ABSTRACT

MCMILLEN, JENNIFER DAWN Assessing Perceptions of Outdoor Teaching in Preschool. (Under the direction of L. Suzanne Goodell)

Though obesity is a multi-factorial problem, one of the modifiable determinants in young children is food consumption. Familiarity is an important determinant of whether children try or like foods or not. Multi-component nutrition education interventions show positive health outcomes including increased fruit and vegetable consumption and appropriate weight status but interventions with garden components show a small but significant positive influence on fruit and vegetable consumption over those interventions with solely nutrition education.

Early childhood educators perceive they play an important role in keeping children healthy, yet many lack the knowledge to integrate nutrition education into their curricular lessons. Self-efficacy is an indicator of one’s competency and confidence in completing a skill or goal setting. Outdoor teaching allows teachers to incorporate a variety of subjects into one alternative place and time, but teachers lack self-efficacy for incorporating nature and science into the classroom generally. Head Start is a federally funded program that funds and oversees 1700 public and private agencies that provide Head Start to children from low-income families. Head Start recommends outdoor teaching as a part of teachers matching their curriculum to the Early Learning Outcomes Framework.

This dissertation uses an exploratory sequential design in which qualitative data are collected and analyzed and the results of phase one inform the development and design of phase two, which is quantitative. The first study explored preschool teachers’ experiences and perceptions related to incorporating outdoor teaching and learning into a preschool curriculum for children from low-income families and to develop a grounded theory-based conceptual model to explain the findings. The results uncovered teacher barriers and
facilitators and rendered a conceptual model. This model is important because it helps administrators efficiently understand and communicate what concepts are important to sustainably use Outdoor Learning Centers (OLCs). The second study explored the emergent concept of food and nutrition activities as an integral aspect of sustainable use in preschool gardens. Though they were not asked directly, teachers readily shared examples of food and nutrition activities when describing preschool OLCs or gardens. Researchers identified 6 constructs stitched across participants’ narratives that utilized food and nutrition activities in outdoor teaching: Observation and Discovery, Cooperation and Social Building, Motor Skill Development, Sensory Exploration, Farm to Table, and Food Insecurity.

The purpose of third study was to develop and validate a useful scale to measure preschool teachers’ self-efficacy for utilizing outdoor teaching in their curriculum. The study was conducted in 5 phases including item writing, expert panel review #1, cognitive interviews, expert panel #2, and finally the validation administration of the survey. Researcher collected the expert panel and validation data through an online survey system and conducted the one-on-one cognitive interviews via the telephone. This research project provided a validated tool (STO) for teacher self-efficacy in using outdoor teaching and allowed for grantees to measure need and could help them more appropriately allocate resources for in-service and continuing education to keep outdoor teaching sustainably integrated into their curricula.

This dissertation filled a gap in the literature related to teacher perspectives for using outdoor learning centers and preschool gardens as teaching centers. There were 2 main outcomes from this dissertation research: (1) The conceptual model; it describes components that influence the sustainable use of outdoor teaching and learning in the Head Start setting
thus it suggests opportunities for changes or additions to pre-service and continuing education curricula, (2) The STO survey: A valid and reliable self-efficacy in teaching outdoors measurement tool for Head Start teachers; it provides a convenient and efficient online measure for grantee agencies, preschool centers, or pre-post program assessment.
Assessing Perceptions of Outdoor Teaching in Preschool

By

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DEDICATION

I dedicate this dissertation work to my family and friends. To my parents, my mother Gracie and my step-father Gary Donaldson for giving me a solid foundation and love of learning, inquiry, critical thinking, and debate. And also for encouraging me to strive for my goals even when they felt just beyond my reach. To my sisters, Leslie Donaldson and Marlea Donaldson and your families for your endless support, love, and encouragement during this process. To Jessica Basco for your support as I began and walked through this journey and for giving me the biggest gift of my life, our daughter Anna. To Elizabeth Millione and Aurora Tiffany-Davis, for giving me kindness, love, and insight into how to make my next step when I most needed it and for your audacious belief in my abilities and strength of spirit, I am forever grateful. Finally, I dedicate this dissertation to my amazing daughter, Anna Basco-McMillen for sharing me so I could achieve my academic goals and for the delightful energy and brilliant smiles you brought to my life every day and also for the lessons of patience and persistence I learned with you. May you grow up to set goals just beyond your reach and have a strong, kind, giving community around you that helps you obtain them.
BIOGRAPHY

Jennifer Dawn McMillen was born on March 18, 1975 in Morgantown, West Virginia in the United States of America. After graduating from Fairmont Senior High School, she attended West Virginia University for 2 years. She then transferred to Marshall University, obtaining a Bachelors of Arts degree in Biology and General Science Education in May 1998. After moving to North Carolina, Ms. McMillen pursued a Masters of Science degree in Nutrition Sciences from Meredith College and graduated in May 2010. She began teaching as an adjunct instructor at Meredith College in the Fall of 2010 after enjoying a summer trip to Peru to study the anthropology of the potato in the Andes mountains.

While continuing to teach as an adjunct instructor, Ms. McMillen began her doctoral program in Nutrition Science at North Carolina State University (NCSU) in the Department of Food, Bioprocessing, and Nutrition Sciences under the College of Agriculture and Life Science. Under the direction of L. Suzanne Goodell, Ms. McMillen explored the topic of teacher perceptions of utilizing outdoor teaching in Head Start and other like programs geared toward children from low-income families. As a part of this exploratory study, Ms. McMillen worked with Head Start teachers from across the country and gained research experience with qualitative interviews and survey development and validation. Ms. McMillen supervised more than 10 undergraduate and graduate assistants and volunteers who helped her collect and analyze data throughout the dissertation research project. Some of these students analyzed sub-topics within the dissertation and Ms. McMillen guided them in their learning and analysis culminating in poster presentations at Undergraduate Research Symposia at NCSU. While completing her dissertation course work and research, Ms.
McMillen also oversaw the NCSU’s Nutrition Understanding Through Service (NUTS) community volunteer program. She continues to teach and mentor students in her faculty position and as director of graduate program in Nutrition Science at Meredith College.
ACKNOWLEDGEMENTS

Firstly, and most boldly; I would like to sincerely declare my gratitude for my committee chair Dr. L. Suzanne Goodell for her kindness, patience, encouragement, advice, and guidance. She has given me continuous support since before I began this doctoral program and helped me through challenging academic and personal situation along my journey. I fully appreciate the time and energy she has given to me and I know I would not have reached my academic goals without her assistance and supervision. Additionally, I am thankful that she has shared with me her passion for thoughtful rigorous qualitative research, her compassion for our community and how to attempt to impact the people groups in it with kindness, and her zeal for learning new research methods and pedagogies so I don’t become stale or irrelevant in my field.

I also thank my committee members, Drs. Jonathan C. Allen, Lucy Bradley, and Koralalage Jayaratne for supporting and challenging me where appropriate so I was able to become a better researcher and critical thinker during my education at NCSU. Knowing I could count on you to answer questions and give me insight from your knowledgeable perspectives was priceless throughout my dissertation process.

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I would like to thank my academic family at Meredith College (Dr. William Landis, Dr. Marie Chamblee, Dr. Susan Fisher, Dr. Matthew Poslusney, Tracy Smith, Rachel Findley, Cathie Ostrowski, Dr. Lanae Ball, Dr. Melinda Campbell, Dr. Stephanie Little, and Dr. Brent Pitts) for your patience and support while I balanced being a faculty member at Meredith College with my research and academic goals at NCSU. The reinforcement of your belief in me to accomplish this significant step in my academic career helped lift me through the challenging times and I hope to return your thoughtfulness in kind.

I also would like to gratefully acknowledge financial support provided by the Department of Food, Bioprocessing, and Nutrition Sciences and NCSU’s Graduate School as I learned much as a graduate teaching and research assistant within the department.

Lastly, my sincere thanks also go to all the preschool administrators for helping us recruit potential study participants and for the study participants who generously shared their time and perspectives with our research team. We would not have the in-depth understanding without you honesty sharing your thoughts and experiences with us. As this body of knowledge moves forward, it is because you helped lay the foundation of our understanding.
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OVERVIEW OF DISSERTATION CHAPTERS

This dissertation includes five chapters. Chapter 1 focuses on the background of early childhood food acceptance, preference, and consumption; nutrition education’s impact on food acceptance, preference, and consumption; student outcomes for outdoor learning; teacher perspectives in regard to outdoor teaching; Head Start’s early learning outcomes framework, and a brief overview of research method utilized in the dissertation. Chapters 2, 3 and 4 present the 3 main dissertation research manuscripts. Due to the lack of basic information and validated measurement tools in the research topic, researchers employed an exploratory sequential mixed methods approach employing a qualitative phase followed by quantitative phase. The research team chose to begin the project with one-on-one interviews to gain an in-depth understanding of the complexity of the phenomenon. The analysis of the qualitative interviews resulted in chapters 2 and 3. Following the qualitative work, the research team developed and validated a survey using quantitative methods. The survey results and analysis resulted in chapter 4. Lastly, chapter 5 summarized the dissertation research findings and shares the overall significance of chapter 2, 3, and 4 to the greater body of knowledge and our discipline. Chapter 5 also shared future research opportunities that resulted from this dissertation work. The following sections describe each research purpose, methodologies, and research significance in Chapters 2 through 4.

Chapters 2 and 3. The purposes of this qualitative interview project were to explore preschool teachers’ experiences and perceptions related to incorporating outdoor teaching and learning into a preschool curriculum for children from low-income families and to develop a grounded theory-based conceptual model to explain the findings. To explore this research phenomenon, the research team conducted one-on-one in-depth telephone
interviews with Head Start across the US. Researchers asked teachers open-ended questions and follow-up probes about their perspectives about utilizing outdoor learning centers. The research team utilized this method because it allowed for the participants to share their in-depth perspective without being influenced by “group think” as may happen in focus group research. Chapter 2 explained the overall grounded theory model, and chapter 3 explored the emergent concept of food and nutrition activities as an integral aspect of sustainable use in preschool gardens. This exploratory research informed the development of the initial survey items in the quantitative phase of the project.

Chapter 4. The purpose of this quantitative research project was to develop and validate a useful scale to measure preschool teachers’ self-efficacy for utilizing outdoor teaching in their curriculum. The study was conducted in 5 phases including item writing, expert panel review #1, cognitive interviews, expert panel #2, and finally the validation administration of the survey. Research members collected the expert panel and validation data through an online survey system and conducted the one-on-one cognitive interviews via the telephone. This research project provided a validated tool for teacher self-efficacy in using outdoor teaching and allowed for grantees to measure need and could help them more appropriately allocate resources for in-service and continuing education to keep outdooring teaching sustainably integrated into their curricula.
CHAPTER 1: THE LITERATURE REVIEW

Introduction

Childhood obesity rates are lower than in adults but the cumulative effect of weight gain over time is apparent. Among toddlers (age 2) and preschool children (aged 3-5) the obesity rate was 8.9% (Ogden, 2016) but prevalence increased to 17.5% during middle childhood (ages 6-11) and again during adolescence (12-19 years) to 20.5% (Ogden, 2016). Low income preschoolers have a higher prevalence of overweight and obesity than do preschoolers from middle and high-income families (Harbaugh, 2011; Montgomery, 2017). Though obesity is a multi-factorial problem, one of the modifiable determinants in young children is food consumption which impacts energy balance (Skinner, 2002; Skinner, 2012). Familiarity is an important determinant of whether children like foods or not (Aldridge, Dovey, & Halford, 2009) and consumption patterns are associated with taste preferences (Drewnowski, 1997). Multi-component nutrition education interventions show positive health outcomes, including fruit and vegetable consumption and weight status (Natale, 2014). Furthermore, interventions with garden components indicate a small but significant positive influence on fruit and vegetable consumption over those interventions with solely nutrition education (Savoie-Roskos, 2017). Early childhood educators perceive they play an important role in keeping children healthy (Kenney, 2011) through influencing eating and basic activity habits (Derscheid et al., 2010), yet many lack the knowledge to integrate nutrition education into their curricular lessons (Mita, 2013).

The purpose of this dissertation is to assess, through an exploratory sequential mixed methods design (Creswell, 2014), teacher perspectives for using outdoor learning centers and preschool gardens as teaching centers. Chapter 1 provides an overview of the current
understanding of research literature impacting this topic including childhood obesity and health consequences; preschool Head Start environment; determinants for and consumption of fruits and vegetables; nutrition education and outdoor learning; the role of teachers in outdoor learning settings; and the qualitative and quantitative research methods used in chapters 2 through 4. Chapter 2 explains the created grounded theory model and chapter 3 explores the emergent concept of food and nutrition activities as an integral aspect of sustainable use of preschool gardens. Chapter 4 discusses the development and validation of a survey to measure preschool teachers’ self-efficacy for utilizing outdoor teaching in their curriculum. Chapter 5 provides a summary of the dissertation work and the research significance of the component parts.

**Childhood Obesity**

Obesity impacts 37.9% of adults and 17.2% of children in the US (Figure 1.1) according to the latest data from 2013-2014 (Flegal, 2016, Ogden 2015). Obesity trends increase from early childhood to later childhood, again into adolescence, and once again into adulthood (Cunningham, 2014; Deshmukh-Taskar 2006; Ogden, 2015; Ogden, 2016; Reilly, 2003; Singh, 2008). Harbaugh and colleagues’ data highlight the need for early intervention, obesity rates in their study steadily creep upward as children age from age 3 at 13.1% to age 4 at 22.7% and eventually at age 5 reach 21.6% (Harbaugh, 2011). overweight 5-year olds are 4 times more likely to become obese adults as normal weight 5-year olds (Cunningham, 2014), suggesting that instilling healthy behaviors before kindergarten could benefit children’s long-term health and highlights why it is critical to implement sustainable obesity prevention strategies in the early years. Focus should be on strategies that will help children maintain Body Mass Index (BMI) status as they leave the early years and become more
Childhood is naturally a time of growth and development but accumulation of excess body fat is not recommended (AAP, 2003). Because body fat assessment requires equipment that is not always available, BMI is utilized as standard diagnostic tool for overweight and obesity. BMI is the current screening standard for adiposity as a ratio of weight to height measurements, which can practically be carefully measured (Klein, 2010). BMI is calculated as weight (pounds) divided by height (inches) squared, multiplied by 703. Standard growth rates and adiposity norms differ throughout childhood life stages, so carefully measured height and weight data are plotted on growth charts (Figure 1.2) to determine age and gender specific BMI percentiles (Cole, 2012; Rifas-Shiman, 2012). Standard classifications for

**Figure 1.1.** Prevalence of Obesity Among Children 2-5 Years Old in the US, NHANES Data (Ogden, 2015)

**Childhood Adiposity Classifications**

Trends in Youth Obesity Prevalence (aged 2-19)
children considering age and gender are BMI over 85\textsuperscript{th} percentile and under the 95\textsuperscript{th} percentile is considered overweight and 95\textsuperscript{th} percentile and over is considered obese (Table 1.1). Historically, these percentiles were thought to be good at classifying children but likely poor at quantifying adiposity changes where BMI and BMI percent seems to perform better (Cole, 2005). More recent evidence questions whether BMI percentile should be used as a screening tool in children under 9 years old as it appears only to be weakly correlated with percent body fat (Vanderwall, 2017).

**Figure 1.2.** Individual growth chart for girls, body mass index for age, 2 to 20 years from the CDC (CDC, 2010)
### Table 1.1. BMI Status Categories in Childhood

<table>
<thead>
<tr>
<th>BMI Status Category</th>
<th>Percentile Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Underweight</td>
<td>&lt; 5\textsuperscript{th} percentile</td>
</tr>
<tr>
<td>Healthy weight</td>
<td>5\textsuperscript{th} percentile to less than 85\textsuperscript{th} percentile</td>
</tr>
<tr>
<td>Overweight</td>
<td>85\textsuperscript{th} percentile to less than 95\textsuperscript{th} percentile</td>
</tr>
<tr>
<td>Obese</td>
<td>95\textsuperscript{th} percentile and greater</td>
</tr>
</tbody>
</table>

### Determinants of Childhood Obesity

The causes of childhood obesity are complex and multifactorial. One model for understanding the layers of determinants of obesity is the Six-C’s (Harrison, 2011). The 6 layers are cell, child, clan, community, country, and culture and are based on the social ecological model which describes how various layers of personal and environmental factors dynamically impact child weight status (Harrison, 2011). Because the layers of contributions interact with one another, there is also 5 zones of influence that cross-section the 6 layers. The 5 zones are nutrition-related opportunities and resources, activity-related opportunities and resources, nutrition-related practices, activity-related practices, and personal and relational attributes. This model acts as a theoretical lens underscoring the design and implementation of the dissertation research project.

### Childhood Obesity, Health, and Risk of Chronic Disease

In and of itself, childhood obesity adversely affects childhood health, wellbeing, and is strongly associated with increased risk for cardiovascular diseases, metabolic disorders, pulmonary diseases, gastrointestinal diseases, and multiple kinds of cancer (Daniels, 2006; Freedman, 1999; Reilly 2003). Low-income preschoolers in the US are significantly more likely than high income preschoolers to be reported as having fair to poor health, stomachaches, to be iron deficient and have lower quality of life and social well-being.
In addition, food insufficient preschoolers are more likely to report having poor health, stomachaches, headaches, and experience more colds than do food sufficient preschoolers. They are also less likely to eat recommended servings of fruits and vegetables and a higher portion of their vegetable consumption tend to be fried potatoes (Lorson, 2009). Both low-income and food insufficiency negatively impacts preschooler’s health (Lorson, 2009; Alaimo, 2001).

**Childhood Obesity and Low-income**

Obesity rates among low-income children remain higher than their middle and high-income counterparts (Ogden, 2014). Comparative rates from National Health and Nutrition Examination Survey (NHANES) in 2003 were 14.5% for low income preschoolers and 13.9% in the overall preschool populations, showing that obesity disproportionally affects those with limited resources even in the early years (Ogden, 2014; CDCP, 2009). Additionally, the prevalence of obesity among non-Hispanic whites seems to be less than the prevalence among non-Hispanic blacks and Hispanic whites (Ogden, 2015), which are heavily represented in low-income population (Dalenius, 2012). The predominance of overweight preschoolers, which tracks into later childhood and adulthood, is also higher in low income populations (Bucholz, 2011; Shoeps, 2011). Data from WIC, which focuses on children from low income families, reported an obesity prevalence of 14.5% among 2-4 year olds in 2015 as compared to the US average of 8.9% for the slightly different aged 2-5 year olds from 2011-2014 NHANES data (Ogden, 2015).

Underscoring this point, one study revealed that kindergarten children in the top income quintile (one fifth of the sample) have a 7.4% obesity rate whereas the bottom two income quintiles have rates of 16.5% and 13.8%, suggesting somewhat of a dose response for
income and childhood obesity rates (Cunningham, 2014). This trend continues and widens through eighth grade where their data stops. Furthermore, the data suggest that if children exit the preschool years at normal weight, their future incidence of obesity remains lower between the ages of 5-14 years (Cunningham, 2014).

It appears that Head Start may offer protective effects against childhood overweight and obesity as well as against poor health in general (Belfield, 2013). Mandal and Powell’s study shows that time spent in Head Start is correlated with an increase in low energy dense food choices (Mandal, 2014). In their study, children in Head Start consuming more frequent servings of fruits and vegetables compared to other socioeconomically similar children who spent time spent in parental care (Mandal, 2014). Overall, the positive effects of center based childcare like preschools and Head Start centers on low-income children’s health and wellbeing is convincing.

**Childhood Obesity and Food Consumption Patterns**

There is good evidence that lean preschoolers (BMI under 85th percentile for age and sex) consume a lower energy dense diet (calories per weight) than obese preschoolers (Vernarelli, 2011). However, this is not so for the youngest preschoolers (3 year olds). Data show as the energy density of 4 and 5 year olds diets increase, so does their BMI status. Those consuming lower energy diets are also consuming greater servings of fruits and vegetables. Most preschoolers are not consuming the recommended servings of fruit and vegetables (Lorson, 2009; Vernarelli, 2011), especially when 100% fruit juice is excluded from the analysis (Vernarelli, 2011). Highlighting the importance of including or excluding certain foods, it appears that preschoolers in the highest BMI categories are consuming the most servings of fruit juice (Vernarelli, 2011) and a greater portion of their vegetable consumption is fried.
When the difference between the energy density of the lean and obese children is calculated into the context of kcals/week, the difference translated into ~600 kcals, which is certainly enough to account for weight gain over time (Varnarelli, 2011). A significant increase in BMI reduction in overweight and obese preschoolers when parents were also targeted in the intervention (Quattrin, 2014). Frequent consumption of specific foods become particularly important when transitioning beyond the general population and into minority populations. Socioeconomic and cultural factors may create circumstances where foods are more highly consumed affecting diet quality when compared to recommendations. For example, it appears that low-income Hispanic preschoolers are consuming higher amounts of fruit juice (Salvo, 2012) than other low-income minorities. Concerns with this are at least two-fold. Firstly, liquids do not appear to engage the process of satiety signaling, so energy that is ingested as liquid could result in a higher caloric diet. Secondly, sweetened beverages decrease the nutrient density of the diet by adding calories while displacing more nutrient dense options (Libuda, 2009).

**Head Start**

Head Start is a federally funded program that funds and oversees 1700 public and private agencies that provide Head Start to children from low-income families (HS What we do, 2017). Program oversight is held within the United States Department of Health and Human Services and was established in 1965 (HS program Facts, 2017). During the 2015-2016 school year, Head Start served 1,100,000 children from birth through age 5 and pregnant women (HS What we do, 2017) in every US state and territory (HS About Head Start Programs, 2017). Program foci include supporting children’s growth and development in school readiness, health, and family well-being (HS About Head Start Programs, 2017). Head
Start requires grantee agencies to align program and teaching strategies to the Head Start Early Learning Outcomes Framework (ELOF) (HS ELOF). This framework includes 5 central domains: approaches to learning; social and emotional development; language and literacy; cognition; and perceptual, motor, and physical development. Though the evidence is limited, early childhood interventions, like Head Start, improve health behaviors later in life (Harvard, 2010; Palfrey, 2005).

**Preschool Dietary Recommendations**

Recommendations clearly encourage children to eat a more plant-based diet and emphasize an increase in vegetable consumption (AND, 2014; USDA Dietary Guide, 2015). However, preschoolers are not consuming the number of fruit, vegetable, or whole grain servings as recommended (Ball, 2008; Lorson, 2009; Erinosho, 2011; Fox, 2010). One study highlights that one fourth of 2-3 year olds are not consuming even 1 serving of vegetables per day and of the preschoolers who are consuming vegetables, several studies reiterate that too many preschoolers are consuming vegetables as fried potatoes (Lorson, 2009; Fox, 2010). Additionally, only a small fraction (2%) of preschoolers are consuming the recommended amounts of all 5 food groups while at preschool (Erinosho, 2011). Overall, preschooler consumption of dark green and deep yellow vegetables is extremely low and they are consuming more than recommended amounts of sugar added condiments and sweets (Ball, 2008; Fox, 2010), saturated fat from whole milk (Ball, 2008; Fox, 2010), and high-fat or fried meats (Ball, 2008).

Fortunately, snack time may be one opportunity to align preschooler consumption with recommendations (Roe, 2013). Serving a variety of foods during snack time seems to increase preschooler consumption of self-serve fruits and vegetables during that snack as
compared to only serving one variety of fruit or vegetable. This increase in consumption is accomplished even in the absence of teacher encouragement or role modeling and should be further researched.

**Food Acceptance & Preference**

The first several years of a child’s life is a sensitive period when development of food acceptance and preference patterns are thought to be established (Scaglioni, 2011; Fildes, 2014; Birch, 1999). Though genetic influences such as innate preference for sweet are well documented, other factors also play key roles in the promotion of food consumption patterns (Fildes, 2014; Birch, 1999). A couple notable examples are parental influences and the societal norms that influence individual differences and preferences (Scaglioni, 2011; Fildes, 2014). Social influences such as positive role modeling by both teachers and peers have been studied attempting to increase intake and diversify the pallet to increase healthful choices (Birch, 1999; Hendy, 2000; Knai, 2006; Horne, 2011; O’Connell, 2012).

Additionally, researchers understand the importance of early and persistent (5-12) exposure as a way to influence food preference and consumption (Birch, 1999; Cooke, 2007; Knai, 2006; Niemeier, 2010, Horne, 2011; Birch, 1982; Reinaerts, 2007; Aldridge, 2009; Lakkakula, 2010; Anzman-Frasca, 2012; Roe, 2013). Exposure studies typically focus on exposure as taste, yet the facets of what type of exposure counts, still needs to be elucidated (Pliner, 2008; Houston-Price, 2009; Mustonen, 2010; Heath, 2011; Dazeley. 2012; Osborne, 2012). Of particular interest to the author is the question of how integrating visual exposure, tastings, and hands-on exposure such as outdoor learning impact food acceptance and preference. Coulthard & Sealy (2017) explored sensory-based food activities, increasing
children’s willingness to taste foods used in the activity as well as other foods that were not included in the intervention activities.

**Fruit & Vegetable Consumption**

Fruit and vegetable consumption is linked with health benefits including a lower prevalence of overweight and obesity as well as lower incidence of chronic diseases (Lin, 2002; Bradlee, 2010; Azagba, 2012; Van Duyn, 2000; Hung, 2004; Boeing, 2012). Obesity is a complex issue with a variety of physiological, genetic, psychological, and environmental components. This complexity makes directly connecting specific foods, food groups, or even dietary patterns to obesity difficult. However, studies show that intake of fruits and vegetables is inversely related to central obesity and other measures of obesity such as BMI (Bradlee, 2010; Azagba, 2012; Boeing, 2012). The top two leading causes of death (heart disease and cancer), which account for about 47% of all deaths in 2010, are strongly linked to low fruit and vegetable consumption (Van Duyn, 2000; Heron, 2013). Epidemiological studies indicate a convincing protective effect of fruit and vegetable consumption for heart disease (Van Duyn, 2000; Hung, 2004; Boeing, 2012). Intervention studies demonstrate best results when energy intake is also modified, particularly by decreasing fat intake. Method of preparation should be considered when discussing increasing vegetable intake (Boeing, 2012). Given the indications of healthfulness for fruit and vegetable consumption, it is noteworthy that consumptions patterns of fruit and vegetables fall below recommendations with some estimates less than 50% (Azagba, 2012; Boeing, 2012; Lorson, 2009; Guenther, 2006; Story, 2006). Moreover, children living in low-income families are those most often not meeting recommendations (Lorson, 2009); however, exposure to less-liked foods seems
to be an effective mediator with this group just as it is with children in general (Lakkakula, 2010; Namenek Brouwer, 2013).

**Preschool and Nutrition Education**

Preschools have an opportunity to use nutrition education to focus on modifiable determinants of health outcomes while teaching other content areas in the preschool classroom yet this potential is largely untapped (Kaphingst, 2009). Most successful programs are designed to increase food and nutrition related knowledge, to promote behavior changes towards eating more healthy foods, and some include physical activity components (Davis, 2013; Sharma, 2011). While the results from these interventions are promising, not many studies could be found testing comprehensive nutrition education programs in preschools. More recently, garden components are being integrated into preschool nutrition education programs. Unfortunately, several program poster presentations or program descriptions were found without follow up with manuscript publication (Kalich, 2010; Peracchio, 2016; Peterson, 2013; Rye, 2015).

**Spending Time Outside**

The outdoor environment is an ever-changing landscape where observation and curiosity can be engaged (Dowdell, Gray, & Malone, 2011). Children need positive experiences in the natural world to understand and respect nature (Wells & Lekies, 2006). More time outdoors positively associates with physical activity and better gross motor movement (Hinkley, Crawford, Salmon, Okely, & Hesketh, 2008). This may help explain why children who attend schools that allow for additional minutes of outside time exhibit a more gradual increase in BMI as compared to their counterparts in schools that do not (Miller, 2011). Thoughtfully designed outdoor environments may promote more and diverse physical
activity that could further increase physical activity while children are at school (Fjortoft, 2009). Unfortunately, there is a nationwide trend of school districts decreasing student’s outdoor time during school hours (Burriss, 2011). If we can reverse this trend, there are possible positive consequences in weight and health outcomes as students spend less time being sedentary in school gardens than they do inside traditional classrooms (Wells, Myers, & Henderson, 2014).

**Outdoor Learning**

Natural, outdoor, and garden settings improve children’s health, both physically and mentally (Miller, 2011; Hinkley, 2008; Fjortoft, 2009; McCurdy, 2010; Heneman, 2008). Environment based learning enhances academic learning and results in higher grades and improved test scores (Heneman, 2008; Robinson-O’Brien, 2009). Outdoor gardens readiness for hands-on activities allow students to engage in science education (Berezowitz, 2015; Eick, 2012; Skinner, 2012; Wells, 2015) and make connections to the environment (Witt & Kimble, 2008). Well’s (2015) showed a dose-response indicating the robustness of intervention studies need to be carefully designed to maximize treatment effects of school gardens on science knowledge.

Programs with hands-on exposure to fruit and vegetables or that pay specific attention to fruits and vegetables, as opposed to sole nutrition education in general, show successful results both of which are easily incorporated in outdoor learning centers (Knai, 2006; Witt, 2011). Outdoor learning provides opportunities to improve food consumption through exposure and preference (Berezowitz, Bontrager Yoder, & Schoeller, 2015; Robinson-O’Brien, Story, & Heim, 2009). However, the ability to impact knowledge, preference, and consumption of fruits and vegetables through school gardens in elementary schools is
convincing though not completely understood. Intervention with hands-on outdoor components involve more than simply taste exposure and makes controlling and comparing variables more challenging (Herron, 2008; Heneman, 2008; Robinson-O’Brien, 2009; Somerset, 2009; Parmer, 2009; Heim, 2009; Blair, 2009; Oxenham, 2010; Morgan, 2010; Jaenke, 2012; Gatto, 2012). Additionally, learning skills, such as food prep, that could contribute to future healthy behaviors are also positively associated with exposure to a food-based school garden (Somerset, 2009; Jaenke, 2012).

**Outdoor Learning in Preschools**

Only handful of outdoor learning or garden studies focus in preschool settings (Castro, 2013; Farfan-Ramirez, 2011; Izumi, 2015; Kos, 2012; Lee, 2017; Namenek Brouwer, 2013; Sharma, 2015). Farfan-Ramirez’s research focused on preschool children enrolled in early childcare centers within the California unified school district. These centers enrolled children from low-income families. The authors report positive results in improving willingness to taste fruits and vegetables after their involvement in the garden curriculum as compared to only the nutrition lessons (Farfan-Ramirez, 2011). Namenek Brouwer’s (2013) study evaluating Watch Me Grow investigates the integrated garden-based intervention focused on the number of fruits and vegetables served and consumed school meal service. Results were mixed because the intervention centers served fewer vegetables servings than did the control centers but the intervention children consumed more of what they were served than their control counterparts. This was not the case for fruit consumption as post intervention the children at the control centers consumed more fruit than did the invention center children. This study highlights the challenges of investigating a complex and multi-faceted solution to a complex problem.
Kos (2012) made the connection of using preschool gardens to teach about the origins of food. Izumi’s (2015) evaluation of Harvest for Healthy Kids suggests comprehensive Farm to Preschool programs might be an effective mechanism for increasing willingness to try and preference of a greater variety of foods. Sharma’s (2015) feasibility study of the PLANT program indicates it is well received by teachers and parents alike and significantly increased children’s willingness to try new fruits and vegetables. Participants reported that the program easily integrated into the preschool curriculum and data suggest the experience increased parent interest in gardening. Likewise, Lee (2017) also indicated that the SAGE program was well received by parents but they were unable to significantly change parenting practices and home food environments so overall dietary habits remained unchanged. Further research needs to examine the effects of longer term garden curricula interventions and classroom integrated exposure to school-grown produce. More research investigating whether or not preschool garden program results can improve and sustain significant increases in preschooler fruit and vegetable knowledge, willingness to try, preference and consumption is warranted.

**Outdoor Teaching in Preschools**

Many teachers view teaching outdoors as being healthy, being a place to connect with reality, being a place to activate both halves of the brain, being a place where you can teach all subjects, and being a place to understand connections to nature, yet other teachers do not have a clear conception of outdoor education (Szczepanski, 2006). This may be because teachers lack experience connecting with nature, as teacher site previous experience with nature as a motivation for incorporating nature into lesson plans (Eick, 2012). Though nature play has its advantages, pre-service teachers (those not yet graduated from degree programs)
are more likely to choose maintained outdoor settings over natural ones (Ernst & Tornabene, 2012). Given that teacher role modeling is thought to effectively increase children’s consumption of fruit and vegetables (Birch, 1999; Hendy, 2000; Knai, 2006, Horne, 2011) administrators may want to consider what teachers need to naturally integrate concepts of food and outdoor teaching into their lesson plans. Additionally, there is no clear definition from teachers or researchers in regard to sustainable integration of outdoor teaching in the preschool setting. What does sustainable use look like? What dimensions need to be present or considered? These questions remain unanswered in the literature.

Head Start teachers are skeptical about overweight status in children as they perceive voracious eating as a sign of hunger and food insecurity at home (Lumeng, 2008). Informing teachers with strategies that both increase healthy behaviors and provide opportunities to share food may increase teacher confidence in shaping eating behaviors. Additionally, early childhood educators with more education feel that children can be persuaded to eat healthy foods and better understand the importance of large motor activities in promoting health (Derscheid, 2010). Professional development such as training and education can influence teacher knowledge and confidence (Dyment, 2014) so providing in-service or continuing education where teachers lack knowledge and confidence is warranted. Program design and dose should be carefully considered as programs with short duration have not sustained significant changes in knowledge and confidence (Moseley, 2002).

**Teacher Self-efficacy**

Self-efficacy is an indicator of one’s competency and confidence in completing a skill or goal setting (Bandura, 2004). Outdoor teaching allows teachers to incorporate a variety of subjects into one alternative place and time, but teachers lack self-efficacy for incorporating nature
and science into the classroom generally (Torquati, 2013). Teacher self-efficacy correlates consistently with teacher practice and learning and also with student achievement (Tschannen-Moran & Hoy, 2007). When Piasta et al. (2014) observed preschool classrooms to examine science and math learning, no mention of outdoor learning was included and outdoor playtime was excluded from the observations. This may indicate that outdoor learning is not yet an integrated part of the average classroom and still remains generally an optional learning environment. A recent study explores teacher perceptions of barriers and benefits of using preschool gardens to increase fruit and vegetable intake (Davis and Brann, 2017). Results indicate that teachers see curricular and social skill benefits and think gardens increase exposure, willingness to try, knowledge in general and about food origins, and physical activity. Teachers also indicate they have a lack of knowledge, funds, volunteers, staff participation, and time in addition they want more curricular guidance, struggle with low yield from the garden and plans can be negatively impacted by weather. Weather, volunteers, knowledge, and funds (to purchase equipment) re-iterated teacher identified barriers from a previous study looking at the importance of outdoor play (McClintick, 2015).

Bandura (1977) identified 4 components of self-efficacy that influence the belief of self-efficacy; vicarious learning, verbal persuasion, mastery, and state of arousal. Vicarious learning is observing someone who has already mastered the task or skill (Bandura, 1977). Unfortunately, garden or outdoor teaching experts may not be available for novice teachers to observe. Verbal persuasion includes the expert giving feedback and encouragement to the novice (Bandura, 1977). Finding time and an expert who is willing and able to collaborate may provide challenges to the new teacher in the preschool setting. Mastery is the most important concept in self-efficacy, it is learning the skill and achieving proficiency (Bandura,
There is no research to give an indication of how long it takes most teachers to master the knowledge and skills to effectively teach outdoors. Finally, state of arousal indicates the state of mind an individual experience while trying to learn and master a skill (Bandura, 1977). This heightened state of arousal likely allows a person to pay attention and remember new tasks and skills better.

Early childhood educators feel they play an important role in keeping children healthy through influencing eating and basic activity habits (Derscheid et al., 2010; Kenney, Henderson, Humphries, & Schwartz, 2011). But teachers lack the knowledge to significantly integrate health or nutrition lessons into curricular lessons, so providing teachers with knowledge and strategies that increase healthy behaviors may increase teacher confidence in shaping children’s healthful behaviors (Mita, 2015). Teacher experience is the most direct precursor to teacher self-efficacy, so hands-on active training sessions are recommended to influence self-efficacy (Mosley, 2002). Derscheid et al.’s (2010) work indicated teachers believe that nutrition is a primary mission for Head Start but also report feeling challenged with the expectation of being healthy eating role models. However, when pre-service teachers are exposed to nutrition lessons, they themselves seem to make improvements in healthful practices (Unusan, 2007). Additionally, to allow teachers to better utilize the outdoors, nature education is being incorporated into early childhood teacher education (Torquati et al., 2013).

**Psychometrics in Outdoor Teaching**

At this time, outdoor learning use in preschools is inconsistent and researchers do not fully know why this is so, though several barriers that may impact self-efficacy have been identified (Davis and Brann, 2017). Teachers’ motivations and barriers to utilizing OLCs
have been explored abroad (Waite, 2010), but an understanding of teacher perceptions in the US is warranted. There are currently no validated surveys to evaluate preschool teacher’s self-efficacy for teaching outdoors but there are a couple self-efficacy scales that can be used as perspective.

Derscheid (2014) used a 48-item validated survey with three subscales to examine teacher’s self-efficacy towards nutrition knowledge and physical activity needs of preschool students. This was a part of a 58-item questionnaire which also included knowledge of health practices. Another self-efficacy for outdoor teaching exists, but it focuses on wilderness education and would not be a good fit for preschool teachers who are primarily located in a traditional classroom (Schumann, 2014). Their survey, the TOE-SES began with a 49-item pool and through exploratory factor analysis it was reduced to a 23-item scale with five subscales. Then confirmatory factor analysis further reduced the acceptable fit of 22 items, still with five subscales, all with strong internal consistencies (Schumann, 2014). The methodology for both validation studies was well defined, though the focus was not applicable to the current project.

**Mixed Method Approach**

There are three basic approaches used in research; quantitative, qualitative, and a combination of the quantitative and qualitative aptly called mixed methods (Creswell, 2014). According to Creswell (2014), quantitative research is used when researchers hold a post-positivist worldview and are interested in using deductive reasoning to test a theory. This is typically done by formulating a hypothesis, collecting numerical data, and focusing on understanding “what”. Generally, the quantitative approach is methods focused and the
strengths are protocol adherence and replication, ability to establish validity and reliability, and generalizability to the study population.

Qualitative research is likely used when researchers hold a constructivist or transformative worldview and are interested in exploring a topic or question in depth by focusing on participant perspectives and using inductive reasoning to generate a theory (Creswell, 2014). This typically involves open-ended question, collecting rich text data, and focusing on understanding “why” or “how”. Generally, the qualitative approach is participant focused and strengths are the emergent and explorative nature, ability to gain an in-depth understanding, and capacity to be flexible.

Mixed methods research is used when researchers hold a pragmatic worldview and are interested in solving the research question utilizing whatever methods work best for that topic (Creswell, 2014). Generally, the mixed methods approach is problem focused. Three main mixed methods designs are frequently used; convergent parallel, explanatory sequential, and exploratory sequential. Convergent parallel design collects both qualitative and quantitative data at the same time. Explanatory sequential collects and analyzes quantitative data in phase one and follows up in phase two with collecting and analyzing qualitative data to further explain the quantitative results. This dissertation uses exploratory sequential in which qualitative data are collected and analyzed and the results of phase one informed the development and design of phase two, where quantitative data are collected to confirm the ideas explored in phase one.

Individual Interviews are a qualitative method of data collection where interviewers collect data from one individual regarding one topic (Creswell, 2013). Interviews can be unstructured, semi-structured, or structured and can be administered in person or via
telephone or video (Corbin and Strauss, 2015). In all cases, it is typical for data collection to end when saturation has been reached, which is defined as the point when researchers are no longer hearing new themes and no longer hearing novel ideas that significantly contribute to the existing themes (Bowen, 2005).

Cognitive interviews are a type of individual interview and often used as a check on content validity in the survey development process (Willis, 2015). To do this, researchers often use a semi- or structured interview guide and ask think-aloud and verbal probing questions to gain an understanding of the participants thought processes while engaging with the survey (Di Iorio, 2005; Willis, 2015). This technique allows researchers to assess whether the participants understand the statements or questions and to confirm their interpretation of the intent aligns with the intended meaning.

Exploratory factor analysis is a complex quantitative research method used to assess the construct validity of a scale during the development process (Costello and Osborne, 2005; Di Iorio, 2005). Empirical evidence (responses of participants to items on the scale) is used to support the inclusion of items into a given dimension or sub-scale called a factor (Di Iorio, 2005). Each of these factors is one dimension of the larger construct being measured. Sample size recommendations to achieve significance vary. Tabachnick and Fidell (2001) recommend at least 300 participants for factor analysis yet Pett, Lackey, and Sullivan (2003) recommend a minimum of ten participants for each scale statement. The internal structure is sought through principle axis factoring with an oblique Promax rotation, scree plot examination, and an iterative factor analysis procedure of analyzing loading tables to achieve the cleanest factor structure (Costello and Osborne, 2005). Reliability assessment using Cronbach’s alpha ranges from 0 to 1, with 1 indicating a perfect correlation (Di Iorio, 2005).
Each sub-scale’s reliability or internal consistency should measure at 0.7 or above for acceptable or at .8 for good (George & Mallery, 2003).

**Summary and Conclusion**

Outdoor and garden education show promise but outcome measures are inconsistent and most studies are conducted with school-aged children (Berezowitz, 2015; Ohly, 2016; Savoie-Roskos, 2017). More than half of 2-5 year olds in the US attend preschools. Preschools have also been identified as places where early obesity prevention could be impactful as children are interested in learning about food and still responsive to caregiver influence (Birch and Ventura, 2009). Teachers motivations for using school gardens include their own memories of interactions with nature, observations of student behavior, and pre-established beliefs about teaching and learning (Jorgenson, 2013). But, there is little research-based evidence for understanding preschool teachers’ needs for incorporating outdoor teaching into their classroom routines.

This review sought to make connections within the current literature and serve as a call to action for researched-based inquiry to help fill in the gaps. In order to determine how outdoor teaching can be sustainably integrated into the preschool classroom, researchers need to gain an in-depth understanding teacher’s barriers and facilitators for teaching outdoors. Teachers can provide on the ground perspectives about the challenges of starting, using, and maintaining OLCs in preschool centers. Understanding what impacts preschool teachers’ knowledge, skills, and confidence (self-efficacy) will allow researchers to develop a validated scale. Unfortunately, there is currently no validated scale that measures preschool teacher self-efficacy for outdoor teaching. Once developed, the online self-efficacy survey could be used by agencies or centers to conduct formative and summative assessment and
needs analysis to better utilize funds. Researchers could also use this tool to develop or assess outcomes for training programs, educational material development, and intervention studies.
CHAPTER 2: TEACHERS’ PERCEPTION OF SUSTAINABLE INTEGRATION OF OUTDOOR TEACHING AND LEARNING INTO HEAD START CLASSROOMS: A GROUNDED THEORY APPROACH

Abstract

The perceived benefits of outdoor learning have influenced recommendations and policies alike in early childhood education, yet outdoor learning in preschools is inconsistent and researchers do not yet know why this is so. The purposes of this qualitative interview study were to explore preschool teachers’ experiences and perceptions related to incorporating outdoor teaching and learning into a preschool curriculum for children from low-income families and to develop a grounded theory based conceptual model to explain the findings. Causal conditions included being comfortable in nature, having administrative support, focusing on safety, and reacting to weather. The intervening conditions were teacher knowledge and skills, program structure, resources and physical supplies, and human resources. The strategies for implementing sustainable use of OLCs were employing child-directed practices, applying multi-curricular techniques, incorporating health education, and engaging the community. Finally, the consequences identified for using OLCs were impacting whole child learning, influencing health, and exposing children to nature. Holistic integration of the results into the current literature suggested several opportunities for pre-service teacher education, professional development, and assessment tool development and validation.

Keywords

Early childhood education, Head Start, Preschool education, Outdoor learning, Qualitative interviews, Grounded theory
Introduction

Outdoor learning is a vast term that conjures up thoughts of many different settings: a school garden, a concrete playground with swings and slides, a butterfly observation area or a nature trail through the woods. Regardless of the definition, the perceived benefits of outdoor learning centers (OLCs) have influenced recommendations and policies alike (NAAEE, 2010; Nature-Based Learning and Development, 2015). Perceived benefits of OLCs are in part influenced by early childhood being a time of exploration and discovery (Rahm, 2002) and the outdoors being an ever-changing place welcoming observation and curiosity (Dowdell et al., 2011). Children need positive experiences with nature to understand and respect the natural world (Wells and Lekies, 2006). Both unstructured outdoor exploration and more structured outdoor learning positively impact cognitive development and academic knowledge (Williams and Dixon, 2013). Spending more time outdoors is correlated with more physical activity and gross motor movement (Hinkley et al., 2008) and provides opportunities to improve food consumption through exposure and preference (Berezowitz et al., 2015).

Impacts of outdoor education on academic outcomes

Though the evidence is limited, school gardens appear to enhance academic outcomes (Graham et al., 2005). Some see outdoor garden interventions as opportunities where hands-on learning can be an outlet for increasing science engagement (Wells et al., 2015) or social integration within the school and community (Block et al., 2012). All of these factors could have secondary impacts on future academic outcomes. However, methodological rigor and attention to research design need to be improved to make a stronger case for outdoor education as it relates to academic success (Williams and Dixon, 2013). Though academic
knowledge and skills are positively associated with school gardens, more studies investigate their impact on health (Blair, 2009).

**Impacts of outdoor education on health; physical activity**

Physical activity improves children’s health (McCurdy et al., 2010), and teachers recognize that outdoor play is a source of physical activity through exploratory child-initiated play (Derscheid et al., 2010). Children who spend more time outdoors are more active than children who spend less time outdoors (Hinkley et al., 2008). Students spend less time being sedentary in school gardens as compared to being inside a traditional classroom (Wells et al., 2014).

**Impacts of outdoor education on health; determinants of dietary behavior**

Given the indications of healthfulness for fruit and vegetable consumption, it is concerning that consumption patterns of fruit and vegetables fall below recommendations (Guenther et al., 2006). Those from low-income families meet fruit and vegetable recommendations less frequently than their higher income peers (Grimm et al., 2012). Consumption patterns are associated with food preferences, and familiarity with a food is an important determinant of whether children like it or not (Aldridge et al., 2009). Taste exposure to less-liked foods is an effective mediator to increasing children’s preferences (Lakkakula et al., 2010). Beyond taste exposure, research is also exploring the impact of other sensory-based food activities on children’s willingness to taste and eat new foods (Coulthard and Sealy, 2017).

A handful of outdoor learning and school garden studies have shown positive associations with fruit and vegetable preference (Farfan-Ramirez et al., 2011; Hanbazaza et al., 2015; Meinen et al., 2012), but others have only shown an increase in preferences for vegetable, not fruit (Gatto et al., 2012). Garden interventions’ impact on willingness to try
fruit and vegetables (Meinen et al., 2012) shows promise, yet researchers have been challenged to show increased fruit and vegetable consumption (Hanbazaza et al., 2015; Savoie-Roskos et al., 2017). The ability of school garden interventions to impact knowledge about fruit, vegetable, and healthy eating is also mixed (Meinen et al., 2012). Analysis in the preference arena reiterates that the current body of knowledge lacks robust methodology including treatment randomization (Ohly et al., 2016). Part of the difficulty in assessing the outcomes associated with school gardens is that more than simple taste exposure is involved (Blair, 2009; Hazzard et al., 2011; Jaenke et al., 2012).

**Teacher perspectives, knowledge, and skills**

Outdoor learning appears to be valuable for children; however, it is less apparent how well-prepared teachers are to incorporate outdoor learning into their daily classroom routines. For one, teachers lack self-efficacy for incorporating nature and science into the classroom generally (Torquati et al., 2013). When Piasta et al. (2014) observed preschool classrooms to examine science and math learning, no mention of outdoor learning was included and outdoor playtime was excluded from the observations. This may indicate that outdoor learning is not yet an integrated part of the average classroom and still remains a novel learning environment.

Teachers also lack the knowledge to significantly integrate health or nutrition lessons into their curricular lessons, but providing teachers with knowledge and strategies that increase healthy behaviors may increase teacher confidence in shaping child eating behaviors (Mita, 2013). Early childhood educators feel they play an important role in keeping children healthy through influencing eating and basic activity habits (Derscheid et al., 2010). Even
though teachers indicated that nutrition is a primary mission for Head Start they also report feeling challenged with the expectation of being healthy eating role models.

Some teachers view teaching outdoors as healthy, a place to teach all subjects while connecting with nature, yet other teachers do not have a clear concept of outdoor education (Szczepanski et al., 2006). To allow teachers to better utilize the outdoors, nature education is being incorporated into early childhood teacher education (Torquati et al., 2013). At this time, outdoor learning use in preschools is inconsistent and researchers do not fully know why this is so. Teachers’ motivations and barriers to utilizing OLCs have been explored abroad (Waite, 2010), but an understanding of teacher perceptions in the US warrants further study. Additionally, as far as the authors have found, no refereed publications have solely investigated teacher perceptions of using OLCs in low-income preschools. The purposes of this qualitative study were to explore preschool teachers’ experiences and perceptions related to incorporating outdoor teaching and learning into a preschool curriculum for children from low-income families and to develop a grounded theory based conceptual model to explain the findings.

The Study Methods

Research design
Researchers collected data about teacher perceptions for using OLCs with low-income preschoolers using in-depth semi-structured telephone interviews. Grounded theory informed development of the interview guide, data collection, and analysis for the purpose of generating a conceptual model to explain the phenomenon (Corbin and Strauss, 2015). Open-ended interviews encouraged participants to share their experiences without the influence of
others (as could occur in focus groups). NCSU’s Institutional Review Board approved the study design, protocol, and the measurement instrument.

**Participants and recruitment**

To be included in the study, participants self-identified as teachers or teacher assistants who taught in Head Start or state-funded classrooms serving preschool children (ages 3-5) from low-income families and had to be 18 or older. The investigators used a systematic approach to recruit a purposeful (Creswell, 2013) national sample of preschool teacher participants using US census regions as guidance and the Head Start locator tool to identify grantees. Researchers purposefully sampled each census sub-region to explore possible thematic variation as a result of participant’s geo-climate disbursement. Administrators and directors were contacted via email or phone to obtain teacher contacts to recruit participants into the study.

**Measurement instrument**

A semi-structured interview guide was created to improve consistency and reduce interviewer bias throughout the interviews, but also allow participants to construct and share their own meaning of the explored concepts (Creswell, 2013). The interview guide consisted of 14 main questions (Table 2.1) and was structured to gather information about how the teachers defined an outdoor learning center and what facilitated, acted as barriers, and motivated the preschool teachers to start, use, and maintain outdoor learning centers. To increase trustworthiness (Krefting, 1991; Williams and Morrow, 2009) and reduce bias, each interviewer completed a training series that focused on best practices in qualitative research and how to effectively utilize the interview guide (Goodell, 2016).
Table 2.1. Key interview guide questions for preschool teachers

<table>
<thead>
<tr>
<th>Definition</th>
<th>How would you define an outdoor learning center?</th>
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<td>How might your definition of a school garden differ, if at all, from that of an outdoor learning center?</td>
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<td></td>
<td>What do you think defines a successful outdoor learning center?</td>
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<td>Facilitators</td>
<td>If you were going to have an outdoor learning center at your school, what would help you start one?</td>
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<td></td>
<td>What would help you use and maintain an outdoor learning center as part of your classroom?</td>
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<td>What training would help you incorporate an outdoor learning center as part of your classroom?</td>
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<td></td>
<td>Do you know of any policies or requirements for using an outdoor learning center as part of your classroom? If yes, can you describe them for me?</td>
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<tr>
<td>Barriers</td>
<td>If you were going to have an outdoor learning center at your school, what could get in the way when trying to start an outdoor learning center as part of your classroom?</td>
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<tr>
<td></td>
<td>What could get in the way when trying to use and maintain an outdoor learning center as part of your classroom?</td>
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<td></td>
<td>Some preschools use their outdoor learning centers for only part of the year; when during the year could you use an outdoor learning center?</td>
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<tr>
<td>Motivation</td>
<td>What are some reasons that outdoor learning centers should and should NOT be used as a part of preschool classrooms?</td>
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<td>Teachers use outdoor learning centers to teach a variety of different topics; what subjects or lessons could you teach using an outdoor learning center?</td>
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<td></td>
<td>What experiences have you had (or heard about from others) about trying to start an outdoor learning center in the preschool setting?</td>
</tr>
<tr>
<td></td>
<td>What experiences have you had (or heard about from others) about using and maintaining an outdoor learning center in the preschool setting?</td>
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Data collection procedures

At the beginning of the interviews, the researchers reviewed the consent form, obtained verbal consent, and collected demographic information from the participant. Interviewers took extensive field notes throughout the interview to facilitate the summary provided at the conclusion of the interview. Summarizing allowed the interviewee to hear how the interviewer interpreted what she was saying and to confirm correctness or to clarify her intent.
All interviews were digitally recorded to facilitate subsequent verbatim transcription.

**Data analysis procedures**

Investigators used an iterative analysis and coding process (open, focused, axial, and selective) coupled with weekly meetings to achieve consensus to identify dominant emergent themes per the grounded theory approach (Corbin and Strauss, 2015; Creswell, 2013). Researchers defined thematic saturation when they no longer heard new themes and no longer heard novel information contributing or redefining the identified themes (Bowen, 2008). Saturation for the current study was based on transcript analysis, weekly meeting discussions, and evaluations of the interviewer field notes.

The first author developed the coding manual by collapsing the dominant emergent themes identified by the participants into formal codes. The research team edited the coding manual to improve operational definitions of the codes and the appropriateness of the examples included in the manual. Once consensus was established in all 58 coded transcripts, the first author explored the relationships between code categories (Corbin and Strauss, 2015) to explain the teacher participants’ perspectives in terms of the central phenomenon, its causal conditions, the intervening conditions, strategies of use, and the overall consequences of the phenomenon (Creswell, 2013).

Finally, the research team developed the conceptual model (Figure 2.1) depicting the story of why and how teacher participants incorporated OLCs into their classroom curricula and what barriers kept them from sustainable integration. Outside reviewers provided insight by formative review and assessment of steps from open coding through selective coding and model development, which helped to reduce bias and increase trustworthiness (Krefting,
Throughout the analytic process, memoing permitted the theory to evolve (Corbin and Strauss 2015) and allowed the researchers to reflect on the participant perspectives and gradually gain an understanding of the phenomenon (Creswell, 2013).

**Findings**

**Participants**

Researchers completed semi-structured in-depth interviews with 58 preschool teachers or teacher assistants from 35 states. Participants were all female with an average of 15.5 (±9.9) years of experience working with preschoolers. Thirty participants held bachelors degrees, 13 had associates degrees, 10 held masters degrees, and 5 had high school diplomas. Participants ranged from 27 to 68 years, averaging 43.7 (±10.5) years old. Forty-one participants identified as non-Hispanic white, 7 identified as black, 6 identified as Hispanic or Latina, and 4 participants identified as Asian, multi-racial or chose not to disclose their race or ethnicity.

**Grounded theory conceptual model**

Figure 2.1 represents the connections and relationships between the emergent codes explaining why and how preschool teacher participants incorporated (or not) OLCs into their curriculum based on the 58 interviews which ranged from 33 to 101 minutes (mean 60min). Thematic saturation was achieved at interview 41, but interviews continued to 58 to ensure a nationally geographic representation due to the possibility of geo-climate influences on the topic.
Figure 2.1. Conceptual model of teachers’ perceptions for sustainable use of OLCs
Causal conditions impacting OLC use

The researchers identified 4 causal conditions that significantly impact OLC use in the preschool environment. Researchers defined causal conditions as themes that played an underlying role in OLC creation and use in preschools. These conditions were viewed as those that impact the overall state of OLC use in that they overtly affect the likelihood of an OLC being created or sustainably utilized. The conceptual model (Figure 2.1) represents 3 causal conditions as the primary tree roots grounding the tree to the land (Being Comfortable in Nature, Having Administrative Support, and Focusing on Safety). The conceptual model depicts the fourth causal condition, Reacting to Weather, as a precipitous cloud floating above the tree.

Causal condition: Being comfortable in nature

With the first causal condition, Being Comfortable in Nature, participants indicated that someone with interest and comfort in nature needs to show initiative to get the OLC started and if that person does not exist, the OLC might not get started or be sustainable. One teacher explained, “You have to have a teacher that would be willing to go outside and spend time outside.” Some teachers described being hesitant even to try and grow things. This perception seemed to be associated with a lack of comfort in nature and general confidence in nurturing plant life. One participant shared, “Everything dies, so I’m not really sure...could be because the teacher [self] doesn’t have a green thumb.”

Causal condition: Having administrative support

The second causal condition was Having Administrative Support. When asked what might get in the way of using an OLC, many teachers indicated that teachers might not advocate for an OLC if they did not feel supported by administration. Interestingly, when participants
described being unsupported, it was usually in context of what others might experience, not that they themselves felt unsupported by their administration. Administrative Support was also discussed in terms of funding. One teacher shared, “my director and people higher up within the program would probably be able to hopefully, financially or whatever, if they have the funds, to start something like that.” Participants framed starting an OLC in terms of layers of bureaucracy and how they need administrative support to navigate the bureaucracy. One teacher noted:

“There are many channels we would have to go through. My direct supervisor, then her supervisor, then she would need to talk to the area manager, [she] would have to talk to the program manager, there is a lot of people in line.”

**Causal condition: Focusing on safety**

The third causal condition was Focusing on Safety. When asked what knowledge and skills were important for using OLCs, teachers frequently highlighted safety knowledge. Teachers even defined OLCs in terms of safety. One teacher commented, “I follow what they’re interested in and they need, and then I make it a learning opportunity within the structures of being safe and healthy.” Teachers consistently indicated that safety was a primary consideration, though there was no consistency about what was safe or not safe in an OLC setting. Some teachers indicated they needed to limit what they did because of safety concerns, often citing allergens. A few teachers shared extensive lists of plants they perceived not be safe in OLCs, while others acknowledged the need for safety clarification:

“Maybe give us a crash course on gardening...what plants to stay away from. Maybe how if [the children] eat the potato plants, it will be fine. So, we know that we don’t have to freak out.”
Causal condition: Reacting to weather

The last causal condition was Reacting to Weather. Weather seems to supersede everything when discussing OLC use. Geographically, the examples of the limiting weather events change, but the general sentiment was weather has to be mild (not too hot, not too cold, and certainly not having any precipitation) for the OLCs to be fully utilized by the average teacher. Teachers also indicated a variety of seasons when weather affects whether or not they could use an OLC. For example, teachers could not use the OLC, “if it’s freezing cold outside” and there was “no way to do it in the fall; [it’s] too nasty and wet usually.” A few OLC teacher advocates were less concerned about weather but emphasized that other teachers shy away from going outside during mild precipitation. Interestingly, teachers often indicated they would like to use an OLC daily when asked directly, but they also indicated another reality. One teacher remarked, “An event that would get in the way, bad weather... we go out every day... as long as the weather permits.”

Intervening conditions for OLCs use

The study participants discussed 4 intervening conditions that impacted OLC use beyond the causal conditions. Researchers defined intervening conditions as the mediating conditions that influence to what extent OLCs become sustainably integrated into their curricula. The intervening conditions essentially change the frequency and consistency of OLC use and impacted whether the teachers implement the strategies to increase the sustainable use of OLCs. The 4 intervening conditions were Teacher Knowledge and Skills, Program Structure, Resources and Physical Supplies, and Human Resources. The conceptual model (Figure 2.1) represents the first intervening condition, Teacher Knowledge and Skills, as the trunk of the tree. Knowledge and Skills layer on each other and grow like the rings of a tree. The 3
medium sized branches disseminating up from the tree trunk depict the remaining intervening conditions.

**Intervening condition: Teacher knowledge and skills**

Teachers identified OLC-specific Knowledge and Skills as important to translate their curricular information into this alternative teaching space. Teachers also expressed a need for geographic and climate specific knowledge. One teacher shared its importance for creating results for her students, “I need to do more research on what grows when for our area, because it’s important for the children to see it from the beginning seeds to the end where you eat it.” Other teachers focused more on the opportunities for learning within the processes of outdoor learning. One participant stated, “As long as the children learn, even if the plants don’t grow, or they don’t get a successful harvest, I think the process is...more important than the product.”

**Intervening condition: Program structure**

The second intervening condition identified by the teachers was Program Structure influencing time allocation. This intervening condition centered on time restraints due to the large number of daily tasks preschool teachers must complete to prepare students for kindergarten. When asked what would get in the way of using an OLC, teachers frequently mentioned time. One participant observed, “There’s so many other things we have to teach...so it’s difficult to say how often we’d be doing lessons on outdoor environments, because that’s one small slice of the pie when you think about it.” Timing of the school year and teacher perceptions of when plants can be grown and harvested was another aspect of Program Structure. Teachers talked about using an OLC to discuss plant growth but often mentioned the children missing the end of the growing cycle. One teacher explained,
“Unfortunately, we end our program year in the middle of June, so the children...don’t actually get to use the vegetables.” A few teachers saw this limitation as an opportunity to connect with the community by suggesting that students’ families could use the garden during the summer months. For example, “Maybe parents could come take care of it with their children even over the summer when we’re closed?”

**Intervening condition: Resources and physical supplies**

The third intervening condition for implementing strategies to use OLCs was Resources and Physical Supplies. Teachers mentioned needing supplies to create OLC spaces, child-sized tools to work in gardens, and general supplies to set up various centers to encourage exploration and discovery. When discussing OLC supplies, many teachers emphasized the lack of regular funds to purchase supplies, but a few recognized that connecting with the community could help overcome this barrier. One teacher noted, “Usually we don’t have much money in our budget for that...either we [the teachers] were paying for it [out of our own pockets] or we usually try to get it donated to us.”

**Intervening condition: Human resources**

The last intervening condition identified by the teachers is Human Resources. Teachers focused on needing manpower to create, maintain, and use the OLC and described engaging the community as being critical for success. Teachers highlighted the importance of having a consistent work force and support system to stay energized, help them plan, and share physical tasks. One participant stated:

> “It starts really well in the beginning of the year, but by the end of summer I could kind of care less...so making sure you have somebody that will get out there...and help you...because it is a lot of work.”
Strategies for implementing OLCs

The researchers recognized 4 primary strategies the teachers used to implement OLC use with their preschoolers. Researchers defined strategies as the actions that increase integration of OLCs into classroom curricula. The 4 core strategies were Employing Child-Centered Practices, Applying Multi-Curricular Techniques, Incorporating Health Education, and Engaging the Community. In the conceptual model (Figure 2.1), the tree foliage was apportioned into 4 parts, each section depicting one of the strategies identified to increase sustainable OLC use. Within the foliage of the tree, un-harvested apples represented the components of these strategies such as the following: observational learning, science-based learning, literacy development, art education, nutrition education, garden education, school collaboration, and parent involvement.

Strategy: Employing child-centered practices

The first strategy described by the teachers for integrating OLCs into their curricula was Employing Child-Centered Practices. Most teachers expressed an underlying belief that discovery learning was beneficial to preschoolers, and some teachers indicated that OLCs provide good opportunities for the students to safely explore and practice observation. One teacher’s perspective highlighted the child-centered potential of OLCs: “The teachers sets up things for them to take over, and they teach each other...they’re the ones who work it. They do self-directed learning.”

Strategy: Applying multi-curricular techniques

Secondly, teachers described the use of OLCs as a unique opportunity to teach many subjects and ideas in one space, Applying Multi-Curricular Techniques. Teachers also discussed how OLCs could be used to teach a variety of cognitive levels at one time. They highlighted the
benefit of the OLC connecting to a variety of curricular requirements as a reason why they embrace them. One participant expressed the variety of usefulness, “Oh my goodness, it’s endless. Mathematics for one. Literacy. Science most definitely. Social living, I mean it’s a whole curriculum of things.”

**Strategy: Incorporating health education**

The third strategy for implementing OLCs into classroom curricula was Incorporating Health Education. Teachers discussed both nutrition education and physical activity as avenues of implementing OLC use. They discussed using the OLC for indirect exposure to nutrition education to impact fruits and vegetable food preference and consumption. One participant shared:

> “We had several children…their parents said that they refused to eat broccoli. And when…they helped us harvest the broccoli. And when we cut it up and had it for snack…they all tried it. And some of the children…went home and told their parents that they like it…I think that the reason why they tried it was because…they put in so much hard work in gardening and weeding and taking care of them.”

Some teachers also described employing OLCs to help teach children about the origins of food. Teachers emphasized the importance of teaching farm-to-table concepts and how they get joy out of sharing those concepts with the preschoolers. One teacher commented, “I think it’s important that children know where their fruits and vegetables come from.” Teachers also discussed OLCs as a place where physical activity is naturally incorporated. Participants emphasized the importance of freedom of movement, specifically gross motor skills that the outdoor environment allows. One teacher explained, “Physical
movements that they can do outside that are limited in the classroom, the running and the jumping.”

**Strategy: Engaging the community**

The fourth strategy identified by the participants for incorporating OLCs into their curriculum was Engaging the Community. Primarily teachers discussed engaging parents and other community collaborators to keep interest in the garden. This strategy included encouraging parent participation in the OLC to alleviate some of the physical burden faced by the teachers. Teachers also highlighted the importance sharing information and produce with the parents. One teacher commented, “Families would benefit from this, not only from the learning experiences but from ultimately the produced product, if it were gardening.”

Engaging the Community also included school collaborations as critical to sustainable OLCs. Some teachers focused more on social development within and between the students: “They all take care of each other and remind each other, give each other encouragement...[they show] teamwork, working together, rule-following.” While others focused more on community collaboration, sometimes describing this as a strategy to help to alleviate the financial costs of OLCs. For example, “There are people in the community that I might be able to ask to make donations...you just have to go out and find them.”

**Consequences resulting from OLC use**

The researchers identified 3 main consequences as being the most direct outcomes from using the identified strategies to sustainably incorporate OLCs into the preschool curricula. The researcher identified Impacting Whole Child Learning, Influencing Health, and Exposing Children to Nature as the main consequences of sustainable OLC integration into preschool curriculum (including quality, quantity, and consistency).
The conceptual model (Figure 2.1) portrays three individuals: a teacher, a preschooler, and a parent. They represented the three main groups of stakeholders who directly influence and benefit from OLC integration. They each hold a basket representing one of the main consequences of sustainably incorporating OLCs: Impacting Whole Child Learning by the teacher, Exposing Children to Nature by the preschooler, and Influencing Health by the parent.

**Consequence: Impacting whole child learning**

Researchers identified the first consequence as Impacting Whole Child Learning. Many teachers made the connection between the dynamic nature of OLCs and how it naturally lends itself to discovery or exploratory learning. As discussed previously, providing a safe space was emphasized and reiterated when discussing benefits of exploration. One teacher explained, “[With OLCs] you encourage sharing, cooperation, working together, exploring, discovering the world around them.”

**Consequence: Positively influencing health**

The research team described the second consequence as Positively Influencing Health. Most directly, the teachers indicated the OLC as an opportunity to begin conversations about nutritional value of food by increasing exposure to fruits and vegetables and widening food preference. Teachers also recognized that children need physical activity daily and that having a safe location to blow off steam is healthy for the mind, the body, and behavior. A few teachers even expressed hope that OLCs could decrease the amount of junk food children consume. One teacher explained: “It relates to what the children eat…so it’s a wonderful tool for learning…we talk about everything with the garden.”
Consequence: Exposing children to nature

Lastly, teachers believed that OLC use was valuable because Exposing Children to Nature was filling an apparent void. Many of the study participants indicated that exposure to nature is positive yet did not reveal why they viewed it as important. Participants believed that children were not regularly experiencing nature at home. One participant declared, “The kids right now just don’t get a chance to play outside. When you use the outdoor classroom, they are not only getting their learning, but they’re also getting that opportunity to play outside and get fresh air.”

Discussion

When analyzed holistically, the results of the current study suggest 4 needs to influence sustainable OLC use: recognizing the influence of nature on the use of this alternative educational setting (Nature Rules), making sure teachers are supported within the confines of their program structures (Supporting Within the Box), cultivating interest and confidence for teaching in alternative settings (Cultivating Interest and Confidence), and emphasizing the impacts on the preschoolers (Emphasizing Impacts on Children).

Nature rules

Previous observations have shown that teachers wait for good weather to take their students outside (Maynard & Waters, 2007). Teachers within our study also indicated that weather ultimately dictated if, when, how often, and how long teachers utilized OLCs. The significant impact from inclement weather suggests to the researchers that investment in climate appropriate shelters and a basic knowledge of how to troubleshoot in specific micro-climates may increase the regular and sustainable integration of OLCs. This idea, though novel in the current literature, reiterates the need for teacher training to bolster knowledge and skills
Furthermore, participants expressed uncertainty about general safety outside the classroom, potential toxicity of plants and concern about allergic reactions from preschoolers. This concern is consistent with other studies where teachers indicated their primary role when outdoors was keeping preschoolers safe (Coleman and Dyment, 2013; McClintic and Petty, 2015). The current study results concur with previous studies and suggest that the alternative nature of OLCs is an additional challenge for teachers who are not comfortable in nature.

**Supporting within the box**

Head Start and state-funded preschools for children from low-income families are tasked with many responsibilities, one of which is providing outside exposure daily (Nature-Based Learning and Development, 2015). In the current study, teachers indicated that staffing and teacher-to-child ratio policies provide challenges in moving beyond outside time as recess. Human resource availability and allocation as highlights in the current study illuminates previously discovered challenges in supervision and teacher-to-child ratios in outdoor settings (Coleman and Dyment, 2013). Teachers within our study indicated having and communicating supportive administrative policies is critical to the success of OLCs. Additionally, our study participants also confirmed previous results that indicate funding impacts how well OLCs can be incorporated into classroom curricula (Hazzard et al., 2011).

**Cultivating interest and confidence**

Increasingly, many teachers themselves have not had childhood experiences playing and interacting with the outdoors. Ernst and Tornabene (2012) conclude that personal preferences do not correlate with nature relatedness, yet our data contradict that. Additionally, teachers are least confident in implementing nature education in the classroom than any other subject
(Torquati et al., 2013). The current study particularly confirmed a lack of confidence in
garden education (Davis and Brann, 2017). Teacher’s lack of knowledge and their need for
information about how to influence students to eat fruits and vegetables (Mita, 2013) and
how to encourage physical activity (Coleman & Dyment, 2013) may provide additional
explanations for teacher hesitations. Our results are consistent with the idea that teachers’
knowledge and motivation will stimulate outdoor environment development and use
(McClintic and Petty, 2015).

**Strengths and limitations**

Qualitative research seeks to develop a deeper understanding of participants’ perspectives
through purposeful sampling; therefore, the results may not be generalizable to a broader
population. Though comparatively small to quantitative studies, the sample size was
relatively large (58) for a qualitative interview study, due to the grounded theory approach
(Corbin and Strauss, 2015) and collecting data beyond saturation. Data collection continued
beyond saturation to explore the possibility of significant regional or geographic differences
in teacher perceptions because of the subject matter and the impact on the development of the
conceptual model, and therefore, the transferability of the results. The researchers
acknowledged that participant self-selection likely imparted bias into study results. As an
example, even when asked directly, few participants shared significant negative implications
for using OLCs. It is probable that teachers who were willing to spend an average of 60
minutes discussing OLCs were inherently different from those who did not volunteer for the
study. Lastly, the relationships between the perspectives of our study participants and their
actual practices, the perspectives of preschool administrators, or the ideal situation based on
student outcomes are all unknown.
Conclusion

This qualitative investigation of teacher perceptions for using OLCs led to the creation of a conceptual model (Figure 2.1) depicting the causal conditions, intervening conditions, and strategies and consequences of sustainable integration of OLCs into preschool curricula. The need for systematic (Nature-Based Learning and Development, 2015) and grassroots efforts to integrate alternative learning spaces into teachers’ and students’ weekly routines are apparent. After a review of the literature we found few studies that sought to understand how teachers perceive this strategy and what they need to be supported through their barriers to success (Davis and Brann, 2017). Nowhere is there a coherent and holistic definition of sustainable use or integration of outdoor teaching and the analysis of the results of the current study indicated opportunities for pre-service teacher education, professional development, and assessment tool development. From the current study, sustainable use of outdoor teaching considers the frequency, consistency over time, and intensity of holistically integrating outdoor learning environments into the preschool classroom curricula and weekly scheduling routines. Firstly, to impact sustainable use, early childhood education departments could offer courses that impact teachers’ knowledge and skills, such as an OLC methods course; interdisciplinary courses such as nutrition education in the garden; or informative elective courses such as environmental education.

Secondly, professional development such as in-service and continuing education programs could address the causal conditions and intervening factors identified by the research participants. The perspectives of the study participants could be integrated into an online curriculum specifically developed for busy preschool teachers. This curriculum could
provide teachers convenient access to a series of short online tutorials or modules that may bridge the gaps in knowledge, skills, and confidence.

Thirdly, a validated assessment tool that explores the breadth of factors in outdoor learning would allow key stakeholders to better evaluate teacher perceptions and needs as they prepare for in-service workshops. Such an assessment could also provide feedback for teacher training curricula in both pre-service and continuing education settings. Although there is much to do, the results of this study begin to provide a way to consider teacher needs and perspectives within the solution.
CHAPTER 3: FOOD AND NUTRITION ACTIVITIES AS A UNIFYING THREAD TO FACILITATE SUSTAINABLE OUTDOOR TEACHING IN PRESCHOOL GARDENS

Abstract

Head Start recommendations encourage outdoor teaching but application remains inconsistent. Researchers employed telephone interviews to gain an understanding of Head Start teachers’ perspectives for outdoor teaching. One emergent construct was teachers utilizing food and nutrition activities to increase sustainable use of preschool gardens. Participants integrated food and nutrition with outdoor teaching using 6 overarching constructs; Observation and Discovery, Cooperation and Social Building, Motor Skill Development, Sensory Exploration, Farm to Table, and Food Insecurity. The findings suggested that food and nutrition activities could be a conduit for all Early Learning Outcomes Framework domains while imparting sustainable principles.

Keywords: Early childhood education, Head Start, Preschool education, Outdoor learning, Outdoor teaching, Garden education, Nutrition education, Qualitative interviews, Telephone interviews, Grounded theory
Introduction

Preschool teachers believe they have a role in influencing their students’ activity and eating habits (Derscheid et al., 2010; Kenney et al., 2011) and teachers believe school gardens have the potential to promote healthy eating habits in their students (Graham, 2005). Head Start teachers also report balancing the emphasis they place on the diet content of preschoolers with general concerns about food insecurity within their student population (Lumeng, 2008). Additionally, Head Start teachers are more likely than non-Head Start teachers to agree that children are more willing to try unfamiliar or healthy foods at the child care center than at home (Derscheid et al., 2010).

Given teachers focus on wanting to impact their students eating habits, it is important to understand what influences preschoolers’ food preferences (Cooke, 2007). Frequency of taste exposure is one mechanism shown to increase preferences of less-liked foods (Lakkakula, Geaghan, Zanovec, Pierce, & Tuuri, 2010). Preschool based nutrition education programs show promising results for preference and consumption (Farfan-Ramirez et al., 2011; 2015; Izumi et al., 2015; Namenek Brouwer, 2013); however, many preschool teachers lack confidence in their knowledge and ability to deliver quality nutrition education (Carraway-Stage et al., 2014). Despite this, basic food and nutrition activities are regularly executed in preschool classrooms.

Outdoor learning has been highlighted in Head Start and other early childhood education recommendations (NAAEE, 2010; Nature-Based Learning and Development, 2015), but some teachers view the indoor space as the learning place and the outdoors as a place to purge energy and prepare for inside time (McClintic, 2015). Outdoor learning encompasses a large breadth of play and developmental activities and often includes garden.
education. Although outdoor learning has perceived benefits for students (Berezowitz, Bontrager Yoder, & Schoeller, 2015; Hinkley, Crawford, Salmon, Okely, & Hesketh, 2008; Williams & Dixon, 2013; Witt & Kimple, 2008), few studies have explored what motivates or discourages preschool teachers into using outdoor learning (Ernst, 2012) and garden education (Waite, 2010). Opportunities for hands-on and experiential learning are an important component of outdoor learning spaces (Block 2012; Ernst, 2012). Additionally, teachers view the space as a place where normal content-based curriculum can be taught as well as a special place where a broader understanding can be acquired (Maynard, 2007). But, there is discrepancy in the preschool community about how outdoor education can best be utilized. Some teachers see the outdoor environment as a place where they can integrate multi-curricular activities while connecting with nature but others are wary about how to incorporate outdoors into their teaching (Szczepanski, Malmer, Nelson, & Dahlgren, 2006).

Garden education programs have provided opportunities for children to be exposed to unfamiliar fruits and vegetables and help them learn about the origins of food (Davis and Brann, 2017; Kos and Jerman, 2012). This knowledge has implications in students’ social understanding of self and how they fit into the natural and social worlds (Waite, 2011). Reaching beyond the children, school garden programs also have the potential to impact food access and family health in general (Chaufan, Yeh, and Sigal 2015).

The current study is part of a broader qualitative study. The purposes of the broader qualitative study were to explore preschool teachers’ experiences and perceptions related to incorporating outdoor teaching and learning into a preschool curriculum for children from low-income families and to develop a grounded theory based conceptual model to explain the findings. From the broader study results, sustainable use of outdoor teaching was defined as
the frequency, consistency over time, and intensity of holistically integrating outdoor learning environments into the preschool classroom curricula and weekly scheduling routines. This component of the study explored the emergent concept of food and nutrition activities as an integral aspect of sustainable use in preschool gardens. Results are explored through the lens of the three pillars of sustainability: social, health and environmental, and economic. This answers the call to action in previous research to explore early childhood educators’ perceptions for opportunities in outdoor setting (Ernst, 2014).

The Study Methods

Study Design

The grounded theory approach informed the development of a semi-structured interview guide, data collection, and analysis (Corbin & Strauss, 2015). Researchers used telephone interviews to gain an in-depth understanding of participant perceptions of using outdoor learning centers (OLCs) at Head Start and other state funded preschools for low income families. One-on-one interviews were designed to gain individual participant perspective as opposed to group perspective as would be the case with focus groups. This avoids “group think” and captures the individuals’ unaltered perspectives. The study design, protocol, and measurement instrument was approved by North Carolina State University’s Institutional Review Board.

Participants and Recruitment

Researchers used a systematic approach to recruit a purposive sample (Creswell, 2013) of preschool teacher participants using the Head Start locator tool and grantee website reviews with guidance from the US census regions (Head Start Locator). The research team sought participation from each census sub-region to explore possible thematic variation due to
influence of participant geo-climate distribution. Administrators and directors were contacted via email or telephone to recruit teacher participants into the study. Teachers had to work in a Head Start or like agency with preschool children and be over the age of 18 to participate in the study. All participants self-selected into the study.

**Measurement Instrument and Interviewer Training**

Researchers created a semi-structured phone interview guide to consistently gain an in-depth understanding of participant perspectives by allowing them to construct and communicate their own meaning of the phenomenon through broad open-ended questions (Charmaz, 2006). Fourteen main questions (Table 2.1) explored teacher perceptions of outdoor learning centers including how teachers defined outdoor learning centers, what facilitated, acted as barriers, and motivated teachers to start, maintain, and utilize these spaces. All interviewers completed a series of training sessions to employ best practices in qualitative research methods with the purpose of increasing trustworthiness and decreasing bias throughout data collection (Goodell, 2016).

**Data Collection Procedures**

Researchers began interviews by obtaining informed consent and collecting demographic information prior to inquiring with the main interview questions. Throughout the interview, interviewers scribed field notes to facilitate the summarization provided at the conclusion of the interview. Summarization allowed the participant to hear each main interview question a second time, add more information to their answers, and confirm or correct initial interpretation by the interviewer (Krefting, 1991). Interviews were conducted beyond the point of saturation to explore potential impact of geo-climate. Location distribution was
tracked by recording the state of each participant. All interviews were digitally recorded to facilitate verbatim transcripts used for data analysis.

**Data Analysis Procedures**

Researchers utilized grounded theory methodology to identify dominant participant perspectives through the analysis and coding process (Creswell, 2013; Corbin & Strauss, 2015). Investigators employed weekly meetings to achieve consensus for each of the 58 interview transcripts. Thematic saturation was achieved when researchers stopped hearing new themes and novel ideas that contributed to the understanding of already identified themes (Bowen, 2008). The research team analyzed the interview transcripts to explore the possibility of variation in themes based on geo-climate and location distribution. Researchers determined thematic saturation via field notes, discussions during weekly meetings, and transcript examination.

The first author drafted the coding manual by collapsing the dominant emergent themes identified with open coding into formal codes. The remainder of the research team reviewed and amended the coding manual to improve operational definitions and ensure interpretive validity. The coding manual was utilized to gain focused coding consensus for all 58 transcripts. One analyst and the first author independently coded each transcript line by line and then came together to obtain 100% consensus. Next, the first author explored the relationships between code categories (Corbin & Strauss, 2015) with axial coding. During this process, the researchers explored the participants perspectives in grounded theory constructs; the central phenomenon, its causal conditions, the intervening conditions, strategies of use, and the overall consequences of the phenomenon (Creswell, 2013). Finally, the research team employed selective coding to develop a conceptual model (presented in a
separate manuscript) that depicted the story of why and how teacher participants incorporated OLCs into their classroom curricula and what barriers kept them from sustainable integration. Throughout analysis, food and nutrition activities emerged as a common thread evident in the interviews even though it was not specifically sought in any of the main interview questions (Table 2.1). Examples of food and nutrition activities include motivation, strategies of use, and in the overall consequences of the phenomenon. Memoing throughout the analysis process allowed the research team to gain a gradual understanding of how food and nutrition activities could be a central strategy to sustainable integration of outdoor teaching in preschool classrooms (Corbin & Strauss, 2015; Creswell, 2013).

Findings

Participant Demographics

The research team conducted 58 semi-structured interviews ranging from 33 to 101 minutes in length, averaged 60 minutes. Thematic saturation was achieved at interview 41, but interviews continued to 58 to investigate the possibility of geo-climate variation in participant perspectives. The research team, however, did not discover any significant thematic differences that could be attributed to geo-climate or participant distribution. Preschool teachers and teacher assistants lived in 35 of the 48 continental United States (Figure 3.1). All participants in the study were female. Over 70 percent of the participants identified as non-Hispanic white and the mean participant age was 43.7 (+/- 10.5) years old. Participants worked with preschoolers for 15.5 (+/- 9.9) years on average and about half of them held bachelors degrees.
Emergent Qualitative Analysis

Without being asked directly about food and nutrition, participating teachers frequently identified food and nutrition activities as a means of motivation for sustainable use of teaching in preschool gardens. One participant indicated that an outdoor learning center was “a food set-up place where we can incorporate all the curriculum to the children.” Another participant elucidated:

“Of course, math, spatial awareness, science, nutrition, literacy...gross motor and fine motor, you know almost everything...social studies, community awareness, I guess technology...you can do anything out there.”
Researchers identified 6 constructs stitched across participants’ narratives that utilized food and nutrition activities in outdoor teaching: Observation and Discovery, Cooperation and Social Building, Motor Skill Development, Sensory Exploration, Farm to Table, and Food Insecurity.

**Observation and Discovery**

Teachers described everyday as being new in an outdoor learning setting. One participant said, “There is always something new to learn and to discover.” The teachers commented that outdoor environments provided ready opportunities for observation and for students to practice questioning skills because nature changed continuously. A participant described successful preschool gardens as places “where kids are asking questions, that they’re interested in what is going on.” Another participant shared, “Our garden looks like a variety of vegetables and fruit that we’re experimenting to see if it will grow or not.” Teachers expressed that learning observation skills allowed students to gain practical understanding of sequence via plant growth, planning and decision making through understanding plant needs, patience by waiting throughout the growing process, classification using which parts of plants are consumed, and comparing and contrasting through observing differences between varietals and species. Each of these skills highlight aspects where food and nutrition activities could sustainably integrate outdoor learning into the classroom. One participant noted that students could “differentiate with texture of leaves, size, shapes, smells of different types of leaves” and another highlighted using different tools, “you know using different kind of measurement tools.” Teachers discussed how gardens integrated child-initiated learning from planning what seeds to plant, to growing and harvesting, to preparing and cooking foods to consume. One participant shared:
“The children chose where the best spot was in the playground...we plotted out...with clipboards and papers and pencils and the children decided which vegetables needed to be planted...we took a field trip to the store to buy the seeds.”

**Cooperation**

Teachers expressed food and nutrition activities, in conjunction with outdoor teaching, were used as a means to encourage cooperation between a variety of people groups and a mutual reliance on nature in the preschool setting. Several teachers indicated that they taught students about nurturing the soil and plants and how the plants in turn helped the children’s bodies grow and mature. One participant said simply that she used outdoor teaching to explore the question, “How does the garden help our body grow?” with her students. Teachers also noted that activities about growing food sustainably integrated social skill lessons such as team building, taking turns, and sharing tools. One participant stated, “It builds their self-esteem...I can see this, I can learn this, I can smell this, I can share it. It’s a safe place to explore.” Once products were harvested from the garden space, a few teachers noted they shared them with other classes which did not participate in outdoor learning or shared with older students who came to volunteer with the preschoolers. Sharing food products from the garden created cooperative environments where collaborating and mentorship is experienced. Participants implied that they were less likely to regularly (sustainably) use the garden if they felt alone in the adventure. One participant elaborated:

“We’ve had high school children who have come and helped our Head Start students plant, harvest, just every aspect of the garden...we had stone soup for Thanksgiving and we talked about how you share with your friends and take care of each other and...we shared that with the high school [students].”
Some teachers indicated that planning and preparing for garden learning takes time and expressed that it could be overwhelming. To help alleviate some of the pressure, some teachers discussed reaching out to the community and asking for knowledge from local experts or donated supplies from businesses. Increasing the stakeholder pool by building relationships and cooperatively integrating the preschool garden into the community allowed for teachers to share the burden increased the sustainability of outdoor teaching. One participant described two successful strategies, “I know Lowe’s and Home Depot is always willing to help out with things. And when we have a parent meeting, asking parents ‘who’s really good at gardening?’” Additionally, teachers expressed wanting to establish relationships with families or community members who might benefit from cooperating in the space as summer caretakers in exchange for taking and consuming the harvested products. Teachers expressed this idea as a win-win sustainable exchange because it could help alleviate one of the limitations to school garden, having no teachers or students at the school over long summer breaks. One participant expressed, “What I would love to see is…a community garden where families would come and help us tend the garden in the summer when we’re not there.”

**Motor Skill Development**

Food and nutrition activities highlighted by planting and harvesting provide a list of fine and gross motor skills for age-appropriate practice and application. One participant explained, “The kids are mastering skills they are needing to move on into life.” Another participant elaborated by making a connection from fine motor skills to the concept of action-consequence. She shared, “I think it’s good for the kids to see that they can make things happen and that they can grow something and then they can eat it and it tastes good.”
Teachers identified other tasks that sustainable inclusion of outdoor learning would provide preschoolers with varied motor skill practice such as harvesting and preparing the products for food activities. In the teachers’ examples, harvesting and preparing foods included a host of motor skill activities such as picking, collecting, washing, chopping, and stirring. One participant noted:

“I did language, I did science, I did math, I did social studies, I did fine motor; picking weeds or even just [harvesting]...using their hands to grasp and...of course gross motor; using muscles, digging.”

Teachers mentioned over and again, the apparent motivation of students’ willingness to taste the products or foods if they physically participated in growing, harvesting, and preparing them. One participant declared:

“We’ve got kids that just flat will not eat anything that is green at all. They are not into that but when they go out to the garden and they pick their own snap pea or carrot, they will eat that.”

**Sensory Exploration**

Teachers gave copious sensory learning and experience opportunities using food and nutrition activities in outdoor learning. They expressed students exhibiting the idea of ‘this is mine, I made this’ and its connection to increased food acceptance and preference. One participant shared:

“A lot of times if a child is involved in growing it and they’re involved in the cooking of it, they’re more apt to try it. So, we try to do a lot of cooking with the stuff from the garden.”
Teachers suggested they believe that both sight (i.e. seeing a variety of colors) and texture (i.e. tactile and hands-on experiences) exposures in the outdoor setting encouraged children to be more eager to taste foods after they were harvested. If teachers regularly integrate the garden into classroom lessons to give students exposure to food products, the constant care and interest in the garden may provide the input gardens need to remain sustainable. Another participant communicated:

“Since they got to do hands-on first, and we were in the garden first, they were more intent to trying it and more interested in it and more willing to talk than if we just would have put it out on their lunch menu.”

Teachers expressed believing that having multiple sensory experiences was a benefit of sustainably incorporating gardening and food activities into the classroom. One participant noted, “Let it just be child-oriented, let them just relax and touch and see and smell and feel.” Other teachers focused more on incorporating the food activities into snack or mealtime. One participant clearly elucidated what several other teachers incorporated into their examples; offering a holistic garden experienced often raised ‘taste it’ to ‘trust it’. She stated, “They trusted it because they pulled it themselves...the kids were excited, so then they talked about crunchy, soft, and all of that.”

**Farm to Table**

Teachers had a few different phrases, such as farm to table and planting to plate, for incorporating the idea of using outdoor learning to teach life skills. One participant stated:

“There’s so many things to do with a garden and there’s so many content areas and learning experience and the big thing being that children realize that food doesn’t just come from a grocery store.”
Teachers described using what was growing in the garden to develop recipes and menus with the children so they learned what grows in their local climate and how to use it. One participant explained:

“They were literally getting the experience from planning it all out, planting everything, taking care of it, harvesting it, and then final preparation of the food. So it was literally from garden to table.”

Many teachers passionately discussed the importance of children learning about the origins of food. One participant exclaimed, “Where does your potato come from? No, it doesn’t come from Wal-mart, it comes from the ground and who harvests it?” Teachers also mentioned the pride the children displayed once they recognized what their hard work, patience, and stewardship produced. One participant shared, “It’s a sense of accomplishment for the kids. And it takes a long time. It’s not an immediate gratification kind of thing. They’ve gotta wait.” Additionally, teachers shared that food and nutrition activities easily connect with social studies lessons that emphasized food as a way to gain different cultural perspectives. One teacher contributed, “And social studies, how people in different parts of the world, not only parts of the US [grow] different foods...because they need different things to grow.” Having food and nutrition activities that touched a variety of subjects/domains increases the potential for sustainable integration into the classroom.

**Food Insecurity**

Though different from the other 5 constructs, in that it is not centered in curricular domains, teachers often made a connection between food and nutrition activities and the impact or potential impact on food insecurity. One participant noted:
“We made sure that we planted enough of everything so that we could use it when we brought it back in the classroom so the children could cut it up and take it apart and see what the insides looked like but then also enough that we had some to prepare as part of a meal that we had in the classroom.”

Teachers highlighted that the school schedule revolved a lot around food. Snacks and meals were regularly scheduled and utilized as a place where learning activities could be superimposed on top of impacting hunger and satiety throughout the school day. Food activities allowed teachers to extend instructional time, though informally, during snack and meal times. One participant reported, “You have a certain schedule to keep and a lot of it revolves around food.” The school to home connection was also an important aspect of fostering effective learning communities and many teachers indicate they readily shared seeds, seedlings, products, and knowledge with families. One participant explained, “Extra [products] went home to the families so they could then prepare them at home. It’s a win-win for everybody that’s involved.” Another participant shared how gardening connected with broader goals for healthful living parent education, “Teaching parents about what things are good for them to eat and stuff like that, and how to grow things.” Teachers also expressed gardens as being financially beneficial as they viewed fresh fruits and vegetables as an expensive burden on the low-income families they served. One participant articulated, “Having a place for [families] to come and get fresh fruits and vegetables because they’re expensive.”

**Discussion**

Head Start encourages the use of outdoor teaching (Nature-Based Learning and Development, 2015) but few research studies have elucidated what strategies actually help
preschool teachers sustainably integrate outdoor teaching into their curricula. The purpose of this study was to investigate teachers’ perceptions of food and nutrition activities as a means to sustainably integrate the alternative outdoor learning space into their preschool classrooms. This focus emerged from qualitative interviews with educators working with preschoolers from low-income families without explicit inquiry.

When analyzed through the lens of the Head Start Early Learning Outcomes Framework (ELOF), the findings of the current study suggest that food and nutrition activities could be used as a conduit to all the ELOF domains (Early Learning Outcomes Framework Implementation Toolkit, n.d.). Teacher participants shared food and nutrition activities that easily aligned with ELOF scaffolding in social and emotional development, language and communication, literacy, cognition, mathematics development, and scientific reasoning domains. Many of the food and nutrition example activities given during the interviews were content-rich and showed nurturing and responsive teaching strategies as encouraged by ELOF. Other studies have indicated a similar multi-curricular benefit of outdoor learning (Szczepanski, 2006).

Ernst (2014) suggested that though educators recognize the value of natural outdoor settings, teachers only occasionally use the settings. The results of the current study suggest that food and nutrition activities may be one mechanism to motivate and encourage outdoor teaching into the preschool curriculum in order to improve developmental skills and reach Kindergarten readiness goals. The researchers broadly define sustainable outdoor teaching as frequent and consistent utilization. The results suggest that using food and nutrition activities as a thread through curricular development positively impact all three dimensions of true
sustainability; social (Community Building), ecological (Health and Environment), and economic (Resource Utilization).

**Community Building**

By sustainably integrating food and nutrition activities, social connections can be fostered within the classroom (Maynard, 2007), preschool center, and into the community with parents and families (Beery, 2012; Davis and Brann, 2017). Our study confirms that child-initiated activities and social skill building as described by Maynard (2007) are unifying theme for outdoor teaching. Though our preschool teachers expressed the potential for garden spaces to be collaborative spaces, other studies indicate that school gardens are not widely utilized among their peers (Dyment, 2005). Moreover, teachers are busy and they express needing help from people outside of the school to keep gardens going (Beery, 2012). Encouragingly, one study indicated that garden volunteer opportunities gave a comfortable place for parents who were less comfortable in the traditional academic classroom to connect with their child’s educational experience (Block, 2012). Garden volunteers also describe gaining unexpected benefits of community building and establishing friendships while volunteering in the garden (Henryks, 2011).

**Health and Environment**

Not all teachers are confident in teaching in nature (Torquati et al., 2013) but consistent with our results, other studies report teachers emphasize the importance of teaching about the origins of food (Davis and Brann, 2017; Kos and Jerman, 2012). Though teachers in our study highlight a school garden’s potential impacts on food insecurity, small yields from school gardens are more likely to impact awareness of healthy eating than make a significant impact on food insecurity (Beery, 2012). However, awareness from garden interventions
may have a small impact on students’ choices in the lunch room (Cotugna, 2012). Perhaps, pairing school garden implementation to include farm to school connections may more significantly impact food intake (Izumi, 2015). Beyond the school day, a preschool garden intervention increased the number of fruits and vegetables available in the home as well as the amount consumed by children, though significance was not reported (Castro, 2013).

**Resource Utilization**

Despite initial concerns, parents and teachers agree that school gardens with hands-on food activities function as natural places to integrate a variety of curricular requirements (Block, 2012; Davis and Brann, 2017). Participants in our study confirmed this idea by sharing how they can use food and nutrition activities with outdoor teaching to efficiently incorporate multiple domains and positively affect teachers’ classroom time management. By integrating multiple learning outcomes in one space or activity, teachers may be motivated to input the time, thoughtful insight, and energy that preschool gardens require. Additionally, the current study participants re-emphasized recent study results of non-tasting sensory exposure increasing willingness to taste fruits and vegetables (Coulthard, 2017). Our study participants believed general sensory exploration in the garden impacted their students’ willingness to try and trust new fruits and vegetables. Broadening students’ willingness to try new fruits and vegetables may impact the centers resource utilization. If students try and consume more fruits and vegetables that are offered by Head Start centers, the center funds will be better utilized while reaching program goals. Additionally, if nutrition and food activities encourage the sustainable use of preschool gardens and centers are able to harvest still small but larger quantities of produce to incorporate into snack and meals, this will better utilize agency funds while providing more nutritious options for the students.
The current study’s strengths are based on utilizing a thorough methodological approach including a sample size that was relatively large (58) for a qualitative interview study. This was primarily due to the grounded theory approach (Corbin and Strauss, 2015) and collecting data beyond saturation (Bowen, 2008) which increased the trustworthiness and transferability of the results. The researchers acknowledge that the limitations of the study center on participant self-selection into the study. It is probable that teachers willing to spend an average of 60 minutes discussing OLCs were inherently different from those who did not volunteer for the study. Lastly, the researchers did not observe actual practices; therefore, the correlation between the study participants’ perspectives and their actual practices are unknown.

**Conclusion**

This qualitative investigation of teachers’ perceptions for using OLCs led to the understanding that food and nutrition activities were used as a strategy to sustainably incorporate outdoor gardens into preschool curricula. The researchers believed that many teachers still need knowledge and skills to understand what opportunities exist in garden education to fully move from casual interest to sustainable weekly practice. The analysis of the results of the current study indicated the academic, social, healthy and environment, and economic benefits of using food and nutrition as a viable strategy. This can be communicated in pre-service teacher education and professional development in the context of sustainability including preparation, implementation, management, use, and assessment. Preschool teachers’ knowledge, understanding, and confidence in regard to concepts within sustainability are limited but they can be improved with professional development (Dyment, 2014). Early childhood development departments could require or offer courses that impact
teachers’ knowledge and skills, such as an outdoor learning methods course and interdisciplinary courses such as nutrition education in the garden. Professional development such as in-service and in person or online continuing education programs could highlight the efficiency of incorporating food and nutrition garden-based activities into classroom curriculum. Although there are other strategies that may achieve similar goals, this study provides insight into one strategy that organically emerged from teachers based on their experience and expertise. Because it has been suggested that formal garden education curricula would benefit both teachers and preschoolers (Davis and Brann, 2017), future studies should seek to go beyond teacher perspectives. Studies should seek to measure the effectiveness of curriculum related practices to confirm outcome measures such as those associated with Head Start’s ELOF as well as the measurable impacts on teachers and their ability to work effectively in the classroom. Lastly, a validated tool to measure teacher’s self-efficacy for teaching in preschool gardens would likely be beneficial to administrators who are planning and preparing how to use resources for training and continuing education.
CHAPTER 4: DEVELOPMENT AND VALIDATION OF THE SELF-EFFICACY IN TEACHING OUTDOORS (STO) SURVEY

Abstract

Head Start centers across the nation are encouraged to incorporate outdoor teaching into playground landscapes; however, no validated measurement tool exists to assess teachers’ self-efficacy for outdoor teaching. Researchers collected data and developed the online 18 statement Self-efficacy in Teaching Outdoors (STO) survey utilizing a multiphase process to achieve both reliability and validity. This process included two expert reviews and cognitive interviews before the STO was administered to 357 participants who completed the survey. Exploratory factor analysis revealed a three-factor structure with an overall correlation of .915 and acceptable to good reliability within each factor (Cronbach’s alpha Factor 1 = .866, Factor 2 = .822, and Factor 3 = .788). Factor 1 related to planning and preparing, Factor 2 related to comfort in teaching in the alternative outdoor setting, and Factor 3 related to nature orientation and gardening. Having a valid and reliable tool could reveal teachers’ areas of greatest training need and better utilize program training funds into purposeful in-service sessions, continuing education seminars, and one-on-one barrier troubleshooting.

Keywords: Early childhood education, Head Start, Preschool education, Outdoor learning, Outdoor teaching, Survey Development, Survey Validation, Factor analysis
Introduction

Head Start centers across the nation are incorporating Outdoor Learning Centers (OLCs) into playground landscapes (Learning Environments, 2017). These are places where teachers can enhance both student and teacher-directed learning with multi-curricular activities. OLCs provide many benefits to preschoolers’ including promoting cognitive development (Jechura, 2016; Ernst, 2014; Wake, 2008; Cooper, 2015), gross motor skills (Jechura, 2016; Cooper, 2015), physical and psychological health (Ernst, 2014), social and emotional well-being (Wake, 2008), and an appreciation for the environment (Cooper, 2015).

Garden components of OLCs are used to incorporate nutrition education into the classroom. Hands-on experiences with gardening positively influence preschoolers’ knowledge about, willingness to try, preference, and consumption of fruits and vegetables (Davis & Brann, 2017; Farfan-Ramirez, 2011; Namenek Brouwer, 2013).

While a variety of benefits have been implicated for school gardens generally (Berezowitz, 2015; Ohly, 2017), the spaces still remain underutilized in preschools (Dyment, 2005; Ernst, 2014). Ernst (2014) discovered that educators value using outdoor environments with their students, but prior difficulty with using OLCs seems to discourage more frequent utilization. Davis and Brann (2017) identified several barriers to successful childcare garden programs, including deficiencies in funds, training, curriculum materials, education, and support from volunteers and the community. In order to increase teacher use of outdoor settings, more focus should be placed on reducing barriers (Ernst, 2014). From previous unpublished work, sustainable use of outdoor teaching was defined as the frequency, consistency over time, and intensity of holistically integrating outdoor learning environments into the preschool classroom curricula and weekly scheduling routines.
Early childhood educators may overcome barriers to sustainably integrating OLCs into preschool curriculum by increasing self-efficacy for using OLCs. Self-efficacy is an indicator of one’s competency and confidence in completing a skill and impacts goal setting (Bandura, 2004). There is currently no validated measurement tool to measure teachers’ self-efficacy in using outdoor teaching. The purpose of the current study was to develop and validate a survey to measure the self-efficacy of using outdoor teaching for preschool teachers who work with low-income students.

The Study Methods

Instrument Development

Researchers developed the Self-efficacy in Teaching Outdoors (STO) survey utilizing a multiphase process to achieve both reliability and validity (Wetzel, 2012). The institutional review board at North Carolina State University (Raleigh, NC) approved each phase of the instrument development and validation protocol.

Phase 1: Item Generation

The scope of the survey was informed by the results of a qualitative study that explored preschool teacher’s facilitators, barriers, and motivations for sustainable use of an OLC. The exploratory study focused on teachers’ working with children from low-income families and thus was informed by Head Start and North American Association for Environmental Education Recommendations (NAAEE; Nature-Based Learning and Development). Based on this information, the primary investigator drafted the initial 78 statements to be considered during the validation process. The research team internally reviewed, edited, and revised the statements and eventually all motivation statements were culled to better focus the survey on
facilitators and self-efficacy. After phase 1, the survey statement pool was narrowed to 35 statements.

**Phase 2: Content Validity Expert Panel 1**

Next, a panel of 16 experts in nutrition education, early childhood development, outdoor learning, survey development, and Head Start program administration reviewed the survey statements for content validity. The expert panel rated the relevancy of each item using a 5-point Likert scale and provided additional comments where appropriate through the Qualtrics online survey system (Qualtrics, Provo, UT). After calculating an average relevancy score and compiling edit comments for each statement, the research team revised the pool of statements through editing, deleting, and adding survey statements. At the end of phase 2, the number of statements remained at 35.

**Phase 3: Cognitive Interviews**

Subsequently, the researchers used the new 35 statements to conduct cognitive interviews via telephone with 11 preschool teachers. This phase analyzed the teachers’ thought processes used while responding to the survey statements as another check on content validity (Willis, 2015). Researchers managed the interviews using a semi-structured interview guide while employing a combination of think-aloud and verbal probing techniques (Di Iorio, 2005; Willis, 2015). For each statement, interviewers inquired about the participants’ level of agreement with the statement, how the participant arrived at choosing her answer, her perception of the intent of the statement, what knowledge and skills she believed were necessary to achieve confidence, to choose “strongly agree”, and finally what suggestions the participant had for changing the statement. Analysis of the cognitive interviews resulted in
the research team revising the pool of statements through editing, deleting, and adding statements. At the end of phase 3, the number of statements grew to 37.

**Phase 4: Content Validity Expert Panel 2**

After making revisions based on the cognitive interview data, the research team shared the revised 37 statements with 13 experts who were not participants in the first expert panel. Experts organized the statements into 4 proposed subscales (Planning and Preparing, Demonstrating and Teaching, Nature Orientation, and Needs and Support) as a final check of content validity using the Qualtrics online survey system (Qualtrics, Provo, UT). After applying feedback from expert panel #2 by editing and deleting statements, a final 34-statement survey was prepared for online validation administration with a national sample of preschool teachers.

**Phase 5: Validation Administration**

Finally, the research team administered the revised survey with 357 participants who completed the STO online through the Qualtrics online survey system (Qualtrics, Provo, UT). To increase the probability of reaching significance, 340 participants was targeted. The sample size 357 surpassed the general 300 participant recommendation from Tabachnick and Fidell (2001) and satisfied Pett, Lackey, and Sullivan’s (2003) recommendation of 10 participants for every survey item (34 x 10 = 340). The survey consisted of 34 facilitator and self-efficacy items, ranked on a 6-point forced response Likert scale from “strongly disagree” to “strongly agree”.

**Participants and Recruitment**

Researchers compiled a randomly organized list of Head Start grantees utilizing the Head Start Locator Tool to identify administrators and directors to access teacher participants. The
primary author contacted preschool administrators and directors via email and provided a link for the online survey to forward to their teachers. Before gaining access to the STO survey, teachers completed a 7-question demographic survey for inclusion/exclusion purposes. To be eligible for this study, teachers had to be a preschool teacher or teacher assistant working with preschoolers (ages 3-5) from low-income families and be over the age of 18. For each completed survey, teachers were eligible to register an email address for a chance to win a $100 gift card as incentive for participation.

Statistical Analysis

Researchers used IBM SPSS Statistics for Macintosh, version 24 (IBM Corp., Armonk, NY, USA) for data management and statistical analyses.

Data quality and descriptive statistics

Kaiser-Meyer-Olkin (KMO) statistic was used to determine sampling adequacy and a Bartlett’s test was used to test for sphericity (Kaiser, 1974). In order to explore trends in teacher self-efficacy based on different demographic conditions, the research team calculated means and standard deviations and conducted analysis of variance (ANOVA) followed by Post Hoc Bonferroni Adjustment comparisons. A p < 0.05 was used to determine statistical significance.

Exploratory factor analysis

Researchers implemented an exploratory factor analysis of the 34 facilitator and self-efficacy statements using principle axis factoring, a factor extraction method with a Promax oblique rotation. This allowed for the factors to correlate and for a sharper distinction between the factors, respectively (Costello, 2005). Scree plots were examined, identifying the break point in the data, to help determine the most appropriate number of factors (Costello,
This was followed by an iterative factor analysis process to confirm the most appropriate number of factors and the correlated statements within each factor by analyzing the loading tables. Because Promax uses an oblique rotation, the pattern matrix was analyzed to determine the most appropriate factor structure. Statements with correlations below 0.32 and loading higher than 0.32 on multiple factors in the pattern matrix were dropped (Costello, 2005). Lastly, to achieve the cleanest factor structure, needs and support statements were dropped resulting in the final factor structure focusing solely on self-efficacy.

**Concurrent Validity**

There is currently no validated self-efficacy survey for preschool teacher use of OLCs, so researchers were unable to measure and calculate concurrent validity.

**Reliability Assessment**

Researchers used IBM SPSS Statistics for Macintosh, version 24 (IBM Corp., Armonk, NY, USA) to calculate Cronbach’s alpha for each of the identified factors. The research team used 0.70 as a baseline to determine adequacy for internal consistency for each factor, noted as “acceptable” (George & Mallory, 2003). Cronbach’s alpha “if the statement was deleted” was compared to the whole factor Cronbach’s alpha and survey statements were removed if deleting the item increased the factor’s Cronbach’s alpha.

**Findings**

**Participant Demographics**

From the 1199 Head Start grantees contacted, 357 participants completed the entire STO survey with virtually all of the participants being female. Three-quarters of the sample identified as Caucasian/white, nearly half of participants held a 4-year college degree, and
the average age of the participants was 41. Experience in preschool and with outdoor learning varied widely with a mean 12.8 years of experience teaching preschool and 8.7 years of experience using outdoor learning. Table 4.1 summarizes the participant demographics.

**Table 4.1.** Participant Demographics, Survey Validation Administration (n=357)

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Number of Teachers</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Race</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Caucasian/white</td>
<td>266</td>
<td>74.5%</td>
</tr>
<tr>
<td>African American/black</td>
<td>48</td>
<td>13.4%</td>
</tr>
<tr>
<td>Hispanic/Latino</td>
<td>32</td>
<td>9%</td>
</tr>
<tr>
<td>Asian</td>
<td>8</td>
<td>2.2%</td>
</tr>
<tr>
<td>Multi-racial</td>
<td>3</td>
<td>.8%</td>
</tr>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>347</td>
<td>97.2%</td>
</tr>
<tr>
<td>Male</td>
<td>9</td>
<td>2.5%</td>
</tr>
<tr>
<td>Other</td>
<td>1</td>
<td>0.3%</td>
</tr>
<tr>
<td><strong>Education</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High school diploma, GED, or some college or technical school education</td>
<td>53</td>
<td>14.8%</td>
</tr>
<tr>
<td>2-year college degree</td>
<td>88</td>
<td>24.6%</td>
</tr>
<tr>
<td>4-year college degree</td>
<td>161</td>
<td>45.1%</td>
</tr>
<tr>
<td>Masters degree</td>
<td>55</td>
<td>15.4%</td>
</tr>
<tr>
<td><strong>Role</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Teacher Assistant</td>
<td>83</td>
<td>23.2%</td>
</tr>
<tr>
<td>Teacher</td>
<td>274</td>
<td>76.8%</td>
</tr>
</tbody>
</table>
Factor Analysis

The KMO statistic of 0.924, classified as ‘‘marvelous’’ confirmed that the sample size was adequate for the factor analysis and the Bartlett’s test of sphericity confirmed that the correlation matrix was significantly different from zero (Kaiser, 1974). Based on the multi-step analytical process for exploratory factor analysis using principle axis factoring with Promax rotation, a 3-factor structure was revealed with eight statements in Factor 1 and five statements in Factors 2 and 3 (Table 4.2).

Table 4.2. Pattern Matrix for Principal Axis Factoring with Promax Oblique Rotation of the 3-factor solution for the Self-efficacy items in Teaching Outdoors (STO) survey, (n=357)

<table>
<thead>
<tr>
<th>Statement</th>
<th>Factor 1 Loading</th>
<th>Factor 2 Loading</th>
<th>Factor 3 Loading</th>
<th>Item mean (SD)a</th>
</tr>
</thead>
<tbody>
<tr>
<td>I have enough time to set up outdoor learning activities for my students.</td>
<td>0.78</td>
<td></td>
<td></td>
<td>3.5 (1.37)</td>
</tr>
<tr>
<td>I feel confident planning outdoor learning activities.</td>
<td>0.70</td>
<td></td>
<td></td>
<td>4.8 (1.05)</td>
</tr>
<tr>
<td>In spite of class time limits, I can still teach at least 1 lesson outdoors weekly.</td>
<td>0.66</td>
<td></td>
<td></td>
<td>4.34 (1.27)</td>
</tr>
<tr>
<td>I feel comfortable showing my students how to use supplies/tools during outdoor learning activities.</td>
<td>0.56</td>
<td></td>
<td></td>
<td>5.03 (0.96)</td>
</tr>
<tr>
<td>I know how to incorporate outdoor learning activities into my weekly lesson plans.</td>
<td>0.56</td>
<td></td>
<td></td>
<td>4.78 (0.95)</td>
</tr>
<tr>
<td>I am able to work with other teachers to collaborate in joint outdoor learning projects.</td>
<td>0.56</td>
<td></td>
<td></td>
<td>4.45 (1.21)</td>
</tr>
<tr>
<td>I can easily find ideas for planning outdoor lessons</td>
<td>0.53</td>
<td></td>
<td></td>
<td>4.49 (1.09)</td>
</tr>
<tr>
<td>I am able to identify lessons in our curriculum that would be appropriate for outdoor learning.</td>
<td>0.52</td>
<td></td>
<td></td>
<td>4.78 (0.95)</td>
</tr>
<tr>
<td>I feel comfortable encouraging my students to interact with nature in general.</td>
<td></td>
<td>0.75</td>
<td></td>
<td>5.16 (0.82)</td>
</tr>
</tbody>
</table>
Table 4.2. Continued

<table>
<thead>
<tr>
<th>Statement</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>I enjoy being outdoors with my students.</td>
<td>0.74</td>
<td>5.49</td>
</tr>
<tr>
<td>(0.68)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I do not mind getting dirty while I am outside with my students.</td>
<td>0.71</td>
<td>5.2</td>
</tr>
<tr>
<td>(0.89)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I feel it is important to include “child choice” when teaching outdoors.</td>
<td>0.64</td>
<td>5.23</td>
</tr>
<tr>
<td>(0.75)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I am willing to teach at least 1 lesson outdoors weekly.</td>
<td>0.41</td>
<td>5.03</td>
</tr>
<tr>
<td>(0.98)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>When it comes to growing things, I believe I have a “green thumb”</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.70</td>
<td></td>
<td>3.74</td>
</tr>
<tr>
<td>(1.52)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>When I am not at work, I often spend time outdoors.</td>
<td>0.672</td>
<td>4.83</td>
</tr>
<tr>
<td>(1.16)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I feel comfortable making a yearly schedule for seasonal planting in an</td>
<td></td>
<td></td>
</tr>
<tr>
<td>outdoor learning center.</td>
<td>0.595</td>
<td>4.15</td>
</tr>
<tr>
<td>(1.37)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I feel comfortable incorporating harvested products into my teaching</td>
<td></td>
<td></td>
</tr>
<tr>
<td>lessons.</td>
<td>0.52</td>
<td>4.75</td>
</tr>
<tr>
<td>(1.03)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I feel confident teaching in an outdoor learning center.</td>
<td>0.42</td>
<td>4.91</td>
</tr>
<tr>
<td>(1.03)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Survey was 6-point forced response scale with response choices 1=strongly disagree, 2=disagree, 3=slightly disagree, 4=slightly agree, 5=agree, 6= strongly agree.

The correlation between Factor 1 and Factor 2 was 0.62, between Factor 1 and Factor 3 was 0.61 and between Factor 2 and Factor 3 was 0.69. This moderate level of correlation indicated that the three factors were related, but not too high which would indicate a 1-factor or 2-factor solution was warranted. Items that loaded on Factor 1 related to preparing and getting ready for outdoor teaching, on Factor 2 related to comfort in teaching in the alternative outdoor setting, and on Factor 3 related to nature orientation and gardening.

Reliability Assessment

A Cronbach’s alpha of 0.866 for Factor 1, 0.822 for Factor 2, and .788 for Factor 3 indicated
acceptable to good internal consistency within each factor (Table 4.3).

**Table 4.3.** Descriptive statistics for the 3 factors in the Self-efficacy in Teaching Outdoors (STO) survey, (n=357)

<table>
<thead>
<tr>
<th>Factor</th>
<th>Number of Statements</th>
<th>Mean Score</th>
<th>SD</th>
<th>Cronbach's alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Factor 1: Preparing and getting ready for outdoor teaching</td>
<td>8</td>
<td>4.52</td>
<td>0.22</td>
<td>0.87</td>
</tr>
<tr>
<td>Factor 2: Comfort in teaching in the alternative outdoor setting</td>
<td>5</td>
<td>5.22</td>
<td>0.03</td>
<td>0.82</td>
</tr>
<tr>
<td>Factor 3: Nature orientation and gardening</td>
<td>5</td>
<td>4.48</td>
<td>0.26</td>
<td>0.79</td>
</tr>
<tr>
<td>STO Complete with all 3 Factors</td>
<td>18</td>
<td>4.70</td>
<td>0.67</td>
<td>0.92</td>
</tr>
</tbody>
</table>

**Demographic Analysis**

The mean score of all participants for Factor 1 was 4.52, Factor 2 was 5.22, and Factor 3 was 4.48 (Table 4.3). The mean score for the full STO was 4.70. There were no significant differences between role or level of education for the full STO mean score or on Factors 1, 2, or 3. The sample did not represent gender well enough to make an inference from the data.

Analysis indicated the mean scores for the full STO (F = 4.267; df = 4; p = 0.002) and for Factor 1 (F = 6.646; df = 4; p = 0.000) were significantly different among the categories of race, however this was not persistent for Factors 2 and 3.

**Table 4.4.** Mean scores (SD) for participant demographics groups for each factor in the Self-efficacy in Teaching Outdoors (STO) survey

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Factor 1</th>
<th>Factor 2</th>
<th>Factor 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>All subjects (n=357)</td>
<td>4.52 (0.79)</td>
<td>5.22 (0.63)</td>
<td>4.48 (0.90)</td>
</tr>
<tr>
<td>Race</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Caucasian/white</td>
<td>4.43 (0.76)</td>
<td>5.21 (0.60)</td>
<td>4.43 (0.90)</td>
</tr>
<tr>
<td>African American/black</td>
<td>4.94 (0.64)</td>
<td>5.38 (0.49)</td>
<td>4.65 (0.82)</td>
</tr>
<tr>
<td>Hispanic/Latino</td>
<td>4.46 (0.99)</td>
<td>5.01 (0.99)</td>
<td>4.47 (1.04)</td>
</tr>
<tr>
<td>Asian</td>
<td>5.13 (0.78)</td>
<td>5.40 (0.39)</td>
<td>4.83 (0.65)</td>
</tr>
<tr>
<td>Multi-racial</td>
<td>5.52 (0.79)</td>
<td>5.67 (0.63)</td>
<td>5.13 (0.90)</td>
</tr>
</tbody>
</table>
**Table 4.4.** Continued

<table>
<thead>
<tr>
<th>Gender</th>
<th>Female</th>
<th>4.52 (0.78)</th>
<th>5.22 (0.64)</th>
<th>4.47 (0.90)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>4.58 (1.18)</td>
<td>5.42 (0.37)</td>
<td>4.87 (0.99)</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>4.88 (0)</td>
<td>5.4 (0)</td>
<td>5.2 (0)</td>
<td></td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High school diploma, or GED</td>
<td>4.42 (0.52)</td>
<td>4.83 (0.70)</td>
<td>4.20 (0.70)</td>
<td></td>
</tr>
<tr>
<td>Some college or technical school education</td>
<td>4.74 (0.70)</td>
<td>5.23 (0.52)</td>
<td>4.55 (0.98)</td>
<td></td>
</tr>
<tr>
<td>2-year college degree</td>
<td>4.60 (0.76)</td>
<td>5.27 (0.70)</td>
<td>4.65 (0.83)</td>
<td></td>
</tr>
<tr>
<td>4-year college degree</td>
<td>4.43 (0.83)</td>
<td>5.24 (0.60)</td>
<td>4.42 (0.89)</td>
<td></td>
</tr>
<tr>
<td>Masters degree</td>
<td>4.49 (0.79)</td>
<td>5.16 (0.67)</td>
<td>4.37 (0.97)</td>
<td></td>
</tr>
<tr>
<td>Role</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Teacher Assistant</td>
<td>4.57 (0.76)</td>
<td>5.10 (0.70)</td>
<td>4.44 (0.92)</td>
<td></td>
</tr>
<tr>
<td>Teacher</td>
<td>4.51 (0.80)</td>
<td>5.26 (0.60)</td>
<td>4.49 (0.89)</td>
<td></td>
</tr>
</tbody>
</table>

There was no significant difference between mean scores for categories of years of experience teaching preschool for the full STO mean score or on Factors 1, 2, or 3. Conversely, there was significant difference in mean STO, Factors 1, 2, and 3 scores for the 4 categories of years of experience with outdoor learning (0-1 years, 2-5 years, 6-10 years, and 10+years). There was a significant difference at the p <.05 level in the scores for the full STO mean score (F= 8.804; df=3; p<0.000), Factor 1 (F= 9.587; df=3; p<0.000), Factor 2 (F= 4.563; df=3; p<0.004), and Factor 3 (F= 4.581; df=3; p<0.004) for the 4 categories of experience teaching outdoors. The scores for 0-1 year of experience were the lowest and 10+ years of experience had the highest scores (Table 4.5). However, despite reaching significance, the actual differences in group means were small. Post-hoc comparisons using Bonferroni correction indicated that the mean full STO scores for 0-1 years of experience was significantly different from 2-5 years of experience, 6-10 years of experience, and from
10+ years of experience. The Factor 1 scores for 0-1 years of experience was significantly different from 6-10 and 10+ years of experience and 2-5 years of experience was significantly different from 10+ years of experience. The Factor 2 scores were only significantly different between 0-1 years of experience and 10+ years of experience. The Factor 3 scores for 0-1 years of experience were significantly different from 6-10 and 10+ years of experience.

Table 4.5. Mean scores (SD) for participant years of teaching preschool and outdoors for each factor in the Self-efficacy in Teaching Outdoors (STO) survey

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Factor 1</th>
<th>Factor 2</th>
<th>Factor 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teach Preschool 0-1 Years</td>
<td>4.37 (0.72)</td>
<td>5.03 (0.52)</td>
<td>4.28 (0.73)</td>
</tr>
<tr>
<td>Teach Preschool 2-5 Years</td>
<td>4.50 (0.74)</td>
<td>5.14 (0.56)</td>
<td>4.34 (0.85)</td>
</tr>
<tr>
<td>Teach Preschool 6-10 Years</td>
<td>4.47 (0.93)</td>
<td>5.24 (0.77)</td>
<td>4.48 (0.91)</td>
</tr>
<tr>
<td>Teach Preschool 10+ Years</td>
<td>4.57 (0.76)</td>
<td>5.27 (0.61)</td>
<td>4.56 (0.93)</td>
</tr>
<tr>
<td>Teach Outdoors 0-1 Years</td>
<td>4.17 (0.79)</td>
<td>5.03 (0.58)</td>
<td>4.17 (0.89)</td>
</tr>
<tr>
<td>Teach Outdoors 2-5 Years</td>
<td>4.48 (0.70)</td>
<td>5.19 (0.56)</td>
<td>4.48 (0.89)</td>
</tr>
<tr>
<td>Teach Outdoors 6-10 Years</td>
<td>4.60 (0.90)</td>
<td>5.26 (0.74)</td>
<td>4.60 (0.87)</td>
</tr>
<tr>
<td>Teach Outdoors 10+ Years</td>
<td>4.77 (0.70)</td>
<td>5.37 (0.62)</td>
<td>4.63 (0.89)</td>
</tr>
</tbody>
</table>

Discussion

In this study, we created a valid and reliable survey to assess preschool teachers’ self-efficacy for teaching outdoors, resulting in the 18-statement STO survey. The final factor structure of the STO survey included three dimensions; preparing and getting ready for the OLC, comfort in teaching in the alternative outdoor setting, and nature orientation and
gardening. Larger non-validated surveys have been used to assess teacher perceptions of children’s experiences (Torquati, 2013). Also, a 48-item validated survey examining teachers’ self-efficacy towards nutrition knowledge and physical activity needs of children in the preschool classroom has been developed (Derscheid, 2014), but this is the first reliable and valid survey that focuses on teachers’ self-efficacy in a preschool garden. Reliability analysis confirmed good rates of internal validity for all three factors. Validity checks were used for content validity in the development of the survey, but concurrent validity assessment was not possible because the research team did not know of another validated tool for domain-specific self-efficacy comparison. One self-efficacy for outdoor teaching survey has been published, but it focuses on wilderness education and thus is not applicable to the current study population (Schumann, 2013). The purpose of developing the STO survey was to create such a measurement tool for self-efficacy in outdoor teaching.

Though the three subsets of self-efficacy are correlated, they were distinct. Factor 1 measured teachers comfort in planning and preparing to use OLCs. This factor included teacher comfort in the processes of getting ready for OLC work. Items loading on Factor 1 include teacher comfort in working with time constraints, creating lesson plans for the OLC, preparing students to use tools in this alternative teaching space, and collaborating with other teachers. Factor 2 included teacher comfort in the processes of actually using the OLC with students. As such, the items loading on Factor 2 measure the teacher comfort in encouraging the students to interact with nature, incorporating child-choice philosophy while teaching, comfort in getting dirty outside with the students, and general enjoyment of teaching students outdoors. Connected to this sub-scale, teacher modeling seems to encourage healthy behaviors in children (Hendy, 2000). Factor 3 included teacher’s nature orientation and
comfort in gardening. Items loading on Factor 3 focused on self-identification of having a “green thumb”, comfort in using harvested products, and propensity of spending personal time in nature. This factor is more centered on the teacher than is Factor 2, which is more connected to students. The impact of teachers’ nature orientation has been previously explored and shown positive effects on preschool learning (Jorgenson, 2013), but the sample size was small. Have a validated tool with a sub-scale for nature orientation could elucidate this impact of social and academic outcomes more clearly.

Across all the demographics, teachers tended to score higher on Factor 2 than on Factors 1 and 3, which is interesting given that is the factor connected to students. Factor 1 focuses on getting ready and being prepared and Factor 3 focuses on teacher comfort in nature and with gardening. Perhaps teachers are motivated to jump into alternative outdoor teaching with students even when they are not as prepared or comfortable in the setting as they would like. This confirms previous studies where planning and preparing has been identified as a barrier to using outdoor learning environments (McClinitic, 2015). This confirms the yet unpublished qualitative data collected to inform this survey development and validation.

Caution should be taken when interpreting the data for male and other gender as well as for Asian and Multi-racial demographic groups because the participant numbers were very small. Though not significantly different, African American participants tended to score higher than Caucasian and Hispanic participants. Teachers scored higher on Factors 2 and 3 whereas Teacher Assistants tended to score higher on Factor 1. There were no detectable trends in education levels, which highlights an opportunity for pre-service programs to impact teacher self-efficacy moving forward.
Most interesting in the data, is the observation that number of years teaching in preschool did not correlate with significant differences in the self-efficacy measure. Though the focus was slightly different, this contradicts Derscheid’s findings that teaching experience impacted teacher perspectives on survey results (2010). However, years of experience teaching in outdoor did show statistical significance. The data from the current study indicated a significant difference in the full STO measure as well as for Factors 1, 2, and 3 between 0-1 years of experience and 10+ years of experience. There were also significant differences between 0-1 years of experience and 6-10 years of experience for the full STO and Factors 1 and 3. These data add to the understanding that personal practical knowledge and self-awareness impacts the decisions early childhood educators make about what and how concepts are taught (Baum and King, 2006). It is probable that the progression of self-efficacy is slow and gradual resulting in teachers gaining knowledge and skill through direct experience teaching in the outdoor setting. This gives clarity to the non-significant findings from Moseley et al. who did not see a self-efficacy impact from a short 3-day outdoor training program (2002). Longer programs or access to training modules for teachers to actively experience with their students may be warranted. Head Start and state-funded preschools for children from low-income families are tasked with many responsibilities, one of which is providing outside exposure daily (Nature-Based Learning and Development, 2015). Increasingly, many teachers themselves have not had childhood experiences playing and interacting with the outdoors, as such they are least confident in implementing nature education in the classroom (Torquati et al., 2013). And so, teachers may be acquiring these skills on the job and could utilize training, continuing education, and in-service opportunities to help them improve self-efficacy (Dyment, 2014) in teaching outdoors. The current study
provides a validated instrument that can be utilized to make ongoing assessments in self-efficacy.

This study is correlational in nature and cannot make conclusions about cause and effect (Creswell, 2014). Participant self-selection may have imparted bias into results, it is possible that teachers who were willing to take a survey about outdoor learning may be inherently different from those who did not volunteer for the study (Rosenthal, 1965). Additionally, email based recruiting and the online nature of the survey may have excluded participation from those who did not have easy internet access and impacted response rate. However, the short length of the survey and providing a chance to enter a drawing to win a $100 gift card were used to attempt to increase the response rate (Porter and Whitecomb, 2003). Lastly, because the survey is self-report, it does not measure skills of teachers, only their perceived self-efficacy and the relationships between our study participants’ self-perceptions and their actual practices are unknown. Therefore, a performance assessment would be useful to compare self-efficacy to performance.

**Implications for Research and Practice**

As far as the authors know, this is the first study to validate a quantitative measurement tool for self-efficacy in outdoor teaching for preschool teachers. Moving forward, the factor structure needs to be confirmed by confirmatory factor analysis (CFA) or structural equation modeling (SEM). CFA or SEM will test the hypothesis developed during the current exploratory factor analysis, confirming a relationship exists between the observed variables and the underlying latent constructs of the factors. Ultimately this study provides a measurement tool for grantee agencies and educational institutions to utilize during in-service and curricular education for garden education. The systematic focus on garden
education in Head Start is explicit (Nature-Based Learning and Development, 2015) yet understanding the full potential of incorporating outdoor teaching into weekly routines is not yet a priority (Brown, 2009; Maynard and Waters, 2007). Davis and Brann (2017) uncovered that preschool teachers are interested in training to better incorporate instructional gardening into their curriculum. The validated STO can inform the development of a variety of training and professional development avenues, as well as, be utilized as a pre-post assessment tool. Firstly, early childhood education departments could use this valid and reliable tool to assess student self-efficacy as a pre-post measure for their course offerings with outcome measuring seeking to impact teachers’ knowledge and skills in regard to outdoor teaching or as a program pre-post measure of self-efficacy to evaluate the effectiveness of their overall curricular impact on outdoor teaching.

Secondly, professional development such as in-service, continuing education programs, or outdoor teaching online tutorials could use this valid and reliable tool as a pre-post assessment for program effectiveness in the same manner as mentioned above for early childhood education course offerings. Easily accessible online tutorials may be helpful, as preschool teachers are largely unaware or feel they do not have access (Davis and Brann, 2017) to formal garden curricula. Lastly, having a valid and reliable tool could illuminate teachers’ areas of greatest need and better utilize grantee, agency, or institutional funds into purposeful education programs, in-service sessions, and general barrier troubleshooting. Although more research is warranted, the results of this study establish a validated self-efficacy measurement tool to impact the sustainability of outdoor teaching.
CHAPTER 5: SUMMARY, FUTURE WORK, RESEARCH SIGNIFICANCE AND GENERAL CONCLUSIONS

Teachers’ perceptions of sustainable integration of outdoor teaching and learning into Head Start classrooms: A grounded theory approach

Summary

The purposes of this qualitative study were to explore preschool teachers’ experiences and perceptions related to incorporating outdoor teaching and learning into preschool curriculum for children from low-income families and to develop a grounded theory based conceptual model to explain the findings. The results uncovered teacher barriers and facilitators and rendered a conceptual model. This model is important because it helps administrators efficiently understand and communicate what concepts are important to sustainably use OLCs. During the study, teachers shared feelings of being pioneers in outdoor teaching and learning and lacking knowledge, skills, and confidence that allows them to fully embrace outdoor learning. As Head Start recommendations actively encouraging outdoor learning, it is important to understand where teachers are and what they need to meet curricular expectations. The conceptual model created for this study can also be used as a tool by administrators to dialog with teachers to understand the complexity of their perspectives and to help teachers troubleshoot and problem solve in their quest to venture into an alternative educational setting. From this study, the definition of sustainable use of outdoor teaching considers the frequency, consistency over time, and intensity of holistically integrating outdoor learning environments into the preschool classroom curricula and weekly scheduling routines.
**Future work**

This study provided an in-depth understanding of teacher perspectives on outdoor teaching and learning and the findings created a conceptual model that can be used to create educational materials, inform program development, and make decisions in Head Start grantee agencies. However, this study was exploratory and thus did not test any of the relationships depicted in the conceptual model. Educational intervention studies that manipulate various constructs within the conceptual model, such as basic garden knowledge and skills, are needed to confirm the impacts on all the other constructs within the model. As one example, the research team sees value in pilot testing short educational videos because teachers reported being busy yet need education to increase knowledge and skills. Convenient short online videos are one way teachers could directly assess the information about the topics they identify as knowledge gaps. Ideally, these would be accompanied by quick knowledge assessments and could include pre-post self-efficacy measurements as well. Additionally, a study investigating the strength of the relationship between teacher perspectives and opinions to actual practices in the classroom is warranted, this would be best as an observation study. Lastly, this study asked 14 main questions and thus had a large amount of data to be analyzed. In alliance with the exploratory sequential mixed methods design of the dissertation project, the analysis of the qualitative data in this study informed the development of the survey used in the second study (Chapter 4). Additionally, one additional manuscript describing how teachers define OLCs will be written from the qualitative data.
**Food and nutrition activities as a unifying thread to facilitate sustainable outdoor teaching in preschool gardens**

**Summary**

The purposes of the broader qualitative study (Chapter 2) were to explore preschool teachers’ experiences and perceptions related to incorporating outdoor teaching and learning into a preschool curriculum for children from low-income families and to develop a grounded theory based conceptual model to explain the findings. This component of the broader study explored the emergent concept of food and nutrition activities as an integral aspect of sustainable use in preschool gardens. Though they were not asked directly, teachers readily shared examples of food and nutrition activities when describing preschool OLCs or gardens. Though they rarely described fully employing nutrition education, teachers often included example of planting, harvesting, and preparing food that allowed them to fulfill other curricular requirements with teaching outdoors. Being able to share food and nutrition with students and families seemed to be a source of pride for the participating teachers, yet it is clear that time and manpower for garden maintenance are barriers that need to be mindfully addressed. Teachers also discussed how along with teaching a variety of curricular subjects, they also tried to dispel the idea that food just comes from the grocery store. Given the cautious enthusiasm that teachers have for teaching outdoors and the many connections they made with food and nutrition, the researchers believe high quality training is warranted to improve teacher confidence. In this, teachers need efficient teaching methods and ideas that incorporate a variety of age appropriate developmental skills and goals in each lesson. If teachers increase their self-efficacy for food and nutrition activities and garden education, perhaps outdoor teaching would be utilized more often and consistently because teachers will
better understand that outdoor teaching with food and nutrition is a way they can readily teach multiple domains at once.

**Future work**

This study provided an in-depth analysis of the emergent idea of using food and nutrition to make outdoor teaching more sustainable (frequency and consistency). As preschool teachers begin to embrace outdoor teaching and garden education as part of the classroom more fully, the opportunity exists to collect data from a variety of skill and experience levels and OLC designs. Specifically, the research team is curious about outcomes from both comprehensive nutrition education programs with garden components as well as less formally unpackaged food and nutrition activities developed by teachers. Researchers are also interested in collecting food intake and biometric data from teachers to determine if their health status remains stable or significantly changes in association with incorporating garden-based food and nutrition activities into their classrooms. These studies do not currently have an immediate time frame as grant funds are necessary to execute the investigations.
**Development and validation of the Self-efficacy in Teaching Outdoors (STO) survey**

**Summary**

The purpose of the current study was to develop and validate a survey to measure the self-efficacy of using outdoor teaching for preschool teachers who work with low-income students. A multiphase process included two expert review panels, one round of cognitive interviews, and a validation administration completed by 357 participants to gain validity and reliability for the 18-statement online survey. After exploratory factor analysis, a three-factor structure was evident with an overall correlation of .915 and an acceptable to good reliability within each factor. Cronbach’s alpha Factor 1 = .866 was related to planning and preparing and comprised of 8 statements, Factor 2 = .822 was related to comfort in teaching in the alternative outdoor setting and comprised of 5 statements, and Factor 3 = .788 was related to nature orientation and gardening and comprised also of 5 statements. Teachers scored significantly higher on the full STO and each of the Factors if they had more years of experience with outdoor teaching. The results were valid but confirmatory factor analysis will be the next step in the research analysis process.

**Future work**

This study provided a validated survey for administers and grantee agencies to assess teacher self-efficacy in using outdoor teaching in the preschool classroom. However, future studies will continue this investigation and analysis. Three hundred and fifty-eight surveys have been collected to perform confirmatory factor analysis and write a second manuscript analyzing STO’s validity in the Spring of 2018. Once the factor structure is confirmed, the STO can be utilized as a basic assessment tool to inform decision making in a grantee or individual center. It could also be used as a pre-post measure for outdoor learning training,
in-service, or continuing education programs. It could also be validated in other populations, such as early elementary school teachers or for early education programs with “preservice” teachers. Other groups within Head Start, such as directors, administrators, education coordinators, and possibly kitchen staff are potential populations for the survey to be validated within so comparisons within agencies could be identified and addressed. Having a validated tool opens the door for collecting trustworthy data and provides the opportunity for researchers and administrators to make valid conclusions.
Research significance and general conclusions

This dissertation entitled, “Assessing the Perceptions of Outdoor Teaching in Preschools,” filled a gap in the literature related to teacher perspectives for using outdoor learning centers and preschool gardens as teaching centers. Overall, this dissertation added significant value to the body of research knowledge with 3 manuscripts consisting of 2 qualitative explorations and 1 survey development and validation investigation. This project provided a needed understanding of teacher perspectives to the existing preschool outdoor teaching and learning literature, connections between food and nutrition and outdoor teaching were further elucidated, and a valid and reliable measurement tool was created. There were 2 main outcomes from this dissertation research: (1) The conceptual model; it describes components that influence the sustainable use of outdoor teaching and learning in the Head Start setting thus it suggests opportunities for changes or additions to pre-service and continuing education curricula, (2) The STO survey: A valid and reliable self-efficacy in teaching outdoors measurement tool for Head Start teachers; it provides a convenient and efficient online measure for grantee agencies, preschool centers, or pre-post program assessment.

Influencing factors and opportunities for curricular change

By utilizing the outcomes from this dissertation research, researchers and program developers may help teachers increase their self-efficacy for outdoor teaching. With the conceptual model as a guide, curriculum development specialists and future researchers can create effective training and education materials as well as appropriate intervention studies. The conceptual model (Figure 2.1) represents a holistic understanding of teachers’ perception of the facilitators, barriers, and motivations for incorporating outdoor teaching into their classrooms. Teacher participants sometimes described themselves as pioneers in outdoor
teaching, so impacting the knowledge and skills to bolster confidence would increase self-efficacy. Suggested training and curricular topics are summarized in Table 5.1 and includes the target population; Head Start administration, Head Start teachers and teacher assistants, and pre-service teachers still attending early childhood education programs.

**Table 5.1. Summary of ideas for future training and curricular topics**

<table>
<thead>
<tr>
<th>Target Population</th>
<th>General Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Administration</td>
<td>Introducing the conceptual model</td>
</tr>
<tr>
<td></td>
<td>Importance of causal conditions</td>
</tr>
<tr>
<td></td>
<td>Impact of intervening conditions</td>
</tr>
<tr>
<td></td>
<td>Consequences of the phenomenon</td>
</tr>
<tr>
<td></td>
<td>Administering, scoring, and making valid conclusion from the STO survey</td>
</tr>
<tr>
<td>Teachers and Teacher Assistants</td>
<td>Introducing conceptual model</td>
</tr>
<tr>
<td></td>
<td>Troubleshooting causal conditions</td>
</tr>
<tr>
<td></td>
<td>Maximizing/alleviating intervening conditions</td>
</tr>
<tr>
<td></td>
<td>Exploiting strategies in outdoor teaching</td>
</tr>
<tr>
<td></td>
<td>Consequences of the phenomenon</td>
</tr>
<tr>
<td></td>
<td>Strategy Highlight: Incorporating the Early Learning Outcomes Framework with food and nutrition activities</td>
</tr>
<tr>
<td>Pre-service Teachers Attending Early Childhood Education Programs</td>
<td>Introducing conceptual model and consequences of the phenomenon</td>
</tr>
<tr>
<td></td>
<td>Importance and troubleshooting causal conditions</td>
</tr>
<tr>
<td></td>
<td>Maximizing/alleviating intervening conditions</td>
</tr>
<tr>
<td></td>
<td>Exploiting strategies in outdoor teaching</td>
</tr>
<tr>
<td></td>
<td>Strategy Highlight: Incorporating the Early Learning Outcomes Framework with food and nutrition activities</td>
</tr>
<tr>
<td></td>
<td>Full course on teaching methods for outdoor learning</td>
</tr>
</tbody>
</table>
The STO survey: A valid and reliable measurement tool

This 18-item survey measures three components of self-efficacy for preschool teachers; preparing and getting ready for outdoor teaching, comfort in teaching in the alternative outdoor setting, and nature orientation and gardening. This survey can be used by Head Start administrators to assess baseline levels of self-efficacy of their teachers and teacher assistants. Having a valid and reliable measurement tool will allow administrators to have baseline markers so they can make informed decisions and use in-service training opportunities more efficiently to impact their teacher population needs. With good indicators, administrators can strategically focus on knowledge and skills that will overcome the barriers uncovered by the survey, impacting the sustainable use of outdoor teaching. The STO may also be used as a pre-post survey to evaluate the effectiveness of in-service training sessions and to alter current training where needed. Beyond in-service training, the STO could also be used to gauge continuing education session effectiveness and early childhood education courses impacts on self-efficacy for teaching outdoors. Hopefully with feedback from the survey, teachers will increase their self-efficacy and increase the sustainable use of outdoor teaching. Lastly, the STO could be used as a pre-post study intervention assessment tool. Data and analysis from a strong assessment tool could impact our understanding of teacher self-efficacy and ways to impact it.
REFERENCES


113. Oxenham E, King AD. School gardens as a strategy for increasing fruit and vegetable consumption. Journal of Child Nutrition and Management. 2010;34(1).


Appendix A: Study 1 and 2 Participant Recruiting Protocol

Outline to be discussed with teachers during recruitment

- Purpose of the study: To understand teacher perceptions of using outdoor learning centers (or gardens) as part of their regular teaching activities.
- Questions to be asked in the interview: How teachers define an outdoor learning center? What teachers need to start an outdoor learning center? What teachers perceive as barriers to starting or using an outdoor learning center? What are the advantages and limitation of using an outdoor learning center? How teachers feel about using an outdoor learning center?
- About the interview
  - Duration: 45 to 60 minutes
  - Compensation: $10 gift card to purchase supplies for study participants’ classroom
- Places, date, and time for the interview
Appendix B: Study 1 and 2 Recruiting Email and Script with Screening Tool

**Recruiting Via Email**

Good Morning! (or Good Afternoon!) I hope this email finds you well. My name is Jennifer McMillen and I am a graduate student majoring in Nutrition at NCSU. I am conducting research in the area of childhood obesity prevention and I am looking for volunteers who would like to help with my research.

The purpose of the study is to learn about teacher perceptions of using outdoor learning centers (or gardens) as part of their regular teaching activities. The research is going to include one-on-one telephone interviews. In the interviews, we will be asking questions about the following topics. How teachers define an outdoor learning center? What teachers need to start an outdoor learning center? What teachers perceive as barriers to starting or using an outdoor learning center? What are the advantages and limitation of using an outdoor learning center? How teachers feel about using an outdoor learning center?

I’m looking for **teachers or teacher’s assistants who are over the age of 18, who work with 3-5 year-old children, and who work in Head Start or other programs focusing on children of low income families.**

You will receive a $10 gift card to purchase supplies for your classroom after completing the 45-60 minute interview. If you think you meet the criteria and are interested in helping us with this study, please let me know via email or telephone. Thank you for your time and consideration. Have a nice day!

Jennifer McMillen
jdmcmil2@ncsu.edu
919-889-6690

**Face-To-Face Recruitment (example: staff meeting)**

Hello, it is very nice to meet you! My name is [research member’s name]. (Brief, friendly introduction. E.g., I am a graduate student at NCSU majoring in Nutrition). I’m looking volunteers who might be interested in participating in our study. The purpose of the study is for us to learn about teacher perceptions of using outdoor learning centers (or gardens) as part of their regular teaching activities. The study will be based on 45 to 60 minutes one-on-one interview. Teachers or teacher’s assistants who completes the study will receive a $10 gift card to purchase supplies for your classroom. In the interviews, we will be asking questions about the following topics. How teachers define an outdoor learning center? What teachers need to start an outdoor learning center? What teachers
perceive as barriers to starting or using an outdoor learning center? What are the advantages and limitation of using an outdoor learning center? How teachers feel about using an outdoor learning center? Would you be interesting to hear more about this study?

- (Yes) Great! (Go to *)
- (No) OK! Do you know any teachers or assistant teachers who might be interested in participating in the study?

* Unfortunately, not all staff will qualify for this study at this time. May I ask you a few questions to see if you qualify?

- (Yes) Great! (Go to Questions)
- (No) OK! Do you know any teachers or assistant teachers who might be interested in participating in the study?

**Questions**

1. Are you over the age of 18?
2. What is your job title?
3. What is the age of the children you currently work with?
4. Where do you work (place of employment)?

**When he/she meets the criteria:** Thank you! You qualify for this study. We expect the interview to last 45 to 60 minutes. When would be the best time to schedule your phone interview? Can I have your name, phone number, and/or e-mail address so that I can remind you about the interview beforehand?

**When he/she doesn’t meet the criteria:** Unfortunately, your group has already filled up. Can I contact you when we have another study in the future?

- (Yes) Thank you! Can I have your name, phone number, and/or e-mail address? Thank you so much for your time! Have a nice day!
- (No) OK. Thank you for your time. Do you know any teachers who might be interested in participating in this study?
Appendix C: Study 1 and 2 Screening Tool

1. What is your job title? ____________________________________________

[If the perspective participant is not a teacher or teacher’s assistant: I’m sorry. There must have been a misunderstanding. We are only interviewing teachers and teacher’s assistants.]

2. Where do you work (location of employment)?

Name of Preschool: ________________________________

Name of Head Start Company: __________________________

[If the perspective participant does not work in a Head Start preschool (or in another preschool which serves children from low income families): I’m sorry. There must have been a misunderstanding. We are only interviewing teachers and teacher’s assistants who work in Head Start centers right now.]

City: ______________________________________________

State: _____________________________________________

3. What is your age? ____________________________________________

[If the perspective participant is under 18 years of age: I’m sorry. There must have been a misunderstanding. We are only interviewing people 18 years of age and older.]
Title of Study: Assessing preschool teachers’ facilitators, barriers, and motivators for using outdoor learning centers

Principal Investigator: Jennifer McMillen
Faculty Sponsor: Suzie Goodell

What are some general things you should know about research studies?
You are being asked to take part in a research study. Your participation in this study is voluntary. You have the right to be a part of this study, to choose not to participate or to stop participating at any time without penalty. Your choices to participate in this study, or not, will not affect your relationship with your work site or NCSU. The purpose of research studies is to gain a better understanding of a certain topic or issue. You are not guaranteed any personal benefits from being in a study. Research studies also may pose risks to those that participate. In this consent form you will find specific details about the research in which you are being asked to participate. If you do not understand something in this form it is your right to ask the researcher for clarification or more information. A copy of this consent form will be provided to you. If at any time you have questions about your participation, do not hesitate to contact the researcher(s) named above.

What is the purpose of this study?
We hope to understand teacher perceptions of using outdoor learning centers (or gardens) as part of their regular teaching activities.

What will happen if you take part in the study?
If you agree to participate in this study, you will be interviewed and we will be asking questions about the following topics. How teachers define an outdoor learning center? What teachers need to start an outdoor learning center? What teachers perceive as barriers to starting or using an outdoor learning center? What are the advantages and limitation of using an outdoor learning center? How teachers feel about using an outdoor learning center? We anticipate the interview will last 45 minutes to 1 hour. We will take notes and record the interview session. The interview will be conducted via telephone. You will also be asked to complete a short demographic survey.

Risks
We will ask you questions about your perceptions about using outdoor learning centers. This process may make you uncomfortable by sharing personal experiences and feelings with an interviewer. Your specific responses will not be shared with your respective employers or other government agencies nor will these parties be informed of your participation or non-participation in the study. You do not have to answer any questions that you do not wish to answer. If you want to end the interview, you can do so at any time, without penalty.

Benefits
You may not receive direct benefits from participating in this project. However, we expect that the project findings will be used to develop educational and teacher training materials that will help teachers start, use, and maintain outdoor learning centers in preschool settings within programs which target children from low income families.

Confidentiality
The information in the study records will be kept confidential. Data will be stored electronically on the departmental server, the Principal Investigator’s research computer, and an external hard drive. All computers and servers are password protected and available only to authorized personnel. Hard copies of interview transcripts will be kept in locked file cabinets in a lock room in Schaub Food Science Building at NCSU. Within ten years after the conclusion of the study, the audio recordings of the interview will be erased and demographic questionnaires will be destroyed. We will talk about what we learned during the interview with other researchers. This could happen in research meetings and/or in written reports. The demographic data will only be used to describe the characteristics of the study participants in oral or written reports. No reference will be made in oral or written reports which could link you to the study.

Compensation
For participating in this study, you will receive a $10 gift card for a local merchant to purchase supplies for your classroom. If you complete the interview but withdraw before the interview transcription review is done, you will get to keep the compensation. If you withdraw from the study prior to or during the interview session, you will not receive any compensation.

What if you have questions about this study?
If you have questions at any time about the study or the procedures, you may contact the principle investigator, Jennifer McMillen, at 206 Schaub Food Science Building, NC State University or jdmcmill2@ncsu.edu or 919-889-6690.

What if you have questions about your rights as a research participant?
If you feel you have not been treated according to the descriptions in this form, or your rights as a participant in research have been violated during the course of this project, you may contact Deb Paxton, Regulatory Compliance Administrator, Box 7514, NCSU Campus (919/515-4514).

Consent To Participate

“I have read and understand the above information. I have received a copy of this form. I agree to participate in this study with the understanding that I may choose not to participate or to stop participating at any time without penalty or loss of benefits to which I am otherwise entitled.”

Subject's signature_______________________________________Date

__________________________________________________________

Investigator's signature____________________________________Date

__________________________________________________________

Appendix E: Study 1 and 2 Interview Guide

OPENING

Hello, [insert teacher name]. I know we’ve been emailing, but I want to take a chance to introduce myself. My name is ________________ and I am a student at North Carolina State University.

I’d like to tell you a little bit about this study. Do you mind pulling up the e-mail I sent you with a copy of the consent form? Did you have a chance to look over the consent form?

[If the interviewee does not have the e-mail, e-mail them the consent form again.]

Before we get started, I want to go through each section of the consent form and explain what it means. It’s long, so bear with me.

At the end, I will ask you to give verbal consent to participate in this interview. Is it alright if I begin?

A. General Information about research studies:
You are being asked to take part in a research study. Your participation in this study is voluntary. You have the right to be a part of this study, to choose not to participate or to stop participating at any time without penalty. Your choices to participate in this study, or not, will not affect your relationship with your work site or NCSU. The purpose of research studies is to gain a better understanding of a certain topic or issue. You are not guaranteed any personal benefits from being in a study. Research studies also may pose risks to those that participate. In this consent form you will find specific details about the research in which you are being asked to participate. If you do not understand something in this form it is your right to ask the researcher for clarification or more information. A copy of this consent form will be provided to you. If at any time you have questions about your participation, do not hesitate to contact Jennifer McMillen.

Do have any questions so far?

B. **Purpose of this study:**
   We hope to understand teacher perceptions of using outdoor learning centers (or gardens) as part of their regular teaching activities.

C. **What will happen if you take part in the study?**
   If you agree to participate in this study, you will be asked questions about starting, using and maintaining outdoor learning centers in your preschool classroom or center. Topics will include how teachers define an outdoor learning center? What teachers need to start an outdoor learning center? What teachers perceive as barriers to starting or using an outdoor learning center? What are the advantages and limitation of using an outdoor learning center? How teachers feel about using an outdoor learning center? We anticipate the interview will last 45 minutes to 1 hour. I encourage you to find a quiet, secluded place to sit during your participation in the interview. I will be taking notes throughout the interview and will also audio-record the session. The interview will be conducted via telephone. You will be asked to complete a demographic survey.

[Audio recorder]: With that being said, I would like to use an audio recorder during the discussion so that I can refer back to it when I write my research report. Is it okay if I record this interview session?

(NO) OK. I’m afraid we have to audio record the interview. Because of that, you will not be able to participate in the interview today. Thank you for your time.

(YES) Thank you!
It’s on. We are now being recorded.

The next section discusses your **Risks**:
We will ask you questions about your perceptions about using outdoor learning centers. This process may make you uncomfortable by sharing personal experiences and feelings with an interviewer. Your specific responses will not be shared with your respective employers or other government agencies nor will these parties be informed of your participation or non-participation in the study. You do not have to answer any questions that you do not wish to answer. If you want to end the interview, you can do so at anytime, without penalty.

Do have any questions so far?

The next section is about your **Benefits**:
You may not receive direct benefits from participating in this project. However, we expect that the project findings will be used to develop educational and teacher training materials that will help teachers start, use, and maintain outdoor learning centers in preschool settings within programs which target children from low income families.

Okay, we are almost done, just a few more sections! I want you to know about how we plan to keep the information you tell us **Confidential**:
All data will be secured in Schaub food Science Building on the campus of NCSU in locked files and/or password protected computers. The researchers will talk about what we learned during the interview with other researchers in research meetings and in written reports. The demographic data will only be used to describe the characteristics of the study participants in oral or written reports. **No reference will be made in oral or written reports which could link you to the study.**

Additionally, I would like to ask you to provide a pseudonym for yourself. That is, I would like you to make up a name for me to call you. **What name would you like me to call you?**

Ok, [INSERT PSEUDONYM]. We only have a few paragraphs left.

**Now, in terms of Compensation:**
For participating in this study you will receive a $10.00 gift card upon completion of the
What questions do you have so far?

Now for the last part, let’s talk about your Consent To Participate:
If you agree to participate, would you please repeat after me while I read the statement at the bottom of the consent form? This will be considered you giving your consent to participate today.
Participant reads:
“I have read and understand the above information. I have received a copy of this form. I give verbal consent to participate in this study with the understanding that I may choose not to participate or to stop participating at any time without penalty or loss of benefits to which I am otherwise entitled.”

I will now write your name and the date on my copy of the consent form, indicating that you have given your consent to participate. I am also signing my name and dating it.

[Indicate on your copy of the consent form that they agreed by writing their name in the participant line and signing your name on the investigator line and dating the document.]

Last, we would like to send you a copy of the final consent form with my signature and date. Would you prefer us to send you an electronic copy by email or a hard copy by mail?

If the participate chooses to receive a hard copy, request their preferred mailing address.

(Transition): Okay! Let’s go ahead and get started with a few demographic questions.

DEMOGRAPHIC INFO:

You’ve told me a bit about yourself in our email conversation, but I’d like to have it on the audio recorder, so I’m going to ask you a few questions again. Please remember that you do not have to answer any questions that you do not wish to answer.

4. What is your job title? ________________________________
5. Where do you work (location of employment)?

Name of Preschool: ________________________________

Name of Head Start Company: ______________________

[If the interviewee does not work in a Head Start preschool (or in another preschool which serves children from low income families): I'm sorry. There must have been a misunderstanding. We are only interviewing teachers and teacher's assistants who work in Head Start centers right now.]

City: ___________________________________________

State: ___________________________________________

6. How long have you been working with preschool children? _______________

7. What is your age? ___________________________________________

[If the teacher is under 18 years of age: I'm sorry. There must have been a misunderstanding. We are only allowed to speak with people 18 years of age and older.]

8. What is your gender?   Female       Male

9. What is your highest level of formal education?
   - Have not completed high school
   - Received high school diploma or GED
   - Some college or technical school
   - 4-year college, university degree or advanced degree
   - If you have any college training, what did you study or what was your major?
     ___________________________________________

10. What is your race/ethnicity? _______________________________

(Transition): Thank you for your responses! Let’s go ahead and get started with the interview questions.

Interview:

I am interested in hearing your opinions and insights about using an outdoor learning center as part of the preschool classroom, so please feel free to tell me stories and give me a lot of examples. When you tell stories, please do not refer to the people in your stories by their real names. You can make up a name for each person or refer to them by their relationship to you (like
your boss or your co-teacher).

Remember, this is all about what you think and about your perceptions. It is okay if you are unsure or do not know the answer to some questions. We are interested in your interpretation of the question and your perspective on the topic. At the end of our talk, I’ll recap our conversation and give you a chance to add to or correct anything that is said during our conversation. Again, I’ll be taking notes throughout the discussion, so I may pause from time to time to finish writing.

Since we are on the phone please be sure to stop me and ask me to repeat anything you do not hear clearly.

What questions do you have about this?

(Transition): Great! Now let’s get started with the interview questions.
**Define:** To start, let’s talk about how you define an outdoor learning center in a preschool setting.

How would you define an outdoor learning center?

<table>
<thead>
<tr>
<th>REQUIRED PROBES (if not already addressed)</th>
<th>GENERAL PROBES</th>
</tr>
</thead>
<tbody>
<tr>
<td>What does an outdoor learning center look like?</td>
<td><em>Can you explain more about this?</em></td>
</tr>
<tr>
<td>How can an outdoor learning center be used in a preschool?</td>
<td><em>Can you give an example?</em></td>
</tr>
<tr>
<td>Where are outdoor learning centers located in preschools?</td>
<td><em>Can you think of anything else?</em></td>
</tr>
</tbody>
</table>
Many teachers highlight school gardens when defining an outdoor learning center, how might your definition of a school garden differ, if at all, from that of an outdoor learning center?

<table>
<thead>
<tr>
<th>REQUIRED PROBES (if not already addressed)</th>
<th>GENERAL PROBES</th>
</tr>
</thead>
<tbody>
<tr>
<td>What does a preschool garden look like?</td>
<td><em>Can you explain more about this?</em></td>
</tr>
<tr>
<td>How is a preschool garden used?</td>
<td><em>Can you give an example?</em></td>
</tr>
<tr>
<td>What could grow in a preschool garden?</td>
<td><em>Can you think of anything else?</em></td>
</tr>
</tbody>
</table>

**REVIEW PROBES**

| Did I get that right?                   |
| Did I leave anything out?              |
| Do you have anything else to add?      |
**What do you think defines a **successful **outdoor learning center?**

<table>
<thead>
<tr>
<th>REQUIRED PROBES (if not already addressed)</th>
<th>GENERAL PROBES</th>
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</thead>
<tbody>
<tr>
<td>Who is involved in a successful OLC?</td>
<td>Can you explain more about this?</td>
</tr>
<tr>
<td>What materials are available in order for an OLC to be successful?</td>
<td>Can you give an example?</td>
</tr>
<tr>
<td>What structures are in place in order for an OLC to be successful?</td>
<td>Can you think of anything else?</td>
</tr>
<tr>
<td>Who benefits from a successful OLC?</td>
<td></td>
</tr>
</tbody>
</table>

### REVIEW PROBES

- Did I get that right?
- Did I leave anything out?
- Do you have anything else to add?
Throughout the remainder of the interview, I will be asking you many different questions about outdoor learning centers, since this is a fairly new term which is still being defined I would like for you to answer the questions with a typical school garden in mind. Does that make sense? If yes, great let’s continue.

What questions do you have for me?

**Facilitators:** Now, let’s talk about what could help you use an outdoor learning center as a part of your classroom. I’ll ask you questions about starting as well as using and maintaining the centers.

If you were going to have an outdoor learning center at your school, what would help you **start** one?

### REQUIRED PROBES (if not already addressed)  |  GENERAL PROBES
--- | ---
Can you think of any knowledge that could help **START** an OLC? | *Can you explain more about this?*
Can you think of any people who could help you **START** an OLC? | *Can you give an example?*
Can you think of any material items that could help you **START** an OLC? | *Can you think of anything else?*
What would help you **use and maintain** an outdoor learning center as part of your classroom?

<table>
<thead>
<tr>
<th>REQUIRED PROBES (if not already addressed)</th>
<th>GENERAL PROBES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Can you think of any knowledge that could help you USE or MAINTAIN an OLC?</td>
<td><em>Can you explain more about this?</em></td>
</tr>
<tr>
<td>Can you think of any people who could help you USE or MAINTAIN an OLC?</td>
<td><em>Can you give an example?</em></td>
</tr>
<tr>
<td>Can you think of any material items that could help USE or MAINTAIN an OLC?</td>
<td><em>Can you think of anything else?</em></td>
</tr>
<tr>
<td>What is the difference between using and maintaining in an OLC?</td>
<td></td>
</tr>
</tbody>
</table>

**REVIEW PROBES**

- *Did I get that right?*
- *Did I leave anything out?*
- *Do you have anything else to add?*
What training would help you incorporate an outdoor learning center as part of your classroom?

<table>
<thead>
<tr>
<th>REQUIRED PROBES (if not already addressed)</th>
<th>GENERAL PROBES</th>
</tr>
</thead>
<tbody>
<tr>
<td>What topics would you like covered in a training session?</td>
<td><em>Can you explain more about this?</em></td>
</tr>
<tr>
<td>What would your ideal training “look like”?</td>
<td><em>Can you give an example?</em></td>
</tr>
<tr>
<td>Are you aware of any training available?</td>
<td><em>Can you think of anything else?</em></td>
</tr>
<tr>
<td>Where did you get the knowledge you already have about using an outdoor learning center?</td>
<td></td>
</tr>
</tbody>
</table>

**REVIEW PROBES**

<table>
<thead>
<tr>
<th>Did I get that right?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Did I leave anything out?</td>
</tr>
<tr>
<td>Do you have anything else to add?</td>
</tr>
</tbody>
</table>
**Barriers**- Now let’s talk about what could get in the way when you try to incorporate an outdoor learning center as part of your classroom. I will ask you about starting a center as well as about using and maintaining the centers.

Do you know of any policies or requirements for using an outdoor learning center as a part of your classroom? If yes, can you describe them for me?

<table>
<thead>
<tr>
<th>REQUIRED PROBES (if not already addressed)</th>
<th>GENERAL PROBES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Does Head Start have any requirements or policies regarding outdoor learning centers?</td>
<td><em>Can you explain more about this?</em></td>
</tr>
<tr>
<td>Does your center have any requirements or policies apart from Head Start policies related to outdoor learning centers?</td>
<td><em>Can you give an example?</em></td>
</tr>
<tr>
<td></td>
<td><em>Can you think of anything else?</em></td>
</tr>
</tbody>
</table>

**REVIEW PROBES**

*Did I get that right?*

*Did I leave anything out?*

*Do you have anything else to add?*
If you were going to have an outdoor learning center at your school, what could get in the way when trying to **start** an outdoor learning center as part of your classroom?

<table>
<thead>
<tr>
<th>REQUIRED PROBES (if not already addressed)</th>
<th>GENERAL PROBES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Can you think of any people who would get in the way of STARTING an OLC?</td>
<td><em>Can you explain more about this?</em></td>
</tr>
<tr>
<td>Can you think of any events or factors that would get in the way of STARTING an OLC?</td>
<td><em>Can you give an example?</em></td>
</tr>
</tbody>
</table>

*Can you think of anything else?*
What could get in the way when trying to **use and maintain** an outdoor learning center as part of your classroom?

<table>
<thead>
<tr>
<th><strong>REQUIRED PROBES (if not already addressed)</strong></th>
<th><strong>GENERAL PROBES</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Can you think of any people who would get in the way of you USING or MAINTAINING an OLC?</td>
<td><em>Can you explain more about this?</em></td>
</tr>
<tr>
<td>Can you think of any events or factors that would get in the way of you USING or MAINTAINING an OLC?</td>
<td><em>Can you give an example?</em></td>
</tr>
<tr>
<td></td>
<td><em>Can you think of anything else?</em></td>
</tr>
</tbody>
</table>

**REVIEW PROBES**

- Did I get that right?
- Did I leave anything out?
- Do you have anything else to add?
Some preschools use their outdoor learning centers for only part of the year, when during the year could you use an outdoor learning center?

<table>
<thead>
<tr>
<th>REQUIRED PROBES (if not already addressed)</th>
<th>GENERAL PROBES</th>
</tr>
</thead>
<tbody>
<tr>
<td>How often would you <strong>like to</strong> use an outdoor learning center?</td>
<td><em>Can you explain more about this?</em></td>
</tr>
<tr>
<td>How often <strong>do you</strong> use an outdoor learning center?</td>
<td><em>Can you give an example?</em></td>
</tr>
<tr>
<td>When might you <strong>not</strong> use an outdoor learning center?</td>
<td><em>Can you think of anything else?</em></td>
</tr>
</tbody>
</table>

**REVIEW PROBES**

- Did I get that right?
- Did I leave anything out?
- Do you have anything else to add?
Motivators: Now let’s switch gears a little and talk about what makes you want to use (or not use) an outdoor learning center as part of your classroom. Ready?

What are some reasons that outdoor learning centers should and should NOT be used as a part of preschool classrooms? [Be sure to answer both parts of the question]

<table>
<thead>
<tr>
<th>REQUIRED PROBES (if not already addressed)</th>
<th>GENERAL PROBES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reasons that OLC should be used?</td>
<td>Can you explain more about this?</td>
</tr>
<tr>
<td>Reasons that OLC should NOT be used?</td>
<td>Can you give an example?</td>
</tr>
</tbody>
</table>

Can you think of anything else?

---

REVIEW PROBES

- Did I get that right?
- Did I leave anything out?
- Do you have anything else to add?
Teachers use outdoor learning centers to teach a variety of different topics, what subjects or lessons could you teach using an outdoor learning center?

<table>
<thead>
<tr>
<th>REQUIRED PROBES (if not already addressed)</th>
<th>GENERAL PROBES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Can you share a specific (formal) lesson with me that could be used in an OLC?</td>
<td>Can you explain more about this?</td>
</tr>
<tr>
<td>How could you use an OLC for informal teaching?</td>
<td>Can you give an example?</td>
</tr>
<tr>
<td>How do you feel about taking children outside when you are teaching?</td>
<td>Can you think of anything else?</td>
</tr>
<tr>
<td>What student characteristics or behaviors are encouraged when you are teaching in an outdoor learning center?</td>
<td></td>
</tr>
</tbody>
</table>

**REVIEW PROBES**

- Did I get that right?
- Did I leave anything out?
- Do you have anything else to add?
What experiences have you had (or heard about from others) when trying to **start** an outdoor learning center in the preschool setting?

<table>
<thead>
<tr>
<th>REQUIRED PROBES (if not already addressed)</th>
<th>GENERAL PROBES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Can you think of any positive experiences when people tried to start an OLC?</td>
<td><em>Can you explain more about this?</em></td>
</tr>
<tr>
<td>Can you think of any negative experiences when people tried to start an OLC?</td>
<td><em>Can you give an example?</em></td>
</tr>
<tr>
<td>What about experiences starting an OLC at your preschool?</td>
<td><em>Can you think of anything else?</em></td>
</tr>
<tr>
<td>What about experiences starting an OLC at another preschool?</td>
<td></td>
</tr>
<tr>
<td>How have these experiences affected your want to <strong>start</strong> an OLC at your preschool?</td>
<td></td>
</tr>
</tbody>
</table>
What experiences have you had (or heard about from others) in using and maintaining an outdoor learning center in the preschool setting?

<table>
<thead>
<tr>
<th>REQUIRED PROBES</th>
<th>GENERAL PROBES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Can you think of any positive experiences of people USING or MAINTAINING an OLC?</td>
<td>Can you explain more about this?</td>
</tr>
<tr>
<td>Can you think of any negative experiences of people USING or MAINTAINING an OLC?</td>
<td>Can you give an example?</td>
</tr>
<tr>
<td>What about USING or MAINTAINING an OLC at your preschool?</td>
<td>Can you think of anything else?</td>
</tr>
<tr>
<td>What about USING or MAINTAINING an OLC at another preschool?</td>
<td></td>
</tr>
<tr>
<td>How have these experiences affected your want to USE an OLC as part of your classroom?</td>
<td></td>
</tr>
</tbody>
</table>

**REVIEW PROBES**

- Did I get that right?
- Did I leave anything out?
- Do you have anything else to add?
Now, I’m going to take a few minutes to review what you’ve said. After each question, I’m going to ask you if I got that right, if I left anything out and if there is anything else you’d like to add. This is a very important step in the process to make sure we have the right information. Feel free to stop me at any time and add anything that I may have missed.
CLOSING:

Now that the interview is over, I would like to talk to you about sending information about our study to other Head Start teachers you might know. Basically, you would be sending them information about participating in the interview you just completed yourself. You could also just provide us with names, email addresses and/or phone numbers of people you think might be interested and we can contact them directly. Either of these options will help us with our recruitment. You do not have to do this, if you do not want to. Would you be interested in helping us identify additional participants?

(YES) Okay. Is it better for me to send you an email for you to forward to them or a hard copy? Again, if you have questions, you can contact Jennifer McMillen or me at any time.

(NO) Alright! Not a problem!

I learned lots of things from you today, Thank you! We ask you to not share any of the information we talked about today with your co-workers, especially if they may be participating in this study too. Thank you again for your participation! You have been generous with your knowledge and time! Have a great rest of the day!
Appendix F: Study 1 and 2 Demographic Survey Questions

Demographic Survey

Thank you for agreeing to talk today. Before we get started, I would like to ask you a few questions about yourself. You’ve told me a bit in the e-mail, but I’d like to have it on the audio recorder. Please remember that you do not have to answer any questions that you do not wish to answer.

11. What is your job title? ________________________________

   [If the interviewee is not a teacher or teacher’s assistant: I’m sorry. There must have been a misunderstanding. We are only interviewing teachers and teacher’s assistants.]

12. Where do you work (location of employment)?

   Name of Preschool: ________________________________

   Name of Head Start Company: ________________________

   [If the interviewee does not work in a Head Start preschool (or in another preschool which serves children from low income families): I’m sorry. There must have been a misunderstanding. We are only interviewing teachers and teacher’s assistants who work in Head Start centers right now.]

   City: ________________________________

   State: ________________________________

13. How long have you been working with preschool children?

14. What is your age? ________________________________

   [If the teacher is under 18 years of age: I’m sorry. There must have been a misunderstanding. We are only speaking with people 18 years of age and older.]

15. What is your gender?
   Female
   Male

16. What is your highest level of formal education?
   Have not completed high school
   Received high school diploma or GED
   Some college or technical school
   4-year college, university degree or advanced degree
   If you have any college training, what did you study or what was your major? ______

17. What is your race/ethnicity? ________________________________
Appendix G: Study 1 and 2 Initial Analysis

Initial Analysis

Interview Number:

Analyzer name/research position:

Overall Impression of the interview and the interviewee:

Define:
1. How would you define an outdoor learning center?

2. How might your definition of a school garden differ, if at all, from that of an outdoor learning center?

3. What do you think defines a successful outdoor learning center?

Facilitators:
4. If you were going to have an outdoor learning center at your school, what would help you start one?

5. What would help you use and maintain an outdoor learning center as part of your classroom?

6. What training would help you incorporate an outdoor learning center as part of your classroom?

Barriers:
7. Do you know of any policies or requirements for using an outdoor learning center as a part of your classroom? If yes, can you describe them for me?

8. If you were going to have an outdoor learning center at your school, what could get in the way when trying to start an outdoor learning center as part of your classroom?

9. What could get in the way when trying to use and maintain an outdoor learning center as part of your classroom?

10. Some preschools use their outdoor learning centers for only part of the year, when during the year could you use an outdoor learning center?

Motivators:

11. What are some reasons that outdoor learning centers should and should NOT be used as a part of preschool classrooms? [Be sure to answer both parts of the question]

12. Teachers use outdoor learning centers to teach a variety of different topics, what subjects or lessons could you teach using an outdoor learning center?

13. What experiences have you had (or heard about from others) when trying to start an outdoor learning center in the preschool setting?

14. What experiences have you had (or heard about from others) in using and maintaining an outdoor learning center in the preschool setting?
Appendix H: Study 1 and 2 Transcription Protocol for transcriber only

Setting up the Audio File:
1. Put on headphones
2. Place CD in CD drive
3. Open up file on Windows Media Player (or Mac alternative)
4. Right click >> Enhancements >> Play Speed Settings
   a. Or click the “screen button” on the bottom left hand corner of the window>>Enhancements>>Play Speed Settings
5. Slide the bar to the left to slow down the audio file. Somewhere between 0.5 and 0.7 is ideal. Make sure you can understand both the interviewer and the interviewee

Transcribing Technique:
1. Use the transcription template. Make sure you’ve formatted the transcript exactly as the template says, including page numbers, etc
2. Play the file at slower speed (between 0.5 and 0.7)
3. Start typing while the file is playing. **Do not rewind if you did not understand what was said**
4. If you do need to pause to catch up, press Fn and the pause button on your keyboard (the shorthand commands may not work on your laptop, you will have to find out on your own how this works for your computer if the suggested method does not work)
5. Start typing again
6. Once you are done, listen to the file again at full speed and fill in parts you missed. You will need to pause to make sure you get everything
7. Re-read the transcript to look for typos while listening to the recording one last time
8. Save the transcript on the research drive and research computer
9. Complete the initial analysis form
10. Return the CD to the participants research file
11. Copy the transcript and initial analysis files to PI’s research computer and research external hard drive.
12. Place a hard copy of the transcript and initial analysis in the participants research file

Common Questions about Transcripts:
**Q1: What do I do when the interviewer says “mmhmm” multiple times while the subject is talking?**
A1: Do not transcribe “mmhmm”s when they interrupt the flow of the subjects’ answer. Also, if the “mmhmm” is said before the interview asks an additional question, you should not transcribe it. The same goes for any other generic verbal indication that the interviewer is listening.

**Q2: What do I do when the interviewer or subject uses a “stalling phrase”?**
A2: Do not transcribe stalling phrases when they interrupt the flow of the subjects’ answer. Also, if the stalling phrase is said before the interview asks a question or before the interviewee answers the question, you should not transcribe it.

123 (example with stalling phrases included): When I was a child, my favorite food was – um – pizza, and – uh – it was only my favorite food – um – because – like - my friends liked to eat it – you know – all the time.

Without the stalling phrases the person analyzing the data can more easily read the interviewer’s questions or interviewee’s statement.

123 (example without stalling phrases): When I was a child, my favorite food was pizza, and it was only my favorite food because my friends liked to eat it all the time.

Q3: What do I do when the interviewer interrupts the subject or the subject interrupts the interviewer?
A3: You denote an interruption by a dash mark “-“.

I: So what you’re saying is that you went –
123: I went to the beach.

I: - to the beach on Saturday?
The interrupting statement is not denoted by a dash mark, only the interrupted statement.

Q4: What happens if I cannot understand what is said?
A4: Denote this in parentheses.

123: My grandmother taught me to cook when I was 7 years old. Or maybe it was when… (inaudible). Anyway, I was really young when I first learned how to cook.

Only use this if you’ve listened to the file 5 or 6 times and can still not understand what was said.

Q5: How do I transcribe laughter?
A5: You can denote this as (Laughter) when it is real laughter and (Laughs) when it is polite laughter. This helps the analyzer know the context better than if the transcript merely said “Haha.” You may also use (Nervous laughter) in some situations where you can tell the subject is laughing to divert the interviewer’s attention from a politically incorrect statement.

Q6: What if there is an action like a head nod that is not heard on the recorder?
A6: If you can tell from the audio file that an action occurred but is not an audible indication, denote this in parentheses. If you were the interviewer, you will be able to determine what action you need to insert in parentheses. For example, in the audio file, N is reviewing information with 123. Transcribed verbatim the conversation reads:

I: And you believe that the best way to prevent childhood obesity is educating the parents. Do you have anything else to add to that?
I: Okay. So then you said that your experience with Nutrition NUTS helped you …
You can tell from this statement that the subject had to give an indication of either “yes” or “no” for the interviewer to move to the next statement. You should denote this as:

I: And you believe that the best way to prevent childhood obesity is educating the parents. Do you have anything else to add to that?
123: (Nonverbal indication of yes)
N: Okay. So then you said that your experience with Nutrition NUTS helped you …
Appendix I: Study 1 and 2 Transcription Template

Outdoor Learning Centers, Head Start

Interview Number:
Date:
Length:

I:
###:
I:

-----------------------------------------------------------------------------------------------------------------------------END
Appendix J: Study 1 and 2 Coding Manual

Coding Manual for
Defining and Outdoor Learning Center (D)

Physical Space (P)

P Proximity
Definition: Any indication that the teacher defines an OLC by its closeness to the classroom or the school. Examples may indicate accessibility, convenience, or logistic connections.

SZ Size
Definition: Any description that the teacher defines an OLC by the actual or expected size of the OLC. Examples can describe a potted plant or a fully designed elaborate center. Teachers describe a variety of sizes.

SS Safe Space:
Definition: Any suggestion that the teacher defines an OLC as needing to meet the centers safety requirements. The teachers may indicate a variety of conditions that would make the space safe, but usually the requirements include the OLC being fenced. In this instance, the fence usually refers to keeping children within a perimeter that is not too small or not too large because children need to be within constant sight of the teacher. Other examples include a teacher indicating the possible presents of toxic plants or unwelcomed visitors (pests, vandalism, or thievery), safety of built structures, or being within close proximity of a busy road.

ST Structures
Definition: Any explanation that the teacher defines an OLC as including elements of the built environment including raised beds and shelters. Raised beds are boxes used to grow plants and provide structure to the landscape or centers for the children to learn. Shelters could include a place for students to seek refuge from the sun or rain as well as sheds that provide convenient access to stored equipment.

M More than just a garden
Definition: Any indication that the teacher defines an OLC as more than just a garden. This usually involves an indication that the OLC should include a variety of centers and foci. Examples include the teacher indicating that a garden is just one part or aspect within the OLC or that an OLC includes places for nature walks.
Learning (L)

I-O  Inside-out
Definition: Any indication that the teacher defines an OLC as being an extension of the inside classroom. Teachers may indicate that whatever can be taught and learned inside can be taught and learned in the OLC. Essentially there is no limit (all aspects of the curriculum can be addressed in the OLC) to what can be taught and learned in the OLC.

MC  Multi-curricular
Definition: Any description that the teacher defines an OLC as being a place to teach and learn a variety of subjects and topics (math, science, social studies, art). Teachers may even describe multiple layers of learning happening simultaneously. One example includes using project learning to teach a variety of tasks/skills at the same time in an OLC. Also included is the ability to stratify teaching to a variety of learning levels when teaching in an OLC.

OE  Observation and exploration
Definition: Any suggestion that the teacher defines an OLC as involving the students learning through visual observation, exploration, or discovery learning. Examples include plant observation, observation of changing seasons, and butterfly cycle observation. Ultimate emphasis goes to information and skills learned through the act of visual observation.

SE  Sensory experiences
Definition: Any explanation that the teacher defines an OLC as involving the students learning through a variety of sensory experiences that are available in that setting. This includes students doing hands on activities such as feeling a variety of leaf textures, smelling a variety of flowers and herbs, and tasting a variety of vegetables. Other examples include learning through auditory sensation such as music centers and exposure to the sounds of nature such as bird songs or the wind rustling through the trees.
Nature (N)

EN  Exposure to nature
Definition: Any indication that the teacher defines an OLC as a place for children to gain exposure to nature because children might not or do not otherwise get to experience nature or being outside. This includes generally perceived benefits of fresh air and children in her class live in apartments and do not have access to outdoor play spaces or the home neighborhood environment is perceived as too dangerous to allow the children to play freely outside.

G  Garden space including vegetables and fruits
Definition: Any description that the teacher defines an OLC as having a garden space. This space is a place to grow vegetables, herbs, and in some cases fruits. This space may act solely as the OLC or it may be only part of the OLC. Examples can include plants grown for measurement of growth activities or for harvest of produce.

PG  Plant growth
Definition: Any suggestion that the teacher defines the OLC as including plants for the purpose of teaching plant growth and the cycle of the plant. Examples could include growing plants in pots to teach the parts of the plant or growing plants in the ground to teach the stages of plant life cycle.
Coding Manual for
Barriers and Opportunities for training (BOT)

Program Structure (PS)

GS-SY Growing Season vs. School Year
Definition: Any indication that the teacher may be discouraged from using an OLC because they perceive the timing of the school year to be at odds with the growing season. This also includes indications about difficulty maintaining the OLC when school is out of session or on breaks. Examples include a teacher indicating the school year is nearly over before it is time to plant and children may not be able to see harvest which happens after the school year ends.

W Weather
Definition: Any description that the teacher may be discouraged from using an OLC because weather patterns may not allow them to go outside on any given day. Examples include cold weather days, rainy days, and extreme weather events such as blizzards, hurricanes, or tornados.

T Time
Definition: Any suggestion that the teacher may be discouraged from using an OLC because other program requirements do not leave time in the school day/week for other activities. Examples could include other foci of the required curriculum, teachers having to “squeeze it all in”, special events and field trips, or simply not having time to make new lesson plans for an OLC.

Definition: Any suggestion that the teacher may be discouraged from starting an OLC because it takes a lot of time to organize and do the physical work to create an OLC and other requirements already fill their day.

TCR Teacher to child ratio
Definition: Any explanation that the teacher may be discouraged from using an OLC because the teacher perceives the teacher to child ratio requirement makes it difficult to do activities in the OLC. Examples include explanations that there is not enough supervision to allow activities in the OLC or the explanation of the teacher to child ratio policy.
Physical Needs (PN)

SS  Safe Space
Definition: Any indication that the teacher may be discouraged from starting an OLC because she perceives it to be difficult to create an OLC that meets the center's safety requirements. The teachers may indicate a variety of conditions that would make the space safe, but usually the requirements include the OLC being fenced. In this instance, the fence usually refers to keeping children within a perimeter that is not too small or not too large. Large spaces may be an issue with children being in constant sight of the teacher. Other concerns include a teacher indicating the possible presence of toxic plants or unwelcomed visitors (pests, vandalism, or thievery), safety of built structures, or being within close proximity of a busy road.

PN  Basic plant needs
Definition: Any description that the teacher may be discouraged from starting or using an OLC because they need basic plant needs such as soil, water, or plant food (fertilizers). Examples of water needs could be actual access (water spigot) or it could be buckets or a hose to make water access more convenient.

PS  Plants and Seeds
Any suggestion that the teacher may be discouraged from starting an OLC because she needs (or do not have access to) plants or seeds to plant in the OLC.

SU  Supplies and tools
Definition: Any explanation that the teacher may be discouraged from starting or using an OLC because she needs supplies and tools to teach and work in the OLC. The explanation may infer that without the supplies the success or development of the garden would be hindered. Examples include adult maintenance tools such as shovels, rakes, hoes, and gloves and child size maintenance tools such as shovels, hand trowels, and gloves. Other supply examples include items to complete learning activities such as easels, clipboards, and observation equipment like magnifying glasses.
Support Needs (S)

F  Funds
Definition: Any indication that the teacher may be discouraged from starting an OLC because she needs funds to create or use an OLC. The amount of funds perceived to be needed varies as does the potential sources. Examples include fitting the OLC into the center’s yearly budget, obtaining grant funds, or identifying donation sources.

V  Volunteers
Definition: Any description that the teacher may be discouraged from starting or using an OLC because she needs volunteers to help with the additional work load. Examples may include community experts volunteering to do a guest lesson with the students, high school students volunteering to work with the children as well as parents volunteering as extra hands and eyes in the OLC.

FT  Feedback to teacher
Definition: Any explanation that the teacher may be discouraged (or encouraged) from starting or using an OLC because she needs the interest of other groups within the center. One example includes other teachers and staff not being interested enough to share the workload of planning and maintaining the OLC. Student examples include individual student feedback, child engagement, and whole class excitement or disinterest.

AS  Administration support
Definition: Any explanation that the teacher may be discouraged from starting an OLC because she needs approval or encouragement of the center’s administration. Examples of encouragement include monetary as the administration divvies up the funds appropriated to the granted organization or it could be moral support, or actual physical help.
Knowledge and Skills (KS)

PK  Plant knowledge
Definition: Any indication that the teacher may be discouraged from starting or using an OLC because she needs more knowledge about basic plant needs, how to maintain an OLC, and the knowledge to utilize the produce from the OLC in lessons such as nutrition education.

S  Skills
Definition: Any suggestion that the teacher may be discouraged from starting or using an OLC because she lacks specific skills needed to perform basic tasks in the garden or lacks the skills needed to translate her current indoor lessons into the OLC. Examples include teachers stating that she does not have the skills to make a garden grow, she does not know how to plant a plant, or that she has does not have a green thumb.

CAK  Confidence in ability and knowledge
Definition: Any description that the teacher may be discouraged from starting or using an OLC because she lacks the confidence to create lesson plans for the OLC, lacks the confidence to translate her current indoor lessons into the OLC environment, lacks the confidence to answer questions from the children, or lacks the confidence in her ability to have a successful garden. One example includes the teacher stating that she does not want to try to use an OLC because she might fail and that would disappoint and discourage the children.

GCK  Geo-climate specific knowledge
Definition: Any suggestion that the teacher may be discouraged from starting or using an OLC because she needs more information about when and what to plant in her geographic and climate area or region. Examples include the teacher stating that she does not know what kind of plants would be successful in an OLC, that she does not know when to plant and harvest the plants, or that she would like to have a yearly planting schedule so she knows when and what to plant to be successful.

SAK  Safety awareness knowledge
Definition: Any explanation that the teacher may be discouraged from starting or using an OLC because she needs to be more aware of safety concerns in the OLC. Examples include concerns about the toxicity of plants as well as awareness of child allergies and how to manage these issues.
Coding Manual for
Teacher Motivations for using an Outdoor Learning Center (M)

Curricular Opportunities (C)

MC  Multi-curricular
Definition: Any description that the teacher uses or wants to use an OLC because it is a place to teach and learn a variety of subjects and topics (math, science, social studies, art). Teachers may even describe multiple layers of learning happening simultaneously. One example includes using project learning to teach a variety of tasks/skills at the same time in an OLC. Also included is the ability to stratify teaching to a variety of learning levels when teaching in an OLC.

L  Literacy
Definition: Any description that the teacher uses or wants to use an OLC to teach or improve student literacy. Examples could be teaching letter recognition, practicing writing letters, journaling, or reading outside.

LPS  Life and practical skills
Definition: Any suggestion that the teacher uses or wants to use an OLC because they can teach non-curricular skills such fine motor skills, reasoning, decision making, responsibility, and independence. These are useful skills that contribute to overall learning but are not specifically subject driven.

CC  Child centered
Definition: Any explanation that the teacher uses or wants to use an OLC because teaching in that setting is perceived to be child centered. The purpose may be explained as orienting all activities and lessons around what interests the children. Examples include discovery moments, informal inquiries, or free choice selection where children are actively engaged in the OLC.
**Influencing Health (H)**

**N** Nutrition  
Definition: Any indication that the teacher uses or wants to use an OLC because it is a place to facilitate nutrition education. This includes exposure to fruits and vegetables that they grow, food tastings, and garden to table exposure during class time.

**PA** Physical Activity  
Definition: Any description that the teacher uses or wants to use an OLC because it is a place where children can be physically active. This includes descriptions of running, gross motor skill movements, and rigorous play activities.

**SF** Share with families  
Definition: Any suggestion that the teacher uses or wants to use an OLC because it is an opportunity to share physically (include sharing product from garden harvest with families to decrease food insecurity) and educationally (having parent education sessions about gardening, having parents participate as volunteers with the children, or encouraging families to start a garden at home because the children share their experiences with their families).

**EN** Exposure to nature  
Definition: Any explanation that the teacher uses or wants to use an OLC because the children might not or do not otherwise get to experience nature or being outside. This includes generally perceived benefits of fresh air and children in her class live in apartments and do not have access to outdoor play spaces or the home neighborhood environment is perceived as too dangerous to allow the children to play freely outside.
Interpersonal Connections (I)

**SO** Social skills
Definition: Any indication that the teacher uses or wants to use an OLC because teaching in that setting encourages the development of social skills. This could be indicated by stories of children working together, acknowledging each other, taking turns, interacting in socially appropriate ways, or learning how to communicate appropriately with one another. One example is a child asking for a tool instead of grabbing it out of another child’s hands.

**CU** Cooperative use
Definition: Any description that the teacher uses or wants to use an OLC because using a garden can be a place to build relationships within the school. Descriptions may include teachers working together to coordinate garden use among the many classrooms or working cooperatively to organize the scheduling and maintenance of the garden.

**CB** Community building
Definition: Any suggestion that the teacher uses or wants to use an OLC because it provides an opportunity for building relationships with the surrounding community. Examples include neighbors, businesses, local farmers, or community garden experts.

**FT** Feedback to teacher
Definition: Any explanation that the teacher may be encouraged (or discouraged) from starting or using an OLC because she needs the interest of other groups within the center. One example includes other teachers and staff being interested enough to share the workload of planning and maintaining the OLC. Student examples include individual student feedback, child engagement, and whole class excitement or disinterest.

**PE** Previous experience
Definition: Any indication that the teacher may be encouraged (or discouraged) from starting or using an OLC because of her previous experience. This may be in other centers, schools, or in her personal life. Examples include teachers indicating their family had a garden when they were kids, they have grown things with students before, or that they currently have a garden at home.
Appendix K: Study 3 Participant Recruiting Email

Subject: Request for expert review of facilitators and self-efficacy survey for preschool teacher use of outdoor learning centers

Dear ___________, [INSERT PERSON-SPECIFIC SALUTATIONS]

My name is Jennifer McMillen, and I am a doctoral student at North Carolina State University in Raleigh, NC. My research team and I are validating a survey for preschool teachers about their knowledge, attitudes, and beliefs of using outdoor learning centers.

My hope is that by validating this tool specifically for preschool teachers, we will be able to identify gaps in teacher knowledge as well as pervasive attitudes and beliefs that may contribute to the effectiveness and consistency or self-efficacy of utilizing an OLC. By using a validated survey to identify gaps, agencies that receive Head Start preschool funds will be able to identify teacher-training needs. The identified needs can then be met during inservice training sessions, by connecting with community partners, or identifying continuing education modules. Once validated the survey could also be used to measure effectiveness of teacher-training programs via formative or summative evaluation of OLC teacher training programs.

In order to develop a relevant survey that will not be too burdensome in length (preschool teachers are busy), I need your help in narrowing down the questions to the most important topics and to make sure each question is clearly and concisely worded. We would like for the final survey to be taken in under 20 minutes.

If you agree to help, I will send you a follow-up e-mail with the draft of the survey and a rating form. The entire process should take no more than 30 minutes of your time. I know your time is valuable, so I appreciate your consideration in helping with this stage of the research project.

Please let me know either way by [INSERT DATE] so that I may make plans accordingly.

Sincerely,

Jennifer D. McMillen, MS
PhD student in Nutrition Sciences
North Carolina State University
Dept. Food, Bioprocessing & Nutrition Sciences
206 Schaub Hall
jdmcmil2@ncsu.edu
Phone: 919-889-6690
Subject: Facilitators and self-efficacy survey for preschool teacher use of outdoor learning centers review instructions – Please complete by [INSERT DATE]

Dear ____________,

Thank you for agreeing to help me with this stage of survey development. I appreciate your honest and analytical opinion of the survey. Attached you will find a document with instructions about how to complete the online survey. Please type directly into the online rating form and hit send once you have finished.

If you could please complete the review by [INSERT DATE], I would greatly appreciate it. I will send you a friendly one-week reminder e-mail on [INSERT DATE] and a one-day reminder e-mail on [INSERT DATE].

Please let me know if you have any questions. Thank you again for helping me with this part of the project. I really appreciate it!

Thank you,

Jennifer D. McMillen, MS
PhD student in Nutrition Sciences
North Carolina State University
Dept. Food, Bioprocessing & Nutrition Sciences
206 Schaub Hall
jdmcmil2@ncsu.edu
Phone: 919-889-6690
Facilitators and Self-efficacy for Teaching Outdoors (F-STO)
Content Validity Rating Form

About the survey:

The Facilitators and Self-efficacy for Teaching Outdoors (F-STO) survey is a 35-question survey about the knowledge, attitudes, and beliefs needed to successfully use outdoor learning centers to facilitate learning in preschools. The survey will measure how Head Start preschool teachers feel about planning and preparing to teach in an outdoor learning center, demonstrating and teaching in an outdoor learning center, their general comfort in nature, and their perceptions of preschooler benefits and general challenges for sustainable use of OLCS. Teachers are asked to rank their level of agreement with the 35 statements on a 6-point Likert scale ranging from Strongly Disagree to Strongly Agree.

Review Directions:

You will find the F-STO in its entirety on the following pages. Read the survey in its entirety to understand the scope of the questions.

After you have read all of the F-STO, you will rank each survey item for importance using the online Qualtrics survey. Please provide comments and suggestions for revision for each item. When thinking about suggestions, consider what knowledge, attitudes, and beliefs you would deem necessary for a teacher to sustainably use an outdoor learning center to teach in a preschool setting.

E-mail the completed packet to jdmcmil2@ncsu.edu by [INSERT DATE]
F-STO Expert panel #1 REVIEWER INFORMATION

Please complete the following information about yourself:

*Name:*
*Title:*
*Institution/Organization:*

Describe your expertise relative to nutrition/nutrition education and/or early childhood education and/or adult education/extension and/or horticulture/outdoor learning/school gardening:

Read the F-STO on the following pages before ranking the importance of each item and providing comments for revision.
RANKING OF CONTENT VALIDITY AND SUGGESTIONS FOR REVISIONS:

For each item:

1. Rank the importance of each survey item using the 5-point Likert scale ranging from Unimportant to Very Important.
2. Provide suggestions for revision of items, as necessary.

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1. I feel comfortable planning outdoor learning activities.

How important is this statement to the overall goal of the survey?  (Mark an X in the box corresponding to your choice).

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What suggestions do you have for revision of this item?

2. I have access to the supplies I need to teach in an outdoor setting.

How important is this statement to the overall goal of the survey?  (Mark an X in the box corresponding to your choice).

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What suggestions do you have for revision of this item?

3. I am willing to spend time setting up outdoor learning activities.

How important is this statement to the overall goal of the survey?  (Mark an X in the box corresponding to your choice).
4. **I am only comfortable taking my students outside when the weather is nice.**

How important is this statement to the overall goal of the survey? (Mark an X in the box corresponding to your choice).

What suggestions do you have for revision of this item?

5. **I am able use an outdoor learning setting to teach concepts from our curriculum.**

How important is this statement to the overall goal of the survey? (Mark an X in the box corresponding to your choice).

What suggestions do you have for revision of this item?

6. **I have access to enough physical space to teach outdoors.**
How important is this statement to the overall goal of the survey? (Mark an X in the box corresponding to your choice).

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What suggestions do you have for revision of this item?

7. **I do not mind getting my hands dirty with my students.**

How important is this statement to the overall goal of the survey? (Mark an X in the box corresponding to your choice).

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What suggestions do you have for revision of this item?

8. **I am willing to use outdoor learning activities weekly with my students.**

How important is this statement to the overall goal of the survey? (Mark an X in the box corresponding to your choice).

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What suggestions do you have for revision of this item?

9. **I have the administrative support needed to teach outdoor learning activities.**
How important is this statement to the overall goal of the survey? (Mark an X in the box corresponding to your choice).

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What suggestions do you have for revision of this item?

10. I can identify what plants grow in my area.

How important is this statement to the overall goal of the survey? (Mark an X in the box corresponding to your choice).

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What suggestions do you have for revision of this item?

11. I am able to get an outdoor learning center ready for use with my class.

How important is this statement to the overall goal of the survey? (Mark an X in the box corresponding to your choice).

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What suggestions do you have for revision of this item?

12. Given class time constraints, I am still able to regularly teach lessons outdoors.
How important is this statement to the overall goal of the survey? (Mark an X in the box corresponding to your choice).

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What suggestions do you have for revision of this item?

13. I feel comfortable encouraging my students to interact with nature

How important is this statement to the overall goal of the survey? (Mark an X in the box corresponding to your choice).

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What suggestions do you have for revision of this item?

14. I enjoy searching through resources to find ideas for teaching outdoors.

How important is this statement to the overall goal of the survey? (Mark an X in the box corresponding to your choice).

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What suggestions do you have for revision of this item?
15. I have the community connections needed to use outdoor learning with my classroom.

How important is this statement to the overall goal of the survey? (Mark an X in the box corresponding to your choice).

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What suggestions do you have for revision of this item?

16. I feel comfortable managing student behavior when I teach outdoors.

How important is this statement to the overall goal of the survey? (Mark an X in the box corresponding to your choice).

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What suggestions do you have for revision of this item?

17. I enjoy being outdoors with my students.

How important is this statement to the overall goal of the survey? (Mark an X in the box corresponding to your choice).

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What suggestions do you have for revision of this item?
18. I feel comfortable showing my students how to use supplies (magnifying glasses, rulers, scales) during outdoor learning activities.

How important is this statement to the overall goal of the survey? (Mark an X in the box corresponding to your choice).

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What suggestions do you have for revision of this item?

19. Safety policies discourage me from teaching in an outdoor setting.

How important is this statement to the overall goal of the survey? (Mark an X in the box corresponding to your choice).

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What suggestions do you have for revision of this item?

20. I feel comfortable teaching in an outdoor learning center.

How important is this statement to the overall goal of the survey? (Mark an X in the box corresponding to your choice).

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What suggestions do you have for revision of this item?

21. I know how to incorporate outdoor learning activities into my lesson plans

How important is this statement to the overall goal of the survey? (Mark an X in the box corresponding to your choice).

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What suggestions do you have for revision of this item?

22. I have the support of other teachers needed to use an outdoor learning center.

How important is this statement to the overall goal of the survey? (Mark an X in the box corresponding to your choice).

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What suggestions do you have for revision of this item?

23. I have a “green thumb”.

How important is this statement to the overall goal of the survey? (Mark an X in the box corresponding to your choice).

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What suggestions do you have for revision of this item?

24. I feel comfortable guiding students in using gardening tools (hoe, rake, hand trowel).

How important is this statement to the overall goal of the survey? (Mark an X in the box corresponding to your choice).

What suggestions do you have for revision of this item?

25. I have access to funds needed to teach in an outdoor setting.

How important is this statement to the overall goal of the survey? (Mark an X in the box corresponding to your choice).

What suggestions do you have for revision of this item?
26. **My school is safely located in an area where I can teach outdoors.**

How important is this statement to the overall goal of the survey? (Mark an X in the box corresponding to your choice).

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What suggestions do you have for revision of this item?

27. **I have parent volunteers who can help me use an outdoor learning center.**

How important is this statement to the overall goal of the survey? (Mark an X in the box corresponding to your choice).

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What suggestions do you have for revision of this item?

28. **I feel comfortable caring for plants as they grow.**

How important is this statement to the overall goal of the survey? (Mark an X in the box corresponding to your choice).

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What suggestions do you have for revision of this item?

29. I am afraid my students will ask me questions while I am teaching outdoors that I cannot answer.

How important is this statement to the overall goal of the survey? (Mark an X in the box corresponding to your choice).

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What suggestions do you have for revision of this item?

30. I feel comfortable making a schedule for outdoor learning.

How important is this statement to the overall goal of the survey? (Mark an X in the box corresponding to your choice).

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What suggestions do you have for revision of this item?

31. I feel comfortable showing students how to plant seeds.

How important is this statement to the overall goal of the survey? (Mark an X in the box corresponding to your choice).
32. Given other demands, I am able to regularly plan for outdoor learning activities.

How important is this statement to the overall goal of the survey? (Mark an X in the box corresponding to your choice).

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What suggestions do you have for revision of this item?

33. I feel comfortable harvesting products that I have grown.

How important is this statement to the overall goal of the survey? (Mark an X in the box corresponding to your choice).

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What suggestions do you have for revision of this item?

What suggestions do you have for revision of this item?
34. The timing of the school year prevents me from growing plants at school.

How important is this statement to the overall goal of the survey? (Mark an X in the box corresponding to your choice).

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What suggestions do you have for revision of this item?

35. I am able to use what my students do, say, and ask to create outdoor lessons.

How important is this statement to the overall goal of the survey? (Mark an X in the box corresponding to your choice).

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What suggestions do you have for revision of this item?

What suggestions do you have for additional items related to the scope of this survey?

Thank you for your feedback! E-mail the completed packet to jdmcmil2@ncsu.edu.
Subject: We need YOUR opinion about a survey for preschool teachers use of Outdoor Learning Centers

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Calling all Head Start preschool teachers!

My research team and I are developing the Facilitators and Self-efficacy for Teaching Outdoors (F-STO). It is a 35-question survey access to facilitators and level of self-efficacy needed to successfully use outdoor learning centers to foster learning in preschools. The survey will measure how Head Start preschool teachers feel about planning and preparing to teach in an outdoor learning center, demonstrating and teaching in an outdoor learning center, their general comfort in nature, and their perceptions of preschooler benefits and their level of access to facilitators for sustainable use of OLCs and we need YOUR help!

We want to ensure that the survey is measuring what we think it is measuring, and in order to make sure, we need to talk to Head Start teachers, like you, about the survey.

The whole process should take approximately 1 hour of your time to:
1. Participate in a telephone interview with one of the members of our research team

If you are willing, please respond with times you would be available to talk for 60 minutes (just to be on the safe side) in the next week.
We appreciate your help. Please feel free to share this e-mail with other friends who are Head Start preschool teachers.

Thank you,
Jennifer McMillen

Jennifer D. McMillen, MS
PhD candidate in Nutrition Sciences

North Carolina State University
Dept. Food, Bioprocessing & Nutrition Sciences
206 Schaub Hall
jdmcmil2@ncsu.edu
Phone: 919-889-6690

(Teachers will respond to the following e-mail and then we will send a follow-up e-mail with interview instructions.)
Appendix O: Email instructions for Cognitive Interviews

Subject: Interview Instructions – Facilitators and Self-efficacy for Teaching Outdoors (F-STO) -------------------------------------------------------------------------------------------------------------------------------------

[INSERT TEACHER NAME]:

Thank you for agreeing to help! I want to introduce you to [INSERT INTERVIEWER NAME]. She will be interviewing you via telephone.

The whole process should take approximately 1 hour (or less!) of your time. I have you scheduled for [INSERT DAY AND TIME] for your interview.

Before the interview please: 1. Read the attached consent form and have a copy available during our phone call 2. Have a copy of the survey available to view during our phone call

[INSERT INTERVIEWER NAME] will contact you 24 hours before your interview time in order to confirm your participation.

Thank you for your help, and please let me know if you have any questions. We will send you the $10 gift card once your cognitive interview is complete.

Jennifer McMillen

**Jennifer D. McMillen, MS**

PhD Candidate in Nutrition Sciences

North Carolina State University  Dept. Food, Bioprocessing & Nutrition Sciences 206 Schaub Hall  jdmcmil2@ncsu.edu  Phone: 919-889-6690
INFORMED CONSENT FORM for RESEARCH

Title of Study: Facilitators and Self-efficacy for Teaching Outdoors (F-STO)
Principal Investigators: Jennifer D. McMillen, MS and Dr. Suzie Goodell

What are some general things you should know about research studies?
You are being asked to take part in a research study. Your participation in this study is voluntary. You have the right to be a part of this study, to choose not to participate or to stop participating at any time without penalty. The purpose of research studies is to gain a better understanding of a certain topic or issue. You are not guaranteed any personal benefits from being in a study. Research studies also may pose risks to those that participate. In this consent form you will find specific details about the research in which you are being asked to participate. If you do not understand something in this form it is your right to ask the researcher for clarification or more information. A copy of this consent form will be provided to you. If at any time you have questions about your participation, do not hesitate to contact the researcher(s) named above.

What is the purpose of this study?
The purpose of the current study is to develop and validate an online survey that measures Head Start teacher’s facilitators and self-efficacy for utilizing OLCs to facilitate learning in preschools. Before distributing the survey to a statewide sample of Head Start preschool teachers, we want feedback from a few Head Start teachers for editing purposes.

What will happen if you take part in the study?
If you agree to participate in this study, you will be asked to review the survey in which you will answer questions about your level of access to facilitators and level of self-efficacy for using outdoor learning centers to teach your preschoolers (it will take approximately 1 hour of your time). To accomplish this you will be interviewed about the survey questions to benefit our editing process. The interview will be a phone interview via Gmail voice chat call. We will take notes and audio record the interview. Both you and the interviewer will be in private rooms. We anticipate the interview will last approximately 45-60 minutes.

Risks
We will ask you questions related to self-efficacy in teaching preschoolers in an outdoor learning setting. This process may make you uncomfortable by sharing personal strengths and weaknesses with an interviewer. You are free to not answer any questions that you do not wish to answer.
Benefits
You will not receive direct benefits from participating in this project. However, your responses will be used to facilitate the validation of a quantitative survey to assess future teachers’ access to facilitators and level of self-efficacy toward utilizing OLCs to foster learning in preschools. Eventually we hope to use this information to improve the quality of OLC training for Head Start preschool teachers, which will hopefully improve the school readiness education of future Head Start preschoolers.

Confidentiality
You will be assigned a unique random digit number to accompany your responses. The information in the study records will be kept confidential. Since both you and the interviewer will be in private rooms, no one should be able to hear your conversation. We will ask you to provide a pseudonym to ensure your anonymity. Data will be stored electronically on the NCSU departmental server and the Principal Investigator’s research computer. All computers and servers are password protected and available only to authorized personnel. Hard copies of interview transcripts and digital audio recordings will be kept in locked file cabinets in the PI’s office. Within ten years after the conclusion of the study, the digital recordings will be erased. No reference will be made in oral or written reports, which could link you to the study. All data will be reported in aggregate.

Compensation
There will be no compensation for completion of this interview.

What if you have questions about the study?
If you have questions at any time about the study of the procedures, you may contact the researcher, Jennifer McMillen, at 206 Schaub Food Science Building, NC State University, or [919-889-6690] or jdmcmil2@ncsu.edu.

What if you have questions about your rights as a research participant?
If you feel you have not been treated according to the description in this form, or your rights as a participant in research have been violated during the course of this project, you may contact Deb Paxton, Regulatory Compliance Administrator, Box 7514, NCSU Campus [919-515-4514].

Consent To Participate
“I have read and understand the above information. I have printed a copy of this form. I give verbal consent to participate in this study with the understanding that I may choose not to participate or to stop participating at any time without penalty or loss of benefits to which I am otherwise entitled.”

Participant's name: _______________________________ Date ____________

Investigator's signature: _______________________________ Date ____________
Appendix Q: Study 3 Cognitive Interview Guide

Thank you for agreeing to help us edit our survey. The purpose of the current study is to develop and validate an online survey measuring Head Start teacher’s access to facilitators and level of self-efficacy in utilizing OLCs to enhance learning in preschools. Before distributing the survey to a statewide sample of Head Start preschool teachers, we want to hear your opinion about the wording of the statements on the survey so that we can figure out if we are asking questions in the best manner possible.

Do you have a copy of the survey in front of you?

[IF THEY DO NOT HAVE A COPY]: I’m sorry. In order to appropriately participate in the interview, I need for you to have a copy of the survey in front of you. Would you like to reschedule for another time?
[DETERMINE A NEW TIME AND STOP THE INTERVIEW].

[IF THEY DO HAVE A COPY]: Great, keep that in front of you throughout the interview! I would like to use an audio recorder during the discussion so that I can refer back to the discussion if needed. Do you mind if I record this interview session?

[IF THEY DO NOT AGREE TO BEING RECORDED]: I’m afraid that we cannot complete the interview if I cannot record the interview, but thank you for your time.

[IF THEY AGREE TO BEING RECORDED]: Thank you! [PRESS BUTTON HERE]: It’s on. You are now being recorded.

Do you mind if I take notes about our conversation?

[IF THEY DO NOT AGREE TO NOTES]: I’m afraid that we cannot complete the interview if I cannot take notes, but thank you for your time.

[IF THEY AGREE TO NOTES]: OK. Thank you. Now will you please open up the consent form I e-mailed you? Let me know when you have the consent form in front of you.

[IF THEY DO NOT HAVE A COPY]: I’m afraid that we cannot complete the interview without reviewing the consent form, but thank you for your time.

[IF THEY HAVE A COPY]: OK. Did you have a chance to look over the consent form? [IF THEY HAVE NOT READ]: Please take a few minutes to read the consent form.
[IF THEY HAVE READ THE CONSENT FORM OR AFTER THEY HAVE READ THE CONSENT FORM WHILE ON THE PHONE]: I’m going to take a few minutes to make sure you understand each part of the consent form. Do you have any questions...

>> About the general information about research studies?

>> About the purpose of the study? >> About what will happen if you take part in this study? >> About risks? >> About benefits? >> About confidentiality? >> About compensation? >> About who to contact if you have questions?

Consent to Participate:

If you agree to participate, please read the statement at the bottom of the consent form, giving your consent to participate today.

Participant reads:

“I have read and understand the above information. I have printed a copy of this form. I give verbal consent to participate in this study with the understanding that I may choose not to participate or to stop participating at any time without penalty or loss of benefits to which I am otherwise entitled."

Thank you. I will now fill in your name on my copy of the consent form. [FILL IN THEIR NAME ON THE PARTICIPANT LINE AND YOUR NAME ON THE INVESTIGATOR LINE. MAKE SURE TO SIGN AND DATE ON YOUR BEHALF AS A WITNESS OF THE VERBAL CONSENT.]

Additionally, I would like you to provide a pseudonym or a made up name for yourself. What would you like me to call you?

Ok, [INSERT PSEUDONYM], let’s get started with the interview! Demographic questions:

What is your job title? How long have you worked with preschoolers? How much experience do you have teaching in an outdoor learning center?

Great, Do you have any questions before we get started? Interview:

During this interview I am going to ask you questions about your thoughts on the survey statements to help us improve the survey. Remember to give your honest opinion. Your expert opinion is important to editing this survey. In order to remember important details you share, I will be taking notes. If you hear any silent pauses, do not be alarmed, I am just writing down what you say. Do you have any questions before we begin?

Let’s start with the directions. Please read them to yourself. (“For each statement, please indicate your level
of agreement by clicking on one of the 6 options, ranging from Strongly Disagree to Strongly Agree.”

Can you describe to me in your own words what the directions tell you to do?

What changes, if any, do you think we should made to the directions?

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Now we will go through each of the statements. I’ll ask you to read each statement to yourself and share your answer with me, and then I will ask you a series of questions about each survey statement.

---------------------------------------------------------------------------------------------------------------------

1. I feel confident planning outdoor learning activities.

   • Participants level of agreement:

   • How did you arrive at choosing your answer?

   • Describe what this statement means in your own words.

   • What would it take for you to say that you are confident planning outdoor learning activities?

   • When you read “confident planning” what do you think of?

   • What, to you, are “outdoor learning activities”?

   • If you were to change the question, what edits would you make?

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2. I have access to the supplies I need to teach in an outdoor setting.

   • Participants level of agreement:

   • What thought process did you use to come to that answer?

   • What is the intent of this statement?

   • Describe how you would know when you have access to the supplies you need to teach in an outdoor
When you read “access to the supplies I need” what do you think of?

What does “teach in an outdoor setting” mean to you?

If you were to change the question, what edits would you make?

3. I can devote enough time toward setting up outdoor learning activities.

Participants level of agreement:

How did you decide on that answer?

What idea is this statement exploring?

What would it take for you to say that you can devote enough time toward setting up outdoor learning activities?

When you read “can devote enough time” what do you think of?

What, to you, is “setting up outdoor learning activities”?

If you were to change the question, what edits would you make?

4. I wait for good weather conditions to take my students outside.

Participants level of agreement:

How did you arrive at that answer?

Describe what this statement means in your own words.

What does “good weather conditions” mean to you?

When you read “take my students outside” what do you think of?
5. I am able to identify lessons in our curriculum that are appropriate to teach outdoors.

- Participants level of agreement:
- How did you arrive at choosing your answer?
- What is the intent of this statement?
- What would it take for you to say that you are able to identify lessons in your curriculum that are appropriate to teach outdoors?
- When you read “appropriate to teach outdoors” what do you think of?
- If you were to change the question, what edits would you make?

6. I have access to enough physical space to teach outdoors.

- Participants level of agreement:
- What thought process did you use to come to that answer?
- What idea is this statement exploring?
- What would it take for you to say that you have enough physical space to teach outdoors?
- When you read “access to enough physical space” what do you think of?
- If you were to change the question, what edits would you make?

7. I do not mind getting my hands dirty while I am outside with my students.

- Participants level of agreement:
8. I am willing to use outdoor learning activities weekly with my students.

• Participants level of agreement:

• How did you arrive at that answer?

• What is the intent of this statement?

• What would it take for you to say that you are willing to use outdoor learning activities weekly with your students?

• When you read “willing to use” what do you think of?

• What, to you, is “using outdoor learning activities weekly”?

• If you were to change the question, what edits would you make?

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9. I have the administrative support needed to teach outdoor learning activities.

• Participants level of agreement:

• How did you arrive at choosing your answer?
• What idea is this statement exploring?

• Describe how you would know when you have the administrative support needed to teach outdoor learning activities.

• When you read “administrative support” what do you think of?

• If you were to change the question, what edits would you make?

-------------------------------------------------------------------------

10. I can tell the difference between plants and weeds.

• Participants level of agreement:

• What thought process did you use to come to that answer?

• What is the intent of this statement?

• What would it take for you to say that you can tell the difference between plants and weeds?

• When you read “plants” what do you think of?

• When you read “weeds” what do you think of?

• If you were to change the question, what edits would you make?

-------------------------------------------------------------------------

11. I struggle with maintaining the outdoor learning center so it is ready for use with my class.

• Participants level of agreement:

• How did you decide on that answer?

• What idea is this statement exploring?

• __________

• Describe how you would know when you are struggling with maintaining the outdoor learning center?
• When you read “ready for use” what do you think of?

• If you were to change the question, what edits would you make?

12. In spite of class time limits, I am still able to teach lessons outdoors weekly.

• Participants level of agreement:

• How did you arrive at that answer?

• Describe what this statement means in your own words.

• What would it take for you to say that given class time limits you are able to teach lessons outdoors weekly?

• When you read “in spite of class time limits” what do you think of?

• If you were to change the question, what edits would you make?

13. I feel comfortable encouraging my students to interact with nature.

• Participants level of agreement:

• How did you arrive at choosing your answer?

• What is the intent of this statement?

• Describe how you would know when you feel comfortable encouraging your students to interact with nature.

• When you read “feel comfortable encouraging” what do you think of?

• What does interact with nature mean to you?

• If you were to change the question, what edits would you make?
14. **I can use existing resources to help me with ideas for teaching outdoors.**

- Participants level of agreement:

- What thought process did you use to come to that answer?

- What idea is this statement exploring?

- What would it take for you to say that you can use existing resources to help you with ideas for teaching outdoors?

- What, to you, are “existing resources”?

- When you read “help you with ideas” what do you think of?

- If you were to change the question, what edits would you make?

15. **I have access to the community resources needed to use outdoor learning with my students.**

- Participants level of agreement:

- How did you decide on that answer?

- Describe what this statement means in your own words.

- Describe how you would know when you have access to the community resources needed to use outdoor learning with your students.

- When you read “have access to” what do you think of?

- What, to you, are “community resources needed to use outdoor learning”?

- If you were to change the question, what edits would you make?
16. I feel comfortable managing student behavior when I teach outdoors.

- Participants level of agreement:

- How did you arrive at that answer?

- What is the intent of this statement?

- What would it take for you to say that you feel comfortable managing student behavior when you teach outdoors?

- When you read “comfortable managing” what do you think of?

- What, to you, is “managing student behavior”?

- If you were to change the question, what edits would you make?

17. I enjoy being outdoors with my students.

- Participants level of agreement:

- How did you arrive at choosing your answer?

- What idea is this statement exploring?

- What would it take for you to say that you enjoy being outdoors with your students?

- When you read “enjoy being outdoors” what do you think of?

- If you were to change the question, what edits would you make?

18. I feel comfortable showing my students how to use supplies during outdoor learning activities.

- Participants level of agreement:
• What thought process did you use to come to that answer?

• What is the intent of this statement?

• What would it take for you to say that you feel **comfortable showing your students how to use supplies outdoors**?

• When you read “**comfortable showing my students**” what do you think of?

• What does “**supplies**” mean to you?

• If you were to change the question, what edits would you make?

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19. I feel that my school’s current safety policies appropriately guide my outdoor teaching.

• Participants level of agreement:

• How did you decide on that answer?

• What idea is this statement exploring?

• Describe how you would know when **safety policies appropriately guide your outdoor teaching**?

• When you read “**safety policies**” what do you think of?

• What does “**appropriately guide**” mean?

• If you were to change the question, what edits would you make?

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20. My director encourages the use of outdoor learning in our teaching.

• Participants level of agreement:

• How did you arrive at that answer?

• Describe what this statement means in your own words.
• Describe how you would know when your director encourages the use of outdoor learning in your teaching.

• When you read “encourages the use of outdoor learning” what do you think of?

• If you were to change the question, what edits would you make

• 21. I know how to incorporate outdoor learning activities into my lesson plans.

• Participants level of agreement:

• How did you arrive at choosing your answer?

• Describe what this statement means in your own words.

• What would it take for you to say that you are able to incorporate outdoor learning activities into your lesson plans?

• When you read “able to incorporate” what do you think of?

• If you were to change the question, what edits would you make?

• 22. I have the support of other teachers needed to use an outdoor learning center.

• Participants level of agreement:

• What thought process did you use to come to that answer?

• What is the intent of this statement?

• Describe how you would know when you have the support of other teachers needed to use an outdoor learning center.

• When you read “have the support of other teachers” what do you think of?

• If you were to change the question, what edits would you make?
23. When it comes to growing things, I have a “green thumb”.

- Participants level of agreement:

- How did you decide on that answer?

- What idea is this statement exploring?

- What would it take for you to say that you have a “green thumb”?

- When you read “green thumb” what do you think of?

- If you were to change the question, what edits would you make?

24. I feel confident guiding students in using gardening tools to aid outdoor learning.

- Participants level of agreement:

- How did you arrive at choosing your answer?

- Describe what this statement means in your own words.

- Describe how you would know when you feel confident guiding students in using gardening tools.

- When you read “confident guiding students” what do you think of?

- What, to you, are “gardening tools”?

- If you were to change the question, what edits would you make?

25. My administration allocates funds to purchase supplies for teaching outdoors.

- Participants level of agreement:

- How did you arrive at choosing your answer?
• What is the intent of this statement?

• What would it take for you to say that your administration allocates funds to purchase supplies for teaching outdoors?

• When you read “allocates funds” what do you think of?

______ ____

• What, to you, are “funds to purchase supplies for teaching outdoors”?

• If you were to change the question, what edits would you make?

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26. My school is safely located in an area where I can teach outdoors.

• Participants level of agreement:

• What thought process did you use to come to that answer?

• What idea is this statement exploring?

• Describe how you would know if your school is safely located in an area where you can teach outdoors.

• When you read “safely located” what do you think of?

• What does “where you can teach outdoors” mean to you?

• If you were to change the question, what edits would you make?

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27. I have access to parent volunteers who will help me maintain an outdoor learning center.

• Participants level of agreement:

• How did you decide on that answer?

• Describe what this statement means in your own words.
• What would it take for you to say that you **have parent access to parent volunteers who will help you maintain an outdoor learning center**?

• When you read “**have access to parent volunteers**” what do you think of?

• What does “**who will help me maintain an outdoor learning center**” mean to you?

• If you were to change the question, what edits would you make?

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**28. To feel comfortable growing plants outdoors, I need to attend a training session.**

• Participants level of agreement:

• How did you arrive at that answer?

• What is the intent of this statement?

• Describe how you would know when you **feel comfortable growing plants outdoors**.

• When you read “**growing plants outdoors**” what do you think of?

• What, to you, is “**a training session**”?

• If you were to change the question, what edits would you make?

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**29. I feel comfortable not knowing all the answers while I am teaching outdoors.**

• Participants level of agreement:

• How did you arrive at choosing your answer?

• What idea is this statement exploring?

• What would it take for you to say that you are **comfortable not knowing all the answers while you are teaching outdoors**?

• When you read “**not knowing all the answers**” what do you think of?
• If you were to change the question, what edits would you make?

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30. I feel comfortable making a schedule for seasonal planting in a school garden.

• Participants level of agreement:

• What thought process did you use to come to that answer?

• Describe what this statement means in your own words.

• Describe how you would know when you feel comfortable making a schedule for seasonal planting in a school garden.

• When you read “making a schedule for seasonal planting” what do you think of?

• If you were to change the question, what edits would you make?

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31. In order to create weekly outdoor learning activities, I need additional planning time.

• Participants level of agreement:

• How did you decide on that answer?

• What is the intent of this statement?

• What would it take for you to say that you have enough planning time for outdoor learning activities?

• When you read “create weekly outdoor learning activities” what do you think of?

• What, to you, is “additional planning time”?

• If you were to change the question, what edits would you make?

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32. I feel comfortable integrating harvested products into my classroom lessons.
• Participants level of agreement:

• How did you arrive at that answer?

• What idea is this statement exploring?

• Describe how you would know when you feel comfortable integrating harvested products into your classroom lessons.

• When you read “harvesting products” what do you think of?

    ______ ______
    • What does “integrating” mean to you?

• If you were to change the question, what edits would you make?

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33. The timing of the school year prevents my students from completely growing plants outdoors.

• Participants level of agreement:

• How did you arrive at choosing your answer?

• What is the intent of this statement?

• Describe how you would know if the timing of the school year prevents your students from completely growing plants outdoors.

• When you read “timing of the school year” what do you think of?

• What, to you, is “completely growing plants outdoors” what do you think of?

• If you were to change the question, what edits would you make?

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34. I can coordinate “child choice” into outdoor learning.

• Participants level of agreement:
• What thought process did you use to come to that answer?

• What idea is this statement exploring?

• What would it take for you to say that you can coordinate “child choice” into outdoor learning?

• When you read “coordinate” what do you think of?

• What, to you, is “child choice”?

• If you were to change the question, what edits would you make?

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35. When I am not at work, I often spend time outdoors.

• Participants level of agreement:

• How did you decide on that answer?

• Describe what this statement means in your own words.

• Describe how you would know if the you often spend time outdoors when you are not at work.

• When you read “not at work” what do you think of?

• What does “often spend time outdoors” mean to you?

• If you were to change the question, what edits would you make?

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What suggestions do you have for additional items related to the scope of this survey?

Thank you. That is the end of our interview. We appreciate you taking the time to share your thoughts. As a reminder, your gift card will be emailed to the email address we used for our previous communication. Please make sure you check your spam folder if you do not see it in the next few days.
Appendix R: Study 3 Expert Panel #2 Recruitment E-mail

Subject: Request for expert review of facilitators and self-efficacy survey for preschool teacher use of outdoor learning centers
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Dear ___________, [INSERT PERSON-SPECIFIC SALUTATIONS]

My name is Jennifer McMillen, and I am a doctoral candidate at North Carolina State University in Raleigh, NC. My research team and I are validating a survey for Head Start preschool teachers about their knowledge, attitudes, and beliefs of using outdoor learning centers (OLC).

My hope is that by validating this tool specifically for preschool teachers, we will be able to identify gaps in teacher knowledge as well as pervasive attitudes and beliefs that may contribute to the effectiveness and consistency or self-efficacy of utilizing an OLC. By using a validated survey to identifying gaps, agencies that receive Head Start preschool funds will be able to identify teacher-training needs. The identified needs can then be meet during in-service training sessions, by connecting with community partners, or identifying continuing education modules. Once validated, the survey could also be used to measure effectiveness of teacher-training programs via formative or summative evaluation of OLC teacher training programs.

The next step involves expert review of this survey for content validity before it is administered online to a nationwide sample of Head Start preschool teachers’. Since you are an expert in the field that pertains to the survey, we value your opinion.

Participating in this expert review of the survey should take approximately 10 minutes of your time. The review involves reading each question and indicating what category each survey statement best fits.

If you agree to help, I will send you a follow-up e-mail with the survey and instructions. I know your time is valuable, so I appreciate your consideration. Please let me know either way by [INSERT DATE] so that I may make plans accordingly.

Sincerely,

Jennifer D. McMillen, MS
PhD Candidate in Nutrition Sciences
North Carolina State University
Dept. Food, Bioprocessing & Nutrition Sciences
Appendix S: Study 3 Expert #1 Instruction Email

Subject: Knowledge, attitudes, and beliefs survey for Head Start teacher use of outdoor learning centers review instructions – Please complete by [INSERT DATE]

Dear ___________,

Thank you for agreeing to help me with this stage of survey development. I welcome your honest and analytical expert opinion of the 31-item survey. Attached you will find a document with instructions about how to review the survey. Please type directly into the online form using the Qualtrics survey system.

If you could please complete the review by [INSERT DATE], I would greatly appreciate it. I will send you a friendly one-week reminder e-mail on [INSERT DATE] and a one-day reminder e-mail on [INSERT DATE].

Please let me know if you have any questions. Thank you again for helping me with this part of the project.

Thank you,

Jennifer D. McMillen, MS
PhD Candidate in Nutrition Sciences

North Carolina State University
Dept. Food, Bioprocessing & Nutrition Sciences
206 Schaub Hall
jdmcmil2@ncsu.edu
Phone: 919-889-6690
Appendix T: Study 3 Expert #1 Info Packet

Facilitators and Self-efficacy for Teaching Outdoors (F-STO)
Content Validity Rating Form

About the survey:

The Facilitators and Self-efficacy for Teaching Outdoors (F-STO) survey is a 31 item survey about the knowledge, attitudes, and beliefs needed to successfully use outdoor learning centers to facilitate learning in preschools. Teachers will be asked to rank their level of agreement with the 31 statements on a 6-point Likert scale ranging from Strongly Disagree to Strongly Agree.

Review Directions:

You will find the F-STO in its entirety on the following page. Read the survey in its entirety to understand the scope of the questions.

After you have read all of the F-STO, please indicate via the online Qualtrics survey the subcategory you would categorize each statement by typing a number (1-4) in the blank. If you believe the statement could fall into more than one category, please type multiple numbers in the blank.

Questions fall into 4 proposed sub-categories:

(1) Planning and Preparing
(2) Demonstrating and Teaching
(3) Nature Orientation
(4) Needs and Support

If you have any, please provide comments and suggestions for item revision in the comment boxes. When thinking about suggestions, consider what knowledge, attitudes, and behaviors you would deem necessary for a teacher to be successful in sustainably using an outdoor learning center in a preschool setting.

E-mail the completed packet to mailto:jdmcmil2@ncsu.edu by [INSERT DATE]. Thank you!
REVIEWER INFORMATION:

Please complete the following information about yourself:

_Name:_
_Title:_
_Institution/Organization:_

Describe your expertise relative to this expert review (nutrition/nutrition education, early childhood education, child development, adult education/extension, horticulture, outdoor learning/school gardening):

Read the category definitions on the following page before assigning an appropriate category to each survey statement and providing comments for revision.
Directions: Please indicate in which category you would categorize each statement by typing a number (1-4) in the blank:

1. **Planning and Preparing:** Indicates the degree that a teacher is comfortable, willing, and able to plan and incorporate outdoor learning ideas and activities into lesson plans or to prepare the outdoor space for use.

2. **Demonstrating and Teaching:** Indicates the degree that a teacher is comfortable demonstrating and modeling behaviors needed while teach specifically in an outdoor learning center and to use these behaviors to achieve curricular goals in that setting.

3. **Nature Orientation:** Indicates the degree that a teacher is comfortable being in nature, interacting with the outdoors, and sees herself/himself as generally being able to cultivate plants.

4. **Needs and Support:** Indicates the perceived level of support, access to physical needs, and limitations that affect the teacher’s ability to regularly use an outdoor learning center. 

*If you believe the statement could fall into more than one category, please type multiple numbers in the blank.*

---------------------------------------------------------------

_________ 1. I feel confident planning outdoor learning activities
_________ 2. I have access to the supplies I need to teach in an outdoor setting
_________ 3. I have enough time to set up outdoor learning activities for my students
_________ 4. I wait for good weather to take my students outside
_________ 5. I am able to identify lessons in our curriculum that I can teach outdoors
_________ 6. I have access to enough physical space to teach outdoors
_________ 7. I do not mind getting dirty while I outside with my students
_________ 8. I am willing to teach at least 1 lesson outdoors weekly
_________ 9. I feel comfortable showing my students how to use supplies/tools during outdoor learning activities
_________ 10. In spite of class time limits, I can still teach at least 1 lesson outdoors weekly
_________ 11. I feel comfortable encouraging my students to interact with nature
_________ 12. I can easily find ideas for planning lessons to teach outdoors
_________ 13. I have the community resources to help me teach outdoors
_________ 14. I feel comfortable managing student behavior when I teach outdoors
_________ 15. I enjoy being outdoors with my students
_________ 16. I feel comfortable identifying plants and weeds
_________ 17. I feel that my school's current safety policies appropriately guide my outdoor teaching
_________ 18. My director encourages me to teach lessons outdoors
Directions: Please indicate in which subcategory you would categorize each question by typing a number (1-4) in the blank:

(1) Planning and Preparing
(2) Demonstrating and Teaching
(3) Nature Orientation
(4) Needs and Support

If you believe the question could fall into more than one category, please type multiple numbers in the blank.

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19. I know how to incorporate outdoor learning activities into my weekly lesson plans
20. I have the support of other teachers in using an outdoor learning center
21. When it comes to growing things, I have a “green thumb”
22. My administration allocates funds to purchase supplies for teaching outdoors
23. My school is located in an area where I can safely teach outdoors
24. I have parent volunteers who will help me in an outdoor learning center
25. To embrace outdoor learning, I would like to attend a training session
26. I feel confident teaching outdoors
27. I feel comfortable making a yearly schedule for seasonal planting in an outdoor learning center
28. In order to create weekly outdoor learning activities, I need additional planning time
29. I feel comfortable using harvesting products in my class lessons
30. I feel it is important to include "child choice" when teaching outdoors
31. When I am not at work, I often spend time outdoors

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What suggestions do you have for edits, deletions, or additional items related to the scope of this survey?

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Thank you for your feedback! E-mail the completed packet to jdmcmil2@ncsu.edu.

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Appendix V: Study 3 Validation Administration Recruitment Email

Subject: Take the 10-minute F-STO survey and be entered to win 1 of 2 $100 gift cards

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[INSERT HEAD START GRANTEE CONTACT NAME]:

My name is Jennifer McMillen, and I am a Doctoral student at North Carolina State University in Raleigh, NC. My research team and I are validating a survey for preschool teachers about their self-efficacy in using outdoor learning centers to teach in a Head Start preschool setting. I would like to ask for your help in recruiting your teachers and teacher assistants at [INSERT INSTITUTION NAME] to participate in this research project. Each teacher who completes the F-STO will be entered into a drawing to win one of two $100 gift cards.

If you are willing, please send the below email to the Head Start teachers and teacher assistants in your agency.

[The link for the survey is provided in the email]

If I should contact someone else at your institution, please provide me with his or her contact information. Thank you in advance for your help.

Sincerely,

**Jennifer D. McMillen, MS**  
PhD Candidate in Nutrition Sciences  
North Carolina State University  
Dept. Food, Bioprocessing & Nutrition Sciences  
206 Schaub Hall  
jdmcmil2@ncsu.edu  
Phone: 919-889-6690

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Subject: Recruiting Head Start Teachers to Participate in 10-minutes Outdoor Learning Survey

We are a team of researchers developing a survey for Head Start preschool teachers, like you, and we need YOUR help!

Please share your personal opinions about teaching in an outdoor learning center by completing the following survey. The survey will take approximately 10 minutes to complete. Once you have completed the survey you will be entered in a drawing to win one of two $100 gift cards.

[INSERT ONLINE LINK]

We appreciate your help. Please feel free to share this e-mail with other friends who are Head Start Preschool teachers and teacher assistants.

Jennifer D. McMillen, MS
PhD Candidate in Nutrition Sciences
North Carolina State University
Dept. Food, Bioprocessing & Nutrition Sciences
206 Schaub Hall
jdmcmil2@ncsu.edu
Title of Study: Validation of the Facilitators and Self-efficacy for Teaching Outdoors (FSTO)  
Principal Investigator: Jennifer D. McMillen, MS  Faculty Sponsor: Dr. L. Suzanne Goodell

What are some general things you should know about research studies?  
You are being asked to take part in a research study. Your participation in this study is voluntary. You have the right to be a part of this study, to choose not to participate or to stop participating at any time without penalty. The purpose of research studies is to gain a better understanding of a certain topic or issue. You are not guaranteed any personal benefits from being in a study. Research studies also may pose risks to those that participate. In this consent form you will find specific details about the research in which you are being asked to participate. If you do not understand something in this form it is your right to ask the researcher for clarification or more information. A copy of this consent form will be provided to you. If at any time you have questions about your participation, do not hesitate to contact the researcher(s) named above.

What is the purpose of this study?  
The goal of the current research is to develop a valid and reliable online survey that can measure Head Start teacher’s knowledge, attitudes and beliefs about utilizing OLCs to facilitate learning in preschools.

What will happen if you take part in this study?  
If you agree to participate in this study, you will be asked to take the online survey in which you will answer questions about your knowledge, attitudes, and beliefs of using outdoor learning centers to teach your preschoolers (it will take approximately 10 minutes of your time).

Risks  
There are minimal risks associated with this research. We will ask you questions related to self-efficacy in teaching in outdoor learning centers. This process may make you uncomfortable by sharing personal strengths and weaknesses. You are free to exit the survey at any time.

Benefits  
You will not receive direct benefits from participating in this project. However, your responses will be used to validate the quantitative survey to assess future teachers’ knowledge, attitudes, and beliefs about utilizing OLCs to facilitate learning in preschools. Eventually we hope to use this information to improve the quality of OLC training for Head Start preschool teachers, which will hopefully improve the school readiness education of future Head Start preschoolers.
Confidentiality
You will be asked to provide your name and e-mail to ensure that there are no duplicated responses; however, when data is analyzed, your name will not be associated with your responses. You will be given a unique random number code to maintain confidentiality. Data will be stored electronically on the NCSU departmental server and the Principal Investigator’s research computer. All computers and servers are password protected and available only to authorized personnel. Electronic copies of consent forms will be kept in on the NCSU departmental server and the Principal Investigator’s research computer.

Compensation
There will be no compensation given for completion of this survey, however, every participant who completes the survey will be entered into a drawing to win one of two $100 gift card once data collection is complete.

What if you have questions about the study?
If you have questions at any time about the study of the procedures, you may contact the primary author, Jennifer McMillen, at 206 Schaub Food Science Building, NC State University, or 919-889-6690 or jdmcmil2@ncsu.edu.

What if you have questions about your rights as a research participant?
If you feel you have not been treated according to the description in this form, or your rights as a participant in research have been violated during the course of this project, you may contact Deb Paxton, Regulatory Compliance Administrator, Box 7514, NCSU Campus 919-515-4514.

Consent to Participate

“I have read and understand the above information. By clicking ‘next,’ I give electronic consent to participate in this study with the understanding that I may choose not to participate or to stop participating at any time without penalty or loss of benefits to which I am otherwise entitled.”

[NEXT] (Teachers will click “NEXT” to electronically consent to participation and will be taken to a demographic survey.)

What is your e-mail address? (Teachers will fill in response if they want to register for $100 gift card drawing)
Appendix X: Study 3 F-STO Demographic Survey and Screening Tool

Demographic Survey

Please take a moment to tell us about yourself by answering the following questions.

1. What is your job title? [Teacher will choose the best answer]
   A. Preschool Teacher
   B. Preschool Teacher Assistant
   C. Other
   [If the individual is not a teacher or teacher’s assistant he/she will be disqualified from the survey]

4. How long have you been working with preschool children?
   [Teacher will fill in response] ________________________________

5. What is your age?
   [Teacher will fill in response] ________________________________
   [If the teacher is not 18 or older he/she will be disqualified from the survey]

6. What is your gender? [Teacher will choose the best answer]
   A. Female
   B. Male
   C. Other

7. What is your highest level of formal education? [Teacher will choose the best answer]
   A. Received high school diploma or GED
   B. Some college or technical school
   C. 2-year college, associates degree
   D. 4-year college, university degree
   E. Received masters or advanced degree

8. What is your race/ethnicity? [Teacher will choose the best answer]
   A. Caucasian/white, non-Hispanic
   B. African American/black
   C. Hispanic/Latino
   D. Bi-racial

9. How many years experience do you have using outdoor learning with students?
   [Teacher will fill in response] ________________________________

[NEXT] (Teachers will click “NEXT” to proceed to the F-STO questions, developed by the research team.)
### Appendix Y: Study 3 Validation Administration F-STO Survey

For each statement, please indicate your level of agreement by clicking on one of the 6 options, ranging from Strongly Disagree to Strongly Agree.

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Slightly Disagree</th>
<th>Slightly Agree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I have the support of other teachers needed to use an outdoor learning center.</td>
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<tr>
<td>2. I feel confident planning outdoor learning activities.</td>
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<td>3. I feel comfortable showing my students how to use supplies/tools during outdoor learning activities.</td>
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<td>4. I feel nervous about correctly identifying plants and weeds.</td>
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<td>5. I have access to the supplies I need to use an outdoor learning setting.</td>
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<td>6. I have enough time to set up outdoor learning activities for my students.</td>
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<td>7. In spite of class time limits, I can still teach at least 1 lesson outdoors weekly.</td>
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<td>8. My director encourages me to teach lessons outdoors.</td>
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<td>9. My director encourages me to teach lessons outdoors.</td>
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<td>10.</td>
<td>I am able to identify lessons in our curriculum that would be appropriate for outdoor learning.</td>
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<tr>
<td>11.</td>
<td>I am willing to teach at least 1 lesson outdoors weekly.</td>
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<td>12.</td>
<td>I feel that my school's current safety policies appropriately guide my outdoor teaching.</td>
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<td>13.</td>
<td>I wait for good weather to take my students outside.</td>
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<td>14.</td>
<td>I can easily find ideas for planning outdoor lessons.</td>
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<td>15.</td>
<td>I am able to work with other teachers to collaborate in joint outdoor learning projects.</td>
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<td>16.</td>
<td>I feel comfortable encouraging my students to interact with nature in general.</td>
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<td>17.</td>
<td>I have access to enough physical space to teach outdoors.</td>
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<td>18.</td>
<td>I feel comfortable managing student behavior when I teach outdoors.</td>
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<td>19.</td>
<td>I know how to incorporate outdoor learning activities into my weekly lesson plans.</td>
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<td>20.</td>
<td>I do not mind getting dirty while I am outside with my students.</td>
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<td>21.</td>
<td>To embrace outdoor learning, I need to attend a training session.</td>
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<td>22.</td>
<td>I feel it is important to include &quot;child choice&quot; when teaching outdoors.</td>
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<td>23.</td>
<td>I feel comfortable making a yearly schedule for seasonal planting in an outdoor learning center.</td>
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<td>24.</td>
<td>I have community resources to help me teach outdoors.</td>
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<td>25.</td>
<td>I enjoy being outdoors with my students.</td>
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<td>27.</td>
<td>I have parent volunteers who will help me in an outdoor learning center.</td>
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<td>28.</td>
<td>In order to create weekly outdoor learning activities, I need additional planning time.</td>
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<td>29.</td>
<td>When I am not at work, I often spend time outdoors.</td>
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<td>30.</td>
<td>My school is located in an area where I can safely teach outdoors.</td>
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<td>31.</td>
<td>I feel comfortable incorporating harvested products into my teaching lessons.</td>
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<td>32.</td>
<td>I know where to find information about nature if children ask me a question to which I don't know the answer.</td>
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<td>33.</td>
<td>I feel comfortable collaborating with other teachers to plan and delegate outdoor learning responsibilities.</td>
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<td>34.</td>
<td>My administration allocates funds to purchase supplies for teaching outdoors.</td>
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Appendix Z: Study 3 Final STO Survey after Exploratory Factor Analysis

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