PREDICTING TEACHER LIKELIHOOD TO USE SCHOOL GARDENS:

A CASE STUDY

by

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(Under the Direction of Nick Fuhrman)

ABSTRACT

The purpose of this study was to predict elementary teachers' likelihood to use school gardens in their curriculum at Colbert Elementary in Madison County, Georgia. A quantitative survey, built around the theory of planned behavior, was used to investigate teachers' attitudes, school norms, perceived behavioral control, and intent in both current and ideal situations toward using gardens in their curriculum. Gardening in teachers' personal time was found to be a significant predicting factor that correlated with many components of the theory of planned behavior. Teachers who had previous experience with gardens had greater overall intent to use gardens over those who did not have any previous experience, aligning with suggestions from previous research. With positive school norms and teachers who garden in their personal time, 77% of teachers' current intent to use school gardens was explained. It is suggested that schools that wish to have a school gardening program utilize teachers who farm or garden in their personal time as mentors to other teachers, and promote positive norms and attitudes towards the use of gardens in the curriculum.

INDEX WORDS: school gardens, theory of planned behavior, elementary school, norms, attitudes, perceived behavioral control, intent, likelihood, barrier, benefit, types of school gardens.

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DEDICATION

This thesis is dedicated to three teachers who planted the seeds, nurtured me, and watched me grow: Mrs. LaRena Wildeman, Mr. Gregory Morris, and Mr. Bradley Beth.

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CHAPTER 1

INTRODUCTION

School gardens as curriculum compliments have increased in popularity in recent years. School gardens, defined by Graham, Beall, Lussier, McLaughlin, and Zidenberg-Cherr (2005) "as plants grown in the ground, in raised beds, in pots, containers or in greenhouses in both classrooms and outdoors to teach any subject or course material," have been in use since the early 1890's. However, the use of school gardens spiked in popularity in the United States during World War II and most recently with a 19% increase since the year 2009 (Draper & Freedman, 2010).

There are many benefits to using school gardens. These include increased physical health, overall academic achievement for those involved in gardening, as well as improved mental health and behavior (Graham, Beall, Luisser, McLaughlin & Zidenberg-Cherr, 2005; Jaeschke, Schumaker, Cullern, & Wilson, 2012; Nedovic & Morrissey, 2013; Oxenham & King, 2010; Ozer, 2007; Phelps, Hermann, & Parker, 2010; Robinson & Zajicek, 2005). However, even with these empirical benefits, many barriers have been reported as to why school gardens are not being used more often. Some of the frequently reported barriers have been a lack of physical support, funding, and most commonly, the lack of teacher training on how to use the garden (Graham et al., 2005; Hazzard et al., 2011; Jaeschke et al., 2012; Klemmer et al., 2005; Knobloch et al., 2007; Oxenham & King, 2010; Ozer, 2007; Skelly & Bradley, 2000; Sosu, McWilliam, & Gray, 2008). Although knowledge of the barriers and benefits to using school gardens is somewhat common in the literature, research on the likelihood of a teacher to use a school garden if one is in place is lacking.

Justification for this Study

As stated previously, gaps in the literature provide a need for a study that investigates not only a teacher's perspective on using school gardens, but all of the factors involved with their likelihood to use school gardens. While there has been previous research about barriers to the use of school gardens, teachers were only a portion of these populations. Additionally, research is needed to characterize exactly what kinds of teachers (e.g., demographically) are more likely to use gardens, as well as those who are not. Information is needed for pre-service teacher education programs to train new teachers how to teach using a garden. This is due to research showing that a lack of knowledge on how to use gardens is a main barrier for teachers (Hazzard, 2011;Klemmer, 2005; Knobloch et al., 2007 ; Ozer, 2007; Skelly, 2000 & Sosu, 2008). This study could also help school administrators or other key stakeholders identify teachers who could serve as "champions of change" to increase the use of school gardens, or mentor teachers to help less experienced teachers within the Clarke County School District [CCSD] in Georgia to use their school gardens. For in-service teachers, data from this study would be helpful to administrators within school systems to establish an environment where the likelihood of a garden being implemented and used will be high, and teachers will embrace the garden as a teaching tool. These two elements align with two main portions of Ajzen's (1991) theory of planned behavior– Norms and Perceived behavioral control. Lastly, with knowledge of the factors affecting teacher likelihood to use a school garden, more could be done to influence these factors towards the use of gardens, resulting in student learning benefiting as well. Therefore, knowing what it takes to influence teacher use of a garden, as this study examined, could in turn increase

the likelihood of student interactions in the garden, and therefore allow students to reap the many positive benefits known to come from school gardens.

Purpose and Scope

The purpose of this study was to understand elementary teachers' likelihood to using school gardens as a complement to their classroom curriculum. There is much research, as outlined in Chapter 2, on the benefits of schools gardens to children, as well as the barriers to the use of gardens in school. Lastly, while the theory of planned behavior has been effective in predicting teachers' likelihood to execute an action in relation to other subjects, including Environmental Education (Sosu, 2008), it has not been used in conjunction with school gardens. This study aims to address the gaps in the research through three objectives:

1. Describe the sample of teachers based on gender, years of service, grades currently taught, current use of school gardens, personal involvement with agriculture, and interest in continuing education on school gardens

2. Test the association between components of the theory of planned behavior and likelihood to use school gardens in the future

3. Predict the likelihood to use school gardens based on components of the theory of planned behavior and select demographic items

Theoretical Framework

The Theory of Planned Behavior is a predictive model that, through the investigation of four elements, allows for conclusions to be drawn about the likelihood of someone to complete an action. These four elements--attitudes, norms, perceived

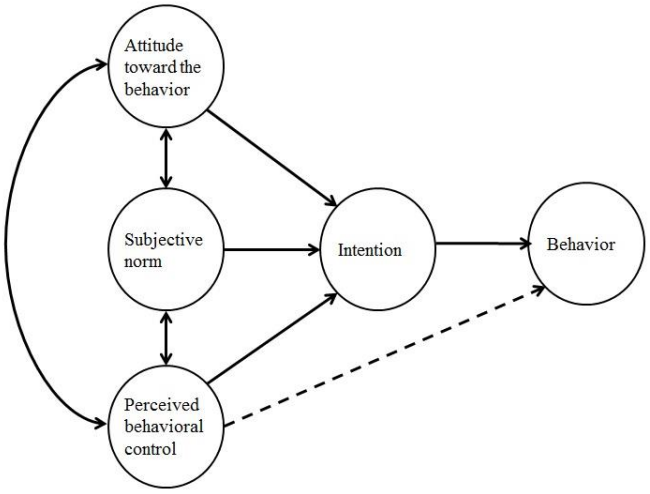

Figure 1.1 **Ajzen's (1991) Theory of planned behavior**

behavioral control, and intent--are all governed by three types of beliefs, including normative, behavioral, and control beliefs. These three beliefs all connect into the central factor of the theory, which is intention to execute the behavior. While each is a separate element within the theory, each element, in turn, influences and compliments the other to then predict likelihood to execute a behavior based on a person's *intent* to do it. Intention, according to Ajzen (1991), represents the reasoning that influences people's behavior. The connections between each element and how they influence likelihood can be seen in Figure 1.1, and are explained in more detail in Chapter 2.

The theory of planned behavior is the most applicable theory to predict likelihood of the use of school gardens not only for the unique components that make up the theory, but also how the components work together with one another. For example, according to

the theory, a teacher who reports a high sense of perceived control over the use of school gardens, has a positive attitude towards the use of gardens, and positive school norms toward gardens in their teaching environment would be a teacher who is likely to use a school garden, and therefore intends to use the gardens according to Ajzen's (1991) theory. Inversely, however, a teacher who reports they have little control over using school gardens, does not have a positive attitude towards school gardens, and is in a teaching environment in which norms indicate they should not be using the gardens would be less likely to use a school garden in their curriculum, and would therefore not have any intentions to utilize a garden as part of their teaching.

Testing the Theory of Planned Behavior

As this study was quantitative in nature, a survey was used to collect data. This survey, first created by Sosu (2008) to test commitment to environmental education, used the theory of planned behavior as the foundation, breaking the survey into sections representing the different elements of the theory. The instrument, made up of a total of seven sections, asked teachers to respond to questions about their attitudes toward the use of school gardens, the intent for their teaching and instructional strategies in both their current and ideal, or the teaching environment most idyllic to that teacher, the norms in their teaching environment about using school gardens, their perceived level of control and ease in using school gardens, and lastly demographic items used to describe themselves. The original survey by Sosu (2008) investigated commitment to environmental education by teachers in the United Kingdom, so minor edits were made to make sure content was not only applicable to teachers in the United States, but also to the use of school gardens. A pilot study was done at Colbert Elementary School in Madison

County, Georgia to test the instrument's applicability to the target audience, reliability, and validity. A paper version of the final survey was distributed to the teachers of Chase Street Elementary School in Athens, Georgia and was analyzed using SPSS Statistical software. However, despite use of many recommended methods, there was extremely low response rate at Chase Street. Therefore, the data in this study is based off of the data collected at Colbert Elementary.

Colbert Elementary School

Colbert Elementary School serves 408 students in grades kindergarten through fifth in the Madison County School District in Northeast Georgia. Gardens at Colbert Elementary School started as long as 15 years ago when funding was received from Project Learning Tree, an environmental education curriculum for grade school children. There is a school garden committee that teachers volunteer to sit on, with one teacher serving as the school garden chair. The garden is used by at least one teacher in all of the grades on a semi-regular basis; sometimes as often as daily in the warm months, but as few as one day a month in the colder months. It is up to the individual teachers to match lessons in the garden with school curriculum, with many teachers not aware of resources such as lessons on the Georgia Extension website (T.Bettis, C. Forrer, L. Skelton, personal communication, December 4, 2014).

Among other elementary schools in the Madison County School District, Colbert Elementary has proved to be an exemplary school with teachers committed to the use of school gardens despite lack of parent involvement, knowdlge of curriculum, and lack of funding. The gardens, held in a school courtyard and consisting of raised beds, in-ground beds against the walls and around a gazebo, and pots, are entirely maintained by the

teachers themselves with parent involvement being non-existent. The school garden at Colbert Elementary is used to grow herbs, native plants to attract pollinators, and flowers. Additionally, the garden serves multi-purposes being used to host the school cookout at the beginning of every year, as well as a place for students to read, explore, and enjoy the aesthetic value of the environment. Colbert Elementary was selected as the site for this case study because they are currently an exemplary school that uses school gardens in their curriculum across many grades and subjects. Key stakeholders have indicated that this school excels at using school gardens, has many teachers involved, and continues to show an increased interest in growing their school garden program (T.Bettis, C. Forrer, L. Skelton, personal communication, December 4, 2014). While every elementary school in the Madison County School District has a school garden, Colbert Elementary is especially committed to school garden use.

Definition of Terms

Barrier – Anything that could prevent the use of a school garden.

Benefit – Any positive effect or outcome related to the use of school gardens, including knowledge, attitude, or behavioral intent of students and teachers.

Community Garden - Gardens used by a congregation of people in a diverse setting, including at schools (Draper & Freedman, 2010).

Curriculum – "The courses, subjects, and topics taught by an educational institution" (Schumaker, 2010, p.15).

Likelihood – The strength of the probability that a teacher would use a school garden.

Ideal Situation– The most idyllic and picturesque teaching environment as visualized by each individual teacher according to their own standards.

School garden – Any plants grown in the ground, in raised beds, in pots, containers or in greenhouses in both classrooms and outdoors to teach any subject or course material (S. Zidenberg-Cher with collaboration from the California Department of Education, Nutrition Services Division and in conjunction with Graham et al., 2005, personal communication, April 15, 2014).

Use – Integrating any type of school garden into a lesson to satisfy any portion of the curriculum.

Study Limitations

This study sought to investigate the commitment of teachers to use school gardens by predicting their likelihood through the theory of planned behavior. The results of this study only reflect the opinions of teachers at one elementary school in one district, as it was a case study. Therefore, the results found are not generalizable to a broader group of teachers.

CHAPTER 2

REVIEW OF LITERATURE

Introduction

This chapter presents a summary of the literature on the historical use of school gardens in the United States and how school gardens are currently being incorporated into curricula. Benefits of the use of school gardens are discussed, and research on the barriers to using school gardens is then explained. The theory of planned behavior is also introduced as the theoretical framework for this study. Finally, use of the theory of planned behavior in relation to school gardens is investigated with a discussion of studies outlining the characteristics of teachers who are and are not likely to use school gardens.

Historical Use of School Gardens

In recent years, gardening has seen resurgence in the United States' public school system. School gardens are now a common occurrence and some of the most largely populated states, such as California and Texas, are encouraging integration of gardens in their school curriculum. In 1995, the California Department of Education launched the "A Garden in Every School Campaign" through passing four bills in both the California state senate and state assembly ("School Garden Program Overview," 2013). In Texas, the Agricultural Extension Service provides support and curriculum to "help teachers, administrators, and parents learn how to incorporate school gardens into their" curriculum (Klemmer, Zajicek, & Waliczek, 2005, p. 433). While California and Texas are known for extensive agricultural production, other states such as New York and Vermont are also actively involved in integrating school gardens into their curriculum (Blair, 2009).

Although states have recently pushed to incorporate gardens into the school day, the integration of gardens in the school curriculum is not a new idea. Montessori (1912, as cited in Klemmer et. al., 2005) suggested the use of gardens in curricula. School gardens had their first appearances in the 1890's as a response to many "social, environmental, and economic climates" that arose in this period for urbanization, economic questionability, and the large amount of immigration (Draper & Freedman, 2010, p. 459). School gardens then saw resurgence during World War II with the popularity of Victory gardens, which were also common in the backyards of many homes. Lastly, with the most recent economic instability from the recession in the mid-2000's, the year 2009 saw an increase of 19% in community gardens from before, which includes school gardens (Draper & Freedman, 2010).

Incorporation of School Gardens in the Curriculum

School gardens are applicable to state and national learning standards. Most recently, with the push towards common core standards so every child across the United States will be learning the same information at the same level, guidelines such as the National Science Education Standards (NSES) advocate the use of school gardens. School gardens allow for a constructivist style of learning and also offer cross-curricular opportunities for students and teachers (Klemmer et al., 2005; Phelps, Hermann, Parker, & Denney, 2010). Garden-based learning (GBL), as school garden programs are often referred to, have been reported to not only increase student scientific achievement, which might be attributed to the large content area that can be used to achieve all eight NSES requirements, but also provide "an authentic and cross-disciplinary experience for all learners" (Rye et al., 2012, p. 65). The constructivist learning theory suggests that when

students learn through various styles, such as experiential, hands-on, or traditional methods, because the students are situated in the center of their own education, they will "build, or construct, their own knowledge for themselves" (Klemmer et al., 2005, p. 433).

Multiple studies (Klemmer et al., 2005; Pascoe & Wyatt-Smith, 2013; Phelps et al., 2010; Robinson & Zajicek, 2005; Rye et al., 2012; Skelly & Bradley, 2000) have empirically proven the positive impact that gardens can have on student learning, primarily focusing on the use of school gardens to teach in a cross-curricular manner. Pascoe and Wyatt-Smith (2013) conducted interviews with key stakeholders in the school garden programs at two schools in Brisbane, Queensland Australia on their opinions of using school gardens to increase cross-curricular literacies in students. The study revealed that using the garden as a "physical and curriculum learning space" benefited students by increasing their literacies "across a range of learning outcomes," but that GBL could also present barriers to learning when lessons are not taught in tight conjunction with one another (p. 34). This study presented another common theme found also in other studies—that of the need for more teacher support in using school gardens (Graham, Beall, Lussier, McLaughlin, & Zidenberg-Cherr, 2005; Hazzard, Moreno, Beall, & Zidenberg-Cherr, 2011; Klemmer et al., 2005; Lautenschlager & Smith, 2007; Ozer, 2007; Pascoe & Wyatt-Smith, 2013). Teacher use of school gardens is encouraged through ease of use of school gardens through the development of a more generalized curriculum to aid in the use of the gardens for lessons, but also through training for teachers who often do not have any personal experience of their own in how to use gardens. Hazzard et al. (2011) suggested that schools who wish to have a sustainable school garden program utilize a school garden coordinator whose sole job would be to

create and plan lessons for the utilization of the garden, but could also execute lessons involving the gardens if individual teachers did not feel comfortable doing so themselves.

School gardens are only likely to be successful over an extended period of time when the school culture (norms) supports the garden. Hazzard et al. (2011) determined through a series of interviews with key stakeholders in the school garden program at ten different schools that long-term sustainability of a school garden program depends on three characteristics embodied by schools with long term garden success. These characteristics include: "1. Incorporation into the academic structure, 2. Sustainability for a minimum of 2 years, …. and 3. Known and recognized in the professional school gardening field" (p. 410). However, these characteristics are ambiguous in their measurability (such as "known and recognized in the professional school gardening field") because, as Ozer (2007) showed, "school garden programs vary widely in the scope, intensity of participation, and integration into regular curriculum even within the same district" (p. 847). Therefore, while some of these characteristics are measurable in their entirety, such as by the number of lessons that use the garden, the number that determines success will vary based on a number of different factors in a state, school district, or even from school to school.

Use of School Gardens in Madison County

The Madison County School district is located in Northeast Georgia and served 4,479 students in the 2012-2013 school year amongst four elementary schools, one middle school and one high school (Madison County Annual Report, 2014). Each of the four elementary schools in the district has their own school gardens, with each garden being run independently of the other. The gardens are used amongst all grades, and are

used to teach in a cross-curricular fashion. The gardens are mostly used to grow flowers, to attract pollinators, and for a small amount of vegetables. There is no information whether or not the vegetables are consumed by students, or what their end use is. There is no person in the district to head up the gardens or to serve as a resource for the schools, teachers, and administrators (T. Bettis, C. Forrer, & L. Skelton, personal communication, December 4, 2014). Additionally, there is no information on the county or school websites highlighting these gardens or where more information might be found.

Benefits to the Use of School Gardens in the Curriculum

The majority of the literature applauds the benefits that school gardens have on students and the overall learning process and even on a student's health (Blair, 2009; Jaeschke, Schumacher, Cullen, & Wilson, 2012; Klemmer et al., 2005; Knobloch, Ball, & Allen, 2007; Lautenschlager & Smith, 2007; Nedovic & Morrissey, 2013; Oxenham & King, 2010; Ozer, 2007; Phelps et al., 2010; Robinson & Zajicek, 2005; Rye et al., 2012; Skelly & Bradley, 2000). Not only have studies found that children who are involved in gardening are more willing to try nutritious foods and cook their own food, they are also more willing to try foods they have never eaten before (Lautenschlager & Smith, 2007). Currently, childhood obesity is an issue as "more than 30% of boys and girls aged 6 to 19 years [in America] are overweight or obese" (Hedley, Ogden, Johnson, Carroll, Curtin, Flegal, 2004 as cited in Hazzard et al., 2011, p. 409). Additionally, there has been a measurable increase in type 2 diabetes in children (Ozer, 2007). Obesity and related health problems can be avoided by "healthful eating and regular physical activity" which can be provided simply through the use of gardens in schools, even if for a limited time during the school week (Phelps et al., 2010, p. 1). In addition, it is especially essential to

teach school age children about healthy lifestyles as this will provide a firm foundation for a healthy lifestyle to be carried out through the rest of their lives (Jaeschke et al., 2012).

Healthy lifestyles education can also help reduce violence (Oxenham & King, 2010). Phelps et al. (2010) found that children in an elementary school after-school program 3-5 days per week self-reported a decrease in sedentary activity. Not only do students self-report that they enjoyed activities such as those provided by a garden, those who may not enjoy commonly offered afterschool activities, such as competitive sports, are also provided an outlet for physical activity in a non-threatening environment (Nedovic & Morrissey, 2013; Phelps et al., 2010). Even children with physical disabilities which might limit their involvement in other activities have the opportunity to participate in school-gardens through the use of raised beds or pots (C. Hinson, Personal Communication, October 25, 2013). Activity such as those provided in the study by Phelps et al. (2010) are especially important when youth today watch three to four hours of television, a sedentary activity, *per day* (Lautenschlager & Smith, 2007). Lastly, school gardens can help improve childhood health by providing additional nutritious options to a school's current meal plan when vegetables from the garden are prepared as a healthy snack, or are integrated into the school's meal programs (Oxenham & King, 2010).

Several studies (Graham et al., 2005; Jaeschke et al., 2012; Nedovic & Morrissey, 2013; Oxenham & King, 2010; Ozer, 2007; Phelps et al., 2010; Robinson & Zajicek, 2005) also show benefits that occur from the use of school gardens beyond physical aspects. Graham et al. (2005), Nedovic and Morrissey (2013), and Phelps et al. (2010) all

report that students who are involved in garden-based learning (GBL) display positive effects in regards to academic performance, perform better on standardized tests, and have a generally greater overall knowledge than other children their age. Elementary age children are still in the prime stage of development and learn many socialization skills from being at school, including when they interact with one another in a school garden (Nedovic & Morrissey, 2013). Robinson and Zajicek (2005) reported improved teamwork and responsibilities through the tasks that gardens provide. Also, because of the hands-on learning required, self-efficacy, problem-solving skills, and confidence in choices are all exhibited by children who have been involved in curriculum taught through the use of school gardens (Oxenham & King, 2010). Lastly, children who are involved in GBL and other learning through nature-based scenarios display lower stress levels, less emotional distress and aggression, and higher levels of connectedness (Nedovic & Morrissey, 2013; Ozer, 2007).

Barriers to Teachers Using School Gardens

Even with all of the documented benefits to the use of school gardens in the curriculum and support for the use of gardens from national education agencies, many studies have also documented barriers to the use of school gardens for teachers. These barriers include those associated with the establishment of gardens, and to the long term sustainability of school gardens (Graham et al., 2005; Hazzard et al., 2011; Jaeschke et al., 2012; Klemmer et al., 2005; Knobloch et al., 2007; Oxenham & King, 2010; Ozer, 2007; Skelly & Bradley, 2000; Sosu, McWilliam, & Gray, 2008). Table 2.2 shows a comparison of studies that described specific barriers to the use of school gardens.

Table 2.1
Identified Barriers to Teachers Using School Gardens

	Barriers to the Use of Gardens						
Author(s)	A	B	C	D	E	F	G
Graham et al., 2005	X	X		X		X	
Hazzard et al., 2011	X	X			X		
Klemmer et al., 2005	X						
Knobloch et al., 2007	X			X			
Oxenham & King, 2010		X	X			X	
Ozer, 2007	X	X	X	X	X		X
Skelley & Bradley, 2000	X				X		
Sosu et al., 2008	X	X	X	X	X	X	

A = Lack of training/experience
B = Lack of support: Volunteers, parents, other teachers, or garden coordinator, etc.
C = Lack of funding
D = Lack of curriculum related to gardens
E = Lack of time
F = Lack of supplies/related materials
G = Lack of space

The most common identified barrier in the literature to teachers' use of school gardens was a lack of teacher training on how to use gardens, both in the classroom and in general, as well as a general lack of teachers' experience with gardens. Studies, such as that by Sosu, McWilliam, and Gray (2008), have shown that previous life experience does not play a role in the intention to execute a behavior. However, teachers still feel they lack the knowledge to use a school garden effectively, so both training on how to use gardens and experience with the use of gardens is needed (Graham et al., 2005; Hazzard et al., 2011; Klemmer et al., 2005; Knoblock et al., 2007; Oxenham & King, 2010; Ozer, 2007; Skelley & Bradley, 2000; Sosu et al., 2008). Blair (2009) echoes the importance of teachers feeling prepared to use school gardens and also suggested that information and experiences on school gardens could become part of teachers' pre-service education. Lastly, Hazzard et al. (2011) found that schools that managed to

sustain exemplary school garden programs also commonly utilized a school garden coordinator. This school garden coordinator worked specifically for the school to not only create lessons utilizing school gardens, but to also be there for teachers as a resource when executing a lesson or to execute the lessons for teachers who saw the benefits of school gardens but did not themselves feel comfortable using the gardens in their own teaching.

General support for teachers to use a school garden in their teaching was another barrier identified in the literature. A lack of general support to maintain the gardens, whether that be through volunteers, parents, other teachers, or a specific school garden coordinator position, was found to be a common barrier in the literature (Graham et al., 2005; Hazzard et al., 2011; Oxenham & King, 2010; Ozer, 2007; Sosu et al., 2008). Teachers often feel the greatest burden of school gardens as they are often responsible for the upkeep of the gardens, which includes maintenance of the gardens when school is not in session (Oxenham & King, 2010). Additionally, as Graham et al. (2005) found, this burden is on top of teachers' general classroom duties, so there is a need for help to carry the heavy responsibility created by a school garden. Oxenham and King (2010) suggest that the inclusion of parents in the garden-based learning process not only helps to reinforce ideas learned in the classroom that could be extended into the home (such as the benefits of consuming fruits and vegetables), but can also help to recruit garden volunteers. Hazzard et al. (2011) also found that in addition to school garden coordinators providing lessons utilizing school gardens, they also proved helpful in coordinating outside support for the gardens. Both Oxenham and King (2010) and Hazzard et al. (2011) list the utilization of multiple sources of support, whether it be parents,

administration, school staff, other teachers, and/or students, as essential to the long term sustainability of a school garden program.

The Theory of Planned Behavior

The theory of planned behavior is a model "designed to predict and explain human behavior in specific contexts" through grouping specific behaviors that occur in varying situations and forms (Ajzen, 1991, p. 190). Three types of beliefs related to the specific action are measured in the theory of planned behavior: behavioral beliefs, normative beliefs, and control beliefs. All of these beliefs, behavioral (attitude toward the behavior), normative (what others do regarding the behavior), and control (how much control one has over engaging in the behavior), connect to Ajzen's (1991) central factor of intention to engage in an action. Intention, according to Ajzen (1991), represents the reasoning that influences people's behavior, therefore "the stronger the intention the greater the likelihood to execute the action" (p. 190).

In the theory of planned behavior, each one of the individual types of beliefs represent a different portion of the model, with each of the beliefs associated with one another to influence a person's overall intent to execute an action. Ajzen's (1991) original model can be seen in Figure 1.1. Behavioral beliefs (attitude portion of the model) refer to the extent of a person's favorable or unfavorable opinions of the behavior. These attitudes are most often formed from experiences the individual has personally had in the past, but are also formed in relation to the object of the behavior itself and are either positive or negative. The normative beliefs, or the subjective norms section, helps to reveal the believed general conventions of the environment surrounding the individual in regards to the behavior. The power of these normative beliefs depends heavily on the

level to which the individual complies with the opinions of the others around them. According to the theory of planned behavior, if others are engaged in a behavior, the likelihood of an individual's engagement increases. Control beliefs, referred to as perceived behavioral control, explain how easy or hard the individual believes it would be to perform the action.

Both first- and second-hand experiences (learning from the actions and stories of others) play a large part in the formation of attitudes and the perceived behavioral control of an action. Thus, this study also measured a teachers' previous experience with gardens in terms of their comfort level in using a garden in their curriculum. Additionally, while perceived behavioral control has its own amount of predictability in relation to the intent to complete the action, when it stands alone from the other elements of the model, perceived behavioral control only has the element of predictability and does not allow for likelihood to be measured. When all used together, attitudes, norms, and perceived behavioral control can predict intent to execute the action "with a high degree of accuracy… in turn, these intentions in combination with perceived behavioral control, can account for a considerable proportion of variance in behavior" (Ajzen, 1991, p. 206).

The Theory of Planned Behavior and Use of School Gardens

In a comprehensive review of the literature from the past 13 years, no studies were found that used the theory of planned behavior in conjunction with the use of school gardens by teachers. However, there have been studies that used the theory of planned behavior in regards to the use gardens by children (Lautenschlager & Smith, 2007), and teachers' commitment to the use of Environmental Education (Sosu, 2008). Additionally, one study by Zint (2002) reported that the theory of planned behavior was found to be the

best model to predict science teachers' intent to teach a given subject in their classrooms when compared to the Theory of Trying and the Theory of Reasoned Action. While others have noted the value in using the theory of planned behavior as a predictive model for intent related to gardens, more research is needed to test the value of using the theory of planned behavior to evaluate *teachers' likelihood* to using school gardens.

Use of School Gardens and Teacher Characteristics

Most of the studies used to evaluate the effects of school garden use on children have not been completed by the children themselves (only Phelps et al. (2010) used children in the evaluation process). Data is typically reported by overseeing individuals such as teachers or administrators. Even when teachers or administrators are used as a sample, as was the case with Graham et al. (2005); Hazzard et al. (2011); Jaeschke et al. (2012); Nedovic and Morrissey (2013); Pascoe and Wyatt-Smith (2013); and Skelly and Bradley (2000), the focus is still on the effect of the garden on children, and does not concern the key garden stakeholders—the teachers. Additionally, no studies were found that accurately describe the teachers who are using gardens in terms of specific demographic characteristics beyond Graham et al. (2005) who asked what best describes the neighborhood in which the school was located where the sample teachers taught. While Sosu (2008) did describe his population in detail, this study specifically focused on the use of Environmental Education which, while partially encompassed the use of school gardens, is viewed here as an entirely separate entity. Therefore, a need has been shown for a study to identify the key characteristics of teachers who are and, maybe more importantly, are not using school gardens in their curriculum.

Summary

A thorough review of literature on school gardens over the past 13 years (since 2000) found that while there are many studies praising the benefits of using school gardens, there are still many barriers to the use of school gardens. The most common barriers reported in the literature were lack of training and experience on how to use the garden. However, much evidence shows that there is ample opportunity for school gardens to be used in a variety of ways, as is shown through the uses of gardens in the Madison County School District where this case study was based. Lastly, little research was found on the use of the theory of planned behavior to test the likelihood of teachers to use gardens in their curriculum. In addition, little research was found on the characteristics of teachers using gardens in their curriculum and therefore warranted the need for this study.

CHAPTER 3

METHODS

Introduction

This chapter provides details on how data was collected for this study, as well as the construction of the instrument used for data collection. Research objectives are outlined, as well as the methods used to achieve each objective.

Research Objectives

This study was guided by the following research objectives:

1. Describe the sample of teachers based on gender, years of service, grades currently taught, current use of school gardens, personal involvement with agriculture, and interest in continuing education on school gardens.
2. Test the association between components of the theory of planned behavior and likelihood to use school gardens in the future.
3. Predict the likelihood to use school gardens based on components of the theory of planned behavior and select demographic items.

Data Collection

To better understand teachers' commitment to using school gardens, Colbert Elementary School in Colbert, Georgia as part of the Madison County school district was chosen as the site for this case study. The school already had an existing school garden available to teachers and students. While all elementary schools in the Madison County School District have a school garden, this school was recommended by key stakeholders as an exemplary school that actively uses their garden despite many limitations (N. Fuhrman, personal communication September, 2013). Colbert Elementary school serves

390 students in grades kindergarten through fifth. Demographically, the school consists of 17.9% of students identifying as Hispanic, 10.0% as black, 68.2% as white, and 3.85 % as another race. Two-thirds of the students receive either free or reduced lunch (Madison County Annual Report, 2014). There are 30 full-time teachers, 60% of whom have advanced degrees. (C. Forrer, personal communication, November 20, 2014). This sample was a purposive, census. All 30full-time classroom teachers at Colbert Elementary School were invited to participate.

The instrument used for this study was first created by Sosu (2008) and was grounded in the theory of planned behavior (Ajzen, 1991). To align data collection with the theoretical framework of this study, the researcher ensured that each construct on the instrument represented a component of the theory of planned behavior. The researcher did modify the instrument to address validity (see details below regarding pilot study revisions) and then distributed it to a census of all full time teachers at Colbert Elementary School. The instrument was distributed electronically to all teachers following guidelines recommended by Dillman, Smyth, and Christian (2009). Some of the guidelines which were specifically adhered to for this study included:

- Breaking the instrument up into sections according to each construct of interest to ensure all questions could be seen, read easily, and were distinguishable from one another.
- Providing instructions at the beginning of each section to ensure participants understood the objective of each section
- Adding a logo to the top marking of every page of the instrument to increase trust (social exchange)

- A progress bar was included in order for participants to gauge their progression through the instrument
- To ensure that all questions could be seen no matter the size of the participant's computer screen or browser window
- Letting participants know how long the instrument was expected to take, how many sections there were, and titling each section throughout the instrument (Dillman et al., 2009)

Dillman et al. (2009) discuss four sources of survey error—measurement error, coverage error, non-response error, and sampling error—and these sources were minimized using a series of steps. Measurement error was minimized by utilizing both peer evaluation and evaluation by the researcher's graduate committee. This ensured that language was appropriate and verified the use of certain phrases for answer choice scales. Coverage error was minimized by having the principal emailing all of the teachers letting them know that the survey would soon be distributed. In addition, Dillman et al.'s (2009) Tailored Design Method helped to ensure the highest response rate possible through the use of a specified deadline, and a reminder from the principal of Colbert Elementary. Lastly, because the target population for this study was teachers at Colbert Elementary, sampling error was minimized by inviting all full-time teachers to participate.

The survey was initially created by Sosu (2008), and first shared in publication by Sosu et al. (2008), but was revised to be more appropriate for the population in this study. The revisions started by first addressing validity. Face and content validity were addressed through the use of peer review, as well as review by the researcher's graduate committee. Social Exchange Theory was also applied to ensure face validity (Dillman et

al., 2009; Emerson, 1976). The researcher used results from Sosu's (2008) dissertation study where a factor analysis of the original constructs was conducted to help determine which items to retain for the current study. Sosu's (2008) original instrument was considerably longer than would be desired for this population of teachers and the researcher wanted to keep constructs to a maximum of 10 items. Lastly, by using an instrument that is grounded in theory, as is the case with the use of the theory of planned behavior, content validity was enhanced (Ajzen, 1991).

Instrument construction

The theory of planned behavior provided the theoretical foundation which guided data collection in this study. The modified instrument was divided into a total of seven sections, with six of them being constructs which aligned with elements of the theory of planned behavior (Ajzen, 1991). Participants were first introduced to the researchers and the purpose of the study. The length, time, and types of questions to be asked of them were also outlined. Participants were then asked if they agreed to the informed consent form that was attached to the survey (APPENDIX A). If they agreed, they proceeded to an introduction page explaining who the researchers were, as well as what the survey would consist of. The instrument provided participants with a working definition of what the researchers meant by "using a school garden." The definition, "using plants grown in the ground, in raised beds, in pots, containers or in greenhouses in both classrooms and outdoors to teach any subject or course material," was meant to provide more clarification as landscapes maintained by district personnel that children have no involvement in were not included in the definition of a school garden (S. Zidenberg-Cher with collaboration from the California Department of Education, Nutrition Services

Division and in conjunction with Graham et al., 2005, personal communication, April 15, 2014)

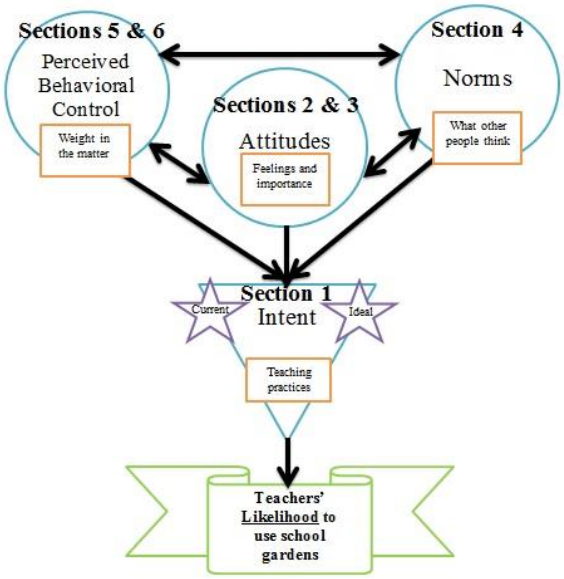

Figure 3.1 Theory of planned behavior model displaying corresponding constructs with section numbers. The full instrument can be found in Appendix A.

Figure 3.1 provides a summary of the constructs on the instrument and their alignment with components of the theory of planned behavior. Section One of the instrument encompassed the first two constructs: IntentCurrent and IntentIdeal. This construct aimed at measuring teachers' intent behind using a specific teaching tool (e.g. a school garden), given both their current teaching situation, as well as in the teaching environment they deem the most desirable. While these constructs do not actually address intent to use school gardens, the original author of the instrument, Sosu, 2008, aimed to investigate *why* teachers would want to use Environmental Education, or in this case school gardens, in their curriculum as a teaching tool. Section Two represented the Attitude Construct where participants were asked about their general feelings toward using gardens in their curriculum. Section Three also represented the Attitudes construct,

but while the first attitudes section (Section Two) asked participants to focus on how they felt about certain statements as they pertained to using gardens in their curriculum, this attitude section (Section Three) had slightly modified items. These items allowed participants to respond to statements related to how they generally felt as a teacher, such as how important it was for their students to acquire certain problem solving strategies, or to bring about changes in their students in regards to gardening.

Section Four measured how the participants viewed the environment in which they teach, or the Norms in their teaching environment. Section Five contained two questions with each question being measured and analyzed independently from one another. The questions in this section related to the participant's Perceived Behavioral Control, and directly asked participants how much control they felt they had over using gardens in their curriculum. While still important to the overall scope of the study and that of the theory of planned behavior, these questions stand alone in their own section, as the scales used for their answer choices are different from one another, as well as from the answers choices used for the other questions from the Perceived Behavioral Control construct. Section Six investigated the participants' Perceived Behavioral Control over using the gardens in their curriculum by asking about their feelings towards using gardens if training, time, space, and freedom were provided. Lastly, Section Seven asked participants to provide demographic information. Demographic questions that were asked included the participants' gender, the number of years participants' had been teaching, the grade(s) participants taught, which categories of gardens they utilized to teach any course material at the time of the survey, if their teaching colleagues use gardens, and whether the participants farmed or gardened in their personal time. In addition to these

being similar demographic questions that were used in the original instrument by Sosu (2008), demographic questions allowed the researcher to create a more accurate description of the types of teachers who were more likely to use gardens in their curriculum, as well as those who are not as likely. Little previous research exists which describes the demographics of teachers who are, and are not, likely to be committed to using gardens in their curriculum and warranted the development of this study.

The end of the instrument invited participants to be part of an optional interview with the researcher. The page after Section Seven asked if participants would like to participate in the interview portion of the study. If participants chose no, they were directed to the last page of the study where they were able to add any additional comments and were thanked for their participation. If participants selected yes, they were asked to enter their email address and were then directed to the final comments and thank you page. Sosu et al. (2008) found that the use of a mixed methods approach allowed a deeper investigation of the culminating factors in the theory of planned behavior which both together and individually affect teachers' commitment. This then allowed for the possibility of even more information to be revealed that could not be seen with either a qualitative or quantitative method alone.

Summary

Sosu's (2008) original instrument was strong. Measurement error was minimized in several ways, and using an online version of the instrument was also appropriate and effective. The following chapter reveals results using this revised instrument with the teachers at Colbert Elementary School.

CHAPTER 4

RESULTS

Introduction

The purpose of this study was to understand elementary teachers' likelihood to using school gardens as a compliment to their classroom curriculum. Surveys were distributed to all full time kindergarten through fifth grade teachers at Colbert Elementary. The following provides details on the types of analysis used to address each of the research objectives in this study (Table 4.1). All analyses were conducted using IBM SPSS Statistics Version 20.

Table 4.1
Data analysis procedures used to analyze each individual research objective

Research Objective	Data Analysis Procedures Used
1. Describe the sample of teachers based on gender, years of service, grades currently taught, current use of school gardens, personal involvement with agriculture, and interest in continuing education on school gardens	Descriptive statistics, including frequencies, percentages, means, and standard deviations as well as.
2. Test the association between components of the theory of planned behavior and likelihood to use school gardens in the future	Cronbach's Alphas for construct reliability, Pearson's Correlation, and T-tests
3. Predict the likelihood to use school gardens based on components of the theory of planned behavior and select demographic items	T-tests, Regression model R-square change and Pearson's Correlation

A response rate of 67% (n = 20) was achieved. All respondents (n = 20) were female. Table 4.2 displays the Cronbach's Alphas for each of the individual constructs of

the instrument. All constructs had internal consistencies above the minimal acceptable level of 0.70 (Davis, 1971).

Table 4.2
Cronbach's Alpha's by Construct

Construct	N of items	Alpha
Intent 1a – Ideal	5	.963
Intent 1b –Current	5	.921
Attitude1	5	.885
Attitude2	5	.902
Norms	5	.969
Perceived Behavioral Control	10	.936

Findings by Objective

Objective One

Table 4.3 displays the number of years participants' had been teaching. Participants had been teaching for an average of 16 and a half years, with the shortest amount of teaching experience being 5 years and the longest being 28 years of experience.

Table 4.3
Number of Years Teaching

N	Valid	16
	Missing	4
Mean		16.50
Median		16.50
Std. Deviation		7.421
Minimum		5
Maximum		28

The frequency in which participants taught individual grades is displayed in Table 4.4. Participants were allowed to choose more than one grade and 45% (n = 9) taught a single grade while 55% (n = 11) taught more than one grade. Fifteen percent (n = 3) of respondents taught all 6 grades. Fourth grade was taught most commonly with 55% (n = 11) while first grade was taught the least (30%, n = 6). This comes to more than 100% as 55% of participants reported that they taught more than one grade (n = 11).

Table 4.4
Grades Taught – Frequencies and Percentages

Grades Taught	*F*	Percent
Kindergarten	9	45%
First	6	30%
Second	7	35%
Third	7	35%
Fourth	11	55%
Fifth	10	50%

Nine respondents (45%) reported that they did garden in their personal time, while 55% (n = 11) reported that they did not garden in their personal time (Table 4.5).

Table 4.5
Frequency of Personal Time Spent Gardening

	Frequency	Valid Percent
Yes	9	45.0
No	11	55.0
Total	20	100.0

Table 4.6 can be used throughout Chapter 4 as a key to identify which portion of the instrument corresponds to the number and name of the construct, as well as the overall purpose of each construct.

Table 4.6
Construct Key

Section	Construct Name	Purpose of Construct

One	IntentCurrent	To identify why teachers use the instructional strategies in their current teaching situation
One	IntentIdeal	To identify why teachers would use their instructional teaching strategies if they were in their most idyllic and picturesque teaching situation
Two	Attitude1	To investigate how teachers generally feelings towards using gardens in their curriculum
Three	Attitude2	To investigate how teachers' felt about using gardens in relation to other curriculum standards
Four	Norms	To measure how participants viewed the environment in which they teach
Five	Perceived Behavior Control	To directly measure how much control participants felt is using gardens in their curriculum
Six	Perceived Behavior Control	To measure participant felt level of control is using gardens in relation to other teaching commitments

Objective 2: Test the association between components of the theory of planned behavior and likelihood to use school gardens in the future.

The individual reliability results for each item's contribution to the overall construct, as well as the overall construct's Cronbach's Alphas can be seen in Tables 4.7 through 4.22.

Section 1 of the instrument encompassed both of the first two constructs– IntentIdeal and IntentCurrent. Table 4.7 shows an overall Cronbach's Alpha reliability of

.963 for the five items. The Cronbach's Alpha for the construct if an individual item was deleted is shown in Table 4.8.

Table 4.7 *IntentIdeal Reliability Statistics*

Cronbach's Alpha	N of Items
.963	5

Table 4.8
IntentIdeal Item Contributions to Construct Reliability

	Cronbach's Alpha if Item Deleted
After attending my class this year….	
Students will have a good understanding of scientific concepts and issues	.965
Students will have a better understanding of their belief, attitude, and values regarding gardening	.961
Students will have a greater appreciation for local food systems	.946
Students will have gained actual experience in solving issues in local food systems	.946
Students will become more involved in resolving issues in local food systems	.952

The overall reliability for the IntentCurrent construct had a Cronbach's Alpha of .921 as shown in Table 4.9. Table 4.10 shows the Cronbach's Alpha reliability statistics for the overall construct if any corresponding item was deleted.

Table 4.9
IntentCurrent Reliability Statistics

Cronbach's Alpha	N of Items
.921	5

Table 4.10
IntentCurrent Item Contributions to Construct Reliability

	Cronbach's Alpha if Item Deleted

After attending my class this year….	
Students will have a good understanding of scientific concepts and issues	.965
Students will have a better understanding of their belief, attitude, and values regarding gardening	.877
Students will have a greater appreciation for local food systems	.874
-Students will have gained actual experience in solving issues in local food systems	.889
Students will become more involved in resolving issues in local food systems	.898

The results for the Attitude constructs, which represents sections 2 (Attitude1) and 3(Attitude2) of the instrument respectively, are shown in Tables 4.11 through 4.14. The overall reliability for the Attitude1 construct is a Cronbach's Alpha of .885, as seen in Table 4.11. The Cronbach's Alpha reliability statistics for Attitude1 if any corresponding item were deleted is shown in Table4.121. The overall reliability for the Attitude2 construct is a Cronbach's Alpha of .902, as shown in Table 4.13. Lastly, the Cronbach's Alpha reliability statistics for Attitude2 if any corresponding item were deleted is shown in Table 4.14.

Table 4.11
Attitude1 Reliability Statistics

Cronbach's Alpha	N of Items
.885	5

Table 4.12
Attitude1 Item Contributions to Construct Reliability

	Cronbach's Alpha if Item Deleted

If I teach gardening to my students they will become aware of agricultural concepts as they are related to general science	.878
If I teach gardening to my students it will enable my students to acquire strategies for solving scientific problems	.806
If I teach gardening to my students it will bring about changes in my students' attitude and behavior toward agriculture as it is related to general science	.885
If I teach gardening to my students it will make my students active and committed citizens in the agricultural sector	.871
If I teach gardening to my students my students will be prepared with skills for future coursework and vocation	.846

Table 4.13
Attitude2 Reliability Statistics

Cronbach's Alpha	N of Items
.902	5

Table 4.14
Attitude2 Item Contributions to Construct Reliability

	Cronbach's Alpha if Item Deleted
Making my students aware of gardening concepts and problems as they are related to general science and everyday life is…	.872
Teaching my students to acquire strategies for solving problems in local food systems in relation to general science is…	.885
Bringing about changes in my students' attitude and behavior toward gardening or farming is...	.869
Training my students to be active and committed citizens to local food systems is...	.856
Preparing my students with skills for future coursework and vocation is...	.935

Section 4 of the instrument measured the influence of Norms on intention to use the school garden. The overall reliability of the Norms construct, a Cronbach's Alpha of .969, is seen in Table 4.15. The overall reliability for the construct if any individual item were to be deleted can be seen by the Cronbach's Alphas in Table 4.16.

Table 4.15
Norms Reliability Statistics

Cronbach's Alpha	N of Items
.969	5

Table 4.16
Norms Item Contributions to Construct Reliability

	Cronbach's Alpha if Item Deleted
Fellow teachers think I ….. use gardening in my curriculum.	.954
School/education authorities think I….. use gardening in my curriculum.	.951
My student's parents think I ….. use gardening in my curriculum.	.965
The local community surrounding my school thinks I ….. use gardening in my curriculum.	.972
My students think I ….. use gardening in my curriculum.	.965

Section 5 of the instrument had two questions that fell into the Perceived Behavioral Control construct, but due to the scale of their answer choices, were analyzed as individual items and not as a construct. Tables 4.17 and 4.18 show the descriptive statistics for the first item in section 5 which asked respondents about the level of control they felt they had in using gardening in their curriculum. A mean of 4.30 suggested that respondents, on average, felt they had slightly more than moderate control in using gardens in their curriculum. The minimum choice showed that of the respondents, none felt they had less than slightly above very little control, while the maximum shows that at least one respondent felt they had complete control over using gardens in their curriculum.

Table 4.17
Control Over Curriculum

N	Valid	20

	Missing	0
Mean		4.30
Median		5.00
Std. Deviation		1.490
Variance		2.221
Minimum		2
Maximum		7

Table 4.18
Control Over Curriculum Frequencies

	Frequency	Valid Percent
No control - 1	0	0
2	3	15.0
3	4	20.0
4	2	10.0
5	7	35.0
6	3	15.0
Complete Control - 7	1	5.0
Total	20	100.0

Table 4.19 shows the descriptive statistics for the second question in section 5 which asked respondents about what they believed to be the level of ease they would have in using gardens in their curriculum (freedom). A mean of 3.05 suggested that respondents, on average, felt that it would be moderately difficult to use gardens in their curriculum. The minimum choice of 1 showed that a portion of the respondents felt that it would not be easy at all for them to use gardens in their curriculum. Examining the frequencies of each answer choice, as shown in Table 4.19, revealed that 30% (n = 6) of respondents felt it would not be easy at all to use gardens in their curriculum. Conversely, 6% (n = 1) of respondents felt it would easy for them to use gardens in their curriculum. No respondents reported that it would be very easy for them to use gardens in their curriculum.

Table 4.19
Freedom in Curriculum

N	Valid	20
	Missing	0

Mean	3.05
Median	2.50
Std. Deviation	1.932
Variance	3.734
Minimum	1
Maximum	6

Table 4.20
Freedom in Curriculum - Frequencies

		Frequency	Valid Percent
Valid	Not easy at all - 1	6	30.0
	2	4	20.0
	3	3	15.0
	4	0	0.0
	5	4	20.0
	6	3	15.0
	7	0	0.0
	Total	20	100.0

Note. 1 = Not easy at all and 7 = Very easy.

The results for the Perceived Behavioral Control (PBC) construct of the instrument are shown in Tables 4.21 and 4.22. The overall reliability for the entire PBC construct was .936 (Table 4.21). The Cronbach's Alpha reliability statistics for the overall construct if any corresponding item was deleted are shown in Table 4.22.

Table 4.21
PBC Reliability Statistics

Cronbach's Alpha	N of Items
.936	10

Table 4.22
PBC Item Contributions to Construct Reliability

	Cronbach's Alpha if Item Deleted
I have enough freedom to use gardening in my curriculum.	.924

I have enough time to use gardening in my curriculum.	.932
I have sufficient training to use gardening in my curriculum.	.922
I have enough space to use gardening in my curriculum.	.939
I have enough funding to use gardening in my curriculum.	.940
I have enough instructional material to use gardening in my curriculum.	.925
I have the necessary skills to use gardening in my curriculum.	.927
I understand concepts for gardening or growing things well enough to be effective in using gardens in my curriculum	.929
I can generally use gardening in my curriculum effectively.	.921
I teach gardening in relation to general science as well as I do most subjects.	.929

With the minimum acceptable alpha for either an individual item's contribution to a construct, or the construct as a whole, being 0.70 (Davis, 1971), it can be seen that the constructs had very strong reliabilities. Therefore, none of the items in any construct, or any overall construct used in the original pilot study were removed from the survey before the launch of the main study. It should also be noted that the two items from the Perceived Behavioral Control construct that were analyzed separately showed results consistent with the remainder of the PBC construct. This revealed that teachers felt they had a high level of freedom in their curriculum, but they did not believe using gardens in their curriculum was easy.

Table 4.23 shows the relationship between whether or not participants farm or garden in their attitudes towards using gardens in their curriculum. There is a difference in the means of 7.822 and this difference is statistically significant ($t = 2.700$, $p = 0.019$)

at the alpha = 0.05 level.

Table 4.23
Independent Samples T-Test for PersonalTime and Attitude1

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
IntentIdeal	Equal variances assumed	4.530	.048	-2.591	17	.019	-7.82222	3.01902	-14.19180	-1.45265
	Equal variances not assumed			-2.700	11.85	.019	-7.82222	2.89702	-14.14310	-1.50135

Table 4.24 shows the relationship between the number of years a participant has been teaching and their intent in both current and ideal situations. For IntentCurrent, participants who had been teaching 0-9 years reported a mean score of 13.67 (n=3); participants who has been teaching for 10-19 years reported a mean score of 17.00 (n=7); and participants who reported teaching for 20-30 years reported a mean score of 14.75 (n=6). For IntentIdeal, participants who had been teaching 0-9 years reported a mean score of 24.67 (n=3); participants who has been teaching for 10-19 years reported a mean score of 27.29 (n=7); and participants who reported teaching for 20-30 years reported a mean score of 26.80 (n=6), with the maximum score for this construct being 35 and the minimum being 7 for both IntentCurrent and IntentIdeal.

Table 4.24
Group Statistics for Years Taught and Intent

		IntentCurrent		IntentIdeal	
	n	Mean	Std. Deviation	Mean	Std.Deviation
0-9 years	3	13.67	8.62	24.67	6.81
10-19 years	7	17.00	7.19	27.29	6.24
20-30 years	6	14.75	4.03	26.80	12.48

Table 4.25 shows the relationship between whether or not teachers farm or garden in their personal time and both their intent for their teaching and instructional strategies in both their current and ideal teaching situations. For IntentIdeal, participants who do

garden or farm in their personal time reported a mean score of 31.22 (n = 9) while those who did not farm or garden reported a mean score of 23.40 (n=11). For IntentCurrent, participants who did farm or garden in their personal time reported a mean score of 17.44 (n=9) and those who did not farm or garden reported a mean score of 11.56 (n=11), with the maximum score for this construct being 35 and the minimum being 7 for both IntentCurrent and IntentIdeal.

Table 4.25
Group Statistics for PersonalTime and Intent

Do you farm or garden in your personal time?	n	IntentCurrent		IntentIdeal	
		Mean	Std. Deviation	Mean	Std.Deviation
Yes	9	17.44	6.23	31.22	3.27
No	11	11.56	5.03	23.40	8.49

Table 4.26 shows the relationship between a grade(s) a participant teachers and their intent both their current and ideal situations. For IntentIdeal, participants who taught kindergarten and first grade reported a mean score of 26.78 (n=10); participants who taught second and third grade reported a mean score of 27.00 (n=9); and participants who taught fourth and fifth grade reported a mean score of 27.46 (n=14). For IntentCurrent, participants who taught kindergarten and first grade reported a mean score of 14.88 (n=10); participants who taught second and third grade reported a mean score of 14.63 (n=9); and participants who taught fourth and fifth grade reported a mean score of 13.42 (n=14), with the maximum score for this construct being 35 and the minimum being 7 for both IntentCurrent and IntentIdeal. For the table, the total number reported is greater than the total number of participants as several participants reported teaching more than one grade.

Table 4.26
Group Statistics for Grade Taught and Intent

		IntentCurrent		IntentIdeal	
	n	Mean	Std. Deviation	Mean	Std.Deviation
K-1st	10	14.88	7.41	26.78	8.90
2nd – 3rd	9	14.63	6.97	27.00	9.84
4th – 5th	14	13.42	6.1	27.46	8.50

Objective 3: Predict the likelihood to use school gardens based on components of the theory of planned behavior and select demographic items.

Table 4.27 shows the correlations for all constructs along with one demographic question which is from section 7 of the instrument, "Do you farm or garden in your personal time?" (PersonalTime). There was a positive correlation at the alpha of 0.05 level between IntentIdeal (intent to use gardens in curriculum in the ideal situation) and Norms, as well as between Norms and IntentCurrent (intent to use gardens in curriculum in the current teaching situation). Positive correlations existed between IntentCurrent and PersonalTime, and IntentIdeal and PersonalTime at the alpha 0.05 level. Positive correlations existed between both attitude constructs, between Norms and PBC, IntentCurrent and PBC, and between IntentIdeal and Attitude2 all at the 0.01 level.

Table 4.27

Correlation Matrix for Variables

	PBC	Attitude1	Attitude2	Norms	Personal Time	Intent Current	Intent Ideal
PBC	1	.005	.376	.756**	.181	.765**	.093
Attitude1	-	-	.712**	-.060	.356	.021	.304
Attitude2	-	-	-	.458	.262	.300	.706**
Norms	-	-	-	-	.065	.622*	.498*
Personal Time	-	-	-	-	-	.483*	.532*
Intent Current	-	-	-	-	-	-	.353
Intent Ideal	-	-	-	-	-	-	-

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed)

Tables 4.28 - 4.30 display the regression information between the PersonalTime (Do you farm or garden in your personal time?) demographic item, and the IntentIdeal construct. By knowing about whether or not a teacher farms or gardens in their personal time, the independent variable, this helps us understand 28.3% about a teachers' intent to use gardens in their curriculum in the ideal situation.

Table 4.28

Regression Table of PersonalTime and IntentIdeal

R	R Square	Adjusted R Square	Std. Error of the Estimate
.532[a]	.283	.241	6.57068

Table 4.29

ANOVA for Regression Table of PersonalTime and IntentIdeal

	Sum of Squares	df	Mean Square	F	Sig.
Regression	289.834	1	289.834	6.713	.019[b]
Residual	733.956	17	43.174		
Total	1023.789	18			

Table 4.30

Coefficient Table of PersonalTime and IntentIdeal

	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
(Constant)	15.578	4.698		3.316	.004
PersonalTime	7.822	3.019	.532	2.591	.019

Dependent variable: IntentIdeal

Tables 4.31 - 4.33 display the regression information between PersonalTime demographic item and the IntentCurrent construct. By knowing about whether or not a teacher farms or gardens in their personal time, the independent variable, 23.3% is then known about a teachers' intent to use gardens in their curriculum in their current teaching situation.

Table 4.31

Regression Table of PersonalTime and IntentCurrent

R	R Square	Adjusted R Square	Std. Error of the Estimate
.483[a]	.233	.186	.464

Table 4.32

ANOVA for *Regression of PersonalTime and IntentCurrent*

	Sum of Squares	df	Mean Square	F	Sig.
Regression	156.056	1	156.056	4.873	.042[b]
Residual	512.444	16	32.028		
Total	668.500	17			

Table 4.33

Coefficient Table of PersonalTime and IntentCurrent

	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
(Constant)	5.667	4.218		1.343	.198
PersonalTime	5.889	2.668	.483	2.207	.042

Dependent variable: IntentCurrent

Tables 4.34 - 4.36 display the regression information between the PersonalTime demographic item and the PBC construct. By knowing about whether or not a teacher farms or gardens in their personal time, the independent variable, 3.3% is then known about a teachers' perceived behavioral control in using gardens in their curriculum.

Table 4.34

Regression Table of PersonalTime and PBC

R	R Square	Adjusted R Square	Std. Error of the Estimate
.181[a]	.033	-.032	14.8410

Table 4.35

ANOVA for Regression of PersonalTime and PBC

	Sum of Squares	df	Mean Square	F	Sig.
Regression	112.452	1	112.452	.511	.486[b]
Residual	3303.431	15	220.229		
Total	3415.882	16			

Table 4.36

Coefficient Table of PersonalTime and PBC

	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
(Constant)	23.069	11.199		2.060	.057
PersonalTime	5.153	7.211	.181	.715	.486

Dependent variable: PBC

Tables 4.37 - 4.39 display the regression information between PersonalTime demographic item and the Attitude1 construct. By knowing about whether or not a teacher farms or gardens in their personal time, the independent variable, 9.6% is then known about a teachers' attitude about using gardens in their curriculum.

Table 4.37

Regression Table of PersonalTime and Attitude1

R	R Square	Adjusted R Square	Std. Error of the Estimate
.310[a]	.096	.053	4.80588

Table 4.38

ANOVA Regression Table of PersonalTime and Attitude1

	Sum of Squares	df	Mean Square	F	Sig.
Regression	60.463	1	60.463	2.618	.123[b]
Residual	415.737	18	23.097		
Total	476.200	19			

Table 4.39

Coefficient Table of PersonalTime and Attitude1

	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
(Constant)	20.232	3.311		6.110	.000
PersonalTime	3.495	2.160	.356	1.618	.123

Dependent Variable: Attitude1

Tables 4.40 through 4.42 displays the regression information between PersonalTime demographic item and the Attitude2 construct. By knowing about whether or not a teacher farms or gardens in their personal time, the independent variable, 6.9% is then known about a teachers' attitude about using gardens in their curriculum. However, this model was not significant at the 0.05 level.

Table 4.40

Regression Table of PersonalTime and Attitude2

R	R Square	Adjusted R Square	Std. Error of the Estimate
.262[a]	.069	.011	4.99359

Table 4.41

ANOVA *Regression Table of PersonalTime and Attitude2*

	Sum of Squares	df	Mean Square	F	Sig.
Regression	29.469	1	29.469	1.182	.293[b]
Residual	398.975	16	24.936		
Total	428.444	17			

Table 4.42

Coefficient Table of PersonalTime and Attitude2

	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
(Constant)	22.725	3.618		6.281	.000
PersonalTime	2.575	2.369	.262	1.087	.293

Dependent Variable: Attitude2

Tables 4.43 and 4.46 show the relationships between teachers' attitudes towards using gardens in their curriculum and whether or not they farm or garden in their personal time. Table 4.43 shows that teachers who do garden or farm in their personal time reported a mean score of 27.222 (n = 9) for the Attitude1 construct while Table 4.44 shows a mean score of 27.8750 (n=8) for the Attitude2 construct for teachers who farm or garden in their personal time. For the Attitude 1 construct there is a mean difference of 3.494 and there is a mean difference of 2.575 for the Attitude2 construct between those who do and do not garden in their personal time. Table 4.45 shows a t-value of -1.626 and a p-value of 0.122 for Attitude1. Table 4.46 shows a t-value of -1.074 and a p-value of .301 for Attitude2. A significant difference did not exist between attitudes for those who did or did not garden in their personal time.

Table 4.43

Independent Sample T-Test for PersonalTime and Attitude1

	Do you garden or farm in your personal time?	N	Mean	Std. Deviation	Std. Error Mean
Attitude1	No	11	23.7273	4.90083	1.47766
	Yes	9	27.2222	4.68449	1.56150

Table 4.44

Independent Samples T-Test for PersonalTime and Attitude2

	Do you garden or farm in your personal time?	N	Mean	Std. Deviation	Std. Error Mean
Attitude2	No	10	25.3000	4.76212	1.50591
	Yes	8	27.8750	5.27629	1.86545

Table 4.45

Independent Samples T-Test for PersonalTime and Attitude1

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Attitude1	Equal variances assumed	.446	.513	-1.618	18	.123	-3.49495	2.16008	-8.03312	1.04322
	Equal variances not assumed			-1.626	17.51	.122	-3.49495	2.14982	-8.02064	1.03074

Table 4.46

Independent Samples Test for PersonalTime andAttitude2

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Attitude2	Equal variances assumed	.011	.917	-1.087	16	.293	-2.57500	2.36867	-7.59635	2.44635
	Equal variances not assumed			-1.074	14.355	.301	-2.57500	2.39743	-7.70509	2.55509

Tables 4.47 through 4.49 display the backward regression information for IntentCurrent (the dependent variable), and PersonalTime and Norms. Additionally, the regression equation, (Equation 4.1) to predict teacher likelihood to use gardens in their curriculum in their current teaching situation based on their reported norms and whether or not they farm or garden in their personal time is displayed. Table 4.48 shows that the model was significant. If it is known what a person's perceived norms are for the use of gardens, as well as if they farm or garden in their personal time, then 77.0% is then known about their IntentCurrent. From this information it can be seen than as a person's Norms score increases, their intent to use a garden in their current teaching situation increases by 0.663. Additionally, if a person farms or gardens in their personal time, their intent to use gardens in their current teaching situation increases by 3.413.

Table 4.47

Backward Regression for IntentCurrent, PersonalTime, and Norms

R	R Square	Adjusted R Square	Std. Error of the Estimate
.877[c]	.770	.731	2.97618

Table 4.48

ANOVA of Backward Regression for IntentCurrent, PersonalTime, and Norms

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	355.441	2	177.721	20.064	.000[d]
Residual	106.292	12	8.858		
Total	461.733	14			

Table 4.49

Coefficients for Backward Regression for IntentCurrent, PersonalTime, and Norms

	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
(Constant)	-5.449	3.388		-1.608	.134
Norms	.663	.113	.810	5.843	.000
PersonalTime	3.413	1.542	.307	2.214	.047

Dependent variable: IntentCurrent

IntentCurrent = -5.449 + 0.663(Norms Score) + 3.413(PersonalTime Score) (4.1)

Tables 4.50 through 4.52 display the backward regression information for IntentIdeal (the dependent variable), and PersonalTime and Attitude2. Additionally, the regression equation (Equation 4.2) to predict teacher likelihood to use gardens in their curriculum in their current teaching situation based on their reported scores for Attitude2 and whether or not they farm or garden in their personal time is displayed. If it is known what a person's Attitude2 score is, and whether or not they farm or garden in their personal time, then 62.6% is then known about their IntentIdeal. Table 4.51 shows that the model is significant. From this information it can be seen than as a person's Attitude2 score increases, their intent to use a garden in their ideal teaching situation increases by 0.620. Additionally, if a person farms or gardens in their personal time, their intent to use gardens in their current teaching situation increases by 4.429.

Table 4.50

Backward Regression of IntentIdeal, Attitude2, and PersonalTime

R	R Square	Adjusted R Square	Std. Error of the Estimate
.791[c]	.626	.569	3.76838

Table 4.51

ANOVA Backward Regression of IntentIdeal, Attitude2, and PersonalTime

	Sum of Squares	df	Mean Square	F	Sig.
Regression	309.328	2	154.664	10.891	.002[d]
Residual	184.609	13	14.201		
Total	493.938	15			

Table 4.52

Coefficients Backward Regression of IntentIdeal, Attitude2, and PersonalTime

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	5.437	5.294		1.027	.323
PersonalTime	4.429	2.066	-.395	-2.144	.052
Attitude2	.620	.209	.547	2.967	.011

Dependent variable: IntentIdeal

IntentIdeal = 5.437 + 0.620(Attitude2 Score) + 4.429(PersonalTime Score) (4.2)

Summary

A response rate of 67% (n = 20) was achieved. All respondents (n = 20) were female. All constructs had internal consistencies above the minimal acceptable level of 0.70 (Davis, 1971). Objective Two utilized t-tests to test components of the theory of planned behavior and likelihood to use school gardens in the future. Objective Three utilized a correlation table to predict the likelihood to use school gardens based on components of the theory of planned behavior and select demographic items then used backward regression to predict intent to use school gardens in the current and ideal teaching situations.

CHAPTER 5

DISCUSSION, CONCLUSIONS, AND RECOMMENDATIONS

Introduction

The purpose of this study was to understand elementary teachers' likelihood to using school gardens as a compliment to their classroom curriculum. Major gaps in the literature on school gardens provide reasoning for the need for this study. While there has been much research on the benefits of school gardens, barriers to the use of school gardens, and how exactly school gardens are being used, there is little research involving teachers and school gardens. Research was needed to characterize exactly what kinds of teachers (e.g., demographically) are more likely to use gardens, as well as those who are not, which was provided by this study. Information from studies such as this was needed to help provide pre-service teachers the tools needed to overcome many barriers to the use of school gardens, but to also provide school administrators with information on how they can make their school more conducive to the use of school gardens in their teachers' curriculum. Overall, information from this study can be used by pre-service teacher preparation programs, current school administrators, and current teachers alike to enhance the overall learning environment for students.

This chapter will briefly explain the methods used for this study, then the study objectives and summarize findings based on these objectives. Conclusions drawn from the findings will be discussed, and, finally, recommendations for future research, as well as recommendations for practice will be provided.

Study Objectives

The following provides details on the types of analysis used to address each of the research objectives in this study (Table 5.1). All analyses were conducted using IBM SPSS Statistics Version 20.

Table 5.1
Data analysis procedures used to analyze each individual research objective

Research Objective	Data Analysis Procedures Used
4. Describe the sample of teachers based on gender, years of service, grades currently taught, current use of school gardens, personal involvement with agriculture, and interest in continuing education on school gardens	Descriptive statistics, including frequencies, percentages, means, and standard deviations as well as.
5. Test the association between components of the theory of planned behavior and likelihood to use school gardens in the future	Cronbach's Alphas for construct reliability, Pearson's Correlation, and T-tests
6. Predict the likelihood to use school gardens based on components of the theory of planned behavior and select demographic items	T-tests, Regression model R-square change and Pearson's Correlation

Methods

As this was a quantitative study, a paper survey was used to collect data. This instrument was first created by Sosu (2008) as part of a study on teacher commitment to the use of Environmental Education and was carried out in the United Kingdom. The instrument was developed around Ajzen's (1991) theory of planned behavior with each component of the theory being represented by a construct. The instrument, made up of a total of seven sections, asked teachers to respond to questions about their attitudes toward the use of school gardens, their intent to use school gardens in both the current and ideal situations, the norms in their teaching environment about using school gardens, their perceived level of control and ease in using school gardens, and lastly demographic items

used to describe themselves (Full instrument available in Appendix A). Because the original survey concentrated on Environmental Education and was carried out in another country, minor edits were made to make the instrument valid for the use of school gardens, but to also make sure the instrument would be reliable for an audience in the United States

An electronic survey was distributed to all full time, kindergarten through fifth grade teachers at Colbert Elementary in Madison County, GA via and electronic link sent through email. The survey was hosted online through Qualtrics Online Survey Software. Colbert Elementary was chosen as the focus for this case study as it was recommended by key stakeholders as an exemplary school that uses school gardens and goes above and beyond the Madison County's expectations. Data from the study was analyzed using IBM SPSS Statistics Version 20.

Summary of Findings

Objective 1: Describe the sample of teachers based on gender, years of service, grades currently taught, and personal involvement with agriculture.

All of the respondents from Colbert Elementary School were female. Participants reported an average of 16.5 years of teaching, with 15% (n=3) of respondents teaching 9 years or less, 35% (n=7) of respondents teaching between 10 and 19 years, and 25% (n=5) of respondents teaching between 20 and 30 years. When asked about grade(s) taught, 50% (n=15) of the respondents taught a single grade and 50% (n=15) taught more than one grade. Fifteen percent (n=5) of respondents taught all 6 grades while 45% (n=9) reported that they farmed or gardened in their own time.

Objective 2: Test the association between components of the theory of planned behavior and likelihood to use school gardens in the future.

To test the association of the theory of planned behavior and likelihood of school gardens, t-tests were performed comparing whether or not participants farmed or garden in their personal time (PersonalTime) and various constructs representing the components of the theory. It was found that there was a significant difference in the reported scores of those who did farm or garden in their personal time and those who did not, with those who did farm or garden in their personal time having a generally greater attitude1 score to use gardens in their curriculum in their ideal teaching situation. The mean scores for both IntentIdeal and IntentCurrent were compared to grades participants taught, number of reported years teaching, as well as if participants farmed or gardened in their personal time. When asked if participants farmed or gardened in their personal time, those who reported they yes had higher mean scores in both their intent to have a positive impact on their students through their instructional strategies. Additionally, when asked to report grade taught, participants who had been teaching 10-19 year also reported the highest mean scores for both the IntentIdeal and IntentCurrent constructs. Lastly, participants who reported teaching fourth and fifth grades had the highest mean IntentIdeal scores, while those who reported they taught kindergarten and first grades had the highest mean IntentCurrent scores. This shows that numerous factors simultaneously affect a teacher's intent to make a positive impact on their students through their teaching and instructional strategies.

Objective 3: Predict the likelihood to use school gardens based on components of the theory of planned behavior and select demographic items

To test this objective, Pearson's correlations were between each of the variables. First, both constructs correlate, Attitude1 and Attitude2. This is important to know as it shows that the constructs, while measuring different things by using different scales, participant's answers have a positive correlation between the two constructs. This shows that as a participant's score for one of the constructs goes up, so will their other score. It was also shown that the Norms and PBC constructs were also positively correlated. This shows that as norms towards the use of gardens in curriculum rises, so does a participant's PBC. PBC is also positively correlated with IntentCurrent. This shows that the more control a participant believes they have; the more intent they will have to use a garden in their curriculum in their current teaching situation. A positive correlation was also shown between the Attitude2 construct, which asks participants to respond to questions that ask about what they believe is important for their students to take away, and IntentIdeal. Their ideal situation, or what environment they see as the most desirable for them would also be closely related to what they hope their students come away from their classroom with no matter what. Lastly, there was a positive correlation between norms and IntentIdeal. This shows that the more positive the norms surrounding the use of gardens, the greater the intent for the participant to use gardens in their curriculum in their ideal teaching situation.

Additionally, regressions were run between demographic items applicable constructs of the instrument. First, the regression of PersonalTime and IntentIdeal revealed that when it is know whether or not a participant farmed or gardened in their

personal time is known, 28.3% is then known about intent to use gardens in their curriculum in their ideal teaching situation. It was also found that by knowing about a participant's PersonalTime, 23.3% is then known about their IntentCurrent. It was found that 3.3% is known about a participant's PBC towards using gardens in their curriculum when their PersonalTime is known. The summed scores from the Chase Street Elementary participants showed relatively positive attitudes towards using school gardens, and the pilot data showed that when a participant's PersonalTime is known, 9.6% is known about their Attitude1 and 11.5% about their Attitude2. Additionally, while t-tests between PersonalTime and the individual attitude construct, Attitude1 and Attitude2, there was a difference in means of 3.02 for Attitude1 and 3.4 for Attitude2. Lastly, backward regressions were performed. It was found that to predict a person's IntentCurrent score, their scores for Norms and PersonalTime can be used. As a person's Norms score increases, their IntentCurrent will increase by .663, and as their PersonalTime increases, their IntentCurrent will increase by 4.429. Additionally, Attitude2 and PersonalTime were found to be able to predict a personal IntentIdeal. As a person's Attitude2 increases, their IntentIdeal increases by .620, and as their PersonalTime increases, their IntentIdeal increases by 4.429.

Conclusions

1. A person's familiarity with gardening, or other agricultural experiences, can influence whether or not a teacher will use gardens in their curriculum.
2. If participants have a generally positive attitude toward school gardens, they will have a higher intent to using their instructional and teaching strategies to make a positive impact on their students, and in their ideal, teaching situation.

3. The norms associated with using school gardens in their curriculum affect a participant's perceived behavioral control. The degree to which a participant perceives their control over using gardens in their curriculum will directly affect their intent to use gardens in their current situation.
4. The attitudes participants have towards using school gardens as a teaching tool is positively related their intent to use a school garden as a teaching tool in their ideal situation. This is directly associated with Ajzen's (1991) theory of planned behavior.
5. Different constructs are strengthened by PersonalTime in predicting intent to use a garden in teachers' curriculum.

Discussion and Implications

Objective 1: Describe the sample of teachers based on gender, years of service, grades currently taught, current use of school gardens, personal involvement with agriculture, and interest in continuing education on school gardens.

While all of the teachers at Colbert Elementary school are female, other demographic information proves helpful to this study. First, only 45% of participants indicated that they farmed or gardened in their free time. These teachers might be able to provide valuable information to other teachers who have less experience in the garden. These teachers might be able to serve as example, or mentor teachers, to those teachers with less experience and might be helpful in the creation of lesson plans, or on how to link standards to current lessons incorporating the garden. Research shows that inexperience is one of the main barriers to use of gardens in schools (Graham et al,

2005;Hazzard et al., 2011; Klemmer et al., 2005; Knoblock et al., 2007; Ozer, 2007; Skelley and Bradley, 2000; and Sosu et al., 2008.) Additionally, teachers at Colbert Elementary reported teaching for an average of 16.5 years. These teachers are well experienced and seasoned in the classroom therefore, they may feel more comfortable with taking students out to a garden when they are already extremely comfortable with classroom and student management.

Objective 2: Test the association between components of the theory of planned behavior and likelihood to use school gardens in the future.

The t-test showed that there was significant difference in the IntentIdeal scores of those who farmed or gardened in their personal time and those who didn't. Participants who did farm or garden had a higher mean difference of 7.822 in IntentIdeal than those who did not. IntentIdeal insinuates that in a teacher's perfect teaching situation, everything in their environment would be going exactly according to how they believe it should. This relationship, or the ideal situation, disregards all other environmental factors such as norms of what they think others believe they should be doing, or their general perceived behavioral control. While it is shown that those who farm or garden in their personal time are generally more likely to use gardens in their curriculum, Sosu (2008) found that previous life experience does not influence intent to execute a behavior. In fact, other factors might be at play, such as general comfort in the garden setting. Several studies have shown (Hazzard, 2011; Klemmer, 2005; Knobloch et al., 2007; Ozer, 2007; Skelly, 2000 & Sosu, 2008) that lack of knowledge on how to use gardens in conjunction with the curriculum is one of the main barriers that stop teachers. A teacher electing to spend time in an agricultural setting in their off time might show a greater sense of

comfort in the garden setting and these teachers then might not share this same barrier as teachers who may have little to no experience in a garden setting outside of work. Additionally, lack of training on how to use the garden was another common barrier found in the literature (Graham, et al., 2005; Hazzard, et al., 2011; Klemmer et al., 2005; Knobloch et al,; 2007; Ozer, 2007; Skelley & Bradley, 2000; and Sosu et al., 2008). If a person farms or gardens in their personal time they are more likely to have the knowledge of what to do in a garden and might be less overwhelmed when linking gardening activities with components of their curriculum.

Objective 3: Predict the likelihood to use school gardens based on components of the theory of planned behavior and select demographic items.

There was also a strong positive correlation between Norms and PBC and this aligns with Ajzen's (1991) theory of planned behavior. This strong positive correlation for the participants in this study not only falls in line with the theory, but shows that no matter what a teacher's attitude may be towards using gardens, or whether or not they have experience with gardens, what other people think they should be doing plays a role in their intent to behave. Lack of school-based support was another common barrier found in the literature investigating why school gardens are not being used (Graham et al., 2005; Hazzard et al., 2011; Oxenham & King, 2010; Ozer, 2007; Sosu et al., 2008). This lack of support often encompasses overall school administration and fellow school faculty not being supportive of the use of school gardens. Whether these non-supporters see school gardens as a drain for funds, or not an appropriate teaching tool is unknown. Regardless, their distaste towards school gardens has been noted as an element that would

stop teachers, who might have the experience, and who have the positive attitude from using this beneficial teaching tool.

PBC and IntentCurrent were also seen to have a strong positive correlation as Ajzen's theory of planned behavior predicts. As stated before, there has been much literature on the barriers that teachers face to using school gardens. All of these barriers, including time, lack of experience, lack of support, a need for curriculum, lacking funds and supplies, and a lack of space, are all key components in whether a teacher believes they have the ability to use a school garden in their curriculum. This in turn directly plays into a teacher's intent to use a garden in their current teaching situation. It does not, however, play into their ideal teaching situation, which is important to note. This ideal situation would likely entail an environment where there were enough curriculums or all of their colleagues using gardens as well. Norms and IntentCurrent also had a positive correlation in this study. While Norms alone are not enough to carry out a behavior, Ajzen's (1991) theory of planned behavior suggests a relationship between what a person believes others think they should do and their intention to carry out a behavior. As a teacher believes others think they should use gardens in their curriculum, their intent in their current situation should increase. However, it is important to remember that while their IntentCurrent will increase as Norms toward the use of gardens become more positive, there are other factors such as their own attitudes and their overall PBC that still influence their intent to use a garden. Therefore, if an administrator would like for more teachers to use school gardens, they could make a first step by making a more conducive environment with positive attitudes toward teachers using gardens (Shumacher, Fuhrman, & Duncan, 2012).

A strong, positive correlation was also found between IntentIdeal and Attitudes2. The questions in Attitudes2 investigated teachers' attitudes towards using school gardens by asking them to respond to questions about how they feel about certain statements regarding why they would use a school garden in their curriculum. These questions were generally more indicative of what the teachers might believe is the importance of using school gardens for their specific class. This positive correlation with IntentIdeal might reveal that as the teachers are answering the questions from this section they are more thinking about their teaching ideals and values, and not about what they believe is feasible, or what they believe their current class can accomplish. Therefore, teachers who might not have the intent in their current situation might still want the positive outcomes for their students that come along with the use of school gardens. These benefits include greater general knowledge than peers who are not involved with school gardens and higher scholastic achievement (Graham et al., 2005; Nedovic & Morrissey, 2013; and Phelps et al., 2010).

Lastly, it was found that IntentIdeal had a strong positive correlation with Norms. As stated before, Norms play a unique role in the intent to carry out a behavior according to Ajzen's (1991) theory of planned behavior. While the theory of planned behavior only accounts for intent in a person's current situation, this study accounted for future intent to investigate a teacher's intent in their perfect teaching situation. This finding, a positive correlation between Norms and IntentIdeal, might suggest that the Norms around what a teacher decides to do in their classroom stretch further into their future than just what they do in a certain situation. A negative outlook on the use of gardens in curriculum by, say, an older teaching mentor or an administrator that is particularly looked up to by a

certain teacher may help to shape all the ways that they teach in the future. Therefore, an administrator who wishes to have teachers use more gardening in the school's curriculum might not only have to face the barriers in their school, but also other barriers that teachers bring with them from previous teaching situations.

Significant differences were found between individuals who reported that they farmed or gardened in their personal time and their peers who did not in regards to their overall intent to use a garden in their curriculum in their ideal teaching situation. It can then be concluded that if a teacher farms or gardens in their personal time that their intent to use a school garden will be greater than teachers who do not. It was found that when it is known whether or not a teacher farms or gardens in their personal time, information can then be known in varying degrees about IntentIdeal, IntentCurrent, PBC, and both attitude constructs. This information could be extremely important for schools who are trying to install or revive school gardening programs. Literature shows that a common barrier to the use of school gardens is a lack of support for not only the physical maintenance aspects, but also to help support teachers who might not be as familiar with the use of school gardens (Graham et al., 2005; Hazzard et al., 2011; Oxenham & King, 2010; Ozer, 2007; Sosu et al., 2008). While Hazzard et al. (2011) suggests using school garden coordinators to coordinate support teachers, schools might be able to utilize teachers who have a greater familiarity with gardens for not only the creation of lessons, but as mentors for other less experienced teachers. Teachers who farm or garden in their personal time might have more familiarity about what to do in a garden, might have a greater sense of PBC, and could be a source of positive norms in regards to the use of school gardens leading to more positive attitudes towards using the gardens, all of which

play into a teachers intent to use a garden. Backward regression revealed that Norms and PersonalTime can help explain the most about a person's intent to use a garden in their current teaching situation, while teacher's feelings toward using gardens to address curriculum standards (Attitude2) and PersonalTime revealed the most about their intent to use a garden in an ideal teaching situation. All of this could be used by those who would like to start or support school gardening programs by knowing who to target, who might be in more need of support than others, and what types of things might be interfering with their use of the gardens in their curriculum. As the literature was rich with studies on the barriers to using school gardens, finding the elements of a school environment which might provide the most interferences might allow for the circumvention of such barriers and promote positive change in schools.

Recommendations for Research

The purpose of this study was to understand elementary teachers' likelihood to use school gardens as a compliment to their classroom curriculum. While the results of this study cannot be generalized to a greater population, what has been discovered from this study might be helpful in overcoming barriers to the use of school gardens and the implementation or sustainability of school garden programs nationwide. The following recommendations are to provide guidance for further research on the subject:

1. Additional research is needed to investigate teacher benefits to using gardens in their curriculum—including potential benefits to them personally, or to their overall teaching efficacy.

2. Qualitative research should be done to investigate specific reasons a teacher might use a school garden and what about the garden is so "special" to their teaching and to student engagement and learning.
3. A national study of teacher commitment using the instrument used in this study is needed to reveal more large scale data on teacher likelihood to use school gardens, specifically in states with wide spread implementation of the use of school gardens such as California, Texas, or New York.
4. Research using the current instrument to test likelihood to use other innovative teaching tools beyond school gardens with the theory of planned behavior as the theoretical framework.
5. Research is needed investigating likelihood to use school gardens for teachers of older students such as those who teach middle or high school, which might reveal more barriers such as shorter class periods or specialized classes tailored to student interests.
6. Research is needed which investigates likelihood to use school gardens with teachers teaching specific subject matter, such as science, agricultural education, or environmental education.
7. Research is needed on male teacher likelihood to use school gardens since this study only gathered data from female teachers.
8. An increased response rate is needed in future studies. As teachers remain constantly busy throughout their day, it would be best to determine the most convenient way to contact teachers in specific studies to achieve higher response rates (i.e. mail for some, internet for others or in person at a faculty meeting).

Recommendations for Practice

Lastly, the following recommendations are provided based on knowledge gathered in this study to help increase the likelihood that school gardens are used by teachers in the future:

1. Provide training on the use of gardens in schools and in curriculum for in-service teachers, either by school garden coordinators, outside organizations, or by teachers or administrators with personal experience in the use of gardens.
2. Provide specific training on the use of school gardens as a part of pre-service teacher training, especially in the states emphasizing the use of school gardens in their curriculum, such as California, Texas, and New York, to better prepare teachers for new requirements.
3. Administrators should implement "garden captains," or point persons, for each grade or teaching team in their school that could provide not only support, but training and partnership opportunities for the use of school gardens.
4. Provide incentives for teachers who use school gardens, such as recognizing star garden users on a school bulletin board or in a faculty newsletter. This would provide support, encouragement, and more positive norms surrounding the use of school gardens in teacher's curriculum and throughout the school as Shumaker (2010) suggested from research about the implementation of Environmental Education in schools.

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APPENDIX A

QUESTIONNAIRE

Thank you for participating in my survey about elementary school teacher perceptions of school gardens. This survey should take between 10 and 15 minutes to complete. There are a total of seven short sections to complete. I am implementing this questionnaire as an assignment in a graduate class at the University of Georgia. Your responses will be used to make improvements to the questionnaire when it is officially used in my thesis study. Thank you so much for your honest responses. Please remember that your answers will remain anonymous and you can stop at any time.

As you complete this questionnaire, please keep in mind the following definition of "using a school garden." By "using gardens in your curriculum", we mean: Using plants grown in the ground, in raised beds, in pots, containers or in greenhouses in both classrooms and outdoors to teach any subject or course material. Landscapes maintained by district personnel that children have no involvement in are not included in the definition of a school garden.

Section 1. Teaching Practices What is your Current and Ideal emphasis on using school gardens in your curriculum? Ideal practice which means, what you would like to teach Current practice, which means what you actually teach (Please check one from ideal and another one from current practice as appropriate)

After attending my class this year:

	Ideal Practice							Current Practice						
	No 1	2	3	Some 4	5	6	Strong 7	No 1	2	3	Some 4	5	6	Strong 7
Students will have a good understanding of scientific concepts and issues	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
Students will have a better understanding of their belief, attitude, and values regarding gardening	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
Students will have a greater appreciation for local food systems	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
Students will have gained actual experience in solving issues in local food systems	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
Students will become more involved in resolving issues in local food systems	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍

Section 2. This section asks how you feel about using gardening in your curriculum. (Please be assured there are no right or wrong answers, so give your honest opinion.)

If I teach gardening to my students they will become aware of agricultural concepts as they are related to general science

- ❍ Unlikely - 1
- ❍ 2
- ❍ 3
- ❍ 4
- ❍ 5
- ❍ 6
- ❍ Likely - 7

If I teach gardening to my students it will enable my students to acquire strategies for solving scientific problems

- ❍ Unlikely - 1
- ❍ 2
- ❍ 3
- ❍ 4
- ❍ 5
- ❍ 6
- ❍ Likely - 7

If I teach gardening to my students it will bring about changes in my students' attitude and behaviour toward agriculture as it is related to general science

- ❍ Unlikely - 1
- ❍ 2
- ❍ 3
- ❍ 4
- ❍ 5
- ❍ 6
- ❍ Likely - 7

If I teach gardening to my students it will make my students active and committed citizens in the agricultural sector

- ❍ Unlikely - 1
- ❍ 2
- ❍ 3
- ❍ 4
- ❍ 5
- ❍ 6
- ❍ Likely - 7

If I teach gardening to my students my students will be prepared with skills for future coursework and vocation

- ❍ Unlikely - 1
- ❍ 2
- ❍ 3
- ❍ 4
- ❍ 5
- ❍ 6
- ❍ Likely - 7

Section 3. Please indicate how you feel about the following statements as a teacher. (Be assured there are no right or wrong answers so please give your honest opinion).

Making my students aware of gardening concepts and problems as they are related to general science and everyday life is...

- ❍ Not important - 1
- ❍ 2
- ❍ 3
- ❍ 4
- ❍ 5
- ❍ 6
- ❍ Very Important - 7

Teaching my students to acquire strategies for solving problems in local food systems in relation to general science is...

- ❍ Not important - 1
- ❍ 2
- ❍ 3
- ❍ 4
- ❍ 5
- ❍ 6
- ❍ Very important - 7

Bringing about changes in my students' attitude and behaviour toward gardening or farming is...

- ❍ Not important - 1
- ❍ 2
- ❍ 3
- ❍ 4
- ❍ 5
- ❍ 6
- ❍ Very important - 7

Training my students to be active and committed citizens to local food systems is...

- ❍ Not important - 1
- ❍ 2
- ❍ 3
- ❍ 4
- ❍ 5
- ❍ 6
- ❍ Very important - 7

Preparing my students with skills for future coursework and vocation is...

- ❍ Not important - 1
- ❍ 2
- ❍ 3
- ❍ 4
- ❍ 5
- ❍ 6
- ❍ Very important - 7

Section 4. This section is about what other people think about you using gardening in your curriculum.

Fellow teachers think I use gardening in my curriculum.

- ❍ Should not - 1
- ❍ 2
- ❍ 3
- ❍ 4
- ❍ 5
- ❍ 6
- ❍ Should - 7

School/education authorities think I use gardening in my curriculum.

- ❍ Should not - 1
- ❍ 2
- ❍ 3
- ❍ 4
- ❍ 5
- ❍ 6
- ❍ Should - 7

My student's parents think I use gardening in my curriculum.

- ❍ Should not - 1
- ❍ 2
- ❍ 3
- ❍ 4
- ❍ 5
- ❍ 6
- ❍ Should - 7

The local community surrounding my school thinks I use gardening in my curriculum.

- ❍ Should not - 1
- ❍ 2
- ❍ 3
- ❍ 4
- ❍ 5
- ❍ 6
- ❍ Should - 7

My students think I use gardening in my curriculum.

- ❍ Should not - 1
- ❍ 2
- ❍ 3
- ❍ 4
- ❍ 5
- ❍ 6
- ❍ Should - 7

Section 5. This section is about how much control you feel you have over using gardening in your curriculum.

How much control do you think you have over whether or not you use gardening in your curriculum?

- ❍ Very little control - 1
- ❍ 2
- ❍ 3
- ❍ 4
- ❍ 5
- ❍ 6
- ❍ Complete Control - 7

For me, using gardening in my curriculum is

- ❍ Not easy at all - 1
- ❍ 2
- ❍ 3
- ❍ 4
- ❍ 5
- ❍ 6
- ❍ Very easy - 7

Section 6. Describe yourself on the following statements.

I have enough freedom to use gardening in my curriculum.

- ❍ Strongly disagree - 1
- ❍ 2
- ❍ 3
- ❍ 4
- ❍ 5
- ❍ 6
- ❍ Strongly agree - 7

I have enough time to use gardening in my curriculum.

- ❍ Strongly disagree - 1
- ❍ 2
- ❍ 3
- ❍ 4
- ❍ 5
- ❍ 6
- ❍ Strongly agree - 7

I have sufficient training to use gardening in my curriculum.

- ❍ Strongly disagree - 1
- ❍ 2
- ❍ 3
- ❍ 4
- ❍ 5
- ❍ 6
- ❍ Strongly agree - 7

I have enough space to use gardening in my curriculum.

- ❍ Strongly disagree - 1
- ❍ 2
- ❍ 3
- ❍ 4
- ❍ 5
- ❍ 6
- ❍ Strongly agree - 7

I have enough funding to use gardening in my curriculum.

- ❍ Strongly disagree - 1
- ❍ 2
- ❍ 3
- ❍ 4
- ❍ 5
- ❍ 6
- ❍ Strongly agree - 7

I have enough instructional material to use gardening in my curriculum.

- ❍ Strongly disagree - 1
- ❍ 2
- ❍ 3
- ❍ 4
- ❍ 5
- ❍ 6
- ❍ Strongly agree - 7

I have the necessary skills to use gardening in my curriculum.

- ❍ Strongly disagree - 1
- ❍ 2
- ❍ 3
- ❍ 4
- ❍ 5
- ❍ 6
- ❍ Strongly agree - 7

I understand concepts for gardening or growing things well enough to be effective in using gardens in my curriculum.

- ❍ Strongly disagree - 1
- ❍ 2
- ❍ 3
- ❍ 4
- ❍ 5
- ❍ 6
- ❍ Strongly agree - 7

I can generally use gardening in my curriculum effectively.

- ❍ Strongly disagree - 1
- ❍ 2
- ❍ 3
- ❍ 4
- ❍ 5
- ❍ 6
- ❍ Strongly agree - 7

I teach gardening in relation to general science as well as I do most subjects.

- ❍ Strongly disagree - 1
- ❍ 2
- ❍ 3
- ❍ 4
- ❍ 5
- ❍ 6
- ❍ Strongly agree - 7

Finally, Section 7. The following questions are about yourself.

I have been teaching years. (Please enter a numerical value)

Please indicate the grade(s) that you teach.

	Do you teach?	
	Yes	No
Kindergarten	❍	❍
1st Grade	❍	❍
2nd Grade	❍	❍
3rd Grade	❍	❍
4th Grade	❍	❍
5th Grade	❍	❍

Are you...

- ❍ Female
- ❍ Male

Do you garden or farm in your personal time?

- ❍ Yes
- ❍ No

Thank you for completing this questionnaire! If you would like, please use the space below for any additional comments you may have.

Please enter your email address below if you are interested in receiving the results of this project.

APPENDIX B

THEORETICAL FRAMEWORK