</sup> grade EARTH/English classroom at GHS to use four project components to learn about each other's culture and garden. Four lessons were created to meet the programs objectives. The activities include; emailing pals, collecting gardening samples, creating a brochure, and making a video tour of the school garden.

A review of the literature revealed few instruments for measuring student engagement and learning efficiency from a pen pal program, but the literature did reveal instruments designed to measure the benefits of school gardens and environment in middle school curricula. Matsumoto and Wiener (2014) *Ecosystem Pen Pal* program was a model of the four project curricula. The four projects were; letter-writing exchanges, field guide, ecosystem suitcase and videoconference or ecosystem poster. Each project was designed and builds upon the previous project. Methods were evaluated with graded rubrics and student and teacher assessments. Blair (2009) reviewed 12 school garden curriculum-related studies for third – to sixth grade students, and found that “all 12 studies have used quasi-experimental pretest and posttest designs or simple posttest designs to quantify the impact of school-garden participation on children's

learning or behavior” (p. 28). In general, school gardening increased the science scores in all studies.

The lessons for this study were designed and modified from the Matsumoto and Wiener (2014) *Ecosystem Pen Pals* program. For this study, the curriculum was nine weeks instead of an entire academic year and four projects were implemented in a different order than the *Ecosystem Pen Pal* program. Each lesson was specifically designed to meet research study objectives and 7<sup>th</sup> and 8<sup>th</sup> grade national standards and benchmarks for science and English education. Matsumoto and Wiener (2014) *Ecosystem Pen Pals* program in comparison to this study is moderately similar in that the instruments are modeled from each other, however vastly different because of participant’s grade level and specific objective modification.

The intervention of all four lessons in the *I Grow Culture Pen Pal Program* curricula has a purpose, objectives, content and an assignment. Participants were graded on their projects and used for analysis. The order of lessons, the purpose, and the learning objectives are identified in the following paragraphs.

### **Lesson 1: Garden Suitcase**

The purposes of the Garden Suitcase lesson was to identify and explore local food and culture through artifacts and identify invasive species. Specific objectives were to define local food, define invasive species, know two ways invasive species are spread, identify one invasive species in his or her local area, and identify at least 5 artifacts and objects that are unique to their school garden and culture.

The assignment for this lesson was to donate an artifact and to complete a worksheet researching an invasive species. The lesson began by a class discussion of the definition of local food (food that is grown or produced within a 100-mile radius and is a collaborative effort to

build self-reliant food economy), identify an invasive species, and know how an introduced species gets into a local environment. A T-chart labeled “garden” and “culture” was written on the board for students to write artifacts that each label represents. Keeping invasive species in mind, artifacts were defined as a non-living thing or objects that would not do harm to another environment and consider the U.S. postage mail guidelines before sending artifacts. The teacher then discussed further with the class what artifacts on the board would not make it into the garden suitcase. Each artifact was assigned to a student to find and put in the box. Students were then assigned a local invasive species to research and answer questions regarding how they became invasive on the Invasive Species Worksheet found in appendix.

Other studies, such as *Birds Across Borders* by McCaffrey (2012), utilized the exchange of artifacts to students to summaries and gain information about the topic of discussion between pals. The invasive species worksheet assignment asked questions to guide a summary. Artifacts donated were sent through the mail in a packaged box and approved by the teacher before delivery. Collecting all the artifacts from students took approximately two weeks and receiving the package from sister school took two weeks as well.

## **Lesson 2: Garden Email**

The fundamental purpose of a pen pal program is writing and exchanging letters of communication (Hughes, et al., 2015; McMillion, 2009). The purpose of the Garden Email was to establish a student connection through email (pen pals), to introduce and ask questions about each other’s garden and to ultimately find out about each other’s location and environment. The objectives for this lesson were; each student will identify three major food products from their school garden, each student will define sustainable and give an example of a sustainable practice,

each student will describe at least one sustainable practice associated to each other's environment or school garden, each student will learn two or more things about their pen pal and make contact through school email. Students wrote letters to their pal via email, which is a profound obligation for student computer proficiency that is most widely gained at the 7<sup>th</sup> grade and lower levels (Alden, 2005; Spielmaker and Leising, 2013). Students were graded on their introduction letter based on a rubric to assist with garden topics of discussion.

Students were directed to introduce each through email to and follow a rubric/checklist to assist with writing their first email during the Garden Email lesson. The checklist for the introduction email assignment is attached in the Appendix B. GHS students introduced themselves first to their pal. The cooperating teacher at WL assigned pals based on the students' writing interest and awareness that would fit each student appropriately. The email checklist specifies the letter content. The checklist has students point out what their hobbies and interests are and discuss their favorite food and why. After the "getting to know me" part, the checklist directs questions around their school garden and sustainability. Each letter was written differently based on the student and their interest as well as the information they shared. For example, following along with the objective of the lesson, students were assigned to ask their pal what the top three garden produce harvested from their school garden and Vis versa.

GHS students sent their email to the cooperating teacher's email. The WL students created a Google doc and email edit to the GHS cooperating teacher. This is the first time most of the students had written a formal email to someone they did not know. For this lesson, students discussed what a good email looks and read like and then wrote draft emails. During the next class session, the cooperating English teacher at GHS assigned student pairs to switch printed draft emails with each other for editing. The emails were then edited by the cooperating

English teacher and passed back out for final revision. The final emails were then sent to the WL cooperating teacher to be printed and handed out to the designated pals. The WL students were instructed to write a formal email reply. The WL student's first draft was their final email because the students were losing class days due to winter weather. The WL student emails were sent using Google Docs to the cooperating GHS teacher from the WL cooperating teacher. The GHS students did write a reply letter to WL students, however, the second letters never made it to them because of limited amount of class time.

### **Lesson 3: Virtual Garden Tour**

The ever changing and evolving classroom for multimedia and technology available systems (Tondeur, Bruyne, Vand dean Driessche, McKenny & Zandvliet, 2014) creates a comprehensive outlet for video-based informational platforms (Mitsuru, 2000). Technology, such as videography, is becoming more readily available to classrooms. Using this technology enhances student creativity and supports positive behavior (Wise and Groom, 1996; Spires, et al., 2012). A virtual garden tour of each school garden was created to share with pal's school. The specific objectives were; each student will identify a piece of his or her garden/growing facility, each student will critique and learn three or more ways to make a garden tour video well, each student will design a script of a garden tour, and each student will collaborate in a group the important features of their school garden and what makes their school garden unique.

Students were grouped and assigned a specific location around the garden and school to design a video script. They first read an example script and watched another school garden tour video to critique and discuss. Student created the script and practiced the skit in front of the camera. When all groups were filmed, the short skits were combined and edited to send to the

sister school. The videos were designed to represent a complete tour of their school garden or greenhouse facilities. A total of two weeks was designated to this project.

A video rubric and example script (Appendix B) was used to help guide WL and GHS students to create their script and performance for their informational video tour. Since the WL school garden is managed by the West Liberty FFA Chapter, the cooperating teacher organized FFA members to assist the 8<sup>th</sup> grade class with this assignment. The FFA members also assisted the cooperating teacher by answering questions for group's assigned areas in the greenhouse and garden space. The WL students had many resources to use when creating their script for the virtual garden tour and learned more about the specific areas and equipment that establish their school garden. The GHS students have been working in their school garden for most of the 2014-2015 academic year and were familiar with the garden space but utilized teachers and faculty in answering any questions they had in developing their scripts. The scripts were approved by the teacher and then practiced in front of the camera before videotaping. This assignment took approximately three weeks to complete for both schools.

#### **Lesson 4: I Grow Culture Poster**

The overall purpose to the last lesson of the *I Grow Culture Pen Pal Program* is the assessment piece of knowledge learned by creating a poster of pal's agriculture communication. Ryan and Johnson (2011) point out that in a science classroom, informational posters created by students are great demonstrations and designs of how student interpret what and how they are learning. The instruments objectives for this assignment were to; each student will identify three garden products from their sister school's location and their own, each student will identify at least five artifacts that represent their pals garden and culture, each student will demonstrate his or her knowledge about the gardening differences in his or her pal's environment with a



descriptive poster and, each student will check comprehension of each other's environment by viewing of poster.

Each student made a poster of their interpretation about their pal and what they learned about their pal's local food, invasive species, environment, sustainable practices, school garden and culture. The original lesson plan found in Appendix B, indicated this project to be a brochure but was instead modified for students to turn in a poster due to time conflict. The lesson began with an overview class discussion of what they collected from their pal and any questions they might still have about their pal and their school. Students also shared some interesting thoughts and ideas they learned from their pal with the class. Both schools had one 50 minute class period to make a poster reflecting information they learned from their pal.

The I Grow Culture Poster rubric for what the students were graded for this assignment is found in the Appendix B. The students used the artifacts, emails and garden tour video as resources to create their poster. Unfortunately, the GHS students did not get to watch the WL Virtual Garden Tour until after they made their posters because the WL video was not completed in time for viewing. Students were asked to use their artifacts, email and video to sum up their pal's culture they learned and observed over the course of the *I Grow Culture Pen Pal Program*. This was the opportunity for the students to compare and contrast cultures. Both GHS and WL had a 50 minute class period to create this poster.

### **Instruments**

Pre- and posttests were given to students to measure knowledge gain of the *I Grow Culture Pen Pal Program*. The pre- and posttest were given to the students using Qualtrics Survey Software on the computer. Many learning based-inquiries use pre- and posttest as an instrument of knowledge gain evaluation (Williams & Dixon, 2013; Blair, 2009). The questions

for this study were the same for all students. The students took the same test again after the pen pal program to evaluate their growth of knowledge. Questions were picked based on common practices at both school gardens and specific objectives covered over the course of the *I Grow Culture Pen Pal Program*.

The instrument was divided into three constructs scattered throughout the test. The first construct addressed common facts about self including location and initials to help identify information for pretest to posttest for analysis. Four questions ask if they have a garden at home and how much time they spend in their school garden, followed by two questions asking where they are from. The second construct focused on garden knowledge and sustainability. There were twelve multiple-choice questions regarding common garden knowledge and sustainability. Additionally, students were asked eight short answer questions in regards to garden knowledge and sustainability. These short answer questions were coded in means of three points: Completely Correct (3), Satisfactory (2), Missing the Major Point (1), and Unclear/Incorrect (0).

The last construct focused on student confidence to explain garden and sustainable practices to someone. Literature suggests that metacognitive judgment a learner makes of their own confidence before and during a performance tends to be accurate prospective judgments of knowledge (Schraw, 2009; Nelson & Narens, 1994). According to Schraw (2009), the most common way to assess a metacognitive judgement of confidence is to have participants make a continuous confidence judgment that ranges from no confidence to complete confidence. Following this recommendation, there are six statements of garden knowledge and ten statements of sustainability. These statements reflect how strongly students agree to explain both garden and sustainable practices to someone. These confident statements were formatted using a 4-point

Likert-type scale including: Extremely Confident (4), Confident (3), Somewhat Confident (2), and Not Confident (1).

### **Observation**

Every class lesson was videotaped to measure student's engagement during lessons to interpret qualitative themes. Being that both classrooms were by viewing the student's interactions and coding the learning process during lessons, the principle researcher was able to see both classrooms to analyze equal data. Measuring student engagement was also captured for comparing purposes of each other school. For coding purposes, student's initial reactions based on their comments and questions during lessons were mostly documented.

### **Validity and Reliability**

This section discusses the validity and reliability of the study. Validity and reliability are necessary to ensure the meaningfulness and measure consistency for all research instruments can provide (Ary, Jacobs, & Sorensen, 2010). The internal validity is threatened for this research experiment because of the selection bias in the design. There is as important difference between the experimental and control groups. Nonrandom factors might influence the selection of the subjects. This most commonly occurs in quasi-experiment study's (Ary, Jacobs & Sorensen, 2010) because the subjects are already in intact groups set up independently of the planned experiment and are not randomized because of their already scheduled classes. The validity of the student's interest and their personal background of gardening may affect the selection bias. Another internal validity threat is the testing performance because the pretest scores can be extremely different. For example, the students at West Liberty never were introduced to their school garden until the agriculture class whereas a majority of GHS 7<sup>th</sup> and 8<sup>th</sup> grade students have been taking the EARTH class since 2<sup>nd</sup> grade. Selection-maturation interaction may threat

the interaction validity because more rapid maturing students may have been selected in the control or experimental group, which may be mistaken for the effect of the experimental variable. Pretest results may indicate equal results between groups but observed effects would assist in validating this threat. Diffusing is another threat that could happen because of communication between the experimental group and control about influence information of treatment (Ary, Jacobs, & Sorensen, 2010). Deemphasizing the facts that the intervention is an experiment during lessons can lessen the likelihood of the diffusion problems. Finally, the history or unrelated events occurring during the study that affect the students like snow day or absents threat the internal validity but has been scheduled during the experiment for these types of issues. In fact, many snow days did occur in Iowa but student's self-efficiency toward the projects reluctantly completed each project.

The strength of the internal validity would be that the pals collaborated with each other to learn more about their garden and culture. The maturation of the selection design is a strength because both groups participating in the intervention would mature during the course of the experiment.

Extraneous variables found for this middle school sample may not hold for different subjects. The selection-treatment interaction does not represent a large middle school population but is a generalized characteristic of the intervention to a sample population. Another threat to extraneous validity would be the subject effects depending on attitude and feeling that develop over the course of the intervention. Results were reported observations and field notes of students experience during the study to best reflect this validity. The experimenter effect may threaten the extraneous validity in which subjects are influenced by the experimenter with a certain personality or other characteristic. Both GHS and WL student experience new teachers who

were the integrator of the experiment lessons which limit the factor of validity when both students are experience a new teacher. Testing effect was a small concern to the threat of extraneous variable however, there is a nine week period between exposure to the pretest to posttest for all three groups. Finally, the last extraneous validity include any timeline lapse or classroom management issues. The lessons were created to be flexible enough to work with calendar issues and classroom management. The only issue that was controlled is to make sure that the projects were done on a timely manner with each group to continue with the experiment.

External validity strengths were that the pen pal program can be done with any two schools with gardens but they should be done in different climate environments. This program could even be manipulated a little to add a third school to the program or even cross-coursed to work with another subject like science. A weakness to an external validity for this experiment is the student's engagement and their learning progress. The lessons engaging enough for the students to stay on task and turn in the homework on time to keep with the timeline of the other school.

Cronbach's alpha was also used to determine the reliability of statistical test for pre and posttest results. The reliability is referenced more in the discussion section for test clarification. Paired T-test was used to statistically compare group's pre and posttest in relation to the objectives.

### **Data Procedures**

The survey materials, including informed consent, parent letter, video recording observation and the instruments were approved by the Institutional Review Board at Iowa State University on January 30, 2015 (Appendix C) and contained the required information for parents and students to accept or decline participation in the *I Grow Culture Pen Pal Program* study.

Parents of the 7<sup>th</sup> and 8<sup>th</sup> grade enrolled at Giffit Hill School as well as the 8<sup>th</sup> grade fourth and fifth quinmester of exploratory agriculture class at West Liberty Middle School during the months of February through May 2015 were contacted during the week of February 2<sup>nd</sup>, 2015 by the principle investigator via a letter taken home from class (Appendix F). Two copies of an informed consent document, including the student consent, were attached to the parent letter. Students were to return one document to their cooperating instructor either their English teacher at Giffit Hill School or the agriculture teacher at West Liberty as instructed by the letter. Parents and students were also instructed to keep one of the documents for their records. By returning the consent form with parent and students signatures, both parties were agreeing to participate in the study. Students were reminded by the cooperating teachers to return the consent forms to the school prior to February 9, 2015.

During the week of February 9, 2015, the pretest instrument was distributed to pen pal students in the designated EARTH course at Giffit Hills School and agriculture class at West Liberty. This time period extended from February 9 to February 11, depending upon the pre-arranged class schedule for each participating grade and classroom. The pretest was distributed to participants by the principal investigator at GHS and the agriculture teacher at WL via Qualtrics Survey Software on the computer. Students were able to make up the pretest any day between February 9 and February 11. A total of 26 7<sup>th</sup> and 8<sup>th</sup> grade students were enrolled at GHS and 13 8<sup>th</sup> grade students were enrolled in the fourth quarter of the exploratory agriculture class for this study. A total of 37 students participated in the pretest for a total response rate of 95%.

The second part of the baseline data collected from this study were the *I Grow Culture Pen Pal Program* activities and lessons scheduled over the course of ten weeks beginning

February 11 through April 8, 2015. Over the course of the study, four lessons and projects were chronologically organized to build from each other to create the *I Grow Culture Pen Pal Program* curriculum. The pen pal curriculum lesson (Appendix B) are; Garden Suitcase, Garden Email, Virtual Garden Tour, and I Grow Culture Poster. Table 3.1 displays the schedule of lessons and week the activity was focused. Each lesson were to take about two to three weeks to complete, however, room for flexibility was available.

Table 3.1  
*Tentative time line for I Grow Culture Pen Pal Program projects*

Month	Date	Week	Lessons/Activities	
			WL	GHS
February	2 <sup>nd</sup> – 6 <sup>th</sup>	1	Distribute Consent	Distribute Consent
	9 <sup>th</sup> - 13 <sup>th</sup>	2	Pretest/Garden Suitcase	Pretest/Garden Suitcase
	16 <sup>th</sup> – 20 <sup>th</sup>	3	Garden Suitcase	Garden Suitcase
	23 <sup>rd</sup> – 27 <sup>th</sup>	4	Garden Email	Garden Email
March	2 <sup>nd</sup> – 6 <sup>th</sup>	5	Garden Email	Garden Email
	9 <sup>th</sup> – 13 <sup>th</sup>	6	Virtual Garden Tour	Virtual Garden Tour
	16 <sup>th</sup> – 20 <sup>th</sup>	7	Virtual Garden Tour	Virtual Garden Tour
	23 <sup>rd</sup> – 27 <sup>th</sup>	8	Virtual Garden Tour	I Grow Culture Poster
March/April	30 <sup>th</sup> – 3 <sup>rd</sup>	9	I Grow Culture Poster	Spring Break
April	6 <sup>th</sup> -10 <sup>th</sup>	10	I Grow Culture	I Grow Culture
			Poster/Posttest	Poster/Posttest

Spring 2015

Data collected from the student's assignments during EARTH and English class for GHS 7<sup>th</sup> and 8<sup>th</sup> grade students and the WL 8<sup>th</sup> grade students were gathered during their exploratory agriculture class. Each grade met twice a week for a 50 minute class period. The 8<sup>th</sup> grade at GHS participated in the pen pal program on Tuesday mornings from 8:15AM to 9:05 AM during their English period and Fridays from 11:00 AM to 11:50 AM during their EARTH class period. Additionally, the 7<sup>th</sup> grade at GHS participated during their English course on Tuesday afternoons from 12:35 PM to 1:25 PM and Wednesday during the same time for their EARTH

course. At WL, the 8<sup>th</sup> grade students were in the agriculture class on Tuesday and Thursday mornings from 8:10 AM to 9:00 AM.

Graded assignments were collected as data from the participating pen pal GHS and WL students from each lesson throughout the curriculum. The Garden Suitcase lesson required the Invasive Species Worksheet instrument, which was given some class time to work on but turned in as homework during the week of February 16, 2015. The GHS students sent the first email on February 27 and the WL students sent a response on March 6 during the Garden Email lessons. Both schools began creating their garden video during the week of March 9. The GHS students were able to complete and send their video to WL on March 23, however, the WL students sent their video to GHS on April 6 but were not viewed until April 7 because GHS had spring break and their poster was already made. Both schools completed and sent their I Grow Culture Poster assignments via email on April 7.

Observations over the course of the pen pal program lessons were collected through video recording. Each lesson was recorded for the principal investigator purposes to observe and measure both classrooms student engagement and questions. No video recording was taken during the control group course.

After the completion of the pen pal curriculum, the posttest instrument was distributed to the pen pal participants in the designated EARTH and agriculture classrooms at GHS and WL. Again, the principal investigator at GHS and agriculture teacher at WL distributed the posttest on a computer via Qualtrics Survey Software. Students were able to make up the pretest any day between April 7 and April 10. A total of 26 7<sup>th</sup> and 8<sup>th</sup> grade students were enrolled at GHS and 13 8<sup>th</sup> grade students were enrolled in the fourth quinmester of the exploratory agriculture class for this study. A total of 37 students participated in the posttest for a total response rate of 95%.



The following week, the fifth quinmester of West Liberty 8<sup>th</sup> grade class (Control) who did not participate in the pen pal activities, were given the same consent form during the week of April 13, 2015 to sign and take home for parents' to consent. Following the same instructions according to the consent form, parents and students are to keep one copy for their records and return the other to the agriculture teacher by April 20, 2015.

The fifth quinmester of West Liberty 8<sup>th</sup> grade class (Control) participated in the pretest instrument during the week of April 13, 2015. The agriculture teacher at WL via Qualtrics Survey Software on the computer distributed the pretest to the control participants. Students were able to make up the pretest any day between April 13 and April 16. Out of 18 8<sup>th</sup> grade students who were enrolled in the fifth quarter exploratory agriculture class from WL, 18 participated in the pretest for a total response rate of 100%.

The control WL 8<sup>th</sup> grade students did not take part in any pen pal activity during their time in the exploratory agriculture course. At the end of their course, they were given the posttest instrument during the week of May 25, 2015. Again, the cooperating agriculture teacher at WL distributed the posttest on a computer via Qualtrics Survey Software. Students were able to make up the posttest any day between May 25 and May 28. A total of 18 8<sup>th</sup> grade students who were enrolled in the fifth quinmester exploratory agriculture class from WL, 18 participated in the posttest for a total response rate of 100%.

### **Data Analysis**

The purpose of this study involving the *I Grow Culture Pen Pal Program* was to evaluate how well middle school students communicate local gardening, science and sustainability. The specific objectives were to:

1. Determine if there is an increase in knowledge as a result of the program;
2. Determine the extent to which students increase their confidence related to their understanding of garden and sustainability;
3. Determine the extent to which students can identify at least five artifacts that represent their pal's garden and culture; and
4. Determine the extent to which students could design and demonstrate a script of a garden tour.

The data collected from the pre- and posttest, classroom observations and student assignments over the course of the *I Grow Culture Pen Pal Program* helped achieve the objectives listed above. The data gathered were coded and entered into Excel spreadsheets and imported into SPSS (version 19 for Windows) to analyze using descriptive statistics including mean, standard deviation, frequency, *t*-tests, ANOVA and effect size.

To ensure confidentiality and to link the student pretest with the posttest as well as student graded assignments with the individual student, a coding system was developed. The system did not include student's projects that were loaded into an Excel spreadsheet for analysis. The use of a coding system allowed for transition from instrument responses between student assignments, without identifying the participant.

Data to support all objectives was gathered by the pre- and posttest asking about ability where students reported their level of confidence for understanding and communicating

gardening tasks. Specifically, for objectives one and two student's assignments and engagement in the classroom reflected their understanding of gardening and culture through questions they ask during lessons and how well they follow assignment rubrics. These objectives and the pre- and posttest questions were analyzed in SPSS using descriptive statistics, including mean, standard deviation and frequency tables. The video observations and student assignments collected were also analyzed and coded for comparisons means of GHS and WL communication ability.

The questions from each section of the pre- and posttest, excluding general demographic characteristics, were compared through means of paired *t*-test from each student. One Way-ANOVA was also performed to compare pre- and posttest knowledge test scores to further justify significance of the test, followed by mean separation to compare each group of student's significant posttest results through the means of the Post hoc Tukey Honestly Significance Difference (HSD) test. The means of questions reported by student pretest to posttest were compared at an alpha level of 0.05. Also taken into consideration the group's sizes of variance are unequal therefore the harmonic mean of the group sizes is used causing a type I error and levels are not guaranteed. Although these comparisons were made, caution should be taken in interpreting the results of this study. The relatively low number of participants limits the generalizations that can be made about this data.

### **Assumptions and Limitations**

The major assumption of this study was that the scheduled classroom time and communication technologies ability during the time of procedures. By using the spring 2015 class schedule at both schools, it was assumed and scheduled that all students would have enough time to complete each lesson and activity also turning in all required communication

efforts to each pal in a timely manner. However, school delays (e.g. snow days, assemblies, etc.) and student absence (e.g. absent due to family emergency, feeling ill, etc.) during lessons occurred during the duration of the study.

The primary limitation to this study was the numbers of participants from GHS as a small, private school where enrollment varies annually. However, the WL school is predominantly large compared to GHS, but was only allowed to use a section of the 8<sup>th</sup> grade class. The pre- and posttest and assignments were also limiting to some students but not others, based on the amount of time students have known about or been involved with the school garden. The pre- and posttest asked students to report their knowledge of gardening and confidence in communication gardening skills but also was scaffolded into learning the garden during lessons and growing a relationship. The lesson activities' primary purpose is to communicate garden information but some students may not have ever been in the school garden or one of their own. Because of the timing of the study, WL was not able to work in the garden environment due to the winter weather and undesirable growing conditions but had access to their greenhouse. Additionally, GHS could work in their garden without difficulty and had an advantage of harvestable items.

The data collected from this study is generalizable to these two populations because of the specificity of the site, population, and current application of garden activities. However, the lessons and activities regarding gardening knowledge could be replicated in similar situations, such as other middle school locations with access to a school garden.

## CHAPTER IV. RESULTS

The purpose of this study involving the *I Grow Culture Pen Pal Program* was to evaluate middle school student's increase in knowledge and confidence related to communicating local gardening, cultural understanding and sustainability. This mixed method case study focused on two very different schools and included Giff Hill School (GHS) on St. John, USVI and West Liberty (WL) Middle School, Iowa. Quasi-experimental and qualitative data were collected and analyzed using pre- and posttest, student artifacts, and classroom observations.

In this chapter, results were organized and reported on four objectives of the *I Grow Culture Pen Pal Program*:

1. Determine if there is an increase in knowledge as a result of the program;
2. Determine the extent to which students increase their confidence related to their understanding of garden and sustainability;
3. Determine the extent to which students can identify at least five artifacts that represent their pal's garden and culture; and
4. Determine the extent to which students could design and demonstrate a script of a garden tour.

### **Objective 1: Determine if there is an increase in knowledge as a result of the program.**

Students who participated in the *I Grow Culture Pen Pal Program* were limited to social and physical interactions because of distance. The primary purpose for the *I Grow Culture Pen Pal Program* is for GHS and WL students to learn and communicate with each other through multiple techniques in a limited amount of time. The students had 9 weeks to send artifacts through mail, write an email, create a video and collaborate on a poster. For this objective,

student's pre and posttest provide evidence of knowledge gain from the participating pen pal groups (GHS and WL) as well as no knowledge gain from Control group. Classroom observations were also taken referring to questions used in the pre and posttest.

### Pre/Posttest Results

Approximately, half of GHS/WL participants ( $n = 20$ , 54%) reported having a garden at home before the start of the *I Grow Culture Pen Pal Program* (Table 4.1). More than half (62%) of participants agreed that they could start a garden on their own before the pen pal program. After the pen pal program, all WL participants and nearly three-fourths of GHS (74%) agreed that they could start their own garden. At both schools, 70% of all participants found their school garden important before the program. When asked about the amount of time spent in their school garden each week before the pen pal program, most GHS students (71%,  $n = 17$ ) reported spending less than 2 hours in their school garden per week and all students at WL (100%,  $n = 13$ ) identified having no time spent in their school garden during the week.

Table 4.1

*Pretest results of student's agreement to garden knowledge statements.*

Statement	WL*		GHS*		Total	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Before the program						
I have a garden at home	8	62	12	50	20	54
I could start a garden on my own	9	69	14	58	23	62
After the program						
I have a garden at home	7	54	15	63	22	59
I could start a garden on my own	13	100	17	74	30	81

\*Includes groups who participated in the *I Grow Culture Pen Pal Program*

Pre- and post-tests were used to measure participants' increase in knowledge as a result of the program. Participants were asked 12 multiple choice questions and 9 short answer questions about what they knew regarding gardening. The test was scored (1 point for each correct multiple choice question and up to 3 points for each correct short answer question) for a total of 36 possible points. Mean pretest scores for all groups were below 50%.

SPSS was used to calculate paired *t*-tests to compare pre and post-test means. Table 4.2 shows that the mean posttest for GHS students is 18.88, WL students were 20.54, and Control students was 11.80. There were significant differences ( $p < .05$ ) between pre and post-test scores for both GHS and WL. However, there were no statistically differences in test scores for the Control group. Figure 1 shows a bar chart of mean scores between groups pre- and posttest representing the increase knowledge GHS and WL experienced as a result of the pen pal intervention and almost no growth from the Control group.

Table 4.2  
*Total mean pre- and posttest scores of students' knowledge in the I Grow Culture Pen Pal Program.*

Group	Students (no.)	Mean Score**	SD	<i>df</i>	<i>t</i>	<i>p</i> (two-tailed)
Giffit Hill School						
Pretest	24	14.88	6.15	23	-4.834	.000*
Posttest	24	18.88	5.50			
West Liberty						
Pretest	13	11.77	4.42	12	-5.754	.000*
Posttest	13	20.54	6.44			
Control						
Pretest	18	11.73	4.80	14	-.066	.948
Posttest	18	11.80	5.85			

\*Paired *t* test statistically significant at  $p = 0.05$

\*\*Test score out of 36 total points

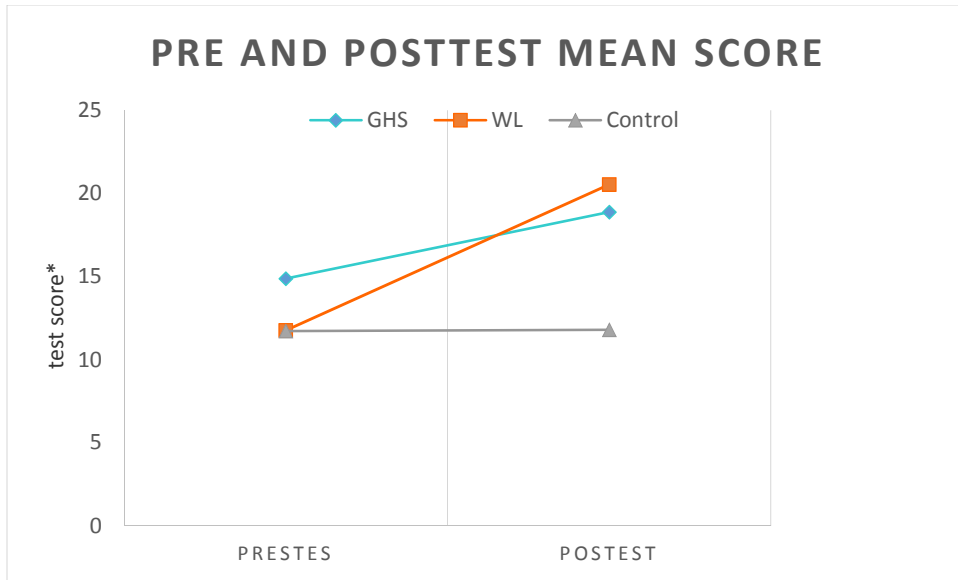


Figure 1. Pre- and posttest average scores of knowledge gained between the GHS, WL and Control groups over the course of the *I Grow Culture Pen Pal Program* (\*Total score out of 36 points).

A statistically significant difference was found among the three groups of students (GHS, WL, and Control) on the posttest,  $F(2, 52) = 12.70, p = .000$ . This allowed the use of one way ANOVA to be performed to compare nominal level or categorical three groups (GHS, WL, and Control) to the dependent test (pre/posttest). To run this analysis, the data meets three assumptions of ANOVA; (1) the value of the groups of students scores do not relate to each other, (2) variances of the pre/posttest are equal across groups according to the Levene Test (Table 4.3), and (3) the pre/posttest are normally distributed (mean is continuous). The results of the One-way ANOVA analysis in Table 4.4 shows the between groups difference from posttest is significant ( $p < 0.05$ ) but the pretest is not significant between the groups of students ( $p > 0.05$ ).



Table 4.3

*Test of Homogeneity of Variances of total pre- and posttest for all three groups.*

	Levene Statistic	df1	df2	Sig.
Pretest	1.392	2	52	.258
Posttest	.390	2	52	.679

\*Statistically significant at  $p = 0.05$

Table 4.4

*One-way analysis of variance summary table comparing groups of students from total pre- and posttest.*

Test	df	SS	MS	F	p
<b>Pretest</b>					
Between groups	2	154.05	77.03	2.68	.078
Within Groups	52	1494.93	28.75		
Total	54	1648.98			
<b>Posttest</b>					
Between groups	2	867.28	433.64	12.70	.000*
Within Groups	52	1445.63	34.15		
Total	54	2642.91			

\*One-way ANOVA test statistically significant at  $p = 0.05$

A mean separation was conducted to prove the Control group is significantly different than both WL and GHS. The reason for a mean separation is to compare the three groups of students (GHS, WL, and Control) to the between group significant posttest found in Table 4.4. The posttest was the only between group difference that was significant ( $p < 0.05$ ) and the Levene's test of variance (Table 4.3) are assumed equal therefore the Post hoc Tukey HSD Test was performed to compare separate means between the students groups. Table 4.5 identifies that the Control group mean is significantly different ( $p < 0.05$ ) compared to either WL or GHS. Additionally, Table 4.6 shows that no groups are listed in the same subset as the Control, therefore, the Control students are significantly different from both GHS and WL students. However, GHS students are not different in comparisons to the posttest from WL students

because they are listed in the same subset. The results provide further evidence that knowledge was gained for the WL and GHS groups who participated in the *I Grow Culture Pen Pal Program*.

Table 4.5  
*Multiple comparisons of the Post hoc Tukey HSD Test for three group's posttest results.*

Group(1)	Group(2)	Mean Difference	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Control	WL	-9.42735	2.12690	.000*	-14.5587	-4.2960
Control	GHS	-7.76389	1.82204	.000*	-12.1597	-3.3680
WL	GHS	1.66346	2.01233	.688	-3.1915	6.5184

\* The mean difference is significant at the 0.05 level.

Table 4.6  
*Homogeneous Subsets of Tukey HSD Test mean separation of three student groups posttest*

Group	n	Subset for alpha = 0.05	
		1	2
Control	18	11.1111	
GHS	24		18.8750
WL	13		20.5385
Sig.		1.000	.683

Means for groups in homogeneous subsets are displayed.

More specifically in the pre- and posttest, participants were asked 12 questions related to their knowledge of common gardening practices at both WL and GHS. Each correct question was worth one point and a total of 12 points were possible. Multiple paired *t*-tests were conducted to compare pre- and posttest basic garden practices knowledge according to the objectives of the pen pal program (Table 4.7). There were no statistically significant ( $p > .05$ ) changes in pre- and post-test knowledge scores for any of the groups.

Table 4.7

*Analysis of the 12 multiple choice garden knowledge question mean score of three groups pre- and posttest results from the I Grow Culture Pen Pal Program.*

Group	Students (no.)	Mean Score**	SD	df	<i>t</i>	<i>p</i> (two-tailed)
Giff Hill School						
Pretest	24	8.08	2.36	23	-1.689	.105
Posttest	24	8.67	1.97			
West Liberty						
Pretest	13	7.00	1.68	12	-.656	.524
Posttest	13	7.46	2.15			
Control						
Pretest	18	6.39	2.09	17	-.205	.840
Posttest	18	6.50	2.33			

\*Paired *t* test statistically significant at  $p = 0.05$

\*\* Test scores out of 12 total points

Also in the pre- and posttest, participants were asked nine short answer questions focused on garden explanations and vocabulary. Each correct short answer was worth three points and a total of 24 points were possible. A grading rubric was developed and used to score each question which allowed for partial credit. The mean pre-test scores were low at first (28% = WL and 20% = GHS) and increased to just less than 50% with the post-test. Paired *t* test using SPSS software compare pre- and posttest results of the three groups short answer results (Table 4.8). There were statistically significant differences between pre- and post-test for both WL and GHS. The Control group, who did not participate in the pen pal program, had no statistically significant difference at the specified level ( $p > .05$ ) and actually decreased slightly in their garden knowledge from their pre- posttest mean score range.

Table 4.8  
*Analysis of the mean pre- and posttest scores of students' short answer knowledge score in the I Grow Culture Pen Pal Program.*

Group	Students (no.)	Mean Score**	SD	df	<i>t</i>	<i>P</i> (two-tailed)
Giff Hill School						
Pretest	24	6.79	4.24	23	-5.439	.000*
Posttest	24	10.21	3.97			
West Liberty						
Pretest	13	4.77	4.42	12	-5.983	.000*
Posttest	13	13.08	4.61			
Control						
Pretest	18	4.94	3.59	17	-.561	.582
Posttest	18	4.61	4.05			

\*Paired *t* test statistically significant at  $P = 0.05$

\*\* Test scores out of 24 total points

### Artifacts and Observations

Each lesson of the *I Grow Culture Pen Pal Program* came with a graded assignment. The Garden Suitcase lesson had an Invasive Species Worksheet assigned as homework for a total of 10 points. The introduction email each student wrote to each other was worth 15 points and assigned during the Garden Email lesson. Students wrote and directed their group section of the Virtual Garden Tour for a total of 25 points. Combined, these assignments were worth 25 points summing up what they learned from the pal program. This resulted in the grand total of 75 points for each student grade. Each group's average grade on assignments in the pen pal program is organized in Table 4.9. Both WL and GHS students who participated in the pen pal program averaged a 90% grade. The lowest average grade assignment for GHS was the group video work (81%) and the WL lowest average assignment was the poster (76%).

Table 4.9

*Average individual assignments (invasive species worksheet, introduction email, video script, and poster) and overall grade for the I Grow Culture Pen Pal Program curriculum.*

Group	N	Invasive		Email		Video		Poster		Mean Total*		%
Total Pts		10	SD	15	SD	25	SD	25	SD	75	SD	100
GHS	24	9.5	0.8	13.8	1.4	22.9	2.1	23.4	1.7	69.6	3.3	92.8
WL	13	9.8	0.6	13.2	1.9	23	1.9	21.6	2.5	67.6	2.2	90.2
Contr.	18	-	-	-	-	-	-	-	-	-	-	-

\*Complete grade score out of 75 total points

### **Garden Suitcase**

One of the first projects of the program was the Garden Suitcase lesson. As part of the lesson, participants were asked to define local foods. Student were asked to do this as a think, pair and share where they; individually write a definition, discuss the definition with a partner and, share and collaborate as a class to develop a working definition of local foods. Qualitative data were collected using observations of this lesson to determine how students define local foods. Initially, students mostly identified specific types of food such as mango (GHS) and corn (WL) as local food. Discussions at GHS lead participants to decide that ‘Fried Chicken’ was considered local food since it is a local delicacy. Students at WL generally identified local food from their home garden. As part of the lesson, participants were provided the correct definition of local food which has been defined by the U.S. Department of Agriculture as food grown in a 100-mile radius (Martinex, et al., 2010). GHS participants struggled to accept this definition because there were only a few islands within a 100-mile radius of St. John. As a result of that discussion, GHS participants added island fishing as another local food.

Participants were asked to write in their own words the definition of local food in the pre-and posttest. Before the pen pal program began, 44% ( $n = 16$ ) of GHS and WL participants defined local food as a form of tasty food. The students from all groups ( $n= 18$ , 49%) also

defined that local food is grown in town/area around them. The GHS students before the pen pal program recognized examples of local food, such as sugar cane and mango, fresh food and food that is healthy as their definition of local food. The WL students pretest results defined local food in themes of delicious and grown in their state. After the program, both WL and GHS students were more specific and precise. Over half of the participating pen pal students were able to give a complete definition of local food on the posttest. The Control students pretest defined themes in their own words of local food as food grown near town, healthy as well as many vegetable examples. There was not a distinct difference between the Control students pre- and posttest responses other than less elaborate explanations on the posttest. For example, one student's pretest definition was "local food is the food grown in your area and the crops that are harvested in the area," this same student stated in the posttest definition, "food around us."

### **Garden Email**

Students were observed during their first letter writing exercise for the garden email lesson. Students at GHS and WL were assigned to write an introduction letter to their pal whom they did not know. While writing this letter, students asked many questions about the top three food crops from their garden. Observations from the GHS students' discussion in class noted their top three crops as basil, bok choy and lettuce. Additionally, WL discussed in class their top crops as Roma Tomato, Bell Pepper and Jalapenos.

At the end of the program, participants were asked to identify the top three food crops they produce from their school garden in the posttest short answer questions. Out of the 24 GHS student responses in the short answer food crop examples question; 11 identified basil, 10 identified lettuce and 6 identified bok choy. No GHS students identified all three food crops (basil, bok choy and lettuce) together from their school garden. Sufficiently, at WL only one

student identify tomatoes, peppers and jalapenos as their school gardens top three food crop. Out of the 13 WL student responses about the top three food crop from their school garden; 12 identified tomato, 8 identified pepper and 3 identified jalapenos. Only one student from the WL group did not state a tomato as one of the top three food crops in their school garden. The Control group had 16 student responses to the short answer question and no student stated jalapeno as the top producing food crop in their school garden. The Control group had 13 students state tomato and 8 students state pepper as one of the top three food crops from the school garden.

### **Virtual Garden Tour**

The Virtual Garden Tour lesson allowed the students to work in the garden by creating a script and videotape a tour to showcase their garden. Students were separated into groups and assigned to make a script about a section of their school garden. During this lesson, student were allowed to ask questions, check out the garden space, and make plans for their assigned parts of the garden. Some of the WL students have never seen the school garden so the cooperating teacher answered a lot of questions for them but also gave them detailed information and points to talk about in their script. Observations during class work of the garden video showed chaos in WL. Since the students were not familiar with the facilities they were not comfortable explaining parts of the greenhouse. In addition, this program was coordinated in late winter or early spring, so WL were required to use a greenhouse as their garden focus. GHS students had the advantage of a harvestable garden and more ideal weather conditions for gardening. The GHS students also identified parts of the school not just the garden facility in the virtual garden video. Classroom observations recognized several themes of unengaged but also overconfident students. A few certain students did not want to write a script or felt that they did not need a

script to describe what they wanted to say in the video. Many low grades for the Virtual Garden Tour were reflected because of the lack of scripts.

The one of the most evident student engagement observations was while GHS students viewed WL garden tour video. While watching the garden tour video, there was complete silence from the class and when one student spoke up to make a comment, another student “shhhhed..” him to be quite. After the tour was watched, many students had questions regarding three themes: greenhouse functions, soil amenities, and invasive species. Discussion began with items they noticed during the video, for example, there were plants under artificial lights in the head house of the WL greenhouse. One GHS students asked, “Is natural light or fake light better?” The discussion continued to elaborate on the functions of the greenhouse such as how it is a controlled ideal environment for WL FFA chapter to start their plants to transplant into the garden. The focus then turned toward the garden beds at WL and if that soil is used for the potted plants in the greenhouse. Another student asked, “Doesn’t the soil have bugs in it?” leading to correcting their statement that they would not use soil in the greenhouse because it is supposed to be a controlled environment. “If a species or bug gets in the greenhouse, is that an invasive species?” is another question the GHS students contemplated during discussion in which they decided is in fact an invasive species because the bug was accidentally introduced to a new environment. Overall, the discussion after viewing their pals garden video tour never changed focusing of the WL greenhouse and garden facilities until class ended.

**Objective 2: Determine the extent to which students increase their confidence related to their understanding of garden and sustainability.**

Discussion of sustainability was another objective of this study. Several assignments (invasive species worksheet, garden email, and poster) as well as a portion related to the



definition and awareness of sustainable practices were in the pre and posttest. Increasing awareness of sustainability, specifically defining sustainability and recognizing sustainable practices in the garden, impacted their learning and confidence.

### **Pre/Posttest Confidence of Sustainability**

Students were asked to rate their confidence about sustainability on a Likert scale Extremely Confident (4), Confident (3), Somewhat Confidence (2), and Not Confident (1). By rating student's confidence using the Likert scale technique, participants are able to not only agree or disagree to their confidence but recognize their metacognitive ability in lower or higher level. Although this non-parametric technique of categorizing their confidence is common in survey social research, it will help this study identify participant's self-confidence ability to recognize sustainable gardening practice between the interventions of the pen pal program.

Paired *t* test using SPSS software was used to analyze the student three groups (Table 4.10). Both GHS and WL students showed significant increases in confidence of sustainable practices from the pre- to posttest. At GHS, seven out of ten statements were increased over time significantly ( $p < .05$ ). At WL, nine of the ten statements increased significantly ( $p < .05$ ). The exceptions at GHS, "explain compost to someone", "explain what a greenhouse is to someone", and "explain how to collect rain water to someone", were not found to be statistically different ( $p > .05$ ) between pre- and posttests. This may be because at GHS, collecting rainwater and composting are integral practice of everyday life and a greenhouse is highly uncommon on a tropical island. The statement, "explain how to collect rain water to someone," resulted of no significant difference between all three groups. This may be the result because collecting rainwater is not a priority in Iowa and a common procedure in the Virgin Islands.

There was no significant difference in pre/posttest for nine out of ten statements in the Control group. The one exception was a statistical decrease ( $p < .05$ ) in confidence in recognizing the need for sustainable gardening. This might be explained by the lack of introduction to sustainable gardening topic during regular agriculture class or they learned just enough in class to realize they did know enough.

Table 4.10

*Analysis of student mean confidence of sustainable recognition comparing pre- and posttest rating from Not Confident (1) to Extremely Confident (4).*

Statement	GHS N = 24					WL n = 13					Control n = 18				
	Pretest		Posttest		Sig.	Pretest		Posttest		Sig.	Pretest		Posttest		Sig.
	M	SD	M	SD		M	SD	M	SD		M	SD	M	SD	
Explain sustainable garden.	1.83	1.05	2.46	1.06	.022*	1.69	1.03	2.31	0.86	.025*	1.62	1.03	1.44	0.86	.430
Explain compost.	2.79	1.10	3.17	0.87	.107	2.00	1.00	2.85	0.90	.001*	2.17	1.04	2.22	0.94	.717
Explain what a greenhouse.	2.50	1.25	2.79	0.98	.317	2.31	0.86	3.15	0.99	.002*	2.83	0.92	2.67	0.97	.381
Explain a sustainable task of gardening.	1.75	1.15	2.50	1.14	.003*	1.77	0.93	2.46	0.78	.022*	1.78	1.06	1.50	0.77	.172
Explain a sustainable practice.	1.75	1.26	2.67	1.09	.003*	1.46	0.52	2.23	0.93	.006*	1.72	1.02	1.50	0.86	.260
Explain how to collect rainwater.	2.83	1.28	3.04	0.91	.534	2.08	0.95	2.62	0.96	.068	2.50	1.10	2.33	1.09	.269
Recognize sustainable garden.	2.08	1.28	2.75	0.94	.015*	1.54	0.78	2.08	0.76	.047*	1.89	1.08	1.67	1.03	.361
Recognize the need for sustainable garden.	2.04	1.37	2.54	0.98	.069*	1.69	0.75	2.38	1.04	.022*	1.94	1.06	1.50	0.86	.028*
Explain to someone an invasive species.	2.21	1.18	3.17	0.87	.001*	1.46	0.66	3.08	0.76	.000*	1.78	1.06	1.78	1.00	1.00
Identify what an invasive species is.	2.04	1.33	3.00	0.98	.008*	1.31	0.63	2.62	0.77	.000*	1.72	1.07	1.83	1.25	.631

\*Paired t test statistically significant at  $P = 0.05$

\*\*Likert scale: 1= Not Confident, 2= Somewhat Confident, 3= Confident, 4= Extremely Confident.

The word “sustainability” was not new vocabulary to most students who participated in the *I Grow Culture Pen Pal Program*. Before the program began, 21 GHS (91%) and 11 WL (81%) students agreed their school gardens practice sustainable gardening. This remained high throughout the program at both schools. However, the Control students mostly agreed that their garden practiced sustainable gardening at least by 80% after both pre- and posttest. Also, both GHS and Control group had at least one student who did not agree that their school garden was sustainable any more after the program. Furthermore, all three groups total pre- and posttest results did not change agreement of their school garden practices sustainable gardening by 87%.

Table 4.11

*Student’s from I Grow Culture Pen Pal Program pre and posttest results of their agreement toward sustainable gardening.*

Statement	WL		GHS		Control		Total*	
Pretest	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Does your school garden practice sustainable gardening?	11	81	21	91	16	88	48	87
Posttest	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Does your school garden practice sustainable gardening?	13	100	20	83	15	83	48	87

\*Total resulted the same

### **Pre/Posttest Confidence of Garden Knowledge**

Participants were asked to rate the confidence of their garden knowledge statements on the pre- and posttest following a Likert scale. The scale was as follows; (1) Not Confident, (2) Somewhat Confident, (3) Confident, and (4) Extremely Confident. By rating student’s confidence using the Likert scale technique, participants are able to not only agree or disagree to their confidence but recognize their metacognitive ability in lower or higher categories. There is

not an odd number to give a middle in-between rating and for this reason is to not allow a maybe answer. Although this non-parametric technique of categorizing their confidence is common in survey social research, it will help this study identify participant's ability to recognize gardening practice between the interventions of the pen pal program

Paired *t*-test analysis was conducted in SPSS to compare the three groups pre- and posttest results of student's confidence of garden knowledge. GHS students did not gain any statistical significant ( $p > .05$ ) confidence in their garden knowledge (Table 4.12). However, the WL student's confidence was statistical significance ( $p < .05$ ) for all six statements. The most statistically significant ( $p = .000$ ) statements were 'explain to someone what grows in your school garden' and 'explain to someone the right conditions for growing a garden to someone.' This might have occurred because the WL students were not previously introduced to their school garden and have found it more interesting than they anticipated. The Control group confidence of garden knowledge did not change significantly ( $p < .05$ ) in all but one statement. Their confidence decreased from pretest to posttest for this statement, 'know what tasks is needed to be done in garden'.

Table 4.12

*Analysis of student mean confidence of garden knowledge comparing pre- and posttest Likert scale.*

Statement	GHS n = 24					WL n = 13					WLCO n = 18				
	Pretest		Posttest			Pretest		Posttest			Pretest		Posttest		
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>Sig.</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>Sig.</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>Sig.</i>
Explain to someone about your school garden.	2.63	0.97	2.79	1.02	.461	1.62	0.96	2.69	0.75	.021*	2.15	0.59	2.17	0.86	1.000
Explain to someone what grows in your school garden	2.50	1.02	2.46	1.02	.664	1.54	0.78	2.85	0.55	.000*	2.20	0.77	2.11	0.90	.483
Know what tasks is needed to be done in garden.	2.58	0.88	2.79	0.93	.575	2.00	0.82	2.77	0.73	.022*	2.60	0.75	2.22	0.65	.002*
Use all the tools in a garden.	2.50	0.98	2.67	1.13	.866	1.92	0.86	2.46	0.88	.014*	2.25	0.91	2.22	0.88	1.000
Begin a plant from seed.	3.13	0.99	2.83	1.09	.284	2.31	0.85	3.00	0.71	.022*	2.90	0.91	2.67	0.77	.269
Explain to someone the right conditions for growing a garden to someone.	2.29	0.91	2.63	1.01	.228	1.54	0.66	2.62	0.65	.000*	2.25	0.85	2.17	0.86	.579

\*Paired *t* test statistically significant at  $P = 0.05$

\*\*Likert scale: 1= Not Confident, 2= Somewhat Confident, 3= Confident, 4= Extremely Confident.

## Observations of Confidence Statements

Observations over the course of the pen pal program positively reflect the outcome of the student's perspectives of confidence statements. Students were not afraid to discuss garden concerns because they had time to ask questions and double check with their peers and instructor that what they are doing is correct. For example, "The fertilizer goes through this pump and into the water house, right?" was a question a WL student asked her teacher before writing it on their script. One student made sure that the seedlings growing under the light in the head house of the greenhouse was going to be a flowering plant for potting or if it was going into the garden for eating.

In regards to the sustainable confidence, GHS students walked around the garden to point out the sustainable practices in the area during the Video Garden Tour lesson. Many questions arose from students such as "If the terrace garden is considered sustainable, why doesn't everyone do this to their backyard?" Another student asked "is that (grass) a cover crop?" which what the student pointed out was not a cover crop but a different type of grass was referred as a common cover crop. After the program, discussion with GHS students confidence of explaining their experience with terms from the pen pal program was evident from one student at GHS defining sustainable as "Having a complete equilibrium and if everything is sustainable then we would never run out of resources."

There were not a lot of questions from WL regarding sustainability but more about general gardening strategies and tools. This could be because they have not been in the garden before and they were more interested in understanding how everything works in the garden before concentrating on the subject of keeping the garden sustainable. However, one WL student commented during the invasive species discussion "did the emerald ash borer come here from

firewood?” which could be a connection they made to being more cautious of what they send as artifacts to their pal.

### **Observations of Understanding Sustainability**

The Merriam-Webster dictionary (2015) defines sustainable as the activity that does not destroy and able to continue for a long period of time. At the beginning of the program, a large percentage of students could not define sustainability. This was more apparent at WL with only three (23%) students able to define sustainability somewhat appropriately. Definitions of sustainability between the groups were coded into themes. There were four distinct themes for sustainable by WL students; (1) constant, (2) fresh, (3) ownership and (4) do not know. The GHS students were more able initially by seven (29%) students to appropriately defining sustainable. There were three distinct themes at GHS: (1) longevity, (2) specific practices (good methods, compost, etc.), and (3) do not know. At the end of the program, 13 GHS students (54%) were able to elaborate more about their definition of sustainability such as; lifetime projects, maintain forever, keep garden/plants going forever and cared for. Over half the WL student (n=7, 54%) were able to elaborate about the definition of sustainable after the program; (1) maintaining, (2) produce food forever, (3) knowing how to take care of something, and (4) keep things living without change. The Control students defined sustainability similarly at the pretest and with no change after at the posttest. Themes delivered from Control group pre- and posttest were; (1) steady rate, (2) taking good care of things, (3) something that can live on its own and (4) many stated they do not know.

### **Examples of Sustainable Practices**

Students were asked to give two examples of sustainable gardening on the pre- and posttest. There were four themes from GHS pretest; (1) watering, (2) compost, (3) specific areas



of garden (keyhole, terrace, etc.), and (4) do not know. After the pen pal program, the GHS student's examples were similar but added more depth such as soil health (fertilizer) and fence/nets to keep pests out. Only three GHS students did not give sufficient examples of sustainable gardening on the posttest. The WL students pretest results showed only one student with an acceptable answer of sustainable gardening example; fertilizing plants. The rest of the 12 WL students did not know or did not give an accurate example of sustainable gardening. After the pen pal program, the WL students were able to describe sustainable gardening examples and four themes emerged, such as; (1) compost, (2) recycling, (3) growing every year, and (4) do not know. However, all of the (n=13, 100%) WL students did not provide two complete examples of sustainable gardening for both pre/posttest and over half did not give a sufficient example.

In the pre/posttest for this study, students were asked to explain what makes their school garden unique. The overarching theme in all three groups pre/posttest is the food they grow, where the food goes, and the structure of the garden. The majority of GHS students identified the terrace, key-hole garden, and stability of their garden as a unique facet of their school garden. The WL students also recognized their greenhouse, student involvement and selling food to local restaurant as unique features of their school garden. Although the Control students did not get to share what they thought was unique about their school garden to a pal, the posttest statement from Control students distinguished student involvement and community outreach unique in their school garden.

**Objective 3: Determine the extent to which students can identify at least five artifacts that represent their pal's garden and culture.**

Over the course of the four lessons for the *I Grow Culture Pen Pal Program*, students were invited to stay connected with their pal in multiple ways and reflect on items given to each other. The Garden Suitcase lesson allowed students to submit an artifact to their pal's class that represents their garden and culture. The Garden Email was created with much anticipation from both schools to meet their pal and discuss certain artifacts sent. After introductions to each other, they were finally allowed to show off each other's garden through the Virtual Video Tour lesson recognizing artifact significance in the garden and represent culture. Finally, after receiving artifacts, letters and a video; the students created posters about their pal and garden, organizing their collaborated learning effort of shared artifacts.

**Garden Suitcase**

The objectives of the Garden Suitcase were to organize student ideas or concept about culture and their connection to the garden through a collection of artifacts. In Figure 4.1, the white board was used to organize the GHS student's ideas of garden and culture artifacts to include in the suitcase. The student reasoning's for picking their artifact after a brainstorming session are presented in Table 4.10. Students were also asked to reflect on if each artifact represents their culture, or garden, or both. Evidence of classroom discussion of original items not recognized by the class or switch category can be seen in Figure 2. The GHS students identified 13 (37%) culture, 20 (57%) garden, and 2 (6%) combination artifacts for their Garden Suitcase. Out of the 35 items identified by GHS students, 6 (17%) were not recognized as suitable artifacts for mailing restriction purposes.

WL students developed a more general idea of their garden and culture of Iowa rather than their own school garden. They organized garden ideas to include meat products and soybeans from farms in their area. This could have occurred because the WL students have not worked in their school garden yet and they were thinking of the common agriculture fields of the Iowa landscape. Out of the 19 items identify by WL, 12 (63%) are recognized as garden and 7 (37%) were culture. Table 4.13 identifies WL student's responses to the artifacts they will donate along with an explanation how it will fit in the garden suitcase.



Figure 2. GHS classroom white board of students T-table of garden, culture and both original suggested artifacts recognizing how the discussion was organized.

Table 4.13

*GHS and WL artifact discussed during class and reasoning for why they represent their garden or culture.*

Group	Artifact	Student Reasoning
		<i>Garden</i>
Giff Hill School	Seed (packet)*	An item they plant in the garden. Either mango, guava or passion fruit seed packet.
	Sugar Cane*	Grown in the garden. Needed to be dried.
	Tamarind Balls*	Local produced and sold from tamarinds. A sweet treat!
	Pictures of Garden*	Displaying the garden and what it looks like.
	Pomegranate	Grown in the garden but it is fresh.
	Jam (preservative)*	From a fruit grown in our garden. Either mango, guava or passion fruit jam.
	Tools*	To show what the garden tools are that they use. Trowel
	Basil leaf stamp	Stamp a basil leaf with paint to send what it looks like and that is grows in our garden.
	Banana Chips	Represent dried bananas that are a staple crop of the garden
	Peppers	Represent what they grow in the garden but can't be sent because it is fresh.
	Dried Mango	They grow mango in the garden and can ship it if it is dried.
	Picture of Eggplant	They grow a lot of eggplant in the garden.
	Passion Fruit	Grows in the garden but is fresh.
		<i>Culture</i>
	Petroglyphs*	Represent their history and the symbol of St. John. Postcard or picture.
	Fish Hooks	Do a lot of fishing on the island and is main source of local food.
	Wob-duyet*	Cultural dress of the U.S.V.I.
	Sand*	Represents the beach that the islands are known for and a favorite place to go.
	USVI National Flag*	Represents where they are from and the government.

Table 4.13 (Continued)

Shells*	Another representation of the beaches and ocean life the students enjoy going to.
Larimer*	Represents the stone of the Caribbean.
Jewelry	Represents what they wear and a common trade.
Picture of Barracuda*	Represents GHS Mascot
Guava Tart	Represents a cultural delicacy but won't make it in the mail.
Picture of Coral Reef*	Represents the island coral and how they want to protect its.
Rice*	Local staple food item. Not grown here but is easy to handle and is in many dishes.
Gooseberry juice	Represents the cultures gooseberry drink. Won't make it in the mail because it might spill.
Sea Glass*	Represents the beaches and found in many cultural crafts and jewelry.
Iguana Picture*	Represents the common road kill and animal that lurks the island. Is an invasive species too.
Annenberg Ruins picture*	Represents the preserved island history.
Coconut Bread	Represents a common dish but won't make it in the mail.
Jumbie picture	Represents the cultures spirits of the island and the islands Carnival celebrations.
Princess Tiara*	Represents the queens and princesses of the island that are showcased at Carnival or the AgFair of the USVI.
Chicken picture	Represent the free range chickens around the island and also a favorite cultural dish; fried chicken.
	<i>Both</i>
Calabash Purse	Calabash is a gourd that is grown in the garden and when its shell is hard enough, locals make purses out of them.
GHS polo*	Giff Hill School is the student's culture but also the garden is a part of the school.

Table 4.13 (Continued)

West Liberty	<i>Garden</i>
Apple Butter*	Made from the apples at a student's home garden. Preserve in jar.
Corn	Represents the landscape around Iowa. Can't send seed but may send picture.
Soybeans	Represents the landscape around Iowa. Can't send seed but may send picture.
Turkey products	Represents the local farms in their town. Maybe send it canned.
Ham	Represents the local pig farms in their town. Maybe send it canned.
Peppers	Represents what grows in their garden. Empty seed packet without the seeds.
Tomatoes	Represents what grows in their garden. Empty seed packet without the seeds.
Trowel*	Represents the tools in their garden. Small version to fit in suitcase box.
Soil	Important source of a garden. Might have to send a picture of the garden instead.
Fertilizer*	Represents the food for the garden.
Worms	Found in the garden soil. It would send better as a picture and not real worms.
Garden name Tags*	Helps identify what grows in their garden.
	<i>Culture</i>
Map of Iowa/WL	Shows where they are.
Iowa/Iowa State/Northern Iowa Universities*	Represents the instate college teams.
Iowa Flag	Represents Iowa.
Postcard	Represents a hello from Iowa.
FFA Badge	The FFA Chapter is large and a big part of their school culture.
WL Logo*	Represents the school's mascot
Sports gear*	Represents their competitive spirit.

\*Artifact actually sent.

Most, but not all of the artifacts, discussed in classroom observations were sent in some way or another. Students at GHS compiled a suitcase with 24 artifacts, the majority of which were pictures ( $n = 14$ , 58%). The WL students collected 28 artifacts with only two picture artifacts (7%). The following Figure 3 shows the pictures of mailed artifacts and Table 4.14 reports the actual artifacts that went into the suitcase along with the sister school response (garden or culture) to each item. Observations in the classroom collected student discussion of the artifacts category (garden or culture) they sought fit most appropriate for sent items. The GHS students recognized 14 (50%) garden, 10 (36%) culture, and 4 (14%) as both garden and culture representation from the WL. Out of the 24 items WL received, the students identified 18 (75%) as culture and 6 (25%) as garden artifacts from GHS.



Figure 3. GHS (left) and WL (right) artifact suitcase sent to each other through mail.

Table 4.14

*GHS and WL student's actual artifacts received by mail from their Garden Suitcase lesson. The student's responses during discussion in class to whether they thought they were garden or culture artifacts.*

Group	Artifact	Student Response
		<i>WL student response</i>
GHS	Sand in a vase*	Culture
	Tamarind Balls*	Garden
	Rice*	Garden
	Sea Glass*	Culture
	GHS Polo*	Culture
	Snorkel Mask	Culture
	Sea Shells*	Culture
	Drawing of Canel Bay	Culture
	Tamarind Fruit (dried)*	Garden
	Picture of USVI Flag*	Culture
	Picture of Petroglyphs*	Culture
	Picture of Wob-duyet*	Culture
	Picture of coral reef*	Culture
	Picture of Mongoose	Culture
	Picture of Iguana*	Culture
	Picture of Anneburg Ruins*	Culture
	Picture of Calabash purse*	Culture
	Picture of Barracuda*	Culture
	Picture of Larimer*	Culture
	Picture of Tierra*	Culture
	Picture of Conch*	Culture
	Picture of Mangos*	Garden
	Picture of school garden*	Garden
	Sugar packets*	Garden
	24 artifacts	
WL		<i>GHS student response</i>
	Hawkeye Stocking cap of Herky the Hawk	Culture
	2 West Liberty Baseball Hats*	Culture
	Iowa Hawkeye Football T-Shirt*	Culture
	3 Iowa Football Bowl Game Pins – 1982, 1988, & 1991.	Culture
	Herky the Mascot Mask*	Culture
	West Liberty High School Lanyard	Culture
	West Liberty Middle School ticket that says 'Respect, Responsibility & Cooperation'	Culture



*Table 4.14 (Continued)*

Seed Master Trowel for dispensing seeds*	Garden
John Deere Tractor	Garden/Culture
Bag of Fertilizer and Lime*	Garden
3 plastic bread toys*	Garden
2 plastic corn toys*	Garden
1 plastic pepper toy*	Garden
Seed packet of green beans	Garden
5 plant labels: Beefmaster, Big Boy, Early girl, Petunia & Vinca*	Garden
Apple Butter*	Garden/Culture
2 Iowa corn field landscape pictures with snow	Garden/Culture
28 artifacts	

\*Artifacts discussed in class.

### **Garden Email**

Observations during the Garden Email lesson recognized admiration when writing and receiving pen pal letters from majority of students at GHS and WL. Comments directed to the writing of the introduction letters were grammar concentrated and technique focused. For example, many students were asking each other how to spell words and if it was appropriate to send their phone number to their pal. No question or discussion were concentrated around the artifacts however, GHS students were anxious to know more about their pal that while they wrote their letters they also researched West Liberty Iowa on the internet. This helped students at GHS understand why they sent the John Deere toy tractor. One student at GHS made the comment after researching Iowa on the computer that, “There is a John Deere tractor company in Iowa”. Another potential connection was made after classroom discussion between the state rivalry between the University of Iowa and Iowa State University. The WL students sent many artifacts with Herky the Hawkeye from the University of Iowa which after further discussion with GHS, found out about the rivalry. Other observations made occurred once the letters were

sent and pal identity unveiled, the GHS students were surprised to find out that most of the WL students are Latino. Observations of classroom comments also reported a few student uninterested in pal, specifically when introducing pal written activities did not match the received pal's interest. For example, "I like (her) pal because they are reading the same series of books as me. Can we switch pals?" No pals were switched but instead were encouraged to continue to find more interest they share with their pal, specifically surrounding their artifacts.

### **Virtual Garden Tour**

While students were creating their scripts for the Virtual Garden Tour, they were diagnosing important features of their school garden and its distinctive qualities that recognize artifacts of garden and culture. GHS students have been active in their garden the whole academic year and could easily identify parts of the facilities and its attributes. No issues or confusion were depicted during the GHS classroom observations, however, some frustration and disorder occurred in the WL classroom. This was the first time the WL students had been in the greenhouse and operated in their school garden so they needed more assistance appraising the facilities and tool contributions. Accommodations to the student's garden facilities hindrances were met under the assistance of the cooperating teacher and FFA members under individual group support. The unique aspects of the WL garden facilities were reported through primary sources, such as, direct questions and responses from active gardening FFA members. When the video was complete, all students were able to comprehend the final product and gain from each other the garden facilities operation to yield their school garden. Although many of the students wanted to redo the video because they thought their cosmetics of that day was mediocre, they all agreed the video answered the important information of their school garden facilities accurately.

Artifacts utilized in the each other's video tour were sports equipment, watering cans, garden pots, fertilizer and some eating of the grown produce.

### **I Grow Culture Poster**

Most students from both schools were able to identify at least one produce the garden grows either written or acknowledge in some way on the poster assignment. Individually, 11 (45%) GHS students were able to identify three or more produce that is grown at WL. However, only 4 (17%) of the GHS student posters identified three or more produce from their own school garden. All 6 WL student posters identified three or more produce from GHS school garden but only half ( $n = 3$ ) of the posters acknowledged from their own garden. The produce the GHS students mentioned the most about WL garden are: Apples ( $n = 12$ ), Pepper ( $n = 11$ ), and Tomato's ( $n = 7$ ). The produce most commonly mentions on WL posters grown in GHS garden are: Mangos ( $n=6$ ), Potatoes ( $n=6$ ) and Broccoli ( $n=4$ ).

The I Grow Culture Posters done by the GHS and WL students not only was graded on identifying garden produce but also their pal's culture. Out of all 30 posters from both schools, 18 (60%) posters completed the objective to identify 5 artifacts related to their pal's garden and culture. Of the 24 individual poster from GHS, 14 (58%) and the 6 paired WL posters, 4 (67%) completed the objective by identifying 5 garden and culture artifacts.

### **Objective 4: Determine the extent to which students could design and demonstrate a script of a garden tour.**

Script practice occurred during the development of their Virtual Garden Tour video. In this lesson, 'each student will critique and learn three or more ways to make a garden tour video well,' stated in the Virtual Garden Tour video objectives. The GHS and WL students were instructed in class to watch part of the student produced school garden tour from Maine video in

the Virtual Garden Tour lesson plan. While watching this video, the GHS and WL students were to critique the video they saw. The only observations documented for this lesson were from the GHS classroom. The Maine video was selected because it represents a poorly made video tour from another middle school garden program. All GHS students agreed the Maine video tour was poorly made. Students were to write down what they liked and disliked in this video. The themes for the positive critique comments include; view of garden (n = 8, 33%), narrator enthusiasm (n = 5, 21%), informative (n = 5, 21%) or nothing stated (n = 6, 25%). Some of the more prevalent negative critique comments included; audio quality (n = 8, 33%), bad narrator (n = 7, 29%), video quality (n = 5, 21%), and nothing stated (n = 4, 17%). This in class discussion led to ideas on improving their videos such as better equipment, more practice, better timing for filming. A majority of students suggested using a tripod and not using a microphone. They also suggested the narrator practice more and memorize the script. The final recommendation to film during the summer instead of fall would improve the scene quality since the garden did not look the best according to the student's observations. This is because the Maine video tour were filmed in the fall which was the end of production season in the garden and everything was brown or dead.

The Virtual Garden Tour lesson required student groups to write a script that applies their video critique to create a better video. Students were assigned groups and designated areas to create scripts following a rubric. The garden tour video was worth 25 Points and 5 points of the completed group project was the script and voice. The majority of GHS student groups created a script but not to the best quality because they were hand written and hard to read for grading. Some scripts can be seen in both schools video to assist the narrator. Only one group of GHS students did not turn in a script for grade. The majority of scripts were handwritten final

submissions. Using the script rubric, grammar written on the scripts neglected one to two points on over half of all the scripts turned in. Observations from this session included that of chaos and acceptance of the final video. While GHS students did not like writing scripts many commented after watching the completed video that they sounded better when using a script. The WL students did not complain when writing a script however they needed more information because they were unfamiliar on greenhouse operation and needed a script. The scripts were helpful for the WL students as many students were using a script in their final video.

## CHAPTER V. DISCUSSION AND CONCLUSIONS

The purpose of this study involving the *I Grow Culture Pen Pal Program* was to evaluate middle school student's knowledge and confidence related to communicating local gardening, cultural understanding and sustainability. This study focused on two very different schools and included Giffit Hill School (GHS) on St. John, USVI and West Liberty (WL) Middle School, Iowa. Quantitative and qualitative data were collected and analyzed using pre- and posttest, student artifacts, and classroom observations. This chapter presents a discussion of the findings and conclusions of the data collected on the four objectives of the *I Grow Culture Pen Pal Program*:

5. Determine if there is an increase in knowledge as a result of the program;
6. Determine the extent to which students increase their confidence related to their understanding of garden and sustainability.
7. Determine the extent to which students can identify at least five artifacts that represent their pal's garden and culture; and
8. Determine the extent to which students could design and demonstrate a script of a garden tour.

### School Garden Demographics

The most common problem associated with school garden research is an insufficient number of participants (Phibbs and Relf, 2005). Another study conducted by Williams and Dixon (2013) examined 48 garden-based learning studies from 1990-2010 reporting 11 studies with a sample size less than 100, more than 50% had sample populations of less than 50. This problem was reflected in the study because both middle schools population (WL= 13, GHS= 24, &

Control= 18) represent a unique situation. There are some significant differences reported in this study, however, extreme caution should be taken when drawing conclusions to populations beyond this research. Williams and Dixon (2013) also reported that middle school garden-based learning populations are not the most studied but neither the least studied. This leaves an opportunity to integrate more middle school population studies using garden-based learning through the pen pal program

### **Increased Knowledge**

Student at WL and GHS who participated in the *I Grow Culture Pen Pal Program* did increase knowledge in both garden and sustainable gardening practices. Although WL students did not have a lot of prior knowledge of working in their school garden like GHS, it did not hinder their learning but in fact enhanced their garden knowledge. According to the pre and posttest results, paired *t* test results from Table 4.2 WL students gained scores were significant between tests. Not only are WL group results significant but it is evident in their mean scores from 11.77 (pre) to 20.54 (post) resulting in an 8.77 point average increase. This is a higher increase compared to that of GHS which was significant but their mean scores only increased by 4.00. The WL students mean score pretest was lower than GHS by 3.11 points and that is not surprising considering their lack of prior school garden knowledge. Also, WL students averaged a higher mean in the posttest compared to GHS by 1.66 points. To most students at WL, the school garden was a new and exciting concept. The new environment made an impression to their understanding but WL students were scaffold into learning about the garden and were evident while communicating to their pal the purpose of their garden.

Another distinction between groups is the fact that both the WL and Control group are from the same school and produced a similar mean pretest score (WL= 11.77, Control= 11.73).

This shows that the 8<sup>th</sup> grade students at West Liberty are on the same level of knowledge of their garden and sustainability before the program. This also represents a strength in internal validity due to the diffusing threat because both groups were from the same school but performed relatively the same on the pretest. Both WL and Control did not work in the garden prior to the intervention, which may also have resulted in a similar mean pretest score.

All three groups of students may have on average increased from their pretest but according to the Tukey HSD test (Table 4.3b), the WL and GHS group who participated in the pen pal program had a significant mean separation ( $p > .05$ ) from the Control group. According to this result, the students who participated in the pen pal program did gain knowledge because the Control group posttest did not meet the comparisons of the WL and GHS group. However, statistical significance means only that the appropriate degrees of freedom of the results are unlikely to be a function of chance.

Students at GHS and WL who participated in the pen pal program gained garden knowledge not only of their own garden but also what their pal's garden grows through artifacts and classroom discussion. To assess that they know what grows in their garden, the pre- and posttest short answer questions asked for students to name the top three food crops in their garden. GHS students were better able to provide acceptable examples before the program because they have already been in the garden, while the WL students were not exposed to the garden prior to the study. Both groups' posttest results showed necessary increase of knowing the plants grown in their own garden. This could have occurred because of evidence from the artifacts selected to send to their pals that represent their garden, what they wrote in their introduction email, and what they observed in their garden facilities while creating scripts. The classroom discussion of the top three produce that grows in their school garden occurred while



WL and GHS were writing their introduction email. Observations noted that the WL and GHS students were not all engaged during this discussion because they were focused on writing. However, majority recognized through discussion with peers their thoughts of the top three producing food. At least all students were able to identify on the pre/posttest one item that grows in their school garden. Knowledge of their own school garden depended on the student but may have been gained through multiple routes.

### **Vocabulary**

Vocabulary, such as local food, sustainability and invasive species were specific terms defined over the course of the pen pal program. When presented in the curriculum, students were encouraged to participate in class discussion over the vocabulary definitions. Discussion forums indicate positive behaviors when all students are participating (Jahng & Bullen, 2012) and student engagement proven to promote academic achievement (Reyes, et al., 2012). Based on classroom observations of discussions and pre/posttest, students who participated in the pen pal program gained vocabulary knowledge of local food, sustainability and invasive species. The pre- and posttest asked students to define these terms in short answer responses and also give at least one example of each. According to the results, over half of the pen pal program participants from WL and GHS were able to elaborate a completely on the definition of local food and sustainability after the program. Themes of their local food short answer responses at the end were more than just examples but the complete definition of food grown and produced in a 100-mile radius from their location. The classroom discussion of the local food definition created a more open mind to what is produced in their local food radius. Students from both schools were thinking outside of their garden produced food, for example, GHS students thought of fish from the ocean and WL students were thinking about the turkey farms outside of town.

Sustainability was also a short answer questions that resulted in more complete answers in pen pal participants posttest. Both GHS and WL pretest defining question of sustainable themed more specific detailed definitions that may not have meant sustainability at all and by the end their posttest resulted with a combined theme of maintain for a long period of time. They were also asked on the pre- and posttest to give at least two examples of sustainability that which both school recognized compost. The depth of the sustainability classroom discussion occurred for GHS while they explored their garden facility to identify sustainable features of their garden. As evidenced by the observations, many students asked questions to clarify items in the garden (i. e. cover crops and terracing) to further refine their understanding of sustainable practices. The WL students discussion of sustainability resulted in more of the functions of the garden rather than how to keep it sustainable. Based on this evidence, both GHS and WL were aware of their surroundings and classroom discussions demonstrated student engagement by the assessment of the posttest.

Evidence of students gained knowledge of the term invasive species and how to identify one was the result of the class discussion. During the pen pal program, the first lesson regarding the Garden Suitcase introduced the term invasive species along with class discussion of the term based on what they should not send their pal. After explaining the definition, discussion began with identifying certain invasive species in their own environment. For example GHS students responded with the lionfish that damages their coral reefs and WL students responded with the emerald ash borer, which is destroying local ash trees. The most evident knowledge gain moment occurred toward the end of the program after GHS students watched their pals garden tour video and discussed the WL soil and how controlled environments could potential introduce

invasive species. There was at least a seven-week span between these discussions and the student retention of invasive species identification was evident.

### **Curriculum Assignments**

The assignments graded over the course of the *I Grow Culture Pen Pal Program* were evidence that students passed the course with an average of over 90% according to Table 4.9. The course work demonstrated that majority of students followed instructions and rubric assessments to gain knowledge in pen pal assignments. Brown and others (2015) state that self-assessment tool of a rubric focuses on formative feedback for efficacy in promoting both academic achievement and self-regulated learning. Students were given back the rubric critique and possibly learn from what they did not do the first time assisting in their self-regulated learning. According to the results, GHS assignment with the lowest average grade was the Garden Video Tour lesson script (92%). This happened because observations results show that some students resisted writing a script which is a requirement of the rubric also, some scripts were hard to read because of the handwriting. This was evident in the standard deviation variance of 2.1 demonstrating that there was a spread between individual grades. WL assignment with the lowest average grade was the poster (86%) which could have happened because of the limited amount of time to create poster. Also, the poster was a partner assignment at WL which may have caused some disagreement between partner's attributions to the poster. The rubric for the poster assignment assessed their acknowledgement of five artifacts that represent both culture and garden of pal which majority did not have at least five. The spread of the standard deviation for this assignment average was 2.5 showing that a few posters did not follow rubric guidelines accurately.

## **Confidence**

Confidence is defined by Merriam-Webster (2015) dictionary as a feeling or belief that you can do something well or succeed at something. Jere Brophy (2010) acknowledges academic success attributes to student's attention to self-worth and appreciation for effort by confidence in their abilities (p. 51). Practicing skills and repeating processes creates a mastery learner who is confident in their ability to succeed. For this study, rating confidence in prior knowledge refers to a retrospective judgment of whether one's current understanding of the topic is correct (Bandura, 1997; Dole & Sinatra, 1998; Cordova, et al., 2014). Student's garden and sustainability knowledge and confidence related to sustainability is measured on the pre/posttest using a Likert type scale of statements concerning objectives over the course of the pen pal program.

### **Confidence Related to Sustainability**

According to the results, GHS and WL students who participated in the pen pal program increased their mean pre- and posttest scores of the ten sustainable confidence statements found on Table 4.7. This could have occurred because before the program the statement topics were not fresh in their mind until after the pen pal program. Not surprisingly, the control group who did not participated in the pen pal program, mean scores that decreased in majority of the pre/posttest sustainable confidence statements. The students at GHS pretest results showed that a majority of the statements mean score were in the 2 range (Somewhat Confident) before the program and after the program results show that all statement increased by 2.50 and up (Confident). The students at WL pretest was different compared to GHS because their pretest mean score resulted to be majority statements in the 1 range (Not Confident) to a majority increase of 2 (Somewhat Confident) on the posttest.

There are many factors that are likely to impact each groups learning and engagement that judge their confidence. Metacognitive judgment refers to an assessment a learner makes of their own performance before, after, or during a performance (Schrwa, 2009) which research has been shown to prove that posttest judgements tend to be more accurate than pretest performance judgment of knowledge (Nelson & Narens, 1994). However, on any confidence test, students still generally tend to be overconfident (Dunlosky & Lipko, 2007). Prior knowledge of the school garden is evident at GHS because of their immediate higher mean score compared to WL, which could be as a result of either overconfidence in their abilities or from participating in previous activities in their garden before the pen pal program. Another obstacle with student's confidence judgment is the student engagement during the program. According to Cordova and others (2014), the message and learner characteristics determine the level of engagement with a topic, which influences the likelihood of conceptual change. Therefore, students who were the most engaged in the pen pal program would have judged their confidence higher or more accurately on the statement topic thus better characterizing themselves.

In all three groups, the statement, "Explain how to collect rain water to someone," did not result in a significant difference between groups pre- and posttest. Collecting rainwater is an everyday lifestyle for students at GHS because of the limited island resource of fresh water. This could be the reason why the GHS mean pretest was already high at a 2.83 (Table 4.7) recognized as Somewhat Confident and followed with an increase on the posttest to just a little over a 3 to being Confident. Wolfgang (2013) suggests that this type of monadic self is experience that intentionally interpretable as regulatory knowledge. The WL students do not have to worry as much about collecting rainwater as resulted by a moderate increase between tests of Somewhat Confident. This could be explained by the fact that collecting rainwater is not a concern in Iowa

since ground water is abundant. Also, collecting rainwater could be many things to WL students since there is no direct procedure like GHS for rainwater use. The Control group decreased between pre- and posttest for this statement and the scores were in the high Somewhat Confident range. This could have occurred because the Control was never introduced to any form of collecting rainwater and that the student's posttest judgments tend to be more accurate (Nelson & Narens, 1994).

### **Garden Knowledge Confidence**

The garden knowledge confidence results found on Table 4.12 demonstrates similar results from group's sustainability statements. The GHS students pretest mean scores of the six statements are majority high 2 (Somewhat Confident) followed by similar mean scores on the posttest. The WL students Paired *t* tests were all significant with majority pretest of the six statements result of 1.50 (Not Confident) to an increase of high 2 (Somewhat Confident) demonstrating a greater increase of confidence for WL students compared to GHS. The garden knowledge statements remain lower than the sustainable confidence statements between tests. However, the garden knowledge confidence statements stay the same for the students at GHS who were already introduced to the garden. The WL students may have found the garden to be an interesting topic since it was a new concept for them that would explain why all garden statements were significant. New learning environments have been shown to increase interest and engagement for learners (Skinner, Chi & The Learning-Gardens Educational Assessment Group, 2012; Blair, 2009) furthermore increasing the level of engagement for the garden causing the likelihood of conceptual change that assisted in WL student's judge of confidence to increase between tests. Also, the garden is not new to the GHS students causing similar scores of confidence between tests.

Both confidence test of sustainability and garden knowledge reported similar results for the Control group. The majority confidence statements decreased from pretest to posttest, which could be explain by the idea that the Control group might not have been introduced to the garden at all. Sustainability statements before and after were similar in the 1 (Not Confident) rating however the gardening knowledge statements pretests were majority high 2 (Somewhat Confident) self-judge rating. This could be explained by the studies that show students who are generally overconfident on test and posttest are generally more accurately represented of metacognitive judgment (Nelson & Narens, 1994; Dunlosky & Lipko, 2007).

### **Garden Education Relationship**

One limiting factor to the two locations and their garden understanding is the seasons of the garden. GHS can produce year round whereas WL has a winter that halts production outdoors. During the time of the *I Grow Culture Pen Pal Program* curriculum, it was almost spring and the FFA chapter was beginning germination of seeds in their greenhouse. The GHS gardens were still running through their crop rotations in the gardens. It was interesting juxtaposition to have students preparing a garden in one location and another already harvesting crops. Although this was not a huge concern for communication purposes, it was a problem for the classroom work at WL. Because Iowa weather tends to be unpredictable, school delays and snow days occurred during the scheduled events of the pen pal program. This created a stressed environment and limited amount of time in the classroom to work on projects. There was approximately seven weather delays that caused disruption or class cancelation at WL and created a time crunch for all projects, more specifically the student's email. This external validity issue affected the WL causing more frustration in turning in assignments on time without

class work time but student self-management was evidence in experiment personality. The WL students were reluctant to work on their projects outside of class for a majority of the curriculum.

GHS students had an advantage of already well acquainted with their garden whereas WL students did not know about their garden until this project. This was evident in the high pretest results from GHS but also in their letters about their garden themed by GHS recognizing their garden at school and WL mostly talking about their own garden at home. Research conducted by Tobias (1994) reviews the similarity between prior knowledge is more engaging for a deeper cognitive processing and creates a more personal associative network when applied somewhere else in learning. GHS students applied their prior knowledge of working in the garden in the situation of explaining what they know to a pal. This was an advantage for GHS students yet WL interacted with the intervention in a more scaffold approach. Pea (2004) identifies scaffolding in the context of learning as proxy for any cultural practices associated with advancing performance, knowledge, and skills whether social, material, or reproducible patterns of interactivity. Educational psychology textbooks, such as Woolfolk (2013, p. 379), define scaffolding as “support of learning and problem solving.” In other words, resources or procedures to provide anything to allow students to grow in independence as a learner. WL students gained knowledge about their garden through a scaffolding approach because they did not have prior knowledge concerning the function of their school garden. The cooperating teacher gave them instructions to proceed to communicate about their school garden however they had no prior knowledge of their school garden. This began the scaffolding approach for WL students because they used the resources of FFA members, teachers and each other to grow as a learning about the school garden to apply in communication to their pal. Although WL felt more



frustration in their scaffold instruction, research has shown that scaffolding curriculum improves knowledge retention and higher-order thinking (Dresner, et. al., 2014).

### **Artifacts**

Rafaeli and Pratt (2006, p. 2) recognize artifacts as the most superficial layer of culture however, are complex and rich with multiple concepts. Artifacts mean different ideas to other people and were evident in this study. During the pen pal program, it was reflected that WL students have not been introduced to the school garden until their agriculture class. This was evident through the artifacts and letters the WL students sent to GHS. As seen in the results of student's discussion of what artifacts to send (Table 4.10), WL students discussed soybeans and meat products as a part of their garden. Also, what students actually sent in Table 4.11 is WL responses to what WL students thought was garden representation from the GHS artifacts were based on edible items. For example, rice were thought by WL to represent items that grow in GHS garden, however, in Table 4.13, GHS students sent rice because it is a staple food of their culture. This is an easy assumption due to the fact that rice could be grown in their garden but was not discussed further in the projects for WL to really know why it was in their garden suitcase. Another artifact the WL students interpreted as a part of their garden is a picture of the Iowa landscape. The students at GHS realized that this picture showed a flat landscape with snow and associated the picture as both garden and culture of WL. One artifact both schools share in common is the picture of their environment. GHS sent a picture of their school garden along with dried tamarind for the students to try as well as WL sent a landscape picture of snow with apple butter to taste. A few GHS students never tried apple butter before and quite a few came up for seconds.

In the WL letters, students wrote mostly where their produce from the garden goes more than what actually is grown and how it's grown in the garden. Although the students were mostly coached to say certain things based on their checklist, it appears that the WL students really did not know what kind of items grow in the garden. For example, one student from WL writes, "I have been in my school garden a couple of times and it was cool I guess." Many other students from WL spoke more about their own garden at home other than their school garden, for example, "At my house I have a garden where we grow tomatoes, blackberries, potatoes, cucumbers and jalapenos" was stated by a WL student. However, the GHS students do acknowledge that they have been in their school garden and some even say they do not like working in the garden. According to one GHS student letter, "The school garden is small and we go in it almost an hour a week and I personally don't really like it." This explains how frequent the GHS students are in the school garden. The selection bias of the experiment groups may have been influenced by their pals experience and knowledge in the garden. This effects internal validation positively because the intervention objective to increase knowledge of gardening is a result of the program

### **Culture Connection**

Students tend to be more engaged when instruction utilize culture pedagogy defined as incorporating local culture affiliations to lessons (Sleeter, 2012). During this intervention, students were encouraged to recognize their culture through artifacts and written words. They were also encouraged to link their culture to what they eat and what they find in the garden. Not only were they responsible for learning more about their own culture but also learning about their pals which has been sufficient in the literature to be true for pen pal programs (McCaffery, 2012; McMillion, 2009; Garcia, 2013; Lemkuhl, 2002). The most evident culture connection

resulted during the revealing of each other's artifacts. Observations showed that students at WL were excited to send items to their pal and continued to stay engaged after viewing items sent from their pal. Students from GHS displayed lacking interest in sending items to their pal until they received items from their pals in which they responded "they sent cooler artifacts than what we sent." This statement in itself represents that since this is a new culture they are being introduced too, GHS students find their artifacts from WL to be more unique than their own. Students from WL responded in a similar way recognizing the GHS snorkel and wanting to go to a beach like their pal does.

### **Communication Response**

The distribution between groups of middle school students was unequal in attempts to create an equal distribution of communication. A total of 11 (84%) students at WL struggled with writing two letters to not only one pal but an additional pal at GHS. Students at WL also volunteered to write an additional letter and was not forced to by the teacher, however, the students who did write an additional letter wrote both similar to each other. The benefit of having two pals for WL was the fact that they received two letters back as well. This did not hinder their communication but created more of a hassle for the WL students and a bit of equity for GHS. A few students responded with questions like, "Why do we have the same pal?" or "their pal has the same name as my pal," which caused some confusion. The students at GHS lost some interest in the pen pal program when they found out that some of them were sharing a pal and this could be caused by the lack of ownership to one person. Pen pals have been a form of companionship between one another allowing the development to confide to each other (McMillon, 2009). By sharing a pal, this could have broken that relationship with their pal because the pal had another person to write to as well.

The most effect communication between pals was during the Garden Video Tour. As a result of the student's reactions during filming their own video and observations after watching their pal's video reflected positive cognitive gain. Research suggest that film can potentially be a powerful and dramatic medium to aid student learning and visualizing international relations (Swimlear, 2013) which is the case for this intervention. Results are evident during the many engaging and on topic questions during discussion after viewing their pal's video. Student's previous knowledge of their pal's garden and culture assisted in encouraging more positive attitudes toward the film they received. The buildup of communication over the time period captured the essence of what the students could visually see and connect with their previous knowledge. Swimlear's (2013) research of utilizing film in the classroom was evident in this study because their film appeared to be effective in encouraging student interest and engagement and aided in conceptual and theoretical understanding of the international relation that occurred between the two schools.

Subject effect over the course of the study at WL became tired and frustrated, however, their performance on assignments was still positive. GHS student performed the same way but time management was not an issue and continued to get frustrated by the constant wait for WL student's responses. Both groups' attitudes were always surprised and anticipated when their pal's responses came in. Student were asking if they received anything from their pal outside of class and much joy was evident when they did received items from their pal. This resulted in a positive external validity over the course of the experiment witch factor for both students and teachers.

## Conclusions

The pen pal program intervention was successful for the two middle school sample populations and to those who participated gained garden and sustainable knowledge according to the pre- and posttest. There was a significant difference between groups who participated in the pen pal program and the control, based on the pre- and posttest which is evident not only based on paired  $t$  test scores but through ANOVA and the mean separation Tukey HSD test.

Considering WL students did not have prior knowledge of their school garden their scaffold learning resulted of a higher posttest mean score than that of GHS. Comparing middle school students between their knowledge gained through the intervention is individually interpreted but evident of this study resulted that it's not important to be already well acquainted with the school garden prior to the pen pal program. These results are based on two samples of middle school students in diverse locations and continued research for this intervention could prove a more descriptive knowledge gain between a different location of similar culture and locations.

The data collected from the pre- and posttest, classroom observation and students assignments generally appear consistent with the current literature of pen pal programs and school gardens. The limitations for this study were the relatively small number of participants, schedule conflicts through intervention and testing effect. Students were also exposed to internal and external validity threats, which were recognized throughout the study.

The data collected from the *I Grow Culture Pen Pal Program* intervention follows the objects set for this study. The conclusions drawn from the data are as follows.

1. Based on students pre- and posttest results of garden and sustainable knowledge, those who participated in the *I Grow Culture Pen Pal Program* gained garden and sustainable knowledge related to their location and their pals.

2. Prior knowledge of student's school garden is not needed to participate in the *I Grow Culture Pen Pal Program*.
3. Students who participate in the *I Grow Culture Pen Pal Program* can properly define vocabulary such as local food, invasive species and sustainability.
4. Students who participate in the *I Grow Culture Pen Pal Program* increased confidence to communicate garden practices to someone else.
5. Students who participating in the *I Grow Culture Pen Pal Program* increased confidence to communicate a sustainable gardening task to someone.
6. Artifacts represent more than one meaning to the individual and for this intervention, students recognized items to be more cultural than garden oriented because culture is more interesting to individuals than garden subjects depending on the individual, which is consistent with the artifact and culture in the classroom literature (Rafaeli and Pratt, 2006;).
7. Continue the research (Sleeter, 2012) of discussing culture in the classroom creating an engaging learning environment.
8. Positive experience viewing each other's video enhanced peer learning which from video communication research increases student's perceptions and engagement of visual interpretation (Swimlear, 2013).

## CHAPTER VI. SUMMARY, RECOMMENDATIONS, AND IMPLICATIONS

### Summary

The purpose of this study involving the *I Grow Culture Pen Pal Program* was to evaluate middle school student's increase in knowledge and confidence related to communication local gardening, cultural understanding and sustainability. The mixed method case study focused on two very different sample middle school populations; Giffit Hill School (GHS) on St. John, USVI and West Liberty (WL) Middle School, Iowa. Quasi-experimental and qualitative data were collected and analyzed using pre- and posttest, student artifacts and classroom observations. The instruments used for this study focused on middle school communication of gardening, culture and sustainability were to fulfill the following four objectives:

1. Determine if there is an increase in knowledge as a result of the program;
2. Determine the extent to which students increase their confidence related to their understanding of garden and sustainability;
3. Determine the extent to which students can identify at least five artifacts that represent their pal's garden and culture; and
4. Determine the extent to which students could design and demonstrate a script of a garden tour.

These objectives were specific to middle school students at GHS and WL. These participants were chosen because of their involvement in a school garden program designated for middle school students. The students who participated in the intervention were in the seventh and eighth grade.

Of the 55 eligible participants, 37 participated in the intervention called *I Grow Culture Pen Pal Program* and were allowed to communicate with a pal over the course of the nine week curriculum. Additionally, 18 participants were the control group who did not participate in the intervention but only given the pre- and posttest over a nine-week period to compare knowledge and confidence difference of the pen pal program. The findings of this study were reported four sections: knowledge gains, self-confidence, artifact description and video efficiency. Each section is organized from quantitative results to qualitative details based on the four objectives of the study. Descriptive statistics were provided for the first two sections, including means, standard deviations, range, frequencies, and percentages. Cronbach's alpha was also used to determine the reliability of the two main objectives, knowledge and confidence (.91 and .77 respectively). Inter-rater reliability was performed on instrument test rubric to rate the same behaviors and then correlate the proper rating. McHugh (2012) identifies the importance of the inter-rater reliability to measure the extent to which the data collector (rater) assigns the same score to the same variable (pre- and posttest). The correlation was measured over a six-month period between scoring. An inter-rater reliability score for the pretest was a 97% and the posttest resulted in a 92%. While analyzing the data, some significant differences were seen when comparing pre- and posttest scores with in groups in both knowledge and confidence portions. However, these results are interpreted with caution because the number of participants was small and is not generalizable to large, differentiated populations.

Students who participated in the *I Grow Culture Pen Pal Program* reported a distinct knowledge gain from before to after the program. Middle school students represented have the ability to better understand garden practice and sustainable techniques through communication with a pal from a different location. GHS students more initial understanding of garden and



sustainable knowledge before the program however WL gained the most understanding after the program. These students are able to identify local food, invasive species and sustainable practices in the garden compared to those who did not communicate to a pal. The most evident comparisons between groups that the intervention helped middle school students gain knowledge through the intervention was the fact that the Control group mean pre- and posttest score stayed the same. Observation related to the knowledge gain was evident based on student questions through the course of the intervention relating to their engagement of garden and sustainable knowledge.

From the confidence in communication of garden responses, students are confident in their ability to explain garden practices and sustainable meaning to another person of different location. Students at GHS had more confidence than WL at the beginning of the program to explain garden and sustainable practices. At the end of the program, all participants in the intervention increased confidence to communicate garden and sustainable practices. All participants are confident in identifying an invasive species. There was a majority of no significant differences of confidence from the Control group who did not participate in the intervention. The only noticeable difference between groups who participated in the intervention and the Control is that recognizing the need for sustainable gardening is not taught in an introductory middle school agriculture curriculum.

GHS students had an advantage over the WL students before participating in the intervention because of their prior knowledge to the school garden. There was some higher scores between pre- and posttest results for GHS because of the level of involvement in the school garden, which was to be expected. However, WL students demonstrated more significant change between pre- and posttest scores because of the scaffolding effect toward the new subject

of the school garden. These differences is evidence for this small population that any middles school student could participate in the *I Grow Culture Pen Pal Program* without prior gardening knowledge. These are specific to the demographics of the sample populations and should be monitored to other groups to determine their significance.

The third objective, to determine the extent to which students can identify five artifacts the represent garden and culture, was reliable in the context of the verbal communication. There was a stated reason from one student or more about each artifact sent to their pal. What is important to distinguish between culture and garden means multiple ideas to certain people (Rafaeli and Pratt, 2006) which is evident in their reactions to each artifact revealing. Majority identified proper difference of culture to garden however there were small differences in each other's reasoning for some items. GHS students reasoned that a large field is a garden to WL, but this was categorized as culture to WL. WL students placed rice in the category of garden but is actually represented as a staple food for GHS. Both groups shared majority of culture items than garden items which would explain what they value more (Martin, 2014).

The last objective relating to students demonstration of a script and video is accomplishable and rewarding. Students participating in the pen pal program gained the most engagement after watching their pal's video of their school garden tour. Although demonstrating how to write a script and video was not desirable for GHS students, it was beneficial for WL students to use while informing others of the new environment. It is important to recognize this is not all students' attitudes but the majority toward the video assignments over the course of the intervention.

Some conclusions can be drawn from the data collected from the pre- and posttest, student artifacts and classroom observations, but further research should be conducted to expand

the findings presented in this study and explain in more detail the effects the *I Grow Culture Pen Pal Program* has on student's garden and sustainable knowledge and confidence. Observational data could be conducted for more reliable sources of student's perceptions of artifacts and video script creation in the classroom. The next sections present recommendations and suggestions for further research as identified by the data collected for this study.

### **Recommendations**

Through the process of compiling the *I Grow Culture Pen Pal Program* data from the three groups, there were several recommendations for this intervention. Currently there are no other groups of middle school students planning to participate in the pen pal program curriculum. This pen pal program is encouraged to be extended beyond an agriculture classroom. In order for this curriculum to be more successful, full participation from other classrooms teachers are recommended to be aware and flexible for shared integration of the program in case of schedule conflict with regular class period. The timeline should also be increased over the course of the pen pal program to ensure any other conflicts due to scheduling, weather conditions, postage, etc. The short period of nine weeks was not enough for making up assignments to those who miss a day or so and some of the time commitments were met barely due to the circumstances. However, do not proceed over a year because sticking to the scaffolding curriculum for an environmental science subject has been known to increase knowledge retention and improve higher-order thinking (Dresner, et. al., 2014).

Another recommendation would be to lower the grade level to fifth or sixth grade middle school program instead of seventh and eighth grade. The *I Grow Culture Pen Pal Program* curriculum would be more practical for a lower grade because of the maturity majority of the students in seventh and eighth grade demonstrated little engagement toward school affiliated

communication with pal. Students were engaged with off topic subjects through other sources from the classroom to communicate with their pal in which became distracting. However, this did not apply to the WL students as much as GHS students since they were well acquainted with their school garden. According to Shandomo (2009), majority of pen pal programs are introduced in elementary grades to improve reading and writing abilities. By applying the *I Grow Culture Pen Pal Program* to students at an early age could emphasize fundamental relationships among people, their school garden and local culture. Although other outlets of communication was distracting in the classroom, this could be adjusted through other routes than lowering the grade but instead encouraging social media in the classroom depending on the school procedures. Using middle school students as a pilot for this curriculum was established to create higher order thinking instead of reading and writing focus which was evident in the data.

### **Future Research**

To enhance and further explain the *I Grow Culture Pen Pal Program* intervention data that were collected from this study, recommendations for future research are included. The purpose of this research was to evaluate middle school student's increase in knowledge and confidence related to communicating local gardening, culture understand and sustainability through the pen pal intervention. These data can be utilized and better show the effects school garden programs can be integrated into the middle school classroom through a pen pal program. Recommendations would be to apply intervention during a longer period of time and for a lower middle school grade levels. Ideally, timing for this curriculum would be at the beginning of the school year when general climate location are just finishing harvest or at the beginning of spring when planting schedules are being organized. To measure long-term retention, students should take the knowledge test again following a year after the intervention. However, it is apparent

there were two different styles of instruction between groups, which could link to how students retain information; GHS had more time between assignments as well as prior knowledge of their school garden and WL student were scaffold into learning about their school garden and completing their assignments.

Future research should focus on how to improve the *I Grow Culture Pen Pal Program* curriculum for high knowledge and confidence scores. Both groups began with lower pretest scores, which is to be expected, but did not increase to a mean score of higher than 50%. Prior knowledge of school garden did show to have an increase of pretest scores but the intervention did not increase their posttest scores as much as the WL group with no prior recollection of school garden functions.

The trend of multiple interpretations of garden artifacts should be explored further. What about gardening artifacts relate to a locations culture? It's fascinating to know that artifacts are general in nature that cause multiple ideas to develop from other people but an analysis of what draws the idea in the first place would be progressive for teaching techniques. A study for connecting culture to garden artifacts could draw in a conclusion for more culture related agriculture curricula.

To better explain the knowledge gain from students specifically related to garden and culture of their own location that is not done through a pre- and posttest assessment. More focus methods of the *I Grow Culture Pen Pal Program* documenting individual knowledge gain of specific objective for the curriculum. Student understand portions of the test that were actually from the curricula or was there more prior knowledge related to students. Pen pal research (Lemkuhl, 2002) describes multiple opportunities of reflection and social relationship proved engaging to students however, learning academic knowledge from pal or more of just the pal's

relationship. Persist into more evaluating data to identify what else was learned during the intervention. A study focusing on individual interview or focus group allows other aspect outside of garden and culture objectives analyzed to understand what other implications were gained from the intervention. The focus group method would be an appropriate step for the knowledge gain research of the pen pal intervention to describe the changes taking place as a result of the relationship development of pals at GHS and WL.

Further research should look into the effect of WL students who had two pen pals to write to and how that may have affected their knowledge gain. Having to communicate with two pals with different ideas of their culture could have been challenging or rewarding. This again follows the scaffolding approach to the WL curriculum and furthering their retention because they were determined to communicate to both. However, it could have hindered their knowledge gain from one another based on their communication efforts to get to know both. Same with the GHS student who found out they were sharing a pal and whether or not that affected their knowledge growth because pen pal research suggest that relationships are special in that they confide in one another (McMillon, 2009).

Finally, the study affiliated only 8<sup>th</sup> grade at WL and both 7<sup>th</sup> and 8<sup>th</sup> grade at GHS. Further research would suggest trying the intervention through a combination of only one grade or more diverse set of age levels. Hughes and others (2014) organized a pen pal program with adolescents and adults in order to use real-world context for learning. Using this intervention with a different population would introduce interesting comparisons between data. This research could go further into identifying gender-learning differences between pals as well.

### **Implications and Educational Significance**

Implications of this study can be drawn from relating the impact of pen pal programs communication practices toward middle school students school garden knowledge and confidence. Giff Hill School and West Liberty both have middle school programs that allow access to a school garden for experiential learning and program development. By applying a pen pal program as a source of exchange between students to discuss and recognize garden practice and communication confidence, school garden curricula could be integrated into any subject. The diversity of school gardens allows students to experience working knowledge. Applying this knowledge of reflection interpretation by students learning the process while also comparing another's view of their school garden is demonstrated through the pen pal program.

Students learn by experience and gain confidence in their ability to reflect on their process of learning that consists with the experiential learning theory. These students not only got to experience working in their school garden but also were able to exchange reflections concerning their thoughts of the school garden, which was interpreted by a pal who reflected in the same manner. Their experience of sharing artifacts they thought represented their garden and culture captured the process that they could have given more. The experience of developing a script reflecting their school garden and then seeing their pal's school garden drawn the conclusion that other schools have different procedures than their own when working in the school garden but some items are the same. By experiencing these many observational and professional assignments, students gained confidence in recognizing gardening practices and metacognition is used in order to explain what they know.

When the participating students are able to use the garden experience in forms of communication concerning their culture and environment, they are encouraging each other to

become more aware of their surrounds and appreciate sustainable thinking. These students benefit from each other from the transfer of sustainable practices and culture surrounds of garden backgrounds and divers locations. The experience required students to use their own perception and scaffold thinking to communicate what make their garden unique including culture and sustainability. They were engaged to know more about each other and the environment they come from. The results of this study, along with future data, provide support for and describe advanced curricula to increase student's engagement and knowledge through pen pal communication integration of a middle school garden program.



**APPENDIX A****PRE/POSTTEST INSTRUMENT**

1. How confident are you to explain to someone about your school garden?
2. How confident are you to explain to someone what grows in your school garden?
3. How confident are you about knowing what to do in a garden?
4. How confident are you to use all the tools in the garden?
5. How confident are you to begin a seed?
6. How confident are you about explaining the right conditions for growing a garden?
7. Can other places in the world produce the same produce you can in your garden?
8. How important is the school garden to you?
9. Could you go home now and start a garden on your own?
10. Do you have a garden at home?
11. What is the purpose of a greenhouse?
  - a. To shield crops from the cold and unwanted pests.
  - b. To grow green plants.
  - c. To make green products.
  - d. To house plant with diseases and find cures.
12. What are three produce that can grow on a Caribbean island?
  - a. Tomatoes, carrots & beans.
  - b. Carrots, beans & strawberries.
  - c. Corn, tomatoes, & raspberries.
  - d. Strawberries, raspberries & tomatoes.
13. What are three produce that can grow in the Upper Midwest United States?
  - a. Corn, apple & blueberry.
  - b. Peaches, beans & sugar cane.
  - c. Rice, corn & beans.
  - d. Apple, rice & cotton.
14. What is the purpose of a shade cloth in a garden?
  - a. To help lower temperatures from the blazing hot sun.
  - b. To stop the light from hurting the plants.
  - c. To give the plants more darkness.
  - d. To increase the temperature of the plant.
15. Define local food in your own words.
16. What is the top three produce that come out of your school garden?
17. What makes your school garden unique?
18. Does your school garden practice sustainable gardening?
19. How confident are you to explain sustainable gardening to someone?

20. How confident are you to explain compost to someone?
21. How confident are you to explain what a greenhouse is to someone?
22. How confident are you to practice a sustainable act of gardening?
23. How confident are you to explain how to collect rainwater to someone?
24. How confident are you to know if you are practicing sustainable gardening?
25. How confident are you to describe to someone the importance of sustainability?
26. How confident are you to explain to someone what an invasive species is?
27. How confident are you to identify what an invasive species is?
28. What is a cistern?
  - a. Container for fertilizer
  - b. Container for collection of rainwater
  - c. A type of pineapple
  - d. A container made out of wood material
29. What is compost?
  - a. Decayed organic material used as a plant fertilizer.
  - b. A woody material used to prevent weeds.
  - c. A type of tea that will cure diabetes
  - d. A pile of dirt and diseases.
30. What can NOT go into compost?
  - a. Weeds
  - b. Plants
  - c. Coffee
  - d. Meat
31. Why do gardeners use pesticides?
  - a. Increase garden production
  - b. Keep crops from freezing
  - c. Crops won't grow at all without pesticides
  - d. All of the above
  - e. None of the above
32. Erosion of the soil is:
  - a. Soil which crumbles easily
  - b. Controlled by using lots of fertilizer
  - c. The wearing away or loss of the land
  - d. Controlled by allowing cattle to graze the land in unlimited numbers
33. Why does a gardener plant cover crops?
  - a. To prevent the soil from washing away
  - b. To provide pretty blooms
  - c. To cover ugly land
  - d. To use the farm machines
34. Which of the following are examples of natural resources?

- a. Radios and televisions
  - b. Heavy metal rock bands
  - c. Forrest and soils
  - d. Different kinds of clothing
35. With the use of biotechnology, new hybrids result in \_\_\_\_\_ an insecticide and herbicide use.
- a. A reduction
  - b. An increase
36. What is an invasive species?
- a. An animal that eats too much of one plant.
  - b. A species that carries a disease to another host species.
  - c. Organisms that are not native and have negative effects to the environment.
  - d. An introduced species that dies in a new environment.
37. Define sustainable in your own words.
38. List three examples of sustainable gardening practices in your school garden or home garden.
39. Identify an invasive species found in your local environment and why?
40. What are ways to prevent invasive species?

**APPENDIX B****CURRICULUM LESSONS AND ASSESMENTS****GARDEN SUITCASE**

**Module or Course Title:** Agriculture

**Unit:** I Grow Culture Pen Pals

**Lesson:** Garden Suitcase

**Educational Goal:** Identify and explore the local food and culture through artifacts and identify invasive species that cause issues within the environment.

**Objectives:**

- Each student will define local food.
- Each student will define invasive species.
- Each student will know two ways invasive species are spread.
- Each student will identify one invasive species in his or her local area.
- Each student will be able to identify at least 5 artifacts and objects that are unique to their school garden and culture.

**Resources and References:**

Academic Kids: [http://www.academickids.com/encyclopedia/index.php/Invasive\\_species](http://www.academickids.com/encyclopedia/index.php/Invasive_species)

Invasion of the Yellow Crazy Ants: <http://www.youtube.com/watch?v=tmztPktOfzs>

**Supplies and Equipment:**

- 10 X 17 X 26 inches suitcase.
- Class room with poster, white or chalk board.
- Computer access for each student.
- LCD Projector to view YouTube Video.

**Estimated Time:** Two 45 minute classes.

**Safety:** Artifact selection needs to consider the potential hazards during transportation to and from the US Virgin Islands; therefore, no live specimens, seeds, or plants can be included.

**Teaching Procedures**

**Content and Strategies:** In this lesson, students will identify artifacts that represent their local food, define invasive species and know how an introduced species get into their environment. Students will also create or find a garden and cultural artifact to send to their pal’s school that will help them identify where their school is located. Finally, they will fill out a worksheet of an invasive species to send to their pal.

Concepts	Performance Objectives
<p><i>Students will know and understand</i></p> <ol style="list-style-type: none"> <li>1. Local food is food that is grown or produced within a 100-mile radius and is a collaborative effort to build self-reliant food economy.</li> <li>2. Artifacts that give a good representation of their school garden and culture.</li> <li>3. Invasive species are organisms that are not native and have negative effects on our economy, environment, or our health.</li> <li>4. Invasive plants and animals are the second greatest threat to biodiversity after habitat loss.</li> <li>5. There are many invasive species out there and need to know where some came from and why.</li> </ol>	<p><i>Student will learn concept by doing</i></p> <ul style="list-style-type: none"> <li>- Think/pair/share ideas of garden artifacts.</li> <li>- Discuss items that will cause harm to the pals environment and why.</li> <li>- <i>Invasion of the Yellow Crazy Ants!</i> Video shown as an example of invasive species.</li> <li>- Creating/finding artifacts to bring to class and send in the suitcase.</li> <li>- Reflect and research on an invasive species in their local area that is harming their environment.</li> </ul>

**Teacher Tips:** Some examples of items include physical objects (rocks, shells, feathers, preservatives, etc.), pictures, books, stores, pressed or stamped plants, and student made objects (bookmarks, origami paper, jewelry, etc.).

## Day 1

- Introduce suitcase discussion (5 min): Show off suitcase and tell students they are putting their school garden in it and sending it to their pen pals. Ask students to define local food. Write the students definition on board. Model an example of an artifact that may be found or produced in their garden and culture (rocks, shells, preservatives, etc.). Critique the definition, if need be; **food that is grown or produced within a 100-mile radius and is a collaborative effort to build self-reliant food economy.**
- Think/Pair/Share (10 min): Have student get out paper to write on. Create two columns on board. 1) **Garden/local food** (What kind of artifacts is found in our school garden or local food that will fit in the suitcase?) 2) **Culture** (What kind of artifacts define our culture to send in suitcase?) Write on board what cannot go in suitcase (no live specimen, seeds or plants) Have them write on their own for 3 minutes. Have them pair up for 5 minutes to discuss and then make a list on the board as a class. Facilitate discussion with students to talk to other groups.
- Class Discussion (10 min): Have students come up to board and write one example under each column. Look at class lists and discuss each item. Add and erase items from list during discussion. Lead discussion into invasive species problem from an example in the column.
- Invasive species video (5 min): watch Invasion of the Yellow Crazy Ants video on invasive species: (<http://www.youtube.com/watch?v=tmztPktOfzs>)
- Class Discussion (10 min): what *cannot be sent* and explain how invasive species are spread through transportation of species and by cling-on-travelers as well as by complete accident. Define invasive species as; **organisms that are not native and have negative effects on our economy, environment, or our health.**
- Assignment (5 min): How and who will get each artifact by next class. Discuss who can get what and where to find items. Try and have each student contribute something or pair them up to find something. Remind them that it is due in class the next time they meet.

## Day 2

- Show and Tell (10 Min): Have each student present and display their artifact for suitcase. Have them say one more time why it is an example of their school garden and culture.
- Invasive species reflection (5 min): Students will fill out the **Invasive Species Quest Worksheet** about an introduced species that may be harming their environment. Use computers to help research where they came from and how they got there.
- Work time (20 min): When student is done writing, let them have students peer edit but make sure teacher edits it before it goes into the suitcase with the rest of the artifacts.
- Conclusion (5 min): Explain this is being sent by mail and we will be receiving the same kind of thing from our pal's class as well next week. Close the suitcase.

**Summary and Review:** The overall concepts learned in this lesson is the idea of local food and how invasive species can create issues to an environment, economy and one’s own health. Invasive species are a conscious issue to worry about because it can happen without even knowing it. Because this lesson pertains to sending a gift describing the local food, garden and culture; it is important to have restrictions and introduce the causes and effects of invasive species. The suitcase should also have cultural artifacts included because what are local foods and their school garden without the culture of the people who produce it.

**Evaluation:** Students will be evaluated through the show and tell and by their invasive species worksheet.

**Essential Questions**

1. What is local food?
2. What artifacts or objects are identified as local food and gardeing?
3. How can we represent out school garden through artifacts?
4. What is an invasive species?
5. How do invasive species spread?
6. How can we prevent invasive species from spreading?

**Key Terms**

**Local**

**Invasive species**

**Culture**

## National AFNR Career Cluster Content Standards Alignment

### AFNR: Life Knowledge and Cluster Skills Content Standards

**CS.06.** Examine the importance of health, safety, and environmental management systems in organizations and their importance to performance and regulatory compliance.

**CS.07.** Safety, Health, and Environmental: Demonstrate appropriate health and safety procedures for AFNR occupations.

**CS.09.** Compare and contrast issues affecting the AFNR industry.

### AFNR: Environmental Service Systems

**ESS.02.** Assess the impact of polices and regulation on environmental service systems

### AFNR: Natural Resource Systems

**NRS.01.** Explain interrelationships between natural resources and humans necessary to conduct management activities in natural environments.

**NRS.02.** Apply scientific principles to natural resource management activities.

## Next Generation Science Standards: Middle School Life Sciences

### MS-LS2 Ecosystems: Interactions, Energy, and Dynamics

<p><b>Science and Engineering Practices</b></p>	<p>Engaging in discussion from evidence in 6-8 builds on K-5 experiences and progresses to constructing a convincing argument that supports or refutes claims for either explanations or solutions about the natural and designed world(s).</p> <ul style="list-style-type: none"> <li>• Construct a written discussion supported by empirical evidence and scientific reasoning to support a cause.</li> <li>• Evaluate independent and dependent variables when considering the cause and effect.</li> </ul>
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## Common Core State Standard for English Language Arts

### CCSS: English Language Arts Standards >> Writing >> Grade 7-8

<p><b>Text Types and Purposes</b></p>	<ul style="list-style-type: none"> <li>• <b>WST.2</b> – Write informative texts to examine a topic and convey concepts through an analysis of relevant content.</li> <li>• <b>WST.4</b> – Produce clear and coherent writing in which the development, organization, and style are appropriate to audience.</li> <li>• <b>WST.6</b> – Use technology, including the Internet, to produce and publish writing and link to and cite sources as well as to interact and collaborate with others, including linking to and citing sources.</li> </ul>
<p><b>Production and Distribution of Writing</b></p>	

### CCSS: English Language Arts Standards >> Speaking and Listening >> Grade 7-8

<p><b>Comprehension and Collaboration</b></p>	<ul style="list-style-type: none"> <li>• <b>SLST.1</b> – Engage in a range of collaborative discussion (one-on-one, in groups, and teacher led) with diverse partners on grade specific topics, text, and issues, building on others’ ideas and expressing their own clearly.</li> <li>• <b>SLST.2</b> – Analyze the main ideas and supporting details presented in diverse media and formats (video) and explain how the ideas clarify issues under study.</li> </ul>
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### CCSS: English Language Arts Standards >> Language >> Grade 7-8

<p><b>Conventions of Standard English</b></p>	<ul style="list-style-type: none"> <li>• <b>LST.1</b> – Demonstrate command of the conventions of standard English grammar and usage when writing.</li> </ul>
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# Invasive Species Quest Worksheet

Name of Species: \_\_\_\_\_

Scientific Name of Species: \_\_\_\_\_

Picture:

**Why this species is considered invasive?**

**What kind of issues does it cause to local food?**

**How did the species become invasive?**

**How does this species spread?**

**How can this species be controlled or prevent its spreading?**

**Other interesting facts about this species.**

## GARDEN EMAIL

**Module or Course Title:** Agriculture

**Unit:** I Grow Culture Pen Pals

**Lesson :** Garden Emails

**Educational Goal:** Establish a student connection through email (pen pals) to introduce and ask questions about each other's school garden to ultimately find out about each other's location and environment.

**Objectives:**

- Each student will identify three major food products from their school garden.
- Each student will define sustainability and give an example of a sustainable practice.
- Each student will describe at least one form of sustainable practice associated to each other's environment or school garden.
- Each student will identify his or her pal and know, at least, two things about them.
- Each student will make contact through school email and connect with their pen pal.

**Resources and References:**

Email Etiquette: <http://cafnr.missouri.edu/career-services/pro-dev/email-etiquette.php>

**Supplies and Equipment:**

- Class room with poster, white or chalk board.
- Computer access for each student research and email.

**Estimated Time:** Two 45 minute classes.

### Teaching Procedures

**Content and Strategies:** In this lesson, students will have the opportunity to introduce themselves to their pal and discuss their interest. They will then ask questions that their pal can answer about local food and what grows in their school garden. Questions will be answered individually and written back in email format. The purpose of the emails is to introduce each other and use email as a form of communication for any future questions to each other.

Concepts	Performance Objectives
<p><i>Students will know and understand</i></p> <ol style="list-style-type: none"> <li>6. Who their pal is.</li> <li>7. What their pal is interested in.</li> <li>8. What the top 3 products from their school garden and how it is produced sustainably.</li> <li>9. What the top 3 products from their pal's school garden and how it is produced sustainably.</li> <li>10. Why the products are the top products from their garden.</li> <li>11. To write a proper informational email.</li> <li>12. Where their pal is from.</li> </ol>	<p><i>Student will learn concept by doing</i></p> <ul style="list-style-type: none"> <li>- Write an introductory email to pal.</li> <li>- Ask questions regarding top 3 school garden produce and why they are.</li> <li>- Define sustainability.</li> <li>- Get responses with answers to questions.</li> <li>- Respond to emails with appropriate etiquette.</li> <li>- Connect with pal through interest and question in emails.</li> <li>- Opening the Garden Suitcase.</li> </ul>

### Day 1

- Think/Pair/Share (15 min): Ask students to write out a definition of sustainability and to give an example in 3 minutes. Have them pair with a student for 5 minutes to compare answers. Have one student from each group go up to board and write out the groups definition and example. Discuss with class the best definition and agree/critique examples. Sustainable means **to maintain at some level without harm**. Use this definition in a garden stand point. Sustainable gardening means **to produce food and fiber products using techniques that protect and maintain the environment and health**. (ex. How do we keep rich nutrient soil in the school garden? Answer: make compost to naturally fertilize the soil.)
- Introduction (5 min): Using the sustainable agriculture definition, explain to the class that they will be sending an email to their pal. They will have to introduce themselves and ask them a few questions about their school garden. These questions will help them with their final brochure lesson. Discuss important gardening questions that need to be answered. Hand out **Email Checklist** and **Email Etiquette Guidelines**.

- Writing practice (20 min): Have students at a computer. Using the **Email Checklist**, the students will introduce themselves and ask questions to help answer about each other's environments. Have students work independently and let teacher read and edit it before they send the email.
- Closure (5 min): Explain to students this is the fastest way to communicate to their pal if they wish to ask them any garden or cultural related questions. The first email they send will have to be printed and given to the teacher for evaluation.

## Day 2

- Show and Tell (20 min): Hopefully, by now, their Garden Suitcases have made it to each other's school. Have one person come up at a time to take something out of it and explain what it is. Have the suitcase and artifacts inside always displayed for students to see the rest of the pen pal program.
- Reading (10 min): Hand pals **Invasive Species Quest Worksheet** to them and look at emails responses. Allow time for student to read the new information.
- Guessing Game (10 min): Display a globe in the front of the class to pin where their pal is. Begin class discussion about what they found out about their pals and where they think their pal is located. What kind of invasive species are there? Talk about the question they sent to them. Ultimately, have student give a final guess where their pal is from.
- Homework (5 min): Using the **Email Etiquette Guidelines**, have students write an email response to their first letter from their pal. Have them answer questions their pal had for each other.

## Day 3

- Homework Work time (10 min): Have student get out their homework and have teacher edit it before sending it. This will also be time for students to finish their homework if they did not get it done.
- Introduce **Virtual Garden Tour Project**.

**Summary and Review:** The goal of this lesson is to establish a comfortable relationship with student's pals through email while contributing gardening and environmental questions. Students will practice email writing to one another and become comfortable with each others pal. Students will gather garden information from their pal about what kind of food they produce in their school garden and maybe even their home garden. The collection of information they will get from their pal will help them with their brochure at the end of the program. They will want to gather information about the sustainable practices and the top three produce grown from their school. The email will be used as a context of sharing with one another for any future questions.

**Evaluation:** Students will be evaluated by their emails.

## Essential Questions

7. What are the top three produce from each garden?
8. Why do these produce grow well in their school garden?

9. What experience does our pal have with these products purpose or operation?
10. Where is our pal from?
11. What does sustainable mean?
12. What are some sustainable practices in each school garden?

**Key Terms**

Emails

Sustainable

Products

## National AFNR Career Cluster Content Standards Alignment

### AFNR: Life Knowledge and Cluster Skills Content Standards

- CS.01.** Acquire the skills necessary to positively influence others.
- CS.02.** Develop skills set to enhance the positive evolution of the whole person.
- CS.03.** Demonstrate those qualities, attributes and skills necessary to succeed in, or further prepare for, a chosen career while effectively contributing to society.
- CS.05.** Identify how key organizational structures and processes affect organizational performance and the quality of products and services.
- CS.09.** Compare and contrast issues affecting the AFNR industry.

### AFNR: Environmental Service Systems

- ESS.02.** Assess the impact of polices and regulation on environmental service systems

### AFNR: Food Products and Processing Systems

- FPP.01.** Apply safety principles, recommended equipment and facility management techniques to the food products and processing industry.

### AFNR: Natural Resource Systems

- NRS.01.** Explain interrelationships between natural resources and humans necessary to conduct management activities in natural environments.
- NRS.03.**Apply knowledge of natural resources to production and processing industries.

### AFNR: Plant Systems

- PS.02.** Prepare and implement a plant management plan that address the influence of environmental factors, nutrients and soil on plant growth.

## Next Generation Science Standards: Middle School Life Sciences

### MS-LS2 Ecosystems: Interactions, Energy, and Dynamics

<b>Science and Engineering Practices</b>	<p>Engaging in discussion from evidence in 6-8 builds on K-5 experiences and progresses to constructing a convincing argument that supports or refutes claims for either explanations or solutions about the natural and designed world(s).</p> <ul style="list-style-type: none"> <li>• Construct a written discussion supported by empirical evidence and scientific reasoning to support a cause.</li> <li>• Evaluate independent and dependent variables when considering the cause and effect.</li> </ul>
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## Common Core State Standard for English Language Arts

### CCSS: English Language Arts Standards >> Writing >> Grade 7-8

<b>Text Types and Purposes</b>	<ul style="list-style-type: none"> <li>• <b>WST.2</b> – Write informative texts to examine a topic and convey concepts through an analysis of relevant content.</li> <li>• <b>WST.3</b> – Write narratives to develop real or imagined experiences or events using effective technique, relevant descriptive details, and well-structured sequences.</li> </ul>
<b>Production and Distribution of Writing</b>	<ul style="list-style-type: none"> <li>• <b>WST.4</b> – Produce clear and coherent writing in which the development, organization, and style are appropriate to audience.</li> <li>• <b>WST.6</b> – Use technology, including the Internet, to produce and publish writing and link to and cite sources as well as to interact and collaborate with others, including linking to and citing sources.</li> </ul>
<b>Range of Writing</b>	<ul style="list-style-type: none"> <li>• <b>WST.10</b> – Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific task, purposes, and audiences.</li> </ul>

### CCSS: English Language Arts Standards >> Speaking and Listening >> Grade 7-8

<b>Comprehension and Collaboration</b>	<ul style="list-style-type: none"> <li>• <b>SLST.1</b> – Engage in a range of collaborative discussion (one-on-one, in groups, and teacher led) with diverse partners on grade specific topics, text, and issues, building on others’ ideas and expressing their own clearly.</li> <li>• <b>SLST.2</b> – Analyze the main ideas and supporting details presented in diverse media and formats (video) and explain how the ideas clarify issues under study.</li> </ul>
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### CCSS: English Language Arts Standards >> Language >> Grade 7-8

<b>Conventions of Standard English</b>	<ul style="list-style-type: none"> <li>• <b>LST.1</b> – Demonstrate command of the conventions of standard English grammar and usage when writing.</li> </ul>
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<b>Knowledge of Language</b>	<ul style="list-style-type: none"> <li>• <b>LST.3</b> – Use knowledge of language and its conventions when writing, speaking, reading, or listening.</li> </ul>
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### **Email Etiquette Guidelines:**

*The purpose of an email to communicate, such as communicating with teachers or coach, keeping in touch with friends, requesting information from other people or businesses, applying for scholarships, jobs and internships. Even though email is a very valuable communication tool, its wide use in business and academic settings has led to the emergence of new challenges for the users. If they are not said or written properly, miscommunications can happen. Use these guidelines to help you address your questions about your pal's school garden and for proper responses.*

1. All messages should have a concise and descriptive subject line. The purpose of the subject line is to alert the reader as to the content of the message.
2. Begin with a salutation. For example, if you are emailing your pal, it would be appropriate to begin your email with "Dear Pal" or "Hello My New Pal" or even "Hey Pal" If you typically call pal by their name, then go ahead and begin the email with their name or however they ended in their last email. If you are unsure of how to address your pal, "Dear Pal" is the best choice.
3. Use traditional rules of grammar, spelling and punctuation in your message. Use spell check but also remember to proofread the message yourself as spell check won't catch everything.
4. Avoid abbreviations associated with texting. Remember, not everyone understands texting lingo...and if you are writing to a teacher, chances are good that you are addressing one of the "more experienced" generations who text less frequently.
5. Reply to email requests in a timely fashion. Most expect that you will reply within one business day. This means you need to make it a habit to check your email account(s) on a daily basis.
6. Send attachments only as they are requested or if you have alerted the receiver. For example, if you are sending your resume to a contact, you may want to alert him/her first to anticipate it. This will help you to avoid the possibility that a SPAM filter keeps your message from getting through.
7. Confidential information, such as your Social Security, credit card and student ID numbers, should not be shared using email. Any email can be shared.

**Response Email Total: \_\_\_\_/5pts**

**Email Checklist:**

\_\_\_ Tell them your nickname or first name, age, gender and the country you live in.

\_\_\_ Tell them your hobbies and interests.

\_\_\_ Tell them where you like to eat and your favorite food item on the menu.

\_\_\_ Tell them what you're excited to learn from them.

\_\_\_ Talk about the weather?

\_\_\_ Talk about your experience in the school garden or home garden.

\_\_\_ Ask them question regarding the top 3 products from their school garden. Why they are so productive in those three products?

\_\_\_ Ask them what experience they have in sustainable practices.

\_\_\_ Never demand that your pen pal write you back. INVITE them to write you back instead. For example, "Looking forward to hearing from you", "I can't wait to hear all about your camping trip", etc.

\_\_\_ Tell the truth.

\_\_\_ What other question do you have for your pen pal?

\_\_\_ Use a friendly closing. For example, "Your New Friend", "Cheery Good-byes", "Yours" or "Cheers". Do not sign your email "Love".

**First Email Total: \_\_\_\_/10pts**



## Virtual Garden Tour

**Module or Course Title:** Agriculture

**Unit:** I Grow Culture Pen Pals

**Lesson :** Virtual Garden Tour

**Educational Goal:** Create and edit a virtual garden tour of the class's school garden to share with pal's school.

**Objectives:**

- Each student will identify a piece of his or her garden/growing facility.
- Each student will critique and learn three or more ways to make a garden tour video well.
- Each student will design and demonstrate a script of a garden tour.
- Each student will collaborate in a group the important features of their school garden and what makes their school garden unique.

**Resources and References:**

Student tour of School Garden in Maine Video: <http://www.youtube.com/watch?v=bYERumdWQFo>

Video Script Examples:

<http://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=5&ved=0CD8QFjAE&url=http%3A%2F%2Fwww.riviera-francaise.fr%2Findex.php%2Frevue-de-presse%3Ftask%3Ddocument.download%26id%3D40&ei=vY5JVN7VDOnLgwSTyIKwAw&usg=AFQjCNFQ3B52IKJZgxmtJiQvMs9-RpbAIA>

**Supplies and Equipment:**

- Video camera or smart phone with video camera.
- Video editing software.
- Projector for computer.
- School garden and/or greenhouse.
- Cue cards.

**Estimated Time:** Six 45 minute classes.

**Teaching Procedures**

**Interest Approach (motivation):** Main garden tour video critic.

**Content and Strategies:** In this lesson, students will work together to design a script to make a video of an actual garden tour. They first will critique a garden video and discuss what they like and dislike about it to help identify how they want their video to look. The class will divide into groups to be in charge of certain parts of the garden facility. The class will collaborate together to put the final editing to the video and send to sister school. The video should represent a complete tour of the school’s garden or greenhouse facilities.

Concepts	Performance Objectives
<p><i>Students will know and understand</i></p> <ul style="list-style-type: none"> <li>13. Identify how to critique garden tour video.</li> <li>14. Areas of their school garden specialty in cultural and sustainable practice.</li> <li>15. Design a script for a video.</li> <li>16. Learn editing video procedures.</li> </ul>	<p><i>Student will learn concept by doing</i></p> <ul style="list-style-type: none"> <li>- Introduce an example of another school give a tour of their school garden.</li> <li>- Critic video by comparing likes and dislikes about it.</li> <li>- Collaborate as a class to design the video.</li> <li>- Discuss with group members the important cultural and sustainable practice area of garden/growing facility.</li> <li>- Write a script with group members.</li> <li>- Work in groups to make editing corrections.</li> </ul>

**Teacher Tips:** Allow students to use smart phones during class time for video recording purposes. Have them practice with their phones to actually see what the video will look like. Video recorder will be supplied for actual recording of each group’s scripted performance. Use a flash drive to hold all groups parts to transfer to students computer for group editing. Be sure to use all same software (iMovie, Windows Movie Maker, etc.). Teacher will be in charge of introduction and conclusion of video tour. Using a private setting, transfer completed video to YouTube to share with other school and vice versa.

**Day 1**

- Finish Agriculture Email (10 min)

- Introduction (10 min): Watch five minutes of the **Student tour of School Garden in Maine Video**.
- Critique (15 Min): Discuss with class what they would critique about the Maine Garden video. Make a comparison list of likes and dislikes.
- Assignment (10 min): Explain to students that their next project to send to the sister school is a garden tour video. Explain they will have to get into groups to write a script about each area of the garden. They will follow guidelines as to what they will say and what they will need to show. Discuss and outline with class what they want to feature at the school. Assign groups and hand out **Guidelines**.

### Day 2

- Script work (40 min): Use this time for students to work in their groups to write and edit script. Show examples of scripts and story boards for students to look at (**Example script**). The groups can collaborate with each other as well. Make sure teacher approves scripts.
- Wrap-up (5 min): Discuss with class how they would like to introduce video and what groups go in what order. Remind them that a dress rehearsal will be done next class.

### Day 3

- Script Share (10 min): Have students sit in circle to rehearse speaking parts of script.
- Action rehearsal (20 min): Walk through video tour with speaking parts.
- Wrap-up (10 min): Make any fixes and edits to scripts that need to be done. Make cue cards.

### Day 4

- Rehearsal (10 min): Walk through video tour with speaking parts
- Video-taping (30 min): Take actual recording of video tour.

### Day 5

- Video-Editing (35 min): Have some video editing done of each group ready for them to complete the editing. Show how to do some simple edits through teacher's choice of editing software (changing scene, adding text, sound, etc.).
- Homework (10 min): Assign group to edit their portion and have ready by next class.

### Day 6

- Homework (10 min): Hand in edited portion of group videos. Teacher will combine them all together with the introduction and ending videos by next class to get approval and send to sister school. Plan to view complete video in next class.
- Introduce **Brochure Project** (35 min)

**Summary and Review:** Use as much time in the classroom to work on script and video editing. Have them work on it as homework if necessary. While one group is being recorded for their section, have the other students patiently watch or quietly practice their scripts in their garden area. Use large poster paper for easy reading of lines during videotaping if necessary. For editing, send groups video section via flash drive. Transport all groups’ video clips on flash drive for easy access for editing on any computer. Combine all video’s with a class intro and conclusion video that the students designed in their outline.

**Evaluation:** A rubric will be used to evaluate the group’s video collaboration and content. The purpose of the garden section and groups input was understood.

**Essential Questions**

- 13. What does our garden look like?
- 14. How can others see our garden virtually?
- 15. What makes our garden unique?
- 16. What can we grow in our garden?
- 17. What can others learn from the tour of our garden?
- 18. Are there any cultural aspects found in the garden?
- 19. What are the sustainable practices in our garden?
- 20. Are there any invasive plants found in the garden?

**Key Terms**

**Tour  
Script**

**Garden  
Virtual**

**Critique  
Editing**

## National AFNR Career Cluster Content Standards Alignment

AFNR: Life Knowledge and Cluster Skills Content Standards
<b>CS.01.</b> Acquire the skills necessary to positively influence others.
<b>CS.06.</b> Examine the importance of health, safety, and environment management systems in organization and their importance of performance and regulatory compliance.
<b>CS.07.</b> Safety, Health, and Environmental: Demonstrate appropriate health and safety procedures for AFNR occupations.
<b>CS.08.</b> Use Tools, equipment, machinery and technology appropriate to work within areas related to AFNR.

AFNR: Agribusiness Systems
<b>ABS.05.</b> Assess accomplishment of goals and objectives by an AFNR business.
<b>ABS.07.</b> Create a production system plan.

### AFNR: Environmental Service Systems

**ESS.01.** Use analytical procedures to plan and evaluate environmental service systems.

**ESS.04.** Operate environmental service systems to manage a facility environment.

**ESS.06.** Use tools, equipment, machinery and technology to accomplish tasks in environment service systems.

### AFNR: Food Products and Processing Systems

**FPP.01.** Apply safety principles, recommended equipment and facility management techniques to the food products and processing industry.

**FPP.04.** Select and process food products for storage, distribution and consumption.

### AFNR: Natural Resource Systems

**NRS.01.** Explain interrelationships between natural resources and humans necessary to conduct management activities in natural environments.

**NRS.03.** Apply knowledge of natural resources to production and processing industries.

**NRS.04.** Demonstrate techniques used to protect natural resources.

**NRS.05.** Use effective methods and venues to communicate natural resource process to the public.

### AFNR: Plant Systems

**PS.02.** Prepare and implement a plant management plan that address the influence of environmental factors, nutrients and soil on plant growth.

**PS.03.** Propagate, culture and harvest plants.

## Next Generation Science Standards: Middle School Life Sciences

### MS-LS2 Ecosystems: Interactions, Energy, and Dynamics

#### Science and Engineering Practices

Engaging in discussion from evidence in 6-8 builds on K-5 experiences and progresses to constructing a convincing argument that supports or refutes claims for either explanations or solutions about the natural and designed world(s).

- Construct a written discussion supported by empirical evidence and scientific reasoning to support a cause.
- Evaluate independent and dependent variables when considering the cause and effect.

## Common Core State Standard for English Language Arts

### CCSS: English Language Arts Standards >> Writing >> Grade 7-8

<p><b>Text Types and Purposes</b></p>	<ul style="list-style-type: none"> <li>• <b>WST.2</b> – Write informative texts to examine a topic and convey concepts through an analysis of relevant content.</li> </ul>
<p><b>Production and Distribution of Writing</b></p> <p><b>Range of Writing</b></p>	<ul style="list-style-type: none"> <li>• <b>WST.3</b> – Write narratives to develop real or imagined experiences or events using effective technique, relevant descriptive details, and well-structured sequences.</li> <li>• <b>WST.4</b> – Produce clear and coherent writing in which the development, organization, and style are appropriate to audience.</li> <li>• <b>WST.10</b> – Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific task, purposes, and audiences.</li> </ul>

### CCSS: English Language Arts Standards >> Speaking and Listening >> Grade 7-8

<p><b>Comprehension and Collaboration</b></p>	<ul style="list-style-type: none"> <li>• <b>SLST.1</b> – Engage in a range of collaborative discussion (one-on-one, in groups, and teacher led) with diverse partners on grade specific topics, text, and issues, building on others’ ideas and expressing their own clearly.</li> </ul>
<p><b>Presentation of Knowledge and Ideas</b></p>	<ul style="list-style-type: none"> <li>• <b>SLST.2</b> – Analyze the main ideas and supporting details presented in diverse media and formats (video) and explain how the ideas clarify issues under study.</li> <li>• <b>SLST.4</b> – Present claims and findings, emphasizing salient points in a focused, coherent manner with pertinent descriptions, facts, details, and examples; use appropriate eye contact, adequate volume, and clear pronunciation.</li> <li>• <b>SLST.6</b> – Adapt speech to a variety of contexts and tasks, demonstrating command of formal English when indicated or appropriate.</li> </ul>

### CCSS: English Language Arts Standards >> Language >> Grade 7-8

<p><b>Conventions of Standard English</b></p> <p><b>Knowledge of Language</b></p>	<ul style="list-style-type: none"> <li>• <b>LST.1</b> – Demonstrate command of the conventions of standard English grammar and usage when writing.</li> <li>• <b>LST.3</b> – Use knowledge of language and its conventions when writing, speaking, reading, or listening.</li> </ul>
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## Video Rubric

	<b>0-1</b>	<b>2-3</b>	<b>4-5</b>
<b>Purpose</b>	<p>Neither purpose of the area is stated or defined.</p> <p>No explanation important value of garden procedures.</p>	<p>The purpose of the area is stated but not defined.</p> <p>Kind of explains important value of garden procedures.</p>	<p>The purpose of area is stated and defined.</p> <p>Explains important value to garden procedures.</p>
<b>Content</b>	<p>Area is not understood.</p> <p>Not enough detailed information about garden area.</p>	<p>Area is somewhat understood.</p> <p>Somewhat detailed information of garden area.</p>	<p>Area is understood visually and orally.</p> <p>Detailed information of garden area.</p>
<b>Script &amp; Voice</b>	<p>Speakers appear robotic and word choice is poor.</p> <p>Script is not easy to read and has many grammar mistakes.</p>	<p>Speakers scarcely established an effective tone. Word Choice is overly simple or limited.</p> <p>Script is somewhat easy to read with some grammar mistakes.</p>	<p>Speakers display a natural style appropriate to purpose and content.</p> <p>Script is easy to read and little to no grammar mistakes.</p>
<b>Visual &amp; Action</b>	<p>Visuals not used nor is the area seen well.</p> <p>Did not accomplish very much action.</p>	<p>Visuals are not completely seen. Area is not fully seen.</p> <p>Limited demonstration of operations.</p>	<p>Viewers understand the visuals and area.</p> <p>Able to demonstrate proper activities and operations.</p>
<b>Time &amp; Group Collaboration</b>	<p>1 minute or below</p> <p>More than one group member is not introduced or speaks.</p>	<p>1:30-1 minutes</p> <p>One group member is not introduced or speaks.</p>	<p>1:30-2 minutes</p> <p>All members are introduced and have a speaking part.</p>

**Total: \_\_\_\_/25pts**

<b>Example Script:</b>
------------------------

SHINE-O-RAMA VS SHINE-O-MATIC  
THE ELECTRIC SHOE SHINE SHOW DOWN

Fade In to TITLE, LOGO, COMPANY URL.

Fade Out

Fade In to:

INT. SMALL ROUND TABLE

Jim, Tammy and Rebecca, our expert panel are seated at a table.  
Two pair of shoes and two shoe shining devices are upon the table.

TAMMY

Hi there...and welcome to The Shoe Hut's shoe-shine show  
down.

Today, two contenders in the shoe shine space will be  
facing off

in a real-time challenge. Which contender will be  
victorious? Time  
will tell.

I'm with Jim, our floor manager, and Rebecca our head of  
new  
shoe product. Nobody knows shoes better than these two. Hi  
Jim.

JIM

Hi.

TAMMY

And, Rebecca, I'm excited that you're with us today  
Rebecca. Thanks for being here.



REBECCA

I'm excited, too. Thanks for having me.

TAMMY

So guys, let's talk about the contenders before they trade leather today.

Jim and Rebecca laugh at the "trade leather" comment.

TAMMY

Rebecca, tell us a bit about Shine-O-Rama, the old veteran of the shoe-shine space. Does Shine-O-Rama stand a chance against this new kid, Shine-O-Matic?

CU of Shine-O-Rama as Rebecca picks it up off the table.

REBECCA

In this corner, we have the crowd favorite. He's been around  
awhile, has put the polish on millions of pairs of shoes,  
and  
has become a household name in shoe polishers. This product is tried, true, but has seen better days. It'll be interesting to  
see how Shine-O-Rama holds up with its old ways, old tech, and slow speed.

Let's look at Shine-O-Rama specs.

Fade In to PIC OF SPECIFICATIONS IMAGE

ETC ETC.

Fade Out

Fade In to: LOGO / URL

## I GROW CULTURE BROCHURE

**Module or Course Title:** Agriculture

**Unit:** I Grow Culture Pen Pals

**Lesson :** I Grow Culture Brochure

**Educational Goal:** To assess the knowledge of the Garden Pen Pal project by students creating brochures of their pal's garden environment they learned over the period of communicating with pal.

**Objectives:**

- Each student will identify at least three garden products from their sister school's location and their own.
- Each student will identify at least five artifacts that represent their pals garden and culture.
- Each student will demonstrate his or her knowledge about the gardening differences in his or her pal's environment with a descriptive brochure.
- Each student will check comprehension each other's environments by a presenting brochure through video chat with pal.

**Resources and References:**

Brochure Design - <http://www.5cubecommerce.com/design-a-brochure.html?p=11>

Brochure Example - <http://www.5cubecommerce.com/datasheets/GB0030101-Preview.pdf>

**Supplies and Equipment:**

- Computer for each student
- Microsoft Publisher or brochure design outlet
- Example brochures

**Estimated Time:** Four 45 minute classes.

### Teaching Procedures

**Content and Strategies:** In this lesson, students will collect all of their information from their pal during the Garden Pen Pal lessons to form a brochure about their pal's garden environment. Student will use their pal as a form of information to present about what they learned during their

communication with their pal. They will use their pal as their source for any question they might have through email. They will present their brochure to their pal via video chat.

Concepts	Performance Objectives
<p><i>Students will know and understand</i></p> <ul style="list-style-type: none"> <li>17. How to organize and categorize the important concepts of their pal’s garden.</li> <li>18. What his or her schools garden looks and compares to their school garden.</li> <li>19. Identify cultural interest from pal.</li> </ul>	<p><i>Student will learn concept by doing</i></p> <ul style="list-style-type: none"> <li>- Designing brochure of their pals garden and facilities.</li> <li>- Organizing of important garden concepts.</li> <li>- Compare and contrast school gardens.</li> <li>- Share cultural similarities and differences.</li> <li>- Present designed brochure to pal during face to face video chat.</li> </ul>

**Day 1**

- Virtual garden tour video wrap-up (10 min):
- Introduction (20 min): Show off brochures of farms and school gardens. Have students look through them. Ask students what the brochure is trying to accomplish? With these brochures as examples, explain how the students are going to use the information gathered from their pal to make a brochure about their pal’s garden environment. Using Microsoft Publisher or student’s preference, the students will inform their pal what they learned from each other and what they learned the most out of this project. Remind them their deadline and they will be presenting this brochure to their pal via video chat.
- Work time (15 min): Allow students time to write their thought on paper about what they will include in their brochure. Remind them to send another email to their pal regarding any questions they might still have for them

**Day 2**

- Home Video (15 min): Watch and discuss their schools garden tour video.

- Sister School Video (15 min): Watch and discuss the pal’s garden tour video. Advise students to take notes from the video and discussion to help them with their brochure.
- Individual Brochure Work time (15 min): Teacher there to help them edit as they create it.

**Day 3**

- Presentation rehearsal and final edits (40 min): Students have their final brochure ready and printed to practice presenting to their pal.
- Conclusion: Turn in final brochure

**Day 4**

- Presentation (45 min): Pals will have access to meet their pal via video chat to present their brochures. Brochures will be sent to each other’s school to be printed off and available for viewing by the pals. Pals will discuss the main topics and discuss what they learned from one another about each other school garden and culture. They will have 15 minutes to present to each other. Five minutes each to discuss their brochure and follow up with a discussion.

**Summary and Review:** The goal of this lesson is to evaluate the students learning through the Garden Pen Pal program and to put a closure to the pen pal project. The students will get the chance to talk one-on-one and relate one last time about how well they learned from each other.

**Evaluation:** Students will be evaluated by their content and understanding of the brochures.

**Essential Questions**

21. What is gardening like where my pal is from?
22. What kind of environment/atmosphere is it like there?
23. What products come from my pal’s environment?
24. What are the invasive species found in my pal’s environment?
25. Where did the invasive species come from and how to control it?
26. What are the similarities and differences of our school gardens?
27. What is my pals’ experience in a garden?
28. What is my pals’ culture like?
29. How are the garden practices sustainable?
30. What are some sustainable practices in their garden?

**Key Terms**

Emails

Brochure

Products

**National AFNR Career Cluster Content Standards Alignment**

**AFNR: Life Knowledge and Cluster Skills Content Standards**

**CS.01.** Acquire the skills necessary to positively influence others.

**CS.02.** Develop skills set to enhance the positive evolution of the whole person.

**CS.03.** Demonstrate those qualities, attributes and skills necessary to succeed in, or further prepare for, a chosen career while effectively contributing to society.

**CS.05.** Identify how key organizational structures and processes affect organizational performance and the quality of products and services.

**CS.06.** Examine the importance of health, safety, and environmental management systems in organizations and their importance to performance and regulatory compliance.

**CS.07.** Safety, Health, and Environmental: Demonstrate appropriate health and safety procedures for AFNR occupations.

**CS.09.** Compare and contrast issues affecting the AFNR industry.

### **AFNR: Agribusiness Systems**

**ABS.05.** Assess accomplishment of goals and objectives by an AFNR business.

**ABS.07.** Create a production system plan.

### **AFNR: Environmental Service Systems**

**ESS.01.** Use analytical procedures to plan and evaluate environmental service systems.

**ESS.02.** Assess the impact of policies and regulation on environmental service systems

### **AFNR: Natural Resource Systems**

**NRS.01.** Explain interrelationships between natural resources and humans necessary to conduct management activities in natural environments.

**NRS.02.** Apply scientific principles to natural resource management activities.

**NRS.05.** Use effective methods and venues to communicate natural resource process to the public.

### **AFNR: Plant Systems**

**PS.02.** Prepare and implement a plant management plan that address the influence of environmental factors, nutrients and soil on plant growth.

## **Next Generation Science Standards: Middle School Life Sciences**

### **MS-LS2 Ecosystems: Interactions, Energy, and Dynamics**

<b>Science and Engineering Practices</b>	<p>Engaging in discussion from evidence in 6-8 builds on K-5 experiences and progresses to constructing a convincing argument that supports or refutes claims for either explanations or solutions about the natural and designed world(s).</p> <ul style="list-style-type: none"> <li>• Construct a written discussion supported by empirical evidence and scientific reasoning to support a cause.</li> <li>• Evaluate independent and dependent variables when considering the cause and effect.</li> </ul>
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## Common Core State Standard for English Language Arts

### CCSS: English Language Arts Standards >> Writing >> Grade 7-8

<b>Text Types and Purposes</b>	<ul style="list-style-type: none"> <li>• <b>WST.2</b> – Write informative texts to examine a topic and convey concepts through an analysis of relevant content.</li> </ul>
<b>Production and Distribution of Writing</b>	<ul style="list-style-type: none"> <li>• <b>WST.3</b> – Write narratives to develop real or imagined experiences or events using effective technique, relevant descriptive details, and well-structured sequences.</li> <li>• <b>WST.4</b> – Produce clear and coherent writing in which the development, organization, and style are appropriate to audience.</li> <li>• <b>WST.6</b> – Use technology, including the Internet, to produce and publish writing and link to and cite sources as well as to interact and collaborate with others, including linking to and citing sources.</li> </ul>
<b>Range of Writing</b>	<ul style="list-style-type: none"> <li>• <b>WST.10</b> – Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific task, purposes, and audiences.</li> </ul>

### CCSS: English Language Arts Standards >> Speaking and Listening >> Grade 7-8

<b>Comprehension and Collaboration</b>	<ul style="list-style-type: none"> <li>• <b>SLST.1</b> – Engage in a range of collaborative discussion (one-on-one, in groups, and teacher led) with diverse partners on grade specific topics, text, and issues, building on others’ ideas and expressing their own clearly.</li> <li>• <b>SLST.2</b> – Analyze the main ideas and supporting details presented in diverse media and formats (video) and explain how the ideas clarify issues under study.</li> </ul>
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### CCSS: English Language Arts Standards >> Language >> Grade 7-8

<b>Conventions of Standard English Knowledge of Language</b>	<ul style="list-style-type: none"> <li>• <b>LST.1</b> – Demonstrate command of the conventions of standard English grammar and usage when writing.</li> <li>• <b>LST.3</b> – Use knowledge of language and its conventions when writing, speaking, reading, or listening.</li> </ul>
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**'I Grow Culture' Poster:**

Create a Poster that explains what you learned from your pal's garden suitcase, email exchanges and virtual video tour. The poster is an informational piece about your pal's garden and what "I" know about \_\_\_\_\_ gardening. You may still be in contact with your pal, via email, to help you answer any more questions you have. Be creative, detailed and informative when making the poster. You will be presenting this poster to your pal, via video chat, when it is complete. What to include:

- Local food
- Invasive species
- What's the Environment/atmosphere like?
- Sustainable activities
- Compare and Contrast school gardens
- Who your pal is and culture is like for them.
- Credit – Thank your pal and class for information

**Total: \_\_\_\_/50pts**

Name: \_\_\_\_\_

Scale: 1 = Not Acceptable; 2 = Needs Improvement; 3 = Acceptable; 4 = Good; 5 = Excellent

Planning Component	Criteria	Scale	Comments
Cover	Title, location, school name, pal's name, authors name.	1 2 3 4 5	

Total Points: \_\_\_\_/5

Organization	Subtitles and bullets of important summarized information.	1 2 3 4 5	
	Color and creative design that is not distracting. Pictures used appropriately. Formatting flows and is understood.	1 2 3 4 5	
	Grammar is correct and used appropriately.	1 2 3 4 5	

Total Points: \_\_\_\_/15

Content: What I learned from the garden suitcase, shared emails and virtual garden tour.	Shows examples of or describes sustainable practice, invasive species and prevention.	1 2 3 4 5	
	Describes environment and local food production.	1 2 3 4 5	
	Compare and contrast school gardens.	1 2 3 4 5	
	Identified 5 artifacts of their school garden.	1 2 3 4 5	
	Who your pal is and what the culture is like for your pal. Credit: Thanks pal and class for information.	1 2 3 4 5	

Total Points: \_\_\_\_/25

Presentation	Focused and informative with interactive comments/remarks as well as valid questions.	1 2 3 4 5	
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Total Points: \_\_\_\_/5

Brochure Total Points: \_\_\_\_/50



## APPENDIX C

### HUMAN SUBJECTS APPROVAL

**IOWA STATE UNIVERSITY**  
OF SCIENCE AND TECHNOLOGY

Institutional Review Board  
Office for Responsible Research  
Vice President for Research  
1138 Pearson Hall  
Ames, Iowa 50011-2207  
515-294-4566  
FAX 515-294-4267

**Date:** 1/30/2015

**To:** Samantha Green  
223 Curtiss Hall

**CC:** Dr. Michael Retallick  
206 Curtiss Hall  
Dr. Cynthia Haynes  
131 Horticulture Hall

**From:** Office for Responsible Research

**Title:** I Grow Culture Pen Pals: Connecting Students from the Midwest to the Virgin Islands using Science and Communication

**IRB ID:** 14-597

**Approval Date:** 1/30/2015      **Date for Continuing Review:** 1/19/2017

**Submission Type:** New      **Review Type:** Full Committee

The project referenced above has received approval from the Institutional Review Board (IRB) at Iowa State University according to the dates shown above. Please refer to the IRB ID number shown above in all correspondence regarding this study.

To ensure compliance with federal regulations (45 CFR 46 & 21 CFR 56), please be sure to:

- **Use only the approved study materials** in your research, including the recruitment materials and informed consent documents that have the IRB approval stamp.
- **Retain signed informed consent documents for 3 years after the close of the study**, when documented consent is required.
- **Obtain IRB approval prior to implementing any changes** to the study by submitting a Modification Form for Non-Exempt Research or Amendment for Personnel Changes form, as necessary.
- **Immediately inform the IRB of (1) all serious and/or unexpected adverse experiences** involving risks to subjects or others; and (2) **any other unanticipated problems** involving risks to subjects or others.
- **Stop all research activity if IRB approval lapses**, unless continuation is necessary to prevent harm to research participants. Research activity can resume once IRB approval is reestablished.
- **Complete a new continuing review form** at least three to four weeks prior to the **date for continuing review** as noted above to provide sufficient time for the IRB to review and approve continuation of the study. We will send a courtesy reminder as this date approaches.

Please be aware that IRB approval means that you have met the requirements of federal regulations and ISU policies governing human subjects research. **Approval from other entities may also be needed.** For example, access to data from private records (e.g. student, medical, or employment records, etc.) that are protected by FERPA, HIPAA, or other confidentiality policies requires permission from the holders of those records. Similarly, for research conducted in institutions other than ISU (e.g., schools, other colleges or universities, medical facilities, companies, etc.), investigators must obtain permission from the institution(s) as required by their policies. **IRB approval in no way implies or guarantees that permission from these other entities will be granted.**

Upon completion of the project, please submit a Project Closure Form to the Office for Responsible Research, 1138 Pearson Hall, to officially close the project.

Please don't hesitate to contact us if you have questions or concerns at 515-294-4566 or IRB@iastate.edu.

**APPENDIX D****ADMINISTRATION CONTACT LETTER****Giffit Hill School Administrator Consent**

Title of Study: I Grow Culture Pen Pals: Connecting Students from the Midwest to the Virgin Islands using Science and Communication.  
 Investigators: Michael S. Retallick, Ph. D., Samantha Green, B.S.

January 21, 2015, 2015  
 Principal of Giffit Hill Middle School

RE: I Grow Culture Pen Pals Program Consent

Dear Mrs. Liz Kinsella,

My name is Samantha Green. I am a graduate student in the Agriculture Education and Studies Master's degree program at Iowa State University. I would like to conduct an educational research project in your middle school English and EARTH classrooms under the supervision of my major professor, Dr. Michael Retallick. The purpose of the study is to evaluate how well middle school students can communicate local gardening through a pen pal program. The objectives of the pen pal program are to 1) increase understanding of gardening, 2) establish a cultural relationship, 3) practice communication tools to improve writing and science, and 4) increase awareness of sustainability in the environment.

Giffit Hill Middle School students will participate in an eight week pen pal program that would include communicating with a group of 8<sup>th</sup> grade students from Iowa. The project will run from February 9<sup>th</sup> through April 8<sup>th</sup>, 2015. Due to the nature of the study, participating students will be collaborating with pals using four lesson plans that include; collecting artifacts to share with pal, email discussion between pals, creating a virtual garden video tour and designing a brochure. A questionnaire will be given to the participating students before and after the program to measure the learning that occurred as a result of this project.

Students, who volunteer to participate, will be given two copies of the two consent forms: one to be signed by their parent or guardian and another for student signature. Teachers who volunteer to participate and collaborate with the researcher will also be asked to sign a consent form.

Student participants will communicate via a pen pal program in the EARTH and English classrooms or school garden twice a week. The pen pal program should take no longer than eight weeks. The results of this project will be collected as a whole class and individual results will remain confidential. Should this study be published, only class data will be reported. Neither your school nor the individual participants will incur any costs.

The artifacts and student coursework from this project will be collected for analyses. With your consent, the student coursework resulting from this project, which may be FERPA-protected, can be collected and analyzed.

During the pen pal program, a video camera will be documenting the lessons and the student's work during the study as a means to measure student engagement. After observations and data are collected, the videos will be stored in a locked cabinet and on an encrypted flash drives. You are free to request that the video camera in the classroom be discontinued at any time, again with no penalty to the school or the participants.

If you have any questions, please feel free to contact me, Samantha Green, via email at [skgreen@iastate.edu](mailto:skgreen@iastate.edu) or via phone at (319) 240-8713. You may also contact my advisor Dr. Retallick via email at [msr@iastate.edu](mailto:msr@iastate.edu) or via phone at (515) 294-4810. If you have any questions about the rights of research subjects or research-related harm, please contact the Institutional Review Board (IRB) Administrator (515) 294-4566, [IRB@iastate.edu](mailto:IRB@iastate.edu), or Director, (515) 294-3115, Office for Responsible Research, 1138 Pearson Hall, Iowa State University, Ames, Iowa 50011.

### **Administration Consent**

Enclosed is a copy of this letter for you to keep. If you are willing to participate in this study, please sign one copy of this letter and return it to me. Your signature indicates that you have read and understand the information above, willingly agree to participate, may withdraw at any time and discontinue participation without penalty, have received a copy of this form, and are not waiving any legal claims, rights, or remedies. If you have any questions or would like us to clarify any points, please ask Dr. Retallick or me to address your concerns before you sign this form. Thank you for your consideration.

Your Name (printed) \_\_\_\_\_

Your Signature \_\_\_\_\_

Date \_\_\_\_\_

<b>West Liberty Middle School Administrator Consent</b>
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Title of Study: I Grow Culture Pen Pals: Connecting Students from the Midwest to the Virgin Islands using Science and Communication.

Investigators: Michael S. Retallick, Ph. D., Samantha Green, B.S.

January 30, 2015

Principal of West Liberty Middle School

RE: I Grow Culture Pen Pals Program Consent

Dear Mrs. Vicki Vernon,

My name is Samantha Green. I am a graduate student in the Agriculture Education and Studies Master's Degree program at Iowa State University. I would like to conduct an educational research project in your middle school exploratory agriculture classroom under the supervision of my major professor, Dr. Michael Retallick. The purpose of the study is to evaluate how well middle school students can communicate local gardening through a pen pal program. The objectives of the pen pal program are to 1) increase understanding of gardening, 2) establish a cultural relationship, 3) practice communication tools to improve writing and science, and 4) increase awareness of sustainability in the environment.

West Liberty Middle School students will participate in a school garden pen pal program that would include communicating with middle school students from U.S. Virgin Island. The 8<sup>th</sup> grade students from the fourth rotation of agriculture exploratory will be participating in the pen pal program. The research study will run from February 9<sup>th</sup> through May 28<sup>th</sup>, 2015. Due to the nature of the study, participating students will be collaborating with pals using four lesson plans that include; collecting artifacts to share with pal, email discussion between pals, creating a virtual garden video tour and designing a brochure. A questionnaire will be given to the participating students before and after the program to measure the learning that occurred as a result of this project.

The fifth 8<sup>th</sup> grade agriculture class rotation will be used as a control group for the program. The control will only be asked to take the pre- and post- questionnaire to help analyze the effects of the pen pal program. No observations or pen pal lessons will be used for the control.

Students, who volunteer to participate, will be given two copies of the two consent forms; one to be signed by their parent or guardian and another for student signature. Teachers who volunteer to participate and collaborate with the researcher will also be asked to sign a consent form.

Student participants will communicate via a pen pal program in the exploratory agriculture classroom twice a week. The pen pal program should take no longer than eight weeks. The results of this project will be collected as a whole class and individual results will remain confidential. Should this study be published, only class data will be reported. Neither your school nor the individual participants will incur any costs.

The artifacts and student coursework from this project will be collected for analyses. With your consent, the student coursework resulting from this project, which may be FERPA-protected, will be collected and analyzed.

During the pen pal program, a video camera will be documenting the lessons and the student's work during the study. After observations and data are collected to measure student engagement, the videos will be stored in a locked cabinet. You are free to request that the video camera in the classroom be discontinued at any time, again with no penalty to the school or the participants.

If you have any questions, please feel free to contact me, Samantha Green, via email at [skgreen@iastate.edu](mailto:skgreen@iastate.edu) or via phone at (319) 240-8713. You may also contact my advisor Dr. Retallick via email at [msr@iastate.edu](mailto:msr@iastate.edu) or via phone at (515) 294-4810. If you have any questions about the rights of research subjects or research-related harm, please contact the Institutional Review Board (IRB) Administrator (515) 294-4566, [IRB@iastate.edu](mailto:IRB@iastate.edu), or Director, (515) 294-3115, Office for Responsible Research, 1138 Pearson Hall, Iowa State University, Ames, Iowa 50011.

### **Administration Consent**

Enclosed is a copy of this letter for you to keep. If you are willing to participate in this study, please sign one copy of this letter and return it to me. Your signature indicates that you have read and understand the information above, willingly agree to participate, may withdraw at any time and discontinue participation without penalty, have received a copy of this form, and are not waiving any legal claims, rights, or remedies. If you have any questions or would like us to clarify any points, please ask Dr. Retallick or me to address your concerns before you sign this form. Thank you for your consideration.

Your Name (printed) \_\_\_\_\_

Your Signature \_\_\_\_\_

Date \_\_\_\_\_

## APPENDIX E

### TEACHER CONSENT

<b>Gifft Hill School Teacher Consent</b>
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Title of Study: I Grow Culture Pen Pals: Connecting Students from the Midwest to the Virgin Islands using Science and Communication.  
 Investigators: Michael S. Retallick, Ph. D., Samantha Green, B.S.

January 30, 2015  
 English Teacher of Gifft Hill Middle School

RE: I Grow Culture Pen Pals

Dear Mike Jones,

My name is Samantha Green. I am a graduate student in the Agriculture Education and Studies Department at Iowa State University. I would like to conduct research in your classroom under the supervision of my graduate advisor from the Department of Agriculture Education, Dr. Michael Retallick.

The purpose of the study is to evaluate how well middle school students can communicate local gardening through a pen pal program. The objectives of the pen pal program are to 1) increase understanding of local gardening, 2) establish a garden-based distance cultural relationship, 3) practice communication technologies to improve writing and science communication, and 4) increase awareness of sustainability in both environments. As a result of this project, we hope to increase your students' knowledge of another culture and school garden as well as their own. This document includes information and an outline of the purpose and learning objectives of each lesson plan we will use in the process. I would like your assistance in teaching this pen pal program to the children in your classroom whose parents have agreed to let them participate in this project. Your participation, however, is totally voluntary.

If you agree to participate, I would like to collaborate with you and your students using four lesson plans I created called the 'I Grow Culture Pen Pals' program during your middle school English class. This pen pal program will last no longer than eight weeks (eight class periods over eight weeks) and will be videotaped for observational purposes to measure student engagement.

The results will be used to distinguish the communication and learning efficiency of the pen pal program for the participating students. If at any time during the pen pal program you decide that you would prefer not to do a lesson or discontinue the program completely, you are free to do so and discontinuation will not affect your relationship with your school, school district, or with Iowa State University.

Before the program, I will prepare you for the pen pal project through classroom visits and lesson plan overviews. We will be in constant communication through email, skype and phone calls during the program while I teach part of the lessons in the EARTH classroom. I would like to request one of your English class sessions per week to dedicate to this pen pal program. We will work in collaboration on the day of the week the program is being

conducted in your classroom. You will not be required to present the lessons but will be asked to help facilitate discussion and answer questions.

For your information, the following are the purpose and learning objectives for each lesson.

**Lesson 1: Garden Suitcase**

Purpose – Identify and explore local food and culture through artifacts and identify invasive species that cause issues within the environment

Objectives –

- Each student will define local food.
- Each student will define invasive species.
- Each student will know two ways invasive species are spread.
- Each student will identify one invasive species in his or her local area.
- Each student will be able to identify at least 5 artifacts and objects that are unique to their school garden and culture.

**Lesson 2: Garden Email**

Purpose - Establish a student connection through email (pen pals) to introduce and ask questions about each other's garden to ultimately find out about each other's location and environment.

Objectives –

- Each student will identify three major food products from their school garden.
- Each student will define sustainable and give an example of a sustainable practice.
- Each student will describe at least one form of sustainable practice associated to each other's environment or school garden.
- Each student will identify his or her pal and know, at least, two things about them.
- Each student will make contact through school email and connect with their pen pal.

**Lesson 3: Virtual Garden Tour**

Purpose – Create and edit a virtual garden tour of the class's school garden to share with pal's school.

Objectives -

- Each student will identify a piece of his or her garden/growing facility.
- Each student will critique and learn three or more ways to make a garden tour video well.
- Each student will design and demonstrate a script of a garden tour
- Each student will collaborate in a group the important features of their school garden and what makes their school garden unique.

**Lesson 4: I Grow Culture Brochure**

Purpose – End of program assessment of knowledge learned by creating a brochure of pal's agriculture communication.

Objectives –

- Each student will identify three garden products from their sister school's location and their own.
- Each student will identify at least five artifacts that represent their pals garden and culture.
- Each student will demonstrate his or her knowledge about the gardening differences in his or her pal's environment with a descriptive brochure.
- Each student will check comprehension each other's environments by a presenting brochure through video chat with pal.

### *Evaluation*

During the pen pal program, a video camera will be documenting the lessons and the students work during the study to measure the level of student engagement. We will record every pen pal lesson stated above during class time. After observations and data are collected, the videos will be locked and stored in a confidential cabinet. You are free to request that the video camera in the classroom be discontinued at any time, again with no penalty to you or the participating students.

The only identified risk associated with your involvement in this study is the possibility that your participation could be discovered by other people, including faculty and staff in your school. To minimize this risk, your name will not be recorded on any of the materials in this study. Instead, your identity will be recorded as the "Teacher of Caribbean Island School." Student participants' names will not be associated with any data or results. If any individual's comments or statements are included in the study, pseudonyms will be used in lieu of student participants' names. Thus, your identity and participation in this study should not be revealed to anyone.

If you have any questions, please feel free to contact me, Samantha Green, via email at [skgreen@iastate.edu](mailto:skgreen@iastate.edu) or via phone at (319) 240-8713. You may also contact my advisor Dr. Retallick via email at [mrsr@iastate.edu](mailto:mrsr@iastate.edu) or via phone at (515) 294-4810. If you have any questions about the rights of research subjects or research-related harm, please contact the IRB Administrator (515) 294-4566, [IRB@iastate.edu](mailto:IRB@iastate.edu), or Director, (515) 294-3115, Office for Responsible Research, 1138 Pearson Hall, Iowa State University, Ames, Iowa 50011.

### **Teacher Consent**

Enclosed is a copy of this letter for you to keep. If you are willing to participate in this study, please sign one copy of this letter and return it to me. Your signature indicates that you have read and understand the information above, willingly agree to participate, may withdraw at any time and discontinue participation without penalty, have received a copy of this form, and are not waiving any legal claims, rights, or remedies. If you have any questions or would like for Dr. Retallick or me to clarify any aspects of this project, please ask Dr. Retallick or me before you sign this form. Thank you for your consideration.

Your Name (printed) \_\_\_\_\_

Your Signature \_\_\_\_\_

Date \_\_\_\_\_



<b>West Liberty Teacher Consent</b>
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Title of Study: I Grow Culture Pen Pals: Connecting Students from the Midwest to the Virgin Islands using Science and Communication.  
 Investigators: Michael S. Retallick, Ph. D., Samantha Green, B.S.

January 30, 2015  
 Agriculture Teacher of West Liberty Middle School

RE: I Grow Culture Pen Pals

Dear Zach Morris,

My name is Samantha Green. I am a graduate student in the Agriculture Education and Studies program at Iowa State University. I would like to conduct research in your 8<sup>th</sup> grade agriculture classroom under the supervision of my graduate advisor from the Department of Agriculture Education and Studies, Dr. Michael Retallick.

The purpose of the study is to evaluate how well middle school students can communicate local gardening through a pen pal program. The objectives of the pen pal program are to 1) increase understanding of local gardening, 2) establish a garden-based distance cultural relationship, 3) practice communication technologies to improve writing and science communication, and 4) increase awareness of sustainability in both environments. As a result of this project, we hope to increase your students' knowledge of another culture and school garden as well as their own. This document includes information and an outline of the purpose and learning objectives of each lesson plan we will use in the process. I would like your assistance in teaching this pen pal program to the children in your classroom whose parents have agreed to let them participate in this project. Your participation, however, is totally voluntary.

If you agree to participate, I would like you to use four lesson plans I created called 'I Grow Culture Pen Pals' program during your fourth 8<sup>th</sup> grade exploratory rotation. This pen pal program will last no longer than eight weeks (16 class periods over 8 weeks) and will all be videotaped for observational purposes to measure student engagement. We would also like to use one week of the fifth 8th grade exploratory rotation, as a control group, to take a pre- and post- questionnaire. The control group will not be videotaped.

The results will be used to distinguish the communication and learning efficiency of the pen pal program for the participating students. If at any time during the pen pal program you decide that you would prefer not to do a lesson or discontinue the program completely, you are free to do so and discontinuation will not affect your relationship with your school, school district, or with Iowa State University.

Before the program, I will prepare you for the pen pal project through my classroom visits and lesson plan overviews. We will be in constant communication through email, skype and phone calls during the program while I teach the same lessons to the other participating school. I will need your help to give the students a questionnaire to test their knowledge of garden and culture for both environments before the program begins. The students will take this questionnaire again at the end of the program to compare their growth of knowledge from the program. This questionnaire will also be given to the control group during their agriculture education session in your classroom.

For your information, the following are the purpose and learning objectives for each lesson.

*Lesson 1: Garden Suitcase*

Purpose – Identify and explore local food and culture through artifacts and identify invasive species that cause issues within the environment.

Objectives –

- Each student will define local food.
- Each student will define invasive species.
- Each student will know two ways invasive species are spread.
- Each student will identify one invasive species in his or her local area.
- Each student will be able to identify at least 5 artifacts and objects that are unique to their school garden and culture.

### *Lesson 2: Garden Email*

Purpose - Establish a student connection through email (pen pals) to introduce and ask questions about each other's garden to ultimately find out about each other's location and environment.

Objectives –

- Each student will identify three major food products from their school garden.
- Each student will define sustainable and give an example of a sustainable practice.
- Each student will describe at least one form of sustainable practice associated to each other's environment or school garden.
- Each student will identify his or her pal and know, at least, two things about them.
- Each student will make contact through school email and connect with their pen pal.

### *Lesson 3: Virtual Garden Tour*

Purpose – Create and edit a virtual garden tour of the class's school garden to share with pal's school.

Objectives -

- Each student will identify a piece of his or her garden/growing facility.
- Each student will critique and learn three or more ways to make a garden tour video well.
- Each student will design a script of a garden tour.
- Each student will collaborate in a group the important features of their school garden and what makes their school garden unique.

### *Lesson 4: I Grow Culture Brochure*

Purpose – End of program assessment of knowledge learned by creating a brochure of pal's agriculture communication.

Objectives –

- Each student will identify three garden products from their sister school's location and their own.
- Each student will identify at least five artifacts that represent their pals garden and culture.

- Each student will demonstrate his or her knowledge about the gardening differences in his or her pal’s environment with a descriptive brochure.
- Each student will check comprehension each other’s environments by a presenting brochure through video chat with pal.

### *Evaluation*

During the pen pal program, a video camera will be documenting the lessons and the students work during the study to measure the level of student engagement. Your responsibility is to record every pen pal lesson stated above during class time. After observations and data are collected, the videos will be locked and stored in a confidential cabinet. You are free to request that the video camera in the classroom be discontinued at any time, again with no penalty to you or the participating students.

The only identified risk associated with your involvement in this study is the possibility that your participation could be discovered by other people, including faculty and staff in your school. To minimize this risk, your name will not be recorded on any of the materials in this study. Instead, your identity will be recorded as the “Teacher of Iowa.” Student participants’ names will not be associated with any data or results. If any individual’s comments or statements are included in the study, pseudonyms will be used in lieu of student participants’ names. Thus, your identity and participation in this study should not be revealed to anyone. If you have any questions, please feel free to contact me, Samantha Green, via email at [skgreen@iastate.edu](mailto:skgreen@iastate.edu) or via phone at (319) 240-8713. You may also contact my advisor Dr. Retallick via email at [msr@iastate.edu](mailto:msr@iastate.edu) or via phone at (515) 294-4810. If you have any questions about the rights of research subjects or research-related harm, please contact the IRB Administrator (515) 294-4566, [IRB@iastate.edu](mailto:IRB@iastate.edu), or Director, (515) 294-3115, Office for Responsible Research, 1138 Pearson Hall, Iowa State University, Ames, Iowa 50011.

### **Teacher Consent**

Enclosed is a copy of this letter for you to keep. If you are willing to participate in this study, please sign one copy of this letter and return it to me. Your signature indicates that you have read and understand the information above, willingly agree to participate, may withdraw at any time and discontinue participation without penalty, have received a copy of this form, and are not waiving any legal claims, rights, or remedies. If you have any questions or would like Dr. Retallick or me to clarify any aspects of this project, please ask Dr. Retallick or me before you sign this form. Thank you for your consideration.

Your Name (printed) \_\_\_\_\_

Your Signature \_\_\_\_\_

Date \_\_\_\_\_

## APPENDIX F

## PARENT CONTACT LETTER AND CONSENT

**IOWA STATE UNIVERSITY**  
OF SCIENCE AND TECHNOLOGY

Department of Agricultural Education and Studies

Michael S. Decker, Ph.D.

515 294-4810 (v)

Associate Professor

515 294-0510 (f)

206 Currier Hall

mar@iastate.edu

Ames, Iowa 50011-1050

Dear 7<sup>th</sup> and 8<sup>th</sup> grade GHS Parents,

You are receiving this letter because your son or daughter is enrolled at Giff Hill School as a 7<sup>th</sup> or 8<sup>th</sup> grade student. You and your student are likely familiar with the EARTH program at GHS. Within the past five years, a garden and food experience has been established at the school and your child may have had the opportunity to participate in gardening and cooking activities through the EARTH program.

While many students have participated in EARTH program activities, it is still relatively new to GHS. Students and professors from Iowa State University are involved in organizing learning and research projects using the school's new garden. In order for us to better understand what kind of an impact the garden is having on students' knowledge of local garden and cultural understanding, we have developed a pen pal program. We would like your student to have the opportunity to participate in this as part of the EARTH Program.

Attached you will find a form that describes the research pen pal program we wish to deliver to your GHS student. This form contains information you and your son or daughter should read before participating. If you are willing to have your son or daughter participate in the pen pal program, please sign one copy of the form and return the signed portion to Giff Hill School. The other copy is for your records.

Thank you for considering this pen pal program for your student. By participating in pen pal projects like this, educators are able to provide activities that are meaningful and relevant to students. If you or your child has any questions about this project research or the procedure for the pen pal program, please do not hesitate to ask.

Sincerely,

Samantha Green  
Graduate Student  
Agriculture Education & Studies  
Iowa State University

## Giff Hill Parental Consent Form

Title of Study: I Grow Culture Pen Pals: Connecting Students from the Midwest to the Virgin Islands using Science and Communication.  
Investigators: Michael S. Retallick, Ph.D., Samantha Green, B.S.

This is a research study. This form has information to help you decide whether or not you wish for your child to participate. Research studies include only people who choose to take part—your child's participation is completely voluntary. Please feel free to ask questions at any time.

Your child is being asked to take part in the pen pal program because he or she is in middle school at Giff Hill School. The purpose of the project is to study how well middle school students can communicate local gardening through a pen pal program.

If your child agrees to participate, he or she will be asked to be involved in classroom lessons that will teach them to talk with a pen pal during the school day. The objectives of the pen pal program are to 1) increase knowledge of gardening, 2) establish a cultural relationship, 3) practice with different tools to improve writing and science communication, and 4) increase awareness of sustainability in the environment. The lesson activities will include; emailing pals, collecting gardening samples, creating a brochure and a video tour of the school garden.

Each lesson will be videotaped for observation to measure the level of student engagement. The videos will only be viewed by the research team and secured in a password protected file to ensure confidentiality. Your child's participation will last no longer than eight weeks in the EARTH and English classroom. Students meet twice a week for 50 minutes in the EARTH and English classroom.

Before the lessons begin, your child will be asked to complete a questionnaire to determine their prior knowledge. The questionnaire will have questions regarding each other's environments and their knowledge of local gardening. This questionnaire will be given to your child again at the end of the pen pal program to check if the project improved their knowledge. Your child can skip any questions that he or she does not wish to answer.

If you decide to let your child participate in the pen pal program, there will be no direct benefit to you or your child. However, it is hoped that the information gained from this pen pal program will help Giff Hill School provide a quality agricultural education program.

There is no cost to your child by participating in this pen pal program. Your child will not be rewarded for participating in this pen pal program. Participating in this study is completely voluntary. Your child may choose not to take part in the study or to stop participating at any time, for any reason, without penalty or negative consequences.

Records identifying participants will be kept confidential to the level allowed by appropriate laws and regulations. Records will not be made publicly available. However, federal

government regulatory agencies, auditing departments of Iowa State University, and the ISU Institutional Review Board (a committee that reviews and approves research studies with human subjects) may inspect and/or copy your records for quality assurance and analysis. These records may contain private information.

To ensure confidentiality to the level allowed by law, access to study records will be available to members of the research team only and will be contained in a locked cabinet or password protected files to ensure confidentiality. If the results are published, your child's identity will remain confidential.

You are encouraged to ask questions at any time during this study. For further information about the study contact Dr. Michael Retallick, 206 Curtiss, Ames, IA 50011, (515) 294-4810; [msr@iastate.edu](mailto:msr@iastate.edu). If you have any questions about the rights of research subjects or research-related injury, please contact the IRB Administrator (515) 294-4566, [IRB@iastate.edu](mailto:IRB@iastate.edu), or Director, (515) 294-3115, Office for Responsible Research, 1138 Pearson Hall, Iowa State University, Ames, Iowa 50011.

### **Consent and Authorization Provisions**

Your signature indicates that you voluntarily agree to let you child participate in the I Grow Cultures Pen Pal Program study, that the study has been explained to you, that you have been given the time to read the document and they your questions have been agreeably answered.

Please sign and return on copy. The second copy may be kept for your records.

Students Name (**printed**) \_\_\_\_\_

Parent/Guardian's Name (**printed**) \_\_\_\_\_

\_\_\_\_\_  
(**Signature** of Parent/Guardian or Legally  
Authorized Representative)

\_\_\_\_\_  
(Date)

**IOWA STATE UNIVERSITY**  
 OF SCIENCE AND TECHNOLOGY

Department of Agricultural Education and Studies

Michael S. ~~Reich~~ ~~Ph.D.~~  
 Associate Professor  
 206 Curtiss Hall  
 Ames, Iowa 50011-1050

515.294-4810 (v)  
 515.294-0530 (f)  
 mre@iastate.edu

Dear 8<sup>th</sup> Grade West Liberty Parents,

You are receiving this letter because your son or daughter is enrolled at West Liberty Middle School as an 8th grade student. You and your student are likely familiar with the exploratory agriculture class at WLMS. Within the past five years, a garden and agriculture-based production facility has been installed at the school and your child may have had the opportunity to participate in gardening and cooking activities through the exploratory agriculture class.

While many students have participated in the Farm to School activities, it is still relatively new to WLMS. Students and professors from Iowa State University are recently involved in organizing learning and research projects using the school's new garden. In order for us to better understand what kind of an impact the garden is having on students' knowledge of garden and cultural understanding, we have developed a pen pal program. We would like your student to have the opportunity to participate in this as part of the exploratory agriculture class.

Attached you will find a form that describes the research pen pal program we wish to deliver to your WLMS student. This form contains information you and your son or daughter should read before participating. If you are willing to have your son or daughter participate in the pen pal program, please sign one copy of the form and return the signed portion to West Liberty Middle School. The other copy is for your records.

Thank you for considering this pen pal program for your student. By participating in pen pal projects like this, educators are able to provide activities that are meaningful and relevant to students. If you or your child has any questions about this project research or the procedure for the pen pal program, please do not hesitate to ask.

Sincerely,

Samantha Green  
 Graduate Student  
 Agriculture Education & Studies  
 Iowa State University

## West Liberty Parental Consent Form

Title of Study: Agriculture Pen Pals: Connecting Students from the Midwest to the Virgin Islands using Science and Communication.  
Investigators: Michael S. Retallick, Ph.D., Samantha Green, B.S.

This is a research study. This form has information to help you decide whether or not you wish for your child to participate. Research studies include only people who choose to take part—your child’s participation is completely voluntary. Please feel free to ask questions at any time.

Your child is being asked to take part in the pen pal program because he or she is in middle school at West Liberty School. The purpose of the project is to study how well middle school students can communicate local gardening through a pen pal program.

If your child agrees to participate, he or she will be asked to be involved in classroom lessons that will teach them to talk with a pen pal during the school day. The goals of the pen pal program are to 1) grow knowledge of gardening, 2) create a cultural relationship, 3) practice with different tool to improve writing and science communication, and 4) grow awareness of sustainability in the environment. The activities will include; emailing pals, collecting garden samples, creating a brochure and a video tour of the school garden.

Each lesson will be videotaped to capture the level of student involvement. The videos will only be viewed by the research team and kept in a password-protected file to make sure of confidentiality. Your child’s participation will last no longer then eight weeks in the agriculture classroom. Students meet every day for 45 minutes in the agriculture classroom.

Before the lessons begin, your child will be asked to complete a questionnaire to determine their knowledge. The questionnaire will have questions about each other’s environment and their knowledge of local gardening. This questionnaire will be given to your child again at the end of the pen pal program to check if the project improved their knowledge. Your child can skip any questions that he or she does not wish to answer.

Your child may also be considered for the control group of this project. Your child will not be videotaped nor asked to participate in lesson activities but will be ask to take the pre/post questionnaire. If your child is picked to be in the control group, once again, they may skip any questions that he or she does not wish to answer.

If you decide to let your child participate in the pen pal program, there will be no direct benefit to you or your child. However, it is hoped that the information gained from this pen pal program will help West Liberty Middle School provide a quality education agriculture program.

There is no cost to your child by participating in this pen pal program. Your child will not be rewarded for participating in this pen pal program. Participating in this study is completely



voluntary. Your child may choose not to take part in the study or to stop participating at any time, for any reason, without penalty or negative consequences.

Records identifying participants will be kept confidential to the level allowed by appropriate laws and regulations. Records will not be made publicly available. However, federal government regulatory agencies, auditing departments of Iowa State University, and the ISU Institutional Review Board (a committee that reviews and approves research studies with human subjects) may inspect and/or copy your records for quality assurance and analysis. These records may contain private information.

To ensure confidentiality to the extent allowed by law, access to study records will be available to members of the research team only and will be contained in a locked cabinet or password protected files to ensure confidentiality. If the results are published, your child's identity will remain confidential.

You are encouraged to ask questions at any time during this study. For further information about the study contact Dr. Michael Retallick, 206 Curtiss, Ames, IA 50011, (515) 294-4810; [msr@iastate.edu](mailto:msr@iastate.edu). If you have any questions about the rights of research subjects or research-related injury, please contact the IRB Administrator (515) 294-4566, [IRB@iastate.edu](mailto:IRB@iastate.edu), or Director, (515) 294-3115, Office for Responsible Research, 1138 Pearson Hall, Iowa State University, Ames, Iowa 50011.

### **Consent and Authorization Provisions**

Your signature indicates that you voluntarily agree to let you child participate in the I Grow Culture Pen Pal Program study, that the study has been explained to you, that you have been given the time to read the document and they your questions have been agreeably answered.

Please sign and return on copy. The second copy may be kept for your records.

Students Name (**printed**) \_\_\_\_\_

Parent/Guardian's Name (**printed**) \_\_\_\_\_

\_\_\_\_\_  
(**Signature** of Parent/Guardian or Legally  
Authorized Representative)

\_\_\_\_\_  
(Date)

**APPENDIX G****STUDENT INFORMED CONSENT****Giff Hill Student Assent Form**

Title of Study: I Grow Culture Pen Pals: Connecting Students from the Midwest to the Virgin Islands using Science and Communication.  
Investigators: Michael S. Retallick, Ph. D., Samantha Green, B.S.

This is a research project. This form has information to help you decide whether or not you wish to participate. Research studies include only people who choose to take part and your participation is completely voluntary. Please ask questions at any time.

You are being asked to participate in a pen pal program because you are a student in the EARTH and English classes at Giff Hill School. We want to learn how well middle school students can communicate local gardening through a pen pal program.

If you agree to participate, you will communicate with a pen pal during the school day. The goals of the pen pal program are to 1) grow knowledge of gardening, 2) create a cultural relationship, 3) practice with different tools to improve communication, and 4) grow awareness to your environment. The activities will include; emailing pals, collecting gardening samples, creating a brochure and a video tour of the school garden.

Each lesson will be videotaped to watch your involvement. The videos will only be viewed by the researchers and kept in a password protected file to make sure of your privacy. Your name will not be attached to any of the information. Your participation will last no longer than eight weeks in the EARTH and English classroom.

Before the lessons begin, you will be asked to complete a garden knowledge worksheet. It will have questions about the environment and your knowledge of gardening. This worksheet will be given to you again at the end of the pen pal program. You may skip any questions that you do not wish to answer.

This is completely voluntary. You may choose to not participate or stop at any time, for any reason, without negative effects.

Any information you will provide will be kept private. Your answers and identity will not be shared and only seen by the researchers. Your individual responses will not be shared with anyone and will be kept under lock and key or in password protected files. Only whole class reviews will be part of any reports from this project. If the results are published, your identity will not be known.

You are encouraged to ask questions at any time during this study. For further information about the study contact Dr. Michael Retallick, 206 Curtiss, Ames, IA 50011, (515) 294-4810; [msr@iastate.edu](mailto:msr@iastate.edu). If you have any questions about the rights of research subjects or research-

related injury, please contact the Institutional Review Board (IRB) Administrator (515) 294-4566, [IRB@iastate.edu](mailto:IRB@iastate.edu), or Director, (515) 294-3115, Office for Responsible Research, 1138 Pearson Hall, Iowa State University, Ames, Iowa 50011.

**Student Assent**

I am willing to participate in the I Grow Culture Pen Pal Program during my English and EARTH classes at Giff Hill School. I am aware that I am volunteering to participate and answer questions about local gardening and develop a relationship with another school's agriculture class. I know that my responses to questions, pen pal emails and work will be collected and that they will be kept private.

Please sign and return one copy. The second copy may be kept for your reference.

Participant's Name (**printed**) \_\_\_\_\_

\_\_\_\_\_  
(Signature of Student Participant)

\_\_\_\_\_  
(Date)

## West Liberty Student Assent Form

Title of Study: I Grow Culture Pen Pals: Connecting Students from the Midwest to the Virgin Islands using Science and Communication.  
Investigators: Michael S. Retallick, Ph. D., Samantha Green, B.S.

This is a research project. This form has information to help you decide whether or not you wish to participate. Research studies include only people who choose to take part and your participation is completely voluntary. Please ask questions at any time.

You are being asked to participate in a pen pal program because you are a student at West Liberty Middle School. We want to learn how well middle school students can communicate local gardening through a pen pal program.

If you agree to participate, you will communicate with a pen pal during the school day. The goals of the pen pal program are to 1) grow knowledge of gardening, 2) create a cultural relationship, 3) practice with different tools to improve communication, and 4) grow awareness of your environment. The activities will include; emailing pals, collecting gardening samples, creating a brochure and a video tour of the school garden.

Each lesson will be videotaped to watch your involvement. The videos will only be viewed by the researchers and kept in a password protected file to make sure of your privacy. Your name will not be attached to any of the information. Your participation will last no longer than eight weeks in the agriculture classroom.

Before the lessons begin, you will be asked to complete a garden knowledge worksheet. It will have questions about the environment and your knowledge of gardening. This worksheet will be given to you again at the end of the pen pal program. You may skip any questions that you do not wish to answer.

You may also be considered for the control group of this project. You will not be videotaped nor asked to participate in lesson activities but will be asked to take the pre/post questionnaire. If you are picked to be in the control group, once again, you may skip any questions that you do not wish to answer.

This study is completely voluntary. You may choose to not participate or stop at any time, for any reason, without negative effects.

Any information you will provide will be kept private. Your answers and identity will not be shared and only seen by the researchers. Your individual responses will not be shared with anyone and will be kept under lock and key or in password protected files. Only whole class reviews will be part of any reports found from this project. If the results are published, your identity will not be known.

You are encouraged to ask questions at any time during this study. For further information about the study contact Dr. Michael Retallick, 206 Curtiss, Ames, IA 50011, (515) 294-4810;

[msr@iastate.edu](mailto:msr@iastate.edu). If you have any questions about the rights of research subjects or research-related injury, please contact the Institutional Review Board (IRB) Administrator (515) 294-4566, [IRB@iastate.edu](mailto:IRB@iastate.edu), or Director, (515) 294-3115, Office for Responsible Research, 1138 Pearson Hall, Iowa State University, Ames, Iowa 50011.

**Student Assent**

I am willing to participate in the I Grow Culture Pen Pal Program during my agriculture class at West Liberty Middle School. I am aware that I am volunteering to participate and answer questions about local gardening and develop a relationship with another school's agriculture class. I know that my responses to questions, pen pal emails and work will be collected and that they will be kept private.

Please sign and return one copy. The second copy may be kept for your reference.

Participant's Name (**printed**) \_\_\_\_\_

\_\_\_\_\_  
(Signature of Student Participant)

\_\_\_\_\_  
(Date)

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