

SEEDS OF CREATIVITY: ASSESSING THE IMPACT OF AN INTEGRATED PILOT  
NATURE PRESCHOOL PROGRAM ON CHILDREN'S CREATIVE DEVELOPMENT

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## **ABSTRACT**

Carrie Brandon Moore: Seeds of Creativity  
Assessing the Impact of an Integrated Pilot Nature Preschool Program  
On Children's Creative Development  
(Under the direction of Rune Simeonsson)

A recent study showed that less than 50 forest kindergartens or nature preschools were in operation in 2012, but as of 2017, over 250 such schools have emerged in 43 states in the United States, with estimations for continuous growth over the next decade (NAAEE, 2017). While nature-based education programs are gaining popularity in light of recent attention to alternative education models, few studies have explored developmental and formal learning outcomes for children enrolled in such programs (Leggett, 2017). Due to the novelty of the nature-based early childhood education movement in the United States, more research is needed to determine the educational advantages of this model of early learning. The present study analyzed children's measures of creative thinking before and after exposure to an integrated 13-week pilot nature preschool program which included daily nature immersive experiences and an entirely nature immersion day, Wilderness Wednesday. Children's characteristics of creative thinking were quantitatively measured using the Torrance Tests of Creative Thinking (TTCT) (Torrance, 1966, 2017) and a parent creativity characteristics inventory of their children, the Preschool and Kindergarten Interest Descriptor (PRIDE) (Rimm, 1981), and the resulting data was analyzed pre and post the 13-week pilot nature preschool program. Qualitative data was also gathered from a generic thematic analyses of children's drawings, parent reports of indoor and outdoor activities of children, and from teacher interviews addressing program implementation considerations and

parameters for creative teaching. Results indicated improvements in certain domains of creativity as measured by the TTCT and PRIDE. Qualitative analysis revealed various themes associated with creativity conveyed in children's drawings, parent indications of outdoor activities, and teacher reflections of program parameters. Limitations, implications, and future directions for research related to the field of education and school psychology are discussed.

## DEDICATION

I dedicate this work, firstly, to my late grandfather who was one of the first people to introduce me to the power of nature experiences. Your dedication to our family farm and getting your grandchildren outside everyday has shaped my perspective of my existence *with* nature. To my parents who helped strengthen this connection, I am eternally grateful to you both for making me play outside until dark as a child and for not always knowing where I was or what I was doing. To my husband, thank you for your patience and believing in this work, and always supporting me in pursuing my goals. Lastly, I was blessed to welcome my first child during the writing of this dissertation. Thank you to my daughter for igniting this passion and inspiring me to continue to pursue ways to connect young children with nature.

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## **CHAPTER I: INTRODUCTION**

In a society of growing technological advances, creativity has become a topic of great interest, not only in fields of science, technology, or business, but has trickled down to primary and secondary education sectors. Innovation has become a contemporary goal in education and this creativity-based construct now pushes humans toward a future orientation in which creativity is a necessary skill of the 21<sup>st</sup> century (Sternberg, 2003). Researchers now understand that creative abilities are useful beyond the academic and industry settings, and can be applied to problem-solving situations throughout the lifespan (Runco, 2013). For the next generation of children in the information age, having the capacity to retain rote knowledge is no longer relevant. Modern children live in a world in which memorizing factual information is dispensable with instantaneous search technology at their fingertips. Children must be able to analyze, manipulate, apply, and innovate with existing knowledge to keep pace in an era of constant creation and iteration (Sawyer, 2019). Stakeholders in early education have begun to understand the need to develop creativity in children to the same extent early educators currently focus on cognitive, social, emotional, and physical domains of development.

Modern children also live in a world where play time in nature is diminishing and this diminished exposure and connection with nature is thought to have detrimental impacts both for the individual child and for society as a whole (Louv, 2005). Various nature-based educational models, including the Nature Preschool (NP) model, have been cited in literature as contributing to the children's creative development (Knight, 2013; Sobel, 2016), though the evidence is

mostly anecdotal. Nature exposure and nature-based education have been associated with improved outcomes in several areas of child development including brain development, communication, self-regulation, social-emotional development, executive functioning, motor functioning, and therapeutic benefits/mental health (Kuo & Taylor, 2004; Larimore, 2011; NAAEE, 2019).

### **Background of the Research Problem**

Early childhood, before age 10, is often recognized as a critical period for creative development when neural pathways in the brain are developing at a rapid rate (Eliot, 1999). “Neurologically, it has been recognized that the early years are a prime time for generating pathways in the brain that lay the foundation for future innovators and creative thinkers.” (Leggett, 2017: 846). Interestingly, as there has been a rise in cognitive testing (IQ) scores over the past several generations, there has been a decline in scores on measures of creative thinking (Flynn, 1984, 2007; Kim, 2011), with recent studies showing a decline in creativity measures over time, especially in children, kindergarten through third grade (Kim, 2011). For example, between 1984 and 2008, the average Elaboration score on a recognized measure of creative thinking, the Torrance Tests of Creative Thinking (TTCT), for every age group, K-12, fell by more than 1 standard deviation. (Gray, 2012). Torrance, one of the most notable creativity researchers and developer of the Torrance Tests of Creative Thinking (TTCT), recognized the need to develop creativity from an early age and thus was cognizant to create an instrument suitable to be used with early education populations (Torrance, 1968). Torrance also proposed the “fourth-grade slump” from his studies of creativity assessment that indicated a decrease in creative thinking scores around fourth grade presumably from school-based conformity (Torrance, 1968). Since the early 2000’s and perhaps to an even greater extent in response to the

current “creativity crisis,” the development of creativity is a primary focus of reform in early education programs in many developed nations (Curriculum Development Council, 2001; National Advisory Committee on Creative and Cultural Education (NACCCE) (NACCCE, 1999). Some researchers posit that this recent decline in measures of creative thinking may be due to generational, philosophical shifts of children spending more time indoors passively playing on electronic devices and less time outdoors in nature (Louv, 2005; Gray, 2012; Sobel, 2016). For most of human existence, people were dependent on nature to meet their basic needs and had to respond to unexpected stimuli in nature as a means of survival. People now have little need to leave their homes in order to fulfill basic needs, and the human connection and dependency on nature is diminishing. NPs, which integrate both traditional early childhood education and nature-based education through nature immersive experiences, seek to reconnect children with nature under the theory that nature deprivation can have detrimental developmental outcomes (Louv, 2005). In reference to this study, these points raise the question: Do alternative early education programs, specifically those that include elements of nature-immersion, impact the creative development of children? If so, which dimensions of creative thinking might be impacted?

Learning scientists have examined various practices and philosophies in education that are thought to contribute to the development of creativity in children (Sawyer, 2019), however little research exists analyzing alternative early educational settings that may contribute to characteristics of creative thinking. This may be due, in part, to the fact that creativity is difficult to define, especially in young children and school age populations. Creativity researchers initially defined this construct in terms of creation of novel, tangible products that have utility in society (Gardner, 1988). This definition, however, does little to help early childhood educators

recognize creativity in young children, being that childhood creativity rarely reaches this level of societal impact. There is a need to examine measures of creative thinking in early education populations of children who are exposed to educational settings thought to foster creative development. This study will include an analysis of measures of creative thinking for children attending a school implementing an integrated pilot NP program with an emphasis on examining if exposure to this educational model impacts children's indications of creative thinking.

Rogers (1954) proposed that children should have three internal conditions for development of creativity: internal locus of evaluation and reflection, openness to experience, and the freedom to explore various elements and concepts. Rogers also thought that these internal conditions must be strengthened by the external conditions of psychological safety and psychological freedom (Rogers, 1954). Even with the push to develop creativity in children, public early education settings have done little over time to adapt to recommended conditions for developing creativity, and may have inadvertently implemented curriculum design, pedagogical parameters, and environmental barriers that negate creative development. Thus, some parents have begun to consider non-traditional early educational models that seek to provide children the necessary conditions of holistic and creative development. NPs are one such educational model that is thought to contribute to creative thinking in children, amongst other strength-based developmental outcomes (Larimore, 2011), but the evidence is mostly anecdotal and little to no empirical research supports these claims. NPs emphasize child-led flow learning, inquiry-based teaching, documentation of emergent curriculum, and place based, informal learning all with an incorporated element of nature-immersive experiences (Larimore, 2011, 2019).

## **Purpose of the Research Study**

One of the defining elements of a NP is the commitment to the incorporation of nature-based education with regular time spent outdoors, rain or shine, in the belief that exposure to the natural environment is fundamental to the healthy development of children and their sense of humanity (Sobel, 2016). Most parents who chose a NP as the early education environment for their child likely trust in the holistic development and environmental awareness that such a learning environment can provide. What parents may be unsure of, however, is if this type of educational environment contributes to formal learning objectives and higher order thinking skills that are necessary for traditional school and later, adult, work readiness. Additional research is needed to determine the learning outcomes of non-traditional early education environments with a caveat that many assessments of learning are still underdeveloped with this age group. In alignment with Rogers' parameters for fostering creativity, NPs emphasize play-based, student-directed, emergent learning, and inquiry-based teaching, all with a central focus of nature-based education through nature immersive experiences.

Few studies have examined alternative early education environments and analyzed creative thinking for children enrolled in such programs (Leggett, 2017). Due to the novelty of the nature-based education movement in the United States, more research is needed to determine the educational advantages and efficacy of this model of early learning. The present study seeks to analyze children's measures of creative thinking before and after exposure to an integrated 13-week NP pilot program which includes regular nature immersive experiences and an entirely nature immersion day, Wilderness Wednesdays. Children's characteristics of creative thinking will be quantitatively measured using the Torrance Tests of Creative Thinking (TTCT) (Torrance, 1966, 2017) and a parent creativity characteristics inventory of their children, the

Preschool and Kindergarten Interest Descriptor (PRIDE) (Rimm, 1981), and the resulting data will be analyzed prior to exposure and at follow up, after a 13 week pilot NP program.

Qualitative data will also be gathered from generic thematic analyses of creativity based and other related themes indicated in children's drawings, parent reports of indoor and outdoor activities of children, and from teacher interviews addressing program implementation considerations and parameters for creative teaching.

### **Justification of the Study in Relation to the Field of School Psychology**

Creativity is a new area of focus in K-12 and early education sectors. Educators are just beginning to realize the need to implement educational practices and environments that foster creative development in the current generation of youth. With the speed of technological advances and the automation of much of the current work force, this generation of children must think creatively to keep pace in a changing world. The proposed questions and research results may encourage educators and parents to consider alternative educational environments that may incite creative thinking in children which can be a precursor to later critical thinking expectations in school and life. The results may also indicate how models of education can strengthen certain dimensions of creative thinking, as evidenced by TTCT subscale scores and PRIDE rating scale categories, and contribute to specific creativity styles that may have academic and industry implications. Assessments of creative thinking can provide information to work with populations of children from a strengths-based approach that may have deficits in other traditional areas of formal assessment. Being that the TTCT and the PRIDE are often used for screening and identification of individuals for gifted and talented programs, these assessments provide alternative identification avenues to formal cognitive assessments that often contain cultural bias and lack representation of diverse populations (Luria & Kaufman, 2017). School

psychologists are often limited in scope to assessment of children for disability identification, but nontraditional assessment instruments, such as the TTCT and the PRIDE may illuminate areas for enrichment in children previously deemed to have few areas of traditional academic strength. Parent reports and children's drawings of indoor vs. outdoor play activities may reveal themes associated with and creativity and encourage educators to consider educational environments that may be more conducive to creative thinking and behaviors. In addition, teacher interviews may reveal or support (existing) program implementation considerations and strategies for creative teaching useful for educational professionals interested in initiating a nature-based early education program.

The profession of school psychology should seek to expand beyond the public, K-12 realm and include non-traditional educational environments that emphasize holistic philosophies of child development. The field of school psychology should be inclusive of all areas of research that concern the development of children within school settings, both traditional and nontraditional. With future research, educators may find that such alternative early education environments provide context for holistic development, necessary intervention, individualized support, and/or enrichment for targeted populations of children.

## **CHAPTER 2: REVIEW OF LITERATURE**

The purpose of the present study will be to assess creative thinking, as measured quantitatively through the Torrance Tests of Creative Thinking (Torrance, 1966, 2017) and the Preschool and Kindergarten Interest Descriptor (Rimm, 1981) for children participating in an integrated pilot NP program. Administrations of the TTCT and the PRIDE will occur with students and parents, respectively, at the beginning of the pilot NP program and after 13 weeks of exposure to this program, and data will be analyzed to determine if exposure to such a program impacted overall Creativity Index and subscales of the TTCT, and the PRIDE creativity characteristic indicators. From a qualitative data perspective, children's drawings and parent descriptions of children's indoor vs. outdoor play activities will be collected at the pre and post data collection periods for an analysis of themes associated with creativity. Semi-structured teacher interviews addressing program implementation considerations and creative teaching strategies will also be conducted after the pilot program period and analyzed for related themes. The following literature review consists of the following two sections: (a) the first section will include background information on the NP movement and the evolution of creativity in education, and (b) the second section will include an in depth examination of the of the NP model tenets which includes relevant research and highlights the need for future research.

### **Literature Selection Documentation**

The selection of research articles and other resources highlighted in this review resulted from a thorough examination of sources using The University of North Carolina at Chapel Hill's



online library. The search utilized the Google Scholar search engine, the EBSCOhost database, and JSTOR. The references cited in the study were found with many combinations of the following search phrases: “NP”, “nature based preschool”, “creativity”, “creative thinking”, “early childhood”, “creativity assessment”, “nature-based education”, “nature school”, “nature immersion”, “nature exposure”, “play-based learning”, “teaching for creativity”, “self-directed learning”, “Reggio Emilia”, “creativity rating scale” and “Torrance Tests of Creative Thinking.” An effort was made to include primarily peer-reviewed journal articles published since the year 2000. Literature sources also included scholarly books, book chapters, important historical, peer reviewed articles and books, relevant websites, the current TTCT Technical Norms Manual (Torrance, 2017), and the Norms Manual for the PRIDE (Rimm, 1981). In addition, Dr. R. Keith Sawyer, an expert in the field of creativity, Dr. Sarah Sumners, an expert in the administration and scoring of the TTCT, as well as Dr. Sylvia Rimm, the developer of the PRIDE recommended resources for examination. The bibliographies of recommended key articles were reviewed for other secondary and frequently cited resources pertinent to the research topic.

### **What is a Nature Preschool (NP)?**

The modern nature school movement originated in Scandinavia in the early 1960’s and quickly spread throughout Europe over the next few decades to Norway, Sweden, Germany, Denmark and the United Kingdom (Sobel, 2016). There are now hundreds of nature schools all over Europe and in other areas of the world, but the nature-based education movement is still emerging in the United States. The nature school movement in the United States, however, is certainly gaining popularity with the number of established nature schools growing from about 30 in 2012, to over 250 in 2017 (NAAEE, 2017). Some of the first nature-based preschool programs in the United States were opened in cooperation with existing community nature

centers, such as the New Cannon Nature Center in Connecticut which started its NP program in the late 1960's. Other nature-based programs were slow to follow in the U.S. (Larimore, 2011). Richard Louv's book *Last Child in the Woods* (2005) would spark a U.S. nature-based school boom in the 2000's resulting in the opening of over 200 nature-based early education programs since 2012 including those that define themselves as NPs (also referred to as nature schools and nature based preschools) and forest kindergartens (also referred to as forest schools) (Larimore, 2011, NAAEE, 2017, AFKA, 2020).

While NP and forest kindergarten variant programs are all under the greater umbrella of nature-based education programs, NPs have the unique framework of incorporating both traditional Early Childhood Education (ECE) objectives along with environmental education objectives (Larimore, 2011, 2019). Some nature-based programs including many forest kindergartens place a greater emphasis on environmental education through complete nature immersion and emergent curriculum and often do not prescribe to any formal early childhood curriculum standards (NAAEE, 2017, AFKA, 2020). While all nature-based education frameworks are valid settings for healthy child development (NAAEE, 2017), NPs have the unique commitment to integrate both preschool curriculum standards and environmental education through regular scaffolded nature immersive experiences. NPs focus the ECE curriculum around nature and include commitment to nature immersive experiences with most schools indicating that they spend at least 75% of the school day outdoors in nature (NAAEE, 2017).

NPs are modeled after the German Waldkindergartens and the Italian, Reggio Emilia approach to early education, both of which emphasize holistic, play-based, collaborative learning, student-directed curriculum, and emergent documentation of learning based on student

interest, specifically with regular integrated nature-based education experiences. The Reggio Emilia approach, which is associated with strengthening children's creative development (Cress & Holm, 2016) draws on Vygotsky's theories of sociocultural, constructivist learning and Dewey's experiential learning which validates the child as a competent stakeholder in their own learning. 'The educational theory of Reggio Emilia recognizes the innate ability, human need and cultural practice of creation,' emphasizing the self-directed philosophies of early education and the child's natural disposition toward creativity (Cutcher, 2013; pg. 321). Malaguzzi (1993), who popularized the Reggio Emilia approach, also supports the idea that optimum levels of creativity are achieved when children can engage in interpersonal exchanges which are means of problem-solving, comparison of ideas, and plans of action. He further outlined the role of the teacher as a coach, facilitator, and model for childhood creativity and the child is viewed as a capable and competent individual (Malaguzzi, 1993). In the NP model, learning flows through collaboration between children and adults, and the "curriculum emerges through consultation between all parties" (Cutcher, 2013; pg. 322). The Reggio Emilia approach also suggests that young children in the proper environment, with the necessary materials, collaborative peers, and scaffolding from adults, are capable of high levels of creativity (Cress & Holm, 2016).

In NPs, children learn in the outdoor environment at their own pace by engaging in activities that are linked back to common core curriculum objectives for early education including science, mathematics, technology, physical development, social/emotional development, and the arts (O'Brien & Murray, 2007). NPs, through regular nature exposure, are reported to show a reduction in: stress, symptoms of hyperactivity, and childhood depression and increases in: attention span, concentration, self-regulation, confidence, autonomy, critical thinking, leadership, risk management, and connection to nature, or biophilia (Kuo & Taylor,

2004, Louv, 2005, Larimore, 2011, NAAEE, 2017). In addition, much of the nature-based education literature alludes to themes associated with the development of creative thinking in children as an outcome of their programs, although little to no current formal evidence support these claims (Larimore, 2011, Sobel, 2016).

Perhaps the most definitive element of a NP is a commitment to centralizing the traditional early childhood education curriculum around nature-based topics through regular nature immersive experiences (Larimore, 2011, 2019). As societal nature preservation and conservation movements strengthen, several models of nature-based education have emerged in the United States. Yet, NPs are still in their infancy in the U.S. education system, and still considered a radical model to some educators and parents. In a NP, children spend regular time in nature immersive experiences, regardless of weather conditions, and seek to centralize the early education curriculum around nature educational topics. Imagine, a cold winter's day with snow lingering on the ground and temperatures hovering around freezing. Many traditional schools would likely skip outdoor time, thinking it too cold or too wet for outdoor play. In a NP, children would arrive bundled in their coats, gloves, hats, and boots ready to explore the outdoors. The day would likely begin outside with children making snow angels, collectively building snowmen or forts, or "cooking" a snow inspired meal in their outdoor "kitchen." Children in NPs regularly spend a great deal of their time in nature, the natural environment their classroom and source of curriculum. In general, the philosophy of nature-based education programs is that, there is no inappropriate weather, only inappropriate (clothing) preparation (Sobel, 2016).

In terms of setting, most NPs have indoor and outdoor space for learning. The outdoor spaces may be referred to as the outdoors and the "beyond" specifically referring to more "wild"

outdoor spaces. These spaces may surround a traditional outdoor playground as was the case in the present research site school, but are generally thought to be defined by spaces that have less defined boundaries (fencing, etc.) and no manmade equipment. For some schools, these “beyond” locations may be at a public park or other off site location. The outdoor time at a NP can be defined by time in the traditional outdoor location or in the “beyond” space, but students should have regular access (at least weekly) to the “beyond” space, but ideally visiting this site daily (Larimore, 2011, 2019).

Before the popularization of preschool programs in the 1960’s in the U.S., many children’s first exposure to formal schooling came in kindergarten, and thus the former kindergarten philosophies are now applied to preschool programs (Sobel, 2016). Friedrich Froebel first introduced the idea of kindergarten, literally translating to ‘a garden for children,’ in his book *The Education of Man* (1907, 2009). Froebel’s kindergartens promoted play, singing, dancing, arts, and socialization in a natural setting to help children make the transition from home to school. He believed that kindergarten should foster independence, trust in others aside from parents including peers and teachers, and a connection to the local community through interaction with natural elements (Froebel, 1907). Froebel’s idea of kindergarten was slow to gain momentum, and in some countries was dismissed all together. In parts of Europe, in particular in Sweden and Germany, Froebel’s vision for kindergarten resurfaced in the 1950’s and 1960’s in the form of outdoor education programs for children (Sobel, 2016). In these early nature-based early childhood education programs, children incorporated natural elements into play and an appreciation and respect for nature became part of the philosophical framework. His idea of kindergarten is still very much alive in the nature-based education movement, but in many

American kindergartens, this idea has faded into desks, chairs, worksheets, and scripted curriculum, now making preschools the place for such holistic education experiences.

Many adults recall memories of their childhood, often recounting endless hours of play in the outdoors, but few include daily outdoor activities in description of their own children's day. Studies over time have documented the reduction in outdoor activity among children. In comparison to the 1970's, children spend 50% less time in unstructured outdoor activities, with more recent data showing that children only spend about 15-25 minutes per day in outdoor play and sports, with this time continuing to decline over the years as screen and media time for children steadily increases (Juster et al., 2014). Notably in the same era as we have seen a reduction in the amount of outdoor exposure and physical activity in children, we have also seen a decrease in measures of creative thinking (Kim, 2011) and increased concern in other areas of childhood development, such as obesity in the physical health domain and mental health in the social-emotional development domain (Gullone, 2000).

Although the integrated nature-immersive experience is perhaps the unique mediator in the present study, the philosophies of NPs encompass many elements thought to contribute to children's creative development. In addition to the fundamental nature-based immersive learning experiences in NPs, their noted play-based learning, student-directed, flow learning, and inquiry-based teaching have also been cited in literature as contributing to creative development of children (Larimore, 2011, Leggett, 2017).

### **Creativity in Education**

In the era of high-stakes testing in schools, many educational policy leaders have focused on the acquisition and regurgitation of surface level knowledge of children in schools. Student learning outcomes and teacher evaluations are often based on a single, final test score assessing

memorization of curriculum-based facts. Few school-based formal assessments allow students the freedom to display knowledge in creative project-based formats that show the application of factual knowledge or other non-traditional productions or expressions. Due to the pressures of high-stakes testing and mandated curriculum timelines, teachers are rarely given the time or space to develop lessons that incorporate and foster creative knowledge in children. Yet in the same era, creativity and innovation are at the forefront of wanted skills in modern industry. Those who study creativity in early education agree that creativity is now a necessary future-ready proficiency for the next generation of industry leaders in the technological era (Leggett, 2017). Csikszentmihalyi (2006) posits that originality and innovation are essential 21<sup>st</sup> century skills and necessary for the advancement of the industry of the new millennium. Low skill, procedural jobs, previously accounting for 95% of the workforce a century ago, will nearly all be automated in the near future, leaving jobs that require the next generation to be creative and innovative (Sawyer, 2019). Therefore, developing creativity in children is critical to their future success in a changing world.

Some educational leaders recognize the implications of an emphasis on simple knowledge acquisition in schools (Hargreaves, 2003), and realize that highlighting creative thinking develops individuality in children and strengthens their competence and sense of self. But what is creativity? Many people use the word creativity in their everyday conversations and upon first examination, think the concept to be very simplistic. Creativity is an abstract concept, not easily defined, and thus often difficult to foster and develop in children in formal education settings. The formal definition of creativity is associated with the ability to create a tangible outcome or product, the use of imagination, or thinking outside conventional norms (Sawyer, 2012). A key aspect of defining creativity is that it is unique from imitation. Reproducing a

product or idea is not in itself creative, though it may be considered a creation, so even by formal definition creativity is ill explained. Plucker and Beghetto's (2004) definition of creativity may be most applicable in that "creativity is the interplay between the ability and process by which an individual or group produces an outcome or product that is both novel and useful as defined within some social context" (p. 156), though this definition still only alludes to creativity within the context of creation and does not account for creative thinking independent of an outcome. In a meta-analysis, Baas, De Dreu, and Nijstad (2008) found measures of creativity to be divided into three domains: open-ended tasks or divergent thinking tasks, insight tasks that often have a single correct/expected answer, and creative performance tasks such as dance or storytelling. This definition broadens creativity to include non-tangible ideas and acts.

It was originally thought that creativity may be a personality trait or that only takes place in the right brain, making it seemingly exclusive to certain individuals. In the past, some thought creativity to be a mark of genius or perhaps more concerning, a mark of mental illness (Getzels & Jackson, 1962). These theories assume that creativity is a fixed trait and cannot be taught, which is now understood to be a narrow view point. While most acknowledge creativity as a cognitive process, it is not as related to intelligence as some may assume. As scores on measures of intelligence (IQ) have steadily risen over time, scores on measures of creativity have declined (Flynn, 1984, 2007; Kim, 2011), thus creativity is thought to be relatively independent of intelligence. Creative ability involves free association, fluid and divergent thinking, and problem-solving which has not been found to be mutually exclusive with intelligence (Runco, 1991), though other research studies have produced evidence of positive correlations between scores of creative thinking and certain measures of IQ (Getzels & Jackson, 1962; Sligh, Connors & Roskos-Ewoldson, 2005). When applied to education, some would say children are naturally



creative until the structure and conformity of school discourages creative expression, although this is a harsh assumption as this study will outline several elements of schools that can influence creative thinking. Educational researchers have only recently begun to study creativity and the development of creative thinking in school-age populations (Sawyer et al., 2003). Also, the examination of alternative education settings that emphasize philosophies relating to creative thinking, especially for young children is a fairly new area of research (Leggett, 2017).

Some of the first creativity researchers following the industrial age defined creativity as an outcome, under the criteria that the creation must be ‘novel and useful’ (Guilford, 1950; Gardner, 1988). In the early stages of the study of creativity in research, the final product was the measure, often only applied to the artistic and technological industries. It is now understood that creativity involves a tangible and cognitive processes, and researchers are beginning to examine how creativity is recognized and strengthened in formal educational settings (Sawyer, 2006). Contemporary research has focused on divergent thinking and problem-solving as processes necessary in creative thinking (Feldman, 1999), though studies of creative assessment would indicate these are partial aspects of the construct. Creativity now includes an examination of processes, influences, feedback, and iteration, though these processes can be difficult to formally measure.

Under Vygotsky’s (1930) Sociocultural Learning Theory, it is believed that children learn through social interactions with peers and adults, emphasizing the collaborative nature of learning in children. In keeping with this theory, collaboration and socialization are considered to be key factors when examining the context in which creativity forms and exists, being that creativity is defined in terms of social value (Sawyer, 2019). Researchers are beginning to understand how significant childhood relationships with peers and adults can influence the

development of creativity. Social contexts in which children are encouraged to share ideas and solve problems, aligned with appropriate adult scaffolding, can be influential in the creative processes of children (Carlile & Jordan, 2012; Cress & Holm, 2016; Sawyer, 2019). Creativity is now conceptualized more broadly as a complex combination of learning capacities, abilities, motivations, personality traits, and cognitive processes rather than a product-based construct (Runco, 2013). Those who study the development of creativity in children also recognize creativity not only as a cognitive or intellectual construct, but a process strengthened by emotional processing and imaginative play (Robinson, 2001). Thus, to develop creativity in children, educators must co-construct an environment conducive to creative thinking, and they must also teach using creative strategies (Jeffrey & Craft, 2004). To foster creativity, teachers should acknowledge and praise the creative process in the work and play of children in addition to the creative product, if applicable (Leggett, 2017). Praising creativity as a process, lessening the focus on the end product in education, is difficult with educational data often only focusing on measurable outcomes.

If educational policy leaders deem knowledge acquisition as the primary goal of educational attainment, teachers must examine how to best help their students learn and apply rote knowledge. Although, as learning scientists discover the ways in which people learn most effectively, active or experiential learning often comes to the forefront of pedagogical strategies necessary for deep learning of knowledge. Sternberg (2005) argues that procedural skills, analytics, and creative processing happen through active learning experiences. This implies that true learning for creativity happens through the active processes associated with social learning and application-based learning. If educators encourage creative thinking, outcomes should be

unique to the individual, though this poses a problem to the outcome standardization expectations of many schools.

More recently, education executives have recognized the importance of teaching for creativity in schools. In technologically advanced nations like China, the development of creativity is listed as one of the three most important skills in cross-curriculum standards to be developed across the lifespan (Curriculum Development Council, 2001). This school-based reform is particularly important for early education settings being that some researchers posit that the critical period for creativity development is between ages three and five (Gardner, 1993), with artistic ability peaking between ages four and six (Gardner, 1982). Others believe that a sensitive period for creative development occurs in the first ten years as children's neurological pathways for novel and divergent thought processes form in the brain (Eliot, 1999). Thus, it is perhaps most important for early-childhood educators to be well trained in how to recognize creativity in children, to utilize the pedagogical processes that foster and sustain creativity, and to create an environment in which creative potential is encouraged. Although, creativity in early childhood education is an area still lacking in research and creativity in this age of children is very ill defined. As referenced in research specifically in the area of early childhood education, creativity in young children is defined as involving "creative processes that develop through social interactions, play and the imagination. Creative thinking is a transformative activity that leads to new way of thinking and doing that are novel for the child or useful to children's communities." (Leggett, 2017: 851). Progressive educators must consider modern models of early education such as NPs which employ elements, cited in literature, as contributing to childhood creativity. NPs are thought to develop creative thinking through play-based, student-directed learning, amid educators trained in inquiry-based practices and teaching for creativity,

with a unique and centralized characteristic of integrated nature-immersive experiences (Larimore, 2011).

### **Play-Based Learning and Creativity**

Children's first indications of complex cognition are often expressed through play. Play is an important component of physical and cognitive development in children, which aligns with the philosophies of the American Academy of Pediatrics (2007) who recommend 60 minutes of active, open-ended play each day for school-age children. This organization posits that lack of unstructured playtime results in increases in depression and anxiety, which affect a child's clarity and readiness for thinking and learning. Proponents of active play in schools believe that outdoor, play-based learning is imperative to a child's physical, emotional, cognitive, social, and communicative development (Hong, Shaffer, & Han, 2017). Even with surmountable contradictory evidence that supports play-based learning in schools, many traditional schools have cut recess/play time for children in the past several years due to demands of measurable academic outcomes. These cuts have produced contradictory research studies that show children who have more recess/play time are found to be better behaved and show greater academic gains (Barros, Silver, & Stein, 2009). Educators may question where the push to eliminate outdoor play in schools originates when the argument for increased unstructured play time in nature is often supported by parents. Singer et al. (2008) conducted a survey and found that 95% of mothers expressed concerns about their children not experiencing enough experiential learning opportunities, free play, and nature exploration in the school curriculum. Piaget (1962) posited play to be crucial to the healthy development of children and believed it to contribute to a child's own knowledge creation about the world through exploration and discovery of their environment.

Although perhaps play is not alone linked to considerable gains in creativity, rather specific types of play including pretend play, imaginative play, and storytelling have been linked to outcomes in creativity (Fehr & Russ, 2016; Hoffman & Russ, 2016). Pretend play may involve utilization of regular objects for alternative use, acting out stories with various characters and plot lines, and creating alternate endings or solutions in play. Researchers have even conducted pretend play interventions for children and later studied creativity measure outcomes (Fehr & Russ, 2016; Hoffman & Russ, 2016). The affective and cognitive aspects of pretend play have produced connections to divergent thinking and found to be fairly independent of measures of intelligence in children (Hoffman & Russ, 2012). In a study examining pretend play and measures of divergent thinking, Russ et al. (1999) found children's play scores to be predictive of divergent thinking task scores at a 4 year follow up, showing that childhood play can be a basis for creative thinking in adulthood. Pretend play is common for children in NPs and other progressive early education settings. The play-based environment allows freedom in choosing and constructing play-based scenarios. From their observations of children in early education settings, Robson and Rowe (2012) found children's exploratory play with various materials and resources to be a strong context for creative thinking when referenced to their creative thinking framework. The researchers also found two contexts to be particularly impactful in supporting children's creative thinking: the outdoors and pretend play scenarios (Robson & Rowe, 2012), which are encompassed in the framework of NPs. The strongest indicators of creative thinking were observed when children engaged in socio dramatic play marked by children sharing in creating the play pretense and collaboratively negotiating the direction of play story lines. Although the Robson & Rowe's (2012) study provides meaningful support for education in the outdoors and collaborative pretend play, which are tenants of the NP

model, the study did not disaggregate data by school setting or philosophical approach, thus these results are difficult to generalize to a specific model of early education.

Storytelling, another version of pretend play, often remains one of the universal activities of children in nature-based education programs (Knight, 2013). The teacher may facilitate the beginning of a story and allow the children to fill in the main plot, ending, or to incorporate various characters and stimuli in the story. The stories are typically ongoing and span several days or may continuously be referenced throughout the school year. Storytelling can be viewed as an active product in childhood creative expression (Hoffman & Russ, 2016) or as a creative performance task (Baas, De Dreu & Nijstad, 2008). Hoffman and Russ (2012) found a relation in divergent thinking and storytelling by noting, in their study of children ages 5-10, that those who scored higher on the divergent thinking task tended to have stories rated as displaying more imagination, emotional expression, originality, and likeability.

Proponents of nature-based education programs and their pedagogy believe that outdoor, play-based learning is imperative to a child's physical, emotional, cognitive, social, and communicative development (Hong, Shaffer, & Han, 2017), however play was not always thought of a means of learning for children. Traditional early education models often dichotomized play and learning, assuming that formal learning could not be achieved through creative play (Vygotsky, 1930). The traditionalist assumption is that learning happens through direct teacher instruction and play is reserved for recess in schools, these processes being separate mediators in childhood development. Some early educators even argue that formal learning is superior to play-based learning (Nilsson, Fernholt, & Lecusay, 2018). In this theory, play may be seen as a means to attract children to an activity in which the teacher has embedded formal instructional goals rather than the play being a student-directed learning activity.

Educators who favor direct instruction may argue that formal learning happens only under the direction of the teacher and that formal cognitive processes cannot be activated through a child's self-directed, play-based learning. Many modern models of early childhood education have sought to bridge this dichotomy with the understanding that formal and informal childhood learning can both happen through play. Most educators now consider learning as an outcome of play rather than learning and play being separate factors of development. Children learn through engagement with the world around them, and seek to understand the world through play and exploration, thus the pedagogy for early education should focus on play as the intrinsic motivator of children (Nilsson, Fernholt, & Lecusay, 2018). Vygotsky (1930) originally thought play to be the basis for imagination, fantasy, and creativity, but believed this to be disconnected from formal academic learning, which is grounded in reality. Early educators now understand that creative formal learning can happen through a child's fantasy and imaginative play. Vygotsky (2004) would later revise his dichotomous theory of creative play and formal learning. He became convinced that formal learning can happen through imaginative and creative play in children, and that in order to foster creative learning, children must be free to explore their environments and use their imagination to create complex play scenarios. Through imaginative and pretend play, children creatively act out their impression of reality. The themes and story lines of a child's play can reflect a sophisticated understanding of human and environmental ecology, interpersonal social skills, emotional regulation, and narrative play. Abstract thinking is developed in pretend play as children give meanings to objects and processes other than their intended meaning or use. This type of divergent cognitive process is often marked as a measure of creativity in many formal assessments.

Open-ended play is crucial for children as they develop independence, self-esteem, and self-concept. If children feel too much constraint in their play, they are less likely to develop play scenarios that reflect imagination and creativity (Nilsson et al., 2018). Nature-based education leaders place a special emphasis on open-ended play, as they believe it promotes creativity through cooperative play, with its higher cognitive challenge for interacting with peers (Broadhead, 2004). Play-based learning encourages creativity through imaginative play and personal autonomy, as children interact and communicate in various play-based situations. There are often few constraints on time, space, and theme in the play-based learning of nature schools, which gives children freedom in decision making and expression of their creative spirits (Knight, 2013).

### **Self-Directed Learning and Creativity**

Many schools for creativity including NPs, emphasize student-directed learning and give students autonomy in many of their daily activities including how and with whom they engage. In early informal childhood education models, autonomy in play is often an important component of creative learning for children. It is alleged that student-directed play that is not directed by an adult or teacher encourages children to develop individualized logic process for the way the world works (Cheung & Leung, 2013). Understandably, learning in a natural setting gives students countless opportunities for free play, free thinking, and choice of activities. The student-directed philosophies of NPs allow children to explore their environment and try new activities. As they make choices, they evaluate their current status and are more intentional in choosing what comes next. When presented with a problem, creative individuals will use their environment as a source of ideas. “Once students have developed a list of quick and simple ideas, teachers can guide students to play with ways to combine these small ideas together to



result in deeper, bigger, and creative solutions that are based in creative knowledge.” (Sawyer, 2019: 25). Free choice and adaptability are key components of a creative learning environment, though many traditional teachers deem classroom management and control in alignment with teacher expectations to be more important than creativity (Cheung & Leung, 2013). Jeffrey and Craft (2004) state that a teacher’s pedagogies should be learner-inclusive and focus on passing control of learning to the students, which involves having students identify their own problems and reflecting upon their own thoughts. In a United Kingdom study focusing on observations of children’s activities in early education settings, Robson and Rowe (2012) used the Analysing Children’s Creative Thinking (ACCT) Framework to code the behaviors of children in reference to their expressions of creative thinking. The researchers found the most frequent behaviors in which children displayed creative thinking were when children were observed to try out ideas, imagine and hypothesize, analyze ideas, and involve others in play (as described in the ACCT Framework), all of which took place more often during child-initiated activities. The data supports the argument that child-initiated activities promote the greatest level of involvement for children and that students are more intrinsically motivated to participate and engage when they share ownership in the education environment (Robson & Rowe, 2012). While this is promising information for early childhood educators, the small sample size and lack of depth in observations limit the application of this study to specific early education models.

In NPs, much of the curriculum is emergent based on the interest of students. Teachers document these interests in the natural environment, share this documentation with other students and school stakeholders, and use this student feedback to drive curriculum development and the iterative process. Nature-based education proponents would agree that students are more likely to creatively engage in their learning when their interests are considered and explored

(Knight, 2013; Sobel, 2016). Teachers in such educational environments employ inquiry-based teaching to facilitate creative thinking and allow open exploration of the educational environment.

### **Creative Teaching and Teaching for Creativity**

Educational environments that intentionally do not emphasize formal curriculum standards and timelines may be called informal learning environments and often focus on alternative pedagogical strategies. Researchers in the area of motivation in education argue that, designing learning environments that give students more autonomy in curriculum-based decisions increases their motivation to engage more creatively in the associated educational activities (O'Brien & Murray, 2007). But the learning environment itself, while perhaps leaving space for exploratory learning, cannot foster creativity alone. Teachers often think of the child as the source of creativity in educational settings, but the teacher's role in developing and encouraging creativity in children is just as essential (Jeffrey & Craft, 2004). Leggett (2017) posits that teachers who seek to develop creative students may not fully understand their role as an educator who facilitates the creative process, models critical thinking, promotes inquiry, provides necessary prompts to stimuli, and provides scaffolding to children as they try new ideas and explore through play. This collaboration with the educator is an essential piece of encouraging the creative process in children. In an observational study of children's creative behaviors, Robson and Rowe (2012) found that children were much more likely to engage in new activities, an indicator of creative thinking in their framework, as a result of adult-direction/involvement, with the caveat that behavioral observations measures for creativity as used in this study with children are informal assessments of creative thinking. These observations, do however, underscore the important role that adults play in supporting child's

initial engagement in play activities. This study also determined that adult and child interactions impacted the way in which children conveyed their creative thinking. Although peer interactions may be equally as impactful in developing other areas of creativity, children were more receptive to ideas that would alter their thinking and engagement in activities when the prompt came from an adult rather than a peer. Teachers were also better able to foster speculative thinking in children, a definitive feature of inquiry-based teaching (Robson & Rowe, 2012).

Although collaboration is rarely imposed upon students in these informal early education environments, many times, collaboration is a naturally derived component of informal learning. When students are given free choice in educational stimuli, engaging with others becomes part of the way students make meaning out of the educational environment. The focus on inquiry and problem-based learning incites peer and teacher collaboration to creatively explore solutions to processes that exist in informal educational settings. The social interactions that take place in informal learning environments can often be more meaningful than the educational stimuli itself. Interactions are conversational, interactive, and occur as a result of embedded content in meaningful activities. Rogoff (2003) found that as children converse with adults and peers, they often adjust their means of communication in an effort to reach a mutual understanding and common beliefs of content specific to their worldview.

There is much that can be learned simply from observing and participating with peers in alignment with intentional educational prompts in informal learning scenarios (Rogoff, Callanan, Gutierrez & Erickson, 2016). When these interactions occur alongside situated content and scenarios, learners are able to truly experience their learning in context with teachers that can provide additional scaffolding. Differing levels of teacher scaffolding may be required to engage learners in meaningful, inquiry-based exercises that arise from student-directed, constructivist

practices. Much of the learning that takes place before a child starts formal schooling occurs in informal learning through social interactions, observations, and modeling from family, peers, and other members of a child's social community. This type of social learning under the guidance of an attentive teacher is essential to adaptive social development in early education settings. The role of the teacher in an informal learning environment is key to creative and meaningful learning as well, and does not have to be absent from formal learning targets. The pedagogical strategies of the teacher can help define a creative learning environment. If a teacher imposes too much structure even in an informal learning environment, such as in nature, this will impact the student's perception of creative freedom.

Modern learning science researchers have begun to study how teachers can teach creatively and use pedagogical approaches that encourage creativity in students. Sawyer (2019) posits that in order to teach for creativity, teachers must use what he calls *guided improvisation* which is a teaching strategy that gives students freedom to engage with curriculum content and find their own means of understanding. This is not to say, however, that teachers do not provide any structure in the learning process, but rather, they apply appropriate scaffolds when requested or when necessary to guide student learning without disrupting the creative process. Providing the appropriate amount of structure in teaching for creativity can be an art in itself. Researchers have found that when too much structure is imposed, creativity decreases, but providing teacher feedback in the creative process can be just as important as providing creative freedom (Sawyer, 2019). Sawyer (2019) outlines that in order to teach creatively, one must develop a creative mindset to teach for creativity by: building an environment of trust and safety, rewarding curiosity and exploration, guiding students in reflective awareness of thought patterns, giving students time to think and reflect, and encouraging risks, mistakes, and failure (Sawyer, 2019:

36). Much of teaching for creativity involves teachers setting the stage for creative learning and providing guidance along the way to sustain creativity in students. Creative learning can require more time for reflection and the iterative process, and the knowledge gained will be a deeper understanding of the material in an individualized manner. Teachers encourage creativity by building creative competence in their students which makes them more intrinsically motivated to pursue creative thought and processes in the future.

Teachers in NPs often guide students through problem-based learning scenarios. The natural environment provides problem scenarios for children, some even as simple as how to avoid a muddy track or cross over a fallen tree. Students must feel that they are safe to pursue creative solutions to problem-based learning scenarios with teacher support. Teachers may encourage group collaboration or the use of available resources to help children arrive at creative solutions while maintaining their autonomy and strengthening their sense of self-reliance. Teaching for creativity is intentional and requires the improvisation and guided structures of a skilled educator open to traveling with his/her students in the creative journey.

### **Creativity in Nature**

Many early education programs share an emphasis on creative development through student-directed, play-based learning, but perhaps no element of creativity is more unique to the NP model than the nature-immersive setting. Nature immersion is a definitive aspect of nature-based education programs with the assumption that humans feel a direct connection to nature and are drawn to engage in their environment, or what Wilson (1984) refers to as *biophilia*. In the past century, this connection to nature has rapidly changed, but the brain's affinity for nature may not have evolved as quickly. One must question, what impact does this diminished connection to nature have on the human brain and (creative) functioning? To answer this

question, the unique functions of the brain and cognitive processes that are activated by exposure to nature must be considered. Outdoor exposure in itself is associated with improvements in biological markers of stress, behavioral self-regulation, emotional affect, and neurological stress in children (Bratman et al., 2015; Kaplan, 1995; Kuo & Taylor, 2004; Kuo & Sullivan, 2001). With numerous studies showing the improvements in biological and neurological stress indicators as a result of time in nature, it is a likely conclusion that nature exposure can prune the brain for learning and creative thinking. Not to mention, nature as the classroom, challenges many of the traditionalist elements of school, and thus creates more opportunities for creativity in the school setting.

In a literature review assessing creativity in children, Davies et al. (2012) found the use of outdoor environments to be one of the identifying characteristics of school environments and conditions that are most effective in promoting the development of creative skills in children. The authors found reasonable evidence from multiple studies of creativity that taking students outside the classroom and into informal learning environments, especially natural environments in this case, can strengthen their creative development (Davies et al., 2012). This evidence suggests that exposure to nature and its elements can stimulate creativity in young people. Although the research directly assessing creativity as a result of nature immersion is limited, especially in young children, Atchley and colleagues (2012), have studied these phenomena in adults. Atchley, Strayer, and Atchley (2012) delivered a higher order cognitive task assessment to hikers at the beginning of a nature-immersion, technology forbidden, hiking trip, and those who were four days into the trip. The researchers found a performance increase of 50% on the problem solving, creativity task in the hiking group four days into their nature-immersive experience in comparison to the pre-test group. In combination, from a break in the use of

technology and the immersive experience in nature, the researchers attributed this increase in creative thinking to Attention Restoration Theory (ART) (Atchley, Strayer, & Atchley, 2012).

Attention-Restoration Theory (ART), popularized by Kaplan (1995), suggests that nature has restorative effects on the pre-frontal cortex, the executive attention system which fatigues with overuse. Kaplan believed that the modernization of society and the increase in technology strains our executive attention constantly. When applied to children's educational settings, spending time in nature can restore a child's ability to focus, and has been associated with increasing on task-behaviors and working memory capacity (Berto, 2005; Berman, Jonides & Kaplan, 2008). Bratman and colleagues are also attempting to pave the way for the study of impacts of nature exposure on cognition and emotional affect which are known to have a neurological basis and connection to cognitive processes (Bratman, Daily, Levy & Gross, 2015). Participants in this study were assigned to a nature or urban group and took a walk in their respective setting followed by cognitive performance tasks and affective questionnaires. The researchers analyzed differences in cognitive functioning as measured through various cognitive performance tasks and found increased performance for the nature group on a working memory task (OSPAN), which was part of the cognitive assessment battery. The researchers in the Bratman et al. (2015) study sought to provide evidence to support Stress Reduction Theory (SRT) which states that natural environments have a restorative impact on bodily and brain functions that are related to stress (i.e. heart rate, nervous system, neurotransmitter levels in the brain, etc.) (Ulrich, 1981). Both SRT and ART support the claim that interaction with natural environmental stimuli can have a positive impact on attention and stress levels, but the theories differ in their view of the mediator responsible for these changes (Bratman, Hamilton, & Daily, 2012). SRT theorists claim that reduction in stress levels allow for more intentional and

sustained concentration, while ART posits that a break in sustained, directed attention lowers stress levels (Kaplan, 1995; Ulrich, 1979). Regardless of which theory one aligns with, several researchers have spent their careers producing studies that support the claim that nature exposure is related to higher levels of positive affect, lower levels of stress, and increased capacity for sustained attention (Kaplan, 1995; Kuo & Taylor, 2004; Ulrich 1979). These studies provide compelling support for nature exposure in general, but are limited in scope when examining nature-immersive experiences for children in early education environments such as those in NPs. Although these studies have emphasized the impact of nature exposure on human cognition and functional biological markers, these outcomes have not been studied within the context of an educational environment, where children spend a great deal of time in their formative years.

### **Nature as a setting for creative development**

Aside from the biological and neurological basis advantages of nature exposure, there are other elements of the outdoor setting that contribute to creative development of children in NPs. In some pre-school classrooms, children are given very little unstructured play time with the pressures of formal, academic, school-readiness markers, which can limit the opportunities for collaborative and play-based learning in the traditional classroom. Unstructured, natural environments provoke curiosity among children and influence a child's desire to explore the innerworkings of nature processes with one another (Sobel, 2016). Because nature does not provide ready-made learning targets (or lessons designed for specific learning outcomes), children are empowered to use their imagination and creativity to make symbolic meaning of natural objects and engage in social interactions geared toward cooperative pretend play. Play materials in nature-based schools tend to be non-provisioned, natural objects which allow children to impose creative uses upon ordinary objects in spontaneous ways. In a recent study,



Leggett (2017) analyzed perceptions of creativity in early childhood educators and found that educators identified the outdoor/nature environment as one of the settings in which children are most creative. Teacher's perceptions indicated that nature provides children the setting, resources, and opportunities to create (Leggett, 2017), but the evidence is simply an assessment of perception and lacks empirical evidence to support the teacher beliefs.

Although some states now accept the nature school model as a valid and endorsed setting for primary education, including the state of Washington which now supports forest and nature schools with state funding, traditionalists in education would consider the outdoors to be an informal learning environment. In either case, nature as an informal learning environment is credited with many positive creativity-related educational outcomes for students. Not only does nature provide stimuli and situated learning that is often aligned with curriculum standards, but nature itself as a learning environment is known to have positive impacts on the motivation for learning and behavior expectations of schools (O'Brien & Murray, 2007). Nature-based experiences are said to allow students to engage in real world application of theoretical knowledge learned in the classroom, and presents students with situated problem-based learning opportunities which encourage critical problem-solving, informed decision making, and an emotional engagement with nature (Ballantyne & Uzzell, 1994). Nature provides the context for students to realize the value of solving real world problems, which may increase student inquiry, creativity, and motivation for exploration (O'Brien & Murray, 2007). Educational researchers have found positive correlations between outdoor activities and motivations for learning. Lai (1999) found that time in nature was shown to strengthen student's motivation for learning as a result of the student-centered approach, and student-teacher rapport was improved based on meaningful interactions stimulated by an alternative educational setting. Nature-based learning

provided students the freedom to expand their knowledge of topics typically covered in the classroom and broaden their perspective of the curriculum through active learning. Students reported academic gains that researchers associated with increased autonomy and student-centered learning (Lai, 1999) as a result of their educational environment.

### **Assessment of Creativity**

While some studies referenced in literature utilize self-reported or observational measures of creative thinking (Lai, 1999; Robeson & Rowe, 2012), this is not to discount more formal measures of creative thinking that exist. In the 1950's and 1960's, following the psychometric development of multiple measures of intelligence, researchers also sought to quantitatively assess creativity. This is due in part to the industrial revolution and the "brains race" (Sawyer, 2012) among developed nations to be on the forefront of technology and innovation. Recognizing creativity in young people became a priority as a means to recruit talented individuals to staff certain government projects and strengthen the emerging Science, Technology, Engineering, and Math (STEM) fields. In educational settings, creativity assessments began to be used in the identification of children for gifted and talented programs to theoretically prepare the next generation of innovative leaders. Experts in the field consider creativity to be a construct much like intelligence, though it has been much more difficult to develop a widely accepted measure of creativity, whereas there are several widely accepted measures of intelligence (Sawyer, 2012). Perhaps one reason for this is that there is not a general consensus on the factors that should be included in an assessment of creativity. Some of the first developers of creativity assessments explored personality characteristics or lifetime achievements associated with creativity (Torrance, 1962; Richards et al., 1988), but these measures did little to assess creative thought processes and creativity in younger populations.

Later, researchers began to use factor analysis and experimental research to determine assessable elements of creativity which often included ideational flexibility, fluency, or originality (Guilford, 1956). In the early stages of assessment of creative thinking, objectively scoring the assessment responses unveiled problems with reliability and arguably this problem still exists in many assessments thought to measure creativity (Sawyer, 2012). As the field of creativity assessment evolved, measures of Divergent Thinking (DT) came to the forefront as being strongly associated with creativity, and some would argue are predictive of lifetime creativity (Torrance, 1972; Runco, 2013). Divergent Thinking (DT) is the process of exploring many potential answers to a problem scenario which makes assessment of creative thinking fundamentally different from intelligence testing which most use convergent thinking to arrive at an expected answer. Guilford (1956) proposed that DT involved four more narrow abilities: fluency, flexibility, originality and elaboration. He studied these abilities among subjects of various ages and evaluated ideation responses in relation to ambiguous stimuli. Guilford's theories of DT would be adapted and used in the development of perhaps the most widely used assessment associated with creativity, the Torrance Tests of Creative Thinking (TTCT) (Torrance, 1966). Though some reject the TTCT as a strong, predictive test of creativity, rather more accurately a measure of DT (Baer, 1993), it is still a widely used assessment in creativity research due to acknowledged associations between DT and creative thinking. Subjective aspects of creativity like DT is part of what makes universal assessments of creativity so difficult to develop. Though most creativity researchers agree that strong DT skills can be a facet of creative ability, DT assessments should not be the only measure of creativity and is certainly not a single indicator. This is not to say that all assessments thought to measure creativity have no utility, but most creativity assessments only measure narrow creative abilities like fluency or

originality of ideas and are not comprehensive measures of creative thinking or creative production. Thus, the results of such assessments, especially those advertising a creativity index or composite, should be interpreted with care and assessment experts agree should be more accurately interpreted by subscores which define more narrow abilities associated with creativity (Treffinger, 1985). Tests of creative thinking, such as the TTCT, are recognized as measures that indicate one's creative potential at a point in time (Torrance, 1966).

Many adult assessments of creativity depend on self-reports of lifetime accomplishments and characteristics associated with creativity (Sawyer, 2012). These self-report measures have little relevance in assessing childhood creativity, especially with early education populations. Parent reports of children's creative thinking and behavior are considered to be more valid with early education populations, especially beginning at age four (Rimm et al., 1982). Experts in creativity assessment suggest using multiple measures of creativity to assess a full range of creativity indicators that may include self or parent reports, observations, formal assessments, teacher reports, interviews and other qualitative data (Sawyer, 2012). Examining multiple measures of creative thinking, including formal student assessments, parent rating scales, and a qualitative thematic analysis of teacher interviews and student and parent produced responses, the researcher can broaden how creativity is typically measured and interpreted. Such analyses can provide a more valid and holistic evaluation of creativity inclusive of various aspects of creative thinking mentioned in research (Sawyer, 2012), where single measures of creativity are lacking. To this end, examinations of creativity-based themes referenced in teacher interviews, children's drawings, and parent indications of indoor vs. outdoor play activities can serve to triangulate the formal quantitative creativity assessment data from children and parents.

## **Conclusion**

In summary, the philosophies of the NP model which include nature immersion, self-directed, play-based learning, and inquiry-based teaching (Larimore, 2011) are connected in the aforementioned literature to creative development in children. Little empirical research exists formally assessing creative thinking in early education settings, and the research is even more scarce in nontraditional early education settings like NPs. This study will seek to examine measures of creative thinking for children participating in a pilot NP program as a result of exposure to this education model triangulated by parent and teacher perspectives. This study aligns with Peter Gray's (2012) hypothesis as cited in (Sobel, 2016: 145), 'creativity is nurtured by freedom and stifled by the continuous monitoring, evaluation, adult-direction, and pressure to conform ...we are increasingly depriving children of free time outside of school to play, explore, be bored, overcome boredom, fail, overcome failure – that is, to do all that they must do in order to develop their full creative potential.' With growing generational concerns, this is a pivotal time in the analysis of child development and nature-based education environments that are believed to be conducive to creative development. These alternative early education environments thought to contribute to creative thinking need to be analyzed to determine their impact on this crucial element of contemporary child development and learning (Sobel, 2016).

## **Research Questions and Hypotheses**

Given the recent focus on fostering creative thinking in school-age populations and in response to the "creativity crisis" (Kim, 2011) in the pre-adolescent age group, the present study will seek to examine if school environment, specifically a nature-immersive, alternative early education environment impacts creative development in early education populations. Measures of creative thinking, using the Torrance Tests of Creative Thinking (Torrance, 1966, 2017),

parent ratings of children's creative characteristics using the Preschool and Kindergarten Interest Descriptor (PRIDE) (Rimm, 1981), and a thematic analysis of children's drawings, and parent reports of indoor and outdoor activities for children participating in a pilot NP program will be conducted prior to program start and after 13 weeks of exposure to the program. Thematic analysis of teacher interviews addressing program implementation considerations and parameters for creative teaching will also occur following the pilot NP program period. In prior studies, children's scores of creative thinking have shown steady increases until declines are indicated, at about 4<sup>th</sup> grade (Kim, 2011). Thus, in addition to exposure to an early education model thought to contribute to creativity, creative thinking is expected to increase significantly even over a short exposure period. Exposure to an educational environment that includes multiple philosophies and parameters shown in research to contribute to creative development will have a significantly positive impact on children's overall scores of creative thinking on the TTCT at posttest when compared to pretest scores. Further, given that the NP model emphasizes attention to detail and awareness of specific environmental elements through self-reflection and emergent curriculum, significant increases are expected in specific dimensions of creativity as a result of exposure to previously unknown nature-based stimuli in the educational environment. The following research questions will be addressed:

1. Are there significant differences in measures of children's creative thinking following participation in a pilot NP program as evidenced by overall Creativity Index composite and individual subscales of the Torrance Tests of Creative Thinking (TTCT)?

Hypothesis 1: Overall Creativity Index scores of the TTCT will increase significantly from pre to posttest and scores of the six subscales of *Fluency*, *Originality*, *Elaboration*, *Abstractness of Titles*, *Resistance to Premature Close*,

and the *Checklist of Creative Strengths* will show significant gains from pre to posttest.

2. Are there significant differences in parent ratings of children's creative characteristics on the Preschool and Kindergarten Interest Descriptor (PRIDE) from pre to posttest (after a 13-week exposure period) for children participating in a pilot NP program?

Hypothesis 2: There will be will be significant increases in parent ratings of children's creative characteristics from pre to post exposure to a pilot NP program on the PRIDE overall index and on each of the four dimensions of the PRIDE: *Many Interests, Independence/ Perseverance, Imagination/Playfulness, and Originality.*

3. What themes associated with creativity are present in children's drawings and parent reports of indoor vs. outdoor activities of children participating in a pilot NP program?
  - a. Children's drawings will be analyzed to identify themes associated with creativity. Differences in drawings from pre to posttest time periods will be assessed for thematic changes over time associated with creativity. While the thematic analysis may produce themes not directly referred to in the literature review, the researcher does expect themes aligned with the literature review of creativity in outdoor education settings to emerge in drawings consistent with nature-based education foundational philosophies.
  - b. Parent reports of children's indoor and outdoor activities will be analyzed to identify themes associated with creativity. Differences in parent reports from pre to posttest time periods will be assessed for thematic changes over time associated with creativity. While the thematic analysis may produce themes not directly

referred to in the literature review, the researcher does expect themes aligned with the literature review of creativity in outdoor education settings to emerge in reports of children's outdoor activities consistent with nature-based education foundational philosophies.

- 4) What creativity-based themes are present in teacher interviews addressing implementation considerations, creative learning, and teaching strategies in the nature-based education context?

Participating teachers will be interviewed via semi structured interviews at the conclusion of the pilot NP program period and asked about their experiences in the implementation of the program from an existing traditional preschool model. Implementation considerations will be analyzed to determine if they reveal new themes and/or support existing themes in this area (NAAEE, 2019). Teachers will also be asked to reflect upon their observations of creative learning, teaching strategies, and design of the educational environment in the context of nature versus the traditional preschool environment and their responses will be coded for themes related to creativity and teaching for creativity.



## **CHAPTER III: METHODS**

### **Nature Preschool Pilot (NP) Program Parameters and Description**

The research setting school has been operating as a licensed traditional preschool since 2016 (with affiliated after school and summer programs in operation since the early 1980's). The current curriculum and program philosophies of the school are consistent with traditional early childhood education methodology. Although students are given regular outdoor time in the current preschool program, the outdoor activities and facilities are highly structured and include built playground equipment, much in keeping with traditional recess playground design and activities. The preschool has an additional six acres surrounding the current playground (which will be used as the “outdoor classroom” and primary location for the NP program). The preschool program (prior to the pilot program) operates from 8:00 a.m. - 12:00 p.m., Monday – Friday with students spending approximately one hour per day outdoors (on the playground) in environmentally structured free play dependent on weather conditions.

While the 2020-2021 school year began for students in fall 2020, as the preschool staff prepared for the start of the NP pilot program in spring 2021, they were intentional to include less structured daily outdoor experiences and began to integrate nature elements and themes in projects, crafts, and storytime during the weeks leading up to the start of the pilot program. The present researcher and two preschool teachers co-facilitating the pilot NP program completed Level I training for the Nature Based Teacher Certification through the Eastern Regional Association of Forest and Nature Schools (ERAFANS), which focuses on implementation

considerations for early childhood educators wishing to start a nature-based early education program. While ERAFANS provides training regarding general guidelines of nature-based programs, there are no regulatory standards that must be met in order for a school to identify as a nature-based program, however programs should include a commitment to daily all-weather, nature-immersive experiences, emergent and inquiry-based learning, and the integration of nature themes and elements into the traditional early childhood education curriculum (Larimore, 2011; NAAEE, 2019).

The pilot NP program spanned 13 weeks beginning in February 2021 through April 2021 with time allotted for implementation considerations, marketing, recruitment, and preassessment (in relation to the current research) prior to the program, and debriefing, program evaluation, teacher interviews, and post assessment following the pilot period. As students returned from the mid-year holiday break, pretesting and pilot program orientation took place with parents and students in January 2021 and post-assessment and debriefing occurred just at the end of the preschool year in May 2021. The pilot program prepared the preschool to transition to a more integrated nature-based preschool model for the 2021-2022 school year. Much of the daily programming of the pilot program was emergent and based on student interest, in keeping with the philosophies of nature-based education (Sobel, 2016; Larimore, 2019).

**Wilderness Wednesdays** was a key component of the pilot program and the transition to an integrated NP model. Wilderness Wednesdays were complete nature immersion days during the pilot period and were facilitated by the present researcher, who was on site, full time on Wednesdays only, during the pilot period. On Wilderness Wednesdays, the students were entirely outdoors in nature immersive experiences for the four-hour school day, while on other days, students spent at least one hour per day in nature immersive experiences facilitated by the

trained preschool staff. The nature-based preschool pilot program included a commitment to at least 40% total nature immersive experiences in alignment with a 2017 study of NPs which found that, on average, 25% to 100% of the time is spent outdoors as a nature-based education program standard (Natural Start Alliance, 2017). The 40% nature immersion time was based on 20 hours per week of total school time, with one fully nature immersive day and at least one-hour nature immersion on other days for a total of eight hours of nature immersive time per week. Wilderness Wednesdays took place in the “outdoor classroom” of the school or in local parks and other community outdoor spaces. Activities on Wilderness Wednesdays were emergent based on student-interest, although nature provocations (teacher facilitated outdoor activities) were provided at times aligned with the *Coyote’s Guide to Connecting with Nature* (Young, Haas, & McGown, 2016) . Marketing of the Wilderness Wednesday program through social media and signage in the local community sought to increase enrollment of the preschool program being that there are very few other nature-based early education programs in the area.

### **Participants**

The participants were a convenience sample of students voluntarily participating in the pilot NP program at their current preschool, at least one parent or caregiver reporter for each child, and participating teachers. Although there are younger students attending the program, for the purposes of this research, only students ranging in ages from four to six were included to be consistently compared to kindergarten (grade level) norms on the TTCT and for validity purposes on the PRIDE. Accounting for exclusions and attrition, the final population included 13 student participants attending full time including on Wilderness Wednesdays, and range in age from four to six. One parent or caregiver reporter per child also results in the inclusion of approximately 13 parent participants. Two teacher participants were interviewed at the

conclusion of the program. Parents who did not wish to have their student participate in the research project and students who did not meet the age range of the study were still included in daily activities including Wilderness Wednesday programming, but they will not participate in study assessments or activities during the pre and post pilot period.

Being that the school serves a diverse group of children, demographic information was noted for the students, including race, gender, age, sibling information, and previous child care experiences. Socioeconomic status was not assessed in this study due to confidentiality concerns, though it should be noted that the preschool operates as a licensed childcare facility and some students enroll with government subsidized vouchers. Students are often educated in a mixed ability and age, whole group model which includes learning experiences with various peers and multiple educators throughout the day. This assumption controls for the variable of individual teacher pedagogy or curriculum approach.

**The research setting** currently operates as a traditional preschool in an urban area in the southeastern United States. While the preschool program specifically has been in operation since 2016, the school site has offered after school childcare and summer programming for more than 30 years. The preschool program includes two licensed classrooms serving ages two to three and ages four to six. For the purposes of this research, only students in the age four to six classroom were invited to participate in the study due to the grade level or age norms of quantitative assessments. While the preschool currently has a gated outdoor playground area, the additional six acres of property surrounding the school were used as the “beyond” space and outdoor classroom for the pilot NP program. Care was taken to preserve the natural elements of the area while adapting recommended components of nature-based early education environments (Larimore, 2011) and state preschool licensing requirements.

## **Procedure**

The present study utilized a mixed methods (QUAN(qual)), quasi-experimental, pretest-posttest, nonequivalent one group quantitative research design supported by a qualitative thematic analysis of teacher interviews, children's drawings, and written parent reports of children's activities in indoor and outdoor settings. While an analysis of changes in TTCT and PRIDE scores from pre to posttest served as primary quantitative data sources, a qualitative thematic analysis of teacher interviews, children's drawings, and parent reports of indoor and outdoor play activities served to further triangulate the quantitative assessment data provided by students and parents respectively. "The pretest-posttest, nonequivalent group design aids in checking the extent of group similarity, and the pretest scores may be used for statistical control or for generating gain scores" (Wiersma & Jurs, 2009; p. 169). This study utilized the nonequivalent design due to the use of an intact group of participants attending the research site school. When a control group cannot be easily included in such a design, the pretest scores provide a basis of comparison to determine effect of the independent variable (Wiersma & Jurs, 2009), which is exposure to pilot NP program, in this case.

In reference to research questions one and two, a quasi-experimental, one group pre-test, post-test design was used, accounting for a 13-week exposure period between subsequent administrations of the Torrance Tests of Creative Thinking (TTCT) with students and the Preschool and Kindergarten Interest Descriptor (PRIDE) with parents. Parents voluntarily agreed to participate and have their child participate in the research study which included a pre-assessment, parent report, and collection of qualitative data at the start of the school year and post assessment and follow up data collection after a 13-week exposure period to the pilot NP program. Parents were given the right to withdrawal at any point from the study.

Due to the use of an intact group and lack of random sampling or random assignment to treatment groups, quasi-experimental research is the most appropriate approach (Wiersma & Jurs, 2009). Parents of participating students were informed of the research study opportunity at a parent meeting prior to the start of the pilot program in winter, 2021 and provided a program flyer, a Frequently Asked Questions (FAQ) handout, and the parental consent form. In order for children to participate in the study, parents were asked to complete the consent form acknowledging that their child will be administered an individual assessment of the TTCT and prompted to draw pictures on two different occasions, and themselves agree to complete a background questionnaire and also a creative characteristics rating scale on their child at the same two time points. The first data collection period was at the beginning of the pilot program in January 2021 as a pre-test, and the follow-up posttest assessment occurred after 13-weeks of exposure to the pilot NP program in May 2021. The TTCT was administered to students individually given the limitations and personalized attention needed in assessing students of this age range. Each TTCT testing session lasted approximately 30-45 minutes total, administered in multiple sessions. Students were administered the TTCT-Figural Form A at pre-test and Form B at post-test to control for testing practice effects. The researcher, having had extensive scoring training to reach scoring reliability, scored the TTCT for each child at pre and posttest, receiving consultation from an expert scorer as needed. Results were analyzed for changes in overall Creativity Index and subscale scores for each child with matching their pre and post test scores.

To address the second research question, parents were asked to complete a creativity characteristics rating scale and screening inventory in reference to observations of their child's creative characteristics. The PRIDE inventory data was collected from parents at intervals coinciding with pre and posttest sessions of the TTCT, accounting for a 13-week exposure period

to pilot NP program. The PRIDE contains 50 items and completion time is estimated at about 20-30 minutes. Educational Assessment Services Inc. licenses the PRIDE inventory and provided scoring services. Results were analyzed for changes in overall PRIDE score, matching each pre and posttest score.

To complement the quantitative analyses described above, a qualitative thematic analysis was conducted on children's drawings and parent reports of children's indoor and outdoor activities. During the pretest data collection period, children were asked to draw what they like to do when indoors, and outdoors, in two separate pictures. Care was taken to provide gate questions to assess the child's understanding of the indoor vs. outdoor contexts before providing drawing prompts (see drawing worksheets in the appendices). The same drawing prompts were given to children during the posttest time frame. Parents were asked to describe in a few sentences what their child likes to do indoors, and outdoors, in two separate questions. The initial parent report of activities children like to do indoors and outdoors were included in the demographic questionnaire at the beginning of the study. Parents were asked to respond to the same questions at the posttest follow up when completing the second administration of the PRIDE. Children's drawings and parent reports were evaluated by the researcher for identification of themes associated with creativity. Thematic analysis included a qualitative examination of changes in drawings and reports of children's activities from pre to post exposure as well as an analysis of indoor vs. outdoor activities at each time frame respectively.

In reference to the fourth research question, a semi structured interview occurred with participating teachers following the pilot NP program period. Teachers were asked to reflect on the creative student learning, implementation process of the program, and teaching and environmental program parameters. An outline of interview questions is included in the

appendices. A thematic analysis was used to code the teacher interview responses for implementation considerations as it relates current NP literature (Larimore, 2019, NAAEE, 2019) and for creativity-based themes associated with student learning, teaching strategies, and classroom environmental design.

### **Assessment Instruments**

**The Torrance Tests of Creative Thinking (TTCT)** (Torrance, 1966) was originally developed by Paul Torrance partially in response to organizations seeking gifted and talented individuals with creative abilities in the workforce and to assist with the identification of specialized cognitive traits during the mid-20<sup>th</sup> century “brains race” (Kim, 2006). While the TTCT was never created to be an exhaustive assessment of creativity, and is acknowledged as only a partial indicator of creative ability or creative potential, the TTCT remains one of the most widely used creativity-based assessment in research and practice (Kim, 2006). The TTCT has been criticized for only measuring narrow creative abilities and many think of it simply as a test of divergent thinking, measuring an important, but single facet of creativity (Baer, 1993). In response to this criticism it may be helpful to note that while the assessment presents tasks of divergent thinking, the measure is scored on several elements of creative thinking assessing other factors of creativity other than just fluency, or the amount of divergent responses. The TTCT has been used in hundreds of studies of creative thinking and is widely recognized as a reliable test of divergent thinking, a primary indicator of creative thinking (Kim, 2006) and strong predictor of creative potential (Runco, 2013).

The TTCT has two portions, the Verbal and Figural, each having two parallel forms (A and B). Many studies utilizing the TTCT use either the Figural or the Verbal, with most using only the Figural portion due to the novel nature of the assessment (Treffinger, 1985; Kim, 2006,



2011). The TTCT-Verbal would not be appropriate for the present study given that it has not been normed on children younger than first grade and requires a high degree of verbal reception and expression, which is of concern with the current study population (Torrance, 1966, 2017). The TTCT-Figural was the primary instrument of the present study due to its content novelty, ease of administration, and regular norming with kindergarten age populations (Torrance, 1966, 2017). The TTCT-Figural has three tasks: Picture Construction, Picture Completion, and a Lines/Circles section each requiring 10 minutes for administration (Torrance, 1966). Scoring consists of six norm-referenced measures and thirteen criterion referenced measures. The overall Creativity Index composite is comprised of an average of five subscales: *Fluency*, *Originality*, *Elaboration*, *Abstractness of Titles*, and *Resistance to Premature Closure* (Torrance, 2017) with an added sixth subscale, the *Checklist of Creative Strengths* score. The *Fluency* subscale measures the number of relevant ideas and is scored on the basis of a complete, logical idea. *Fluency* is the gatekeeper score and other subscale scores are not accounted for in productions that are not considered fluent. *Originality* is a measure of the uniqueness of an idea and is scored against a list of the most frequent responses according to the normative data. Responses that appear more than 95% of the time in normative data sets are not scored for originality. *Elaboration* is scored as the number of added details and development of ideas that are in addition to the basic information needed to formulate the idea. The score of *Abstractness of Titles* is based on the abstractness of thought behind a title and accounts for those that have deeper meaning other than a concrete title of what is depicted. *Resistance to Premature Closure* assumes that humans are drawn to complete or close open figures in the most logical way. This subscale measures how resistant one is to this closure and the ability to keep an open mind in leaving the stimulus open as part of a greater image. The five subscales mentioned are then

scored, standardized, and averaged. The sixth subscale, the *Checklist of Creative Strengths* includes 13 possible elements of scoring that are added to the average standard score of the above subscales and account for additional displays of creative thinking not accounted for in the above scales. Examples of the checklist categories include emotional expressiveness or depiction of emotion in drawings, elements of humor, unusual visualizations or indications of unique visual perspectives, and elements of fantasy, among others. The frequency of these checklist elements are scored, standardized, and the resulting total is added to the average scores of the first five subscales. These scores are combined into an overall Creativity Index score which can be compared to both age and grade level norms.

Although the assessment format has remained generally the same over the years, the scoring system has undergone multiple revisions and data has been re-normed multiple times since its development in 1966, most recently in 2017 (Kim, 2006; Torrance, 2017). The TTCT has two versions, the TTCT-Figural and the TTCT-Verbal, though the TTCT-Figural, which has been normed on kindergarten age subjects, will be the primary instrument of this study given the age range of participants (Torrance, 2017). According to the TTCT-Figural Manual of 2017, the most recent norming sample included over 60,000 students from 35 states in the United States. The interrater reliability estimates are said to be between .86 and .95. Researchers have concluded that considering the complex nature of creative thinking assessments, the TTCT is thought to have reasonable reliability for research and group assessment purposes (Treffinger, 1985). One of the greatest accolades of the TTCT is the claim of strong predictive validity as the result of longitudinal studies with the same study participants. In Torrance's 1972 study, he assessed previous high school students at a 7-year follow up and found that three of the TTCT subscale scores (Fluency, Flexibility, and Originality) were better predictors of adult creative

achievement than IQ (Kim, 2006). Compelling evidence for the content, construct, and predictive validity is also presented by Torrance in a research review of the TTCT (Torrance, 2000). Although there are some critiques of the TTCT, as there are with several formal measures of complex cognitive constructs, many researchers recognize the TTCT-Figural in particular for its ease of administration, years of extensive development, standardized, large normative samples, and limited gender, race, cultural or socioeconomic bias (Torrance, 2000; Treffinger, 1985). Multiple researchers have examined test bias associated with the TTCT and have found no significant differences in performance with regard to race, gender, socioeconomic, or rural/urban geographic categories, and thus the TTCT is thought to be unbiased in relation to underrepresented populations (Torrance, 1971; Voss, 1997; Kim, 2006). Some states in the U.S. have even used the TTCT as a way to broaden the identification measures for gifted and talented programs which has allowed for greater inclusiveness of underrepresented populations originally excluded based on other biased cognitive measures (Kim & Zabelina, 2015). For the purposes of this study, the TTCT-Figural is said to be useful in understanding the function and development of the human mind and in evaluation of educational programming, curriculum, materials, and pedagogical approaches (Kim, 2006).

**The PReschool and Kindergarten Interest DEscriptor (PRIDE)** (Rimm, 1983) is a parent rating scale created to address the need for a creativity screening tool with preschool age populations. The PRIDE was preceded in development by the Group Inventory for Finding Creative Talent (GIFT) and the Group Inventory for Finding Interests (GIFFI I and II) (Rimm et al., 1982). The GIFT was found to have inadequate reliability at the preschool and kindergarten level and thus the PRIDE was created as a parent inventory grounded in the research of creativity characteristics of the 1970's, which included Torrance's research, as he worked to popularize the

TTCT at that time (Rimm et al., 1982). The PRIDE has been shown to have an internal reliability coefficient of .92 and is said to have strong content and criterion validity based on factor analysis research of creativity characteristics at the time, and through validation studies with educators trained in creativity in various U.S. states (Rimm, 1984). The PRIDE is part of a series of creativity inventories which includes the GIFFI I and II, used with different age populations, that “now have been validated for several U.S. mixed race populations including urban, suburban, and rural communities in Wisconsin, Texas, Illinois, New York state, and in Australia” (Rimm, 1984; pg. 185). “PRIDE is an easy to administer, reliable, and valid instrument designed primarily for use in screening preschool and kindergarten children for programs of the creatively gifted” (Hafenstein et al., 1999; pg. 13). While giftedness may not be the specific outcome in question, the PRIDE is noted as an appropriate creativity screening tool for preschool age populations which is recognized as a pivotal time frame in identification and development of creativity characteristics (Pfeiffer, 2001). The PRIDE is a suitable “measuring instrument for identifying highly creative children as well as an appropriate approach to heightening parent awareness about characteristics of creativity.” (Rimm, 2002; pg. 9)

The PRIDE is formatted to provide creativity characteristic scenarios and parents respond in a Likert scale which spans: No, To a Small Extent, Average, More than Average, and Definitely. The PRIDE results in a total score and four dimension scores. The dimensions of the PRIDE are defined as *Many Interests*, *Independence/Perseverance*, *Imagination/Playfulness*, and *Originality*. *Many Interests* is defined as whether the child is curious and asks questions, show a high interest in learning, stories, books and other play materials. Low scorers in *Many Interests* usually have less curiosity and less diverse interests. *Independence/ Perseverance* is defined by the tendency for children to play alone and act independently. Children with higher scores in

this subscale do not give up easily and persevere with difficult tasks. Low scorers in *Independence/Perseverance* are more likely to follow the lead of other children and prefer easier tasks. The *Imagination* dimension is defined by children who show more humor and playfulness and are more likely to participate in pretend or sociodramatic play. Low scorers in *Imagination* tend to be more serious and realistic and have a difficult time participating in pretend play scenarios. The *Originality* dimension is defined by a child having unusual ideas and asking unusual questions. Children with high originality scores typically are more inventive in their art and play, and tend to think differently than the norm. Low scorers in *Originality* usually display common and more typical ideas and artwork (Rimm, 2002). Sample items and dimensions of the PRIDE are described in *Table 1*.

Sample Items for Dimensions of PRIDE	
Dimension	Item
<b>Many Interests</b> — High scorers are curious and ask questions. They show high interest in learning, stories, books, and things around them. Low scorers show less curiosity and have fewer interests.	My child seems to like to think about ideas.
	My child likes to take things apart to see how they work.
	My child gets very interested in things around her/him.
	My child likes to try new things.
<b>Independence-Perseverance</b> — High scorers play alone and do things independently. They do not give up easily and persevere even with difficult tasks. Low scorers tend to prefer easier tasks and are more likely to follow the lead of other children.	My child gets interested in things for a long time.
	*My child gets bored easily.
	*My child usually does whatever other children do.
<b>Imagination-Playfulness</b> — High scorers enjoy make-believe, humor, and playfulness. Low scorers tend to be more serious and realistic.	My child likes to pick his/her own clothes to wear to school.
	My child spends much time playing make-believe.
	My child and I make jokes together.
	My child likes to play out in the rain.
<b>Originality</b> — High scorers tend to have unusual ideas and ask unusual questions. They are inventive in their art and play and tend to think differently than other children. Low scorer's ideas and art work appear to be more typical of children of similar age.	My child often says things that are funny.
	My child asks unusual questions.
	My child has unusual ideas.
	My child seems to do things differently than other children.
	My child often points to unusual things around her/him.

\*Negatively scored.

*Table 1.* Sample Items for Dimensions of PRIDE (Rimm, 1984).

**Children's drawings and parent reports of children's activities** in indoor and outdoor settings served as supporting qualitative data and were collected at pre and posttest time frames. This qualitative data from students and parents served to triangulate the quantitative creativity assessment data of students and parents respectively. The student's drawing prompt worksheet and the demographic questionnaire form, including the parent questions assessing children's creativity in indoor vs. outdoor settings, is contained in the appendices. As the use of self-report creativity questionnaires has often been found unreliable for preschool and kindergarten populations (Rimm, 1984), informal assessment of children through drawings and parent reports of children's creative characteristics will serve to supplement quantitative formal assessment data in this study. While parent reports may always have a bias limitation, parents are thought to be reliable observers and reporters of children's behaviors in reference to creativity, especially beginning at age four (Hafenstein et al., 1999). Children's drawings are recognized as reasonably reliable expressions of children's thoughts, and drawings have been associated with expression and evaluation of childhood creativity in other research studies (Wei & Dzung, 2013). Assessment of children's drawings has also been noted as one of the most culturally conscious forms of creative evaluation of children (Chakroun & Safieh, 2012).

In this study, the investigator will introduce the drawing task by providing the child with two pieces of paper and a #2 pencil. The investigator will say:

"I would like to know about things children like to do indoors and outdoors."

"Can you tell me the difference between indoors and outdoors?"

Thank you.

"Now, can you draw me something you like to do when you are indoors on this paper?"

You can draw anything you like to do while inside"

“Thank you. Can you tell me about what you drew?”

“Now, can you draw me something you like to do when you are outdoors on this paper?”

You can draw anything you like to do while outside”

“Thank you. Can you tell me about what you drew?”

The drawing task was administered at the pre and posttest times frames and was conducted over multiple sessions in combination with the TTCT assessments. The children’s drawings were then analyzed with their parent’s written questionnaire responses of their child’s activities in each context from consistent data collection periods (see appendices for full questionnaire) to examine for emerging themes. By asking children and parents respectively to simply draw and describe activities in indoor and outdoor settings, as opposed to directly asking about creative activities or abilities allows for free expression of ideas related to activities in these settings specifically, and is not dependent on a parent or child’s understanding of creativity or creative expression, which is difficult to define and assess in young children (Leggett, 2017).

**Semi structured teacher interviews** were used to further triangulate the study data and were conducted at the conclusion of the pilot NP program period. Teachers were asked to reflect on creative student learning, the implementation process of the program, and teaching and environmental program parameters. A thematic analysis was also used to code the teacher interview responses for implementation considerations as it relates current NP literature (Larimore, 2019, NAAEE, 2019) and for creativity-based themes associated with student learning, teaching strategies and classroom environmental design. Semi structured interviews are often analyzed with thematic analysis, especially when the interview relates to the respondent’s experiences in the context of the research study. Qualitative semi-structured interviews can be used to consider experience, meanings and the reality of participants’

experiences as they can be used to explore how these experiences, realities and meanings might be primed by assumptions or ideas which exist in society (Braun & Clarke, 2006). The teacher interview question guide is included in the appendices.

### **Ethical Considerations**

The study parameters were submitted for approval of the Institutional Review Board (IRB) at the University of North Carolina, Chapel Hill. The study adhered to FERPA guidelines and confidentiality measures required for conducting research with human subjects with special consideration for minor age participants. Parents of children were notified of the assessment process used in the study and were asked to grant documented consent for inclusion of their child in the research study. Parents were informed of the right to withdrawal from the study at any time. Child participants were administered the TTCT and asked to produce drawings of indoor and outdoor activities on two different occasions, at pre-exposure prior to the start of the pilot program and after a 13-week exposure period. Parents were asked to complete the PRIDE inventory at both pre and posttest time periods as well as be providing brief descriptions of activities their children like to do in indoor and outdoor settings. Debriefing in regards to assessment utility and study objectives with parents occurred following the conclusion of data collection. Data reporting summaries did not include personally identifying data and all participants' scores and study information was coded in alignment with FERPA to protect confidentiality in the data analysis and reporting process. Parent and student data were linked and coded consistently to allow for comparison across data collection time periods. Data analysis included overall Creative Index and subscale scores of the TTCT, parent reports of child characteristics on the overall PRIDE index and subscales, teacher interviews, student drawings, and parent reports of children's indoor and outdoor activities of the sample. Specific



information that may identify the school or individual participants remain confidential and was not included in study reports and discussions. Data was stored by the principal researcher on a platform that requires password entry and two-step identity verification.

### **Data Analysis**

Quantitative data was examined at both pre and posttest using the statistical program, SPSS. Being that paired individual scores can be compared from pretest to posttest, the present study utilized paired-samples t test, one tail analysis for the first and second research questions examining changes in scores on the TTCT and the PRIDE respectively.

The first research question “Are there significant differences in measures of children’s creative thinking following participation in a pilot NP program as evidenced by overall Creativity Index composite and individual subscales of the Torrance Tests of Creative Thinking (TTCT)?” examined overall Creativity Index (CI) scores and individual subtest scores. CI and individual subscales scores were compared for individual students from pre to posttest to analyze for statistically significant differences in association with exposure to a pilot NP program. Data reporting included a summary of overall change of mean scores of the group and an analysis of significance. Results were hypothesized to indicate a significant increase in Creativity Index scores as a result of exposure to the pilot NP program reflecting the unique philosophies and environment of this educational model. Subscale scores across the six domains of creative thinking included on the TTCT were analyzed for statistically significant changes from pre to posttest. Data analysis determined if there were particular subscales that show significant increases for the participant group as a whole. Results were hypothesized to indicate increases on all six subscales of the TTCT. The NP model encourages open exploration, collaborative

play, reflection, and environmental awareness and was hypothesized to contribute to growth in these subscales of creative thinking.

Research question two, “Are there significant differences in parent ratings of children’s creative characteristics on the Preschool and Kindergarten Interest Descriptor (PRIDE) from pre to posttest (after a 13-week exposure period) for children participating in a pilot NP program?” examined overall PRIDE inventory scores as reported by parents. The overall PRIDE index and subdimension scores were compared from pre to posttest for individual students to analyze for statistically significant differences in association with exposure to the pilot NP program. Results were expected to indicate significant increases in scores from pre to posttest as evidenced by parent’s indications of creative characteristics in their children after exposure to this education model. An analysis examining changes in each of the four dimensions of the PRIDE: *Many Interests*, *Independence/Perseverance*, *Imagination/Playfulness*, and *Originality*, was conducted to assess for significant increases for the participant group as a whole. Data analysis determined if there are particular subscales that showed significant increases for the participant group as a whole.

Research question three, “What themes associated with creativity are present in children’s drawings and parent reports of indoor vs. outdoor play activities of children participating in a pilot NP program?” utilized a qualitative thematic analysis of children’s drawings in conjunction with parent written reports of play activities. Researcher interpreted themes will be gathered from coding of parent reports and student drawings using a thematic analysis approach. The present researcher will be especially interested in themes related to creative development in early childhood education.

Research question four, “What creativity-based themes are present in teacher interviews addressing implementation considerations, creative learning, and teaching strategies in the nature-based education context?” also utilized a qualitative thematic analysis approach to analyze semi structured interview responses from participating teachers. Interviews occurred at the conclusion of the nature-based pilot program. Teachers were asked to reflect on the creative learning of students, implementation process of the program, and teaching and environmental program parameters. A thematic analysis was used to code the teacher interview responses for implementation considerations as it relates current NP related literature (Larimore, 2019, NAAEE, 2019) and for creativity-based themes associated with teaching strategies and classroom environmental design.

The goal of this data analysis was not aimed at producing a theory, as in grounded theory research, but rather to examine emerging themes as indicated in student drawings and parent questionnaire responses. Qualitative generic thematic analysis should “be contiguous with the positions and assumptions that led to the research question, it is only through these elements that a study may be evaluated” (Caelli, Ray, & Mill, 2003). The foundational research of children’s creativity in outdoor educational environments included in the literature review allows for a basis of relatability to teacher, student, and parent responses. The researcher evaluated teacher interviews, children’s drawings, and parent reports through thematic analysis which allowed for free and rich interpretation of expressions of participants. Thematic analysis, as developed by Braun and Clarke (2006), allows the researcher to initiate inquiry toward the meaning of the experience of program implementation and teaching parameters with teacher participants and creativity in indoor vs. outdoor settings as indicated in children and parent responses without imposing implied themes.

While there is no specific data analysis process for a qualitative thematic analysis, Braun and Clarke (2006; p. 87) suggest the following procedural steps:

1. Familiarizing yourself with the data
2. Generate initial codes
3. Search for themes
4. Review themes
5. Define and name themes
6. Produce the report

It was expected that data collection from the qualitative thematic analysis and the quantitative analysis would allow for a comprehensive foundation of understanding of creativity in these contexts, supporting themes from prior research (Aronson, 1994) with regard to exposure to a pilot NP program and the development of children's creative thinking.

### **Significance of the Study**

Results of the present study may provide evidence to support the claim of creative development associated with the NP model, an alternative, nature-based, early education model. While the literature (Larimore, 2011, Knight, 2013, Sobel, 2016) alludes to other positive developmental outcomes of this model, there are few studies which provide empirical evidence to support the claims of formal learning objectives in such environments. Educators and parents may find the evidence of the present study compelling in their examination of non-traditional education environments that contribute to creative thinking and other higher order thinking skills for children. In addition, although creativity has been brought to the forefront of necessary skills of the next generation of children, educators are often unaware of their role in fostering creativity in their students and creating classroom environments that contribute to creative development (Leggett, 2017). Research that examines educational environments consistent with gains in creative development can provide useful pedagogical considerations for the professional development of educators. As the field of school psychology should be inclusive of all research

that relates to the holistic development of children in all school-based contexts, educators and student support staff may find the evaluation of creativity in association with nature-based education relevant to child development from a strength based and positive psychology perspective.

## CHAPTER IV: RESULTS

### Participants

The participants in this study consisted of a convenience sample of students attending a preschool that served as the research site. Students between the ages of four and six who had signed parental consent to participate in the study, included 13 children with an average age of 4 years, 11 months at the start of the program. Each student was represented by one parent participant who completed the parent components. Also, two teachers participated in the teacher interview component.

In examining demographic information for child participants, there were six boys and seven girls and in terms of racial and ethnic make-up as reported by the parents of students, nine were White/Caucasian, two were multi-racial, and two were Black/African American. Hispanic ethnicity was reported for two students. Parents reported that six of students previously attended another childcare program prior to their enrollment in the research site school, though none indicated that the previous program included nature-based education elements or any other specialized curriculum or pedagogical framework (Montessori, for example). This indicated there was not a need for disaggregation of student data by previous childcare setting as there was no indication that previous childcare experiences would have a significant impact on initial creative thinking assessment data. Socioeconomic data was not collected from participants for confidentiality purposes, but there is not believed to be significant heterogeneity among

participants in economic status. Parent demographic data was not specifically collected, though in terms of racial and ethnic demographics, is believed to be roughly reflective of student data.

The two teachers participating in the interview portions of the research study were both employed with the research site school for more than 12 years and are co-directors of the school. Both teachers have an Associate's Degree in Early Childhood Education and meet the certification requirements to operate a licensed childcare facility in the state of North Carolina. Both indicated that they are White/Caucasian females in the 30-35 year age bracket. One of the teachers was previously employed as a public school Kindergarten teacher, while the other has been employed at the research site school for the entirety of her career.

## **Program Parameters**

### *Program Schedule*

The pilot NP program developed for this study was defined by the implementation of daily nature immersive experiences (at least one hour each day) and a completely nature immersive day (Wilderness Wednesday). Each preschool day was 4 hours (8:00-12:00), which accounted for a total weekly nature immersive time of eight hours per week or 40% of their weekly schedule (based on a 20 hour week). This is aligned with a 2017 study of U.S. forest kindergartens and NPs which concluded that of the programs surveyed, the total time spent outdoors in nature immersive experiences was at least 25% of the school day or week (NAAEE, 2017). In this case, nature immersive time was defined by opportunities for experiences in natural settings where there were generally no defined boundaries (i.e., playground fencing) and no built equipment (i.e., playground structures) in order to allow for free play in natural, "wilderness" environments. Effort was also made to incorporate a more nature inspired curriculum into their regular centers time (i.e., learning the parts of a plant) and to use nature

objects when teaching school-based concepts (counting rocks or acorns rather than plastic chips or marbles, for example).

The pilot NP program spanned a 13 week exposure period. Students were given pre-assessments prior to the start of the program in January, 2021 with the program beginning on February 1, 2021 and concluding on April 30, 2021. Students were administered post assessments in May, 2021. While effort was made to allow for flexibility of student interest in the daily schedule of the program, particularly on Wilderness Wednesdays, a general schedule guideline is contained in the appendices.

#### *Pilot Program Environment*

The majority of the nature immersive experiences occurred in the “beyond” space in an uncleared six acre area beyond the fencing of the site’s built playground area. A small section of this acreage was cleared for an “outdoor classroom” area which featured a circled seating area for gatherings, made from natural elements within that environment. This area was used for morning meetings on Wilderness Wednesdays and also for debriefing time at the end of the day. Wilderness Wednesday experiences also included visits to local farms and community natural areas for hikes. Effort was made not to include man-made structures or materials in this environment as to allow for exploration of natural objects and to encourage creative play with objects that may not have an intended use in play.

#### *Program Curriculum*

There was no strict, outlined curriculum associated with the program, rather the learning objectives were emergent based on student interests. Emergent curriculum is a philosophy of teaching and a way of planning early education curriculum in this case that focuses on flow learning centered around the interests of students. The general philosophies of the program and



teacher facilitated activities were aligned with the *Coyote's Guide for Connecting with Nature* (Young, Haas, & McGown, 2016) and were meant to create meaningful learning experiences for children. As students explored the environment, learning targets were developed and regularly referenced for iteration. For example, as the students explored the creek in the natural area, they began to experiment with putting different objects in the water to observe if they sank or floated. Thus, a follow up lesson plan was developed in which teachers presented different natural objects and the students formed hypotheses about whether the objects would sink or float. Teachers then debriefed with the students and discussed characteristics of the objects that floated and sank and the class developed some generalizable observations (i.e., smaller, heavier objects tended to sink more often than larger, lighter objects). This later evolved into exploration and discussion surrounding the differences in characteristics between objects found in still water versus moving water.

### *Program Pedagogy*

To guide their pedagogical approach, each teacher (including the researcher) affiliated with the program completed a 6 week, 12 session Nature-Based Teacher Certification course. This course was offered through the Eastern Regional Association of Forest and Nature Schools (ERAFANS). Teachers implemented an inquiry-based approach to pedagogy as part of the pilot NP program. Students were encouraged to explore and ask questions relating to their discoveries, though instead of using a direct instruction approach, teachers often helped students formulate meaningful questions and facilitated student leadership in exploring answers. For example, in reference to the sink or float lesson mentioned earlier, if a student asked why an object sinks, rather than directly answering the question, the teacher might ask the student, “What do you notice about the objects that sank?” An inquiry based approach puts the teacher in

a facilitative role and empowers students to formulate hypotheses and engage in learning more about their topic of interest in order to find answers to their own questions. Inquiry based educational environments support collaborative and experiential learning in an effort to make students aware of the multitude of resources available for learning. There were few rules imposed on students in the outdoor environment but their general guideline was that before taking any action they should think about three questions relating to what they are doing: Could I hurt myself?, Could I hurt someone else?, or Could I hurt something in nature? If the students could answer no to all of those questions, then they were generally free to act. Students were encouraged to process these three guiding principles with one another while playing. This helped them process and interpret personal risk, risk through the perspective of others, and risk to nature elements.

The two teachers of the school facilitated the program during the week with the researcher being present and contributing to the implementation of the program every Wilderness Wednesday, the fully nature immersive day.

### **Analysis for Research Question 1**

#### *Torrance Tests of Creative Thinking (TTCT)*

The TTCT is the most commonly used test in educational and psychological settings and in research to measure creative potential (Torrance, 1990). Many creativity researchers report that creativity measures like the TTCT adequately assess divergent thinking ability and are a strong predictor of adult creative abilities (Torrance, 1972; Runco, 2013). The TTCT was selected as the instrument of use with students in the present study for its ease of administration with younger populations with limited verbal and written abilities, and for the norming of scoring with Kindergarten age populations.

The TTCT has two versions of administration, Verbal and Figural. In this study, the Figural version only was used due to perceived verbal limitations of young children. There are two forms, Form A which was administered during the pre-program data collection period and Form B which was used post-program to control for test retest bias due to a short exposure period. There are three subtests in each form, with each subtest requiring a 10 minute administration period. Students were administered each subtest of the TTCT individually during a centers rotation time in their school day. The centers rotation allowed for students to complete one subtest during each session, thus TTCT testing was completed with each child in three sessions over multiple days. Although this measure can be administered in a group format, individual administrations were necessary due to limited written language abilities and the need of students to provide titles verbally which the researcher then transcribed beside each drawing. Once the students completed a drawing, the researcher would ask, “What title do you want to give this drawing?”

The test yields seven scores: Fluency, Originality, Elaboration, Abstractness of Titles, Resistance to Premature Closure, Checklist of Creative Strengths, and an overall Creativity Index. “Fluency” refers to the total number of responses generated. “Originality” refers to the uniqueness or novelty of the response on the basis of normative data. “Elaboration” consists of the presentation of detail in the picture. “Abstractness of Titles” refers to the ability of the title to capture the essential elements of the picture rather than a mere description of elements in the picture. “Resistance to Premature Closure” refers to the extent to which pictures are developed by using a straight or a simple curved line to close open areas of the figure with the most direct action. The “Checklist of Creative Strengths” examines 13 areas of creative indicators that are less frequently included in response drawings and the scores for the checklist are treated as a

bonus score that is added to the average of the aforementioned subscales (Torrance, Ball, & Safter, 1992). The “Creativity Index” is calculated from the average of the five subscales with the addition of the number of items from the sixth scale, the Checklist of Creative Strengths to derive a total score.

Statistical analysis of the TTCT was conducted using paired samples t-tests with the SPSS software program. Data was organized on the basis of each student participant with collection and pairing of pre and post data for each component of the TTCT. Raw scores for each subscale of the TTCT were converted to standard scores using the administration and scoring guide (Torrance, 2017). The converted standard scores for all subscales, the Checklist of Creative Strengths, and the total Creativity Index were used when conducting analyses. A significance level of  $p < .05$  was used in analyses.

#### *TTCT Results*

The first research question tested was: Are there significant differences in measures of children’s creative thinking following participation in a pilot NP program as evidenced by the overall Creativity Index composite and individual subscale scores of the Torrance Tests of Creative Thinking (TTCT)?

A table summarizing the paired samples t-test results for each subscale of the TTCT, the Checklist of Creative Strengths and the overall Creativity Index is displayed below (*Table 2*). All mean TTCT scale scores are reported in Standard Scores (SS) converted from raw scores using the TTCT manual (Torrance, 2017) with each score being rounded to the nearest whole number as is typical for TTCT results reported in research. In the analysis of Fluency, representing the number of ideas a student was able to indicate on the assessment, students were able to express significantly more ideas ( $p=.006$ ) when assessed after the pilot NP program

(SS=97) than when assessed prior (SS=84) to participating in the program. Elaboration was another subscale of the TTCT, measuring the number of details students include in their drawings, in which results indicated significantly greater scores ( $p=.012$ ) following the pilot NP program. On this measure students performed significantly better when assessed following the pilot NP program at post-assessment (SS=90) when compared to their pre-assessment (SS=76). Student scores on the TTCT were also indicative of a significant difference in overall Creativity Index ( $p = .010$ ) comparing post scores (SS=95) to preassessment scores (SS=88). This overall measurement of creative thinking on the TTCT which encompasses each subscale was significantly greater at post-program when compared to pre-program scores.

*Table 2: Paired Samples T-Test Pre and Post Scores of TTCT Scales*

<b>TTCT Scale</b>	<b>Mean Pre-Program Score (SS)</b>	<b>Pre-Program St. Dev</b>	<b>Mean Post Program Score (SS)</b>	<b>Post-Program St. Dev</b>	<b>t</b>	<b>df</b>	<b>One-Tailed p</b>
<b>Fluency</b>	84	9.67	97	17.14	-2.976	12	.006
<b>Originality</b>	90	13.97	95	16.95	-0.968	12	.176
<b>Elaboration</b>	76	18.79	90	25.74	-2.561	12	.012
<b>Title</b>	90	9.08	90	9.20	.000	12	.500
<b>Res. to Closure</b>	87	10.88	93	16.00	-1.354	12	.100
<b>Checklist</b>	82	11.58	82	7.80	-0.134	12	.448
<b>Creativity Index</b>	88	12.57	95	14.03	-2.698	12	.010

*Mean scores reported as Standard Scores (SS) rounded to nearest whole number*

While scores were significantly different from pre to post assessment indicating a positive change on the subscales of Fluency, Elaboration and overall Creativity Index, the subscales of Originality, Titles, Resistance to Premature Closure, and the Checklist of Creative Strengths scores were not reflective of significant differences from pre to post assessment (*Table 2*). Originality measures the uniqueness of ideas indicated in student drawings and while some positive change was indicated in student scores, these differences were not significant ( $p = .176$ ). The scale of Titles represents the creative characteristics and detail of the titles given to each drawing and there was no change reflected overall in student scores from pre to post assessment

( $p = .000$ ). Closure measures the student's tendency to quickly close open areas of a design to create an idea and again, while some positive differences were indicated from pre to post assessment, the differences were not significant ( $p = .100$ ). The Creativity Checklist is an indication of different aspects of creativity totaling 13 other creative attributes not accounted for in other subscales, which are more rarely seen in typical responses, and the frequency with which the student indicates any of these attributes in their drawings. Although, there was a slight positive change from pre to post assessment when examining Checklist of Creative Strengths scores ( $p=.448$ ), the results were not significant.

In summary, the hypotheses was supported for the Total Creativity Index and for two of the six subscales of the TTCT, Fluency and Elaboration. The hypothesis was not supported for the TTCT subscales of Originality, Titles, Resistance to Premature Closure, and the Checklist of Creative Strengths.

## **Analysis for Research Question 2**

### *The PReschool and Kindergarten Interest DEscriptor (PRIDE)*

The PRIDE (Rimm, 1983) is a parent rating scale created to address the need for a creativity screening tool with preschool age populations. The PRIDE results in a total score and four dimension scores. The dimensions of the PRIDE are defined as *Many Interests*, *Independence/Perseverance*, *Imagination/Playfulness*, and *Originality*. *Many Interests* is defined as whether the child is curious and asks questions, show a high interest in learning, stories, books and other play materials. Children with low scores in *Many Interests* are usually characterized by less curiosity and less diverse interests. *Independence/Perseverance* is defined by the tendency for children to play alone and act independently. Children with higher scores in this subscale do not give up easily and persevere with difficult tasks. Children with low scores in

*Independence/Perseverance* are more likely to follow the lead of other children and prefer easier tasks. The *Imagination* dimension is defined by children who show more humor and playfulness and are more likely to participate in pretend or sociodramatic play. Children with low scores on *Imagination* tend to be more serious and realistic and have a difficult time participating in pretend play scenarios. The *Originality* dimension measures children producing unusual ideas and asking unusual questions. Children with high originality scores typically are more inventive in their art and play, and tend to think differently than the norm. Low scores for children in *Originality* usually reflect common and more typical ideas and artwork (Rimm, 2002).

The PRIDE was completed by parents of participating children prior to the start of the pilot NP program and again at the conclusion of the program. The researcher encouraged families to have the same parent or guardian complete this rating scale at both assessment periods.

#### *PRIDE Results*

Paired sample t-tests using SPSS were conducted to test the second research question: Are there significant differences in parent ratings of children's creative characteristics on the Preschool and Kindergarten Interest Descriptor (PRIDE) from pre to posttest (after a 13-week exposure period) for children participating in a pilot NP program? Each subscale of the PRIDE was analyzed individually along with the overall total score on the PRIDE as customary for reporting PRIDE results. Mean scores of the PRIDE are reported as raw scores as provided by the PRIDE scoring service (*Table 3*) and rounded to the nearest whole number.

Table 3: Paired Samples T-Test Pre and Post Scores of PRIDE Scales

<b>PRIDE Scale</b>	<b>Mean Pre-Program Raw Score</b>	<b>Pre-Program St. Dev</b>	<b>Mean Post Program Raw Score</b>	<b>Post-Program St. Dev</b>	<b>t</b>	<b>df</b>	<b>One-Tailed p</b>
<b>Many Interests</b>	48	7.72	52	9.07	-2.832	12	.008
<b>Independence</b>	36	6.46	38	6.60	-1.484	12	.082
<b>Imagination</b>	39	6.76	45	7.33	-3.007	12	.005
<b>Originality</b>	37	9.14	40	11.54	-1.424	12	.090
<b>PRIDE Total</b>	163	23.36	178	27.44	-2.431	12	.016

Mean Scores reported in Raw Scores (RS) rounded to nearest whole number

A review of the table values indicates that scores of three subscales were significantly higher from pre to post program, Many Interests ( $p = .008$ ) and Imagination ( $p = .005$ ), as well as the total PRIDE Total ( $p=.016$ ). For the Many Interests subscale, parents indicated that children had a greater interest in a variety of play materials, were more inquisitive, and displayed a greater level of engagement in learning when assessed at post-program (RS=52) versus pre-program (RS=48). Items under the subscale of Imagination/Playfulness were also rated higher by parents at post-program (RS=45) versus pre-program (RS=39). These items assessed child's tendency to engage in pretend play and their sense of humor and playfulness. The PRIDE Total score was also significantly greater ( $p=.016$ ) at post-program (RS=178) when compared to pre-program (RS=163). The total score takes all four subscales of the PRIDE into account and while not all subscale scores were significantly different individually, when these scores were considered in summation, the overall scores of parent perception of creative characteristics of children were significantly higher following the pilot NP program as assessed by the PRIDE. The subscale scores of Independence/Perseverance and Originality were not significantly different when comparing scores at post-program versus pre-program. Parent responses following children's participation in the program did not differ when rating items relating to Independence/Perseverance or the child's tendency to play alone, persist with difficult tasks, and display independent thinking or Originality or the child's tendency to convey novel ideas and



alternative perspective. Overall, statistical analysis of PRIDE data provided support for the hypothesis that parent ratings of children's creative characteristics would increase significantly following participation in the pilot NP with reference to the PRIDE scales, Many Interests and Imagination/Playfulness as well as the Total PRIDE score. The hypothesis was not supported for the PRIDE subscales of Independence/Perseverance and Originality.

### **Thematic Analysis**

In reference to the qualitative data collected as part of the present study, a thematic analysis was conducted on responses from teacher interviews, children's drawings, and parent responses to program questionnaires. In alignment with the steps to thematic analysis as suggested by Braun and Clarke (2006), the first step was familiarization with the data. Several readings and close examination of the teachers interviews, parent responses to questionnaires, and children's drawings were completed to ensure that all data was thoroughly reviewed. Being that the study investigator conducted the sessions to collect student drawings and conducted and transcribed the teacher interviews, there was not a need to account for an alternate perspective in the transcription and review of data stage. In evaluating all qualitative data, in particular teacher interview responses, the researcher read the written responses several times and thoroughly examined all data before attempting to generate initial codes which is the second step in thematic analysis (Braun & Clarke, 2006). To generate initial codes, the qualitative data was first examined using a deductive approach for codes relating to creativity in nature as outlined in the literature review. A second review of the qualitative data was conducted with an inductive approach to determine emerging codes not originally expected. After reviewing the data and generating initial codes, another scan of the data was necessary to search for themes, the third step of thematic analysis. As information was gathered and coded, the data was then organized

into themes. The alignment of themes in teacher interviews, with tenets of nature early education programs, as described in the literature review, was apparent. After an initial search for themes, the themes were then reviewed according to the fourth step of thematic analysis to account not only for semantic descriptions of themes but also for latent allusions to themes. The review of themes was meant to ensure that all a priori themes were accounted for while a final review of themes also serves to provide for post-hoc emerging themes. The fifth step of thematic analysis serves as the basis for defining and naming themes. During this stage, themes were refined and consolidated into overarching themes inclusive of related themes. The sixth and final step of thematic analysis is to produce the report. The subsequent summary describes the themes derived from teacher interviews, children's drawings, and parent questionnaires. The children's drawings and parent questionnaire responses were examined for codes with no a priori assumptions relating to children's play activities as indicated by the child or the parent.

### **Analysis for Research Question 3**

A thematic analysis of children and parent responses was conducted to answer the third research question: What themes associated with creativity are present in children's drawings and parent reports of indoor vs. outdoor activities of children participating in a pilot NP program?

#### *Children's Drawings*

Children were asked to draw what they like to do when indoors and outdoors in two separate drawings at both pre-program and post-program assessment periods. These drawings were collected in a format similar to how children were assessed with the TTCT. Children participated in a center's rotation during their typical school day and the drawing activity administered by the researcher was one of their center's activities. Children completed each drawing in a roughly 10 minute time frame, over two days (one for indoor and one for outdoor)

and were allowed to use drawing utensils of their choosing. The instructional guidance for the drawing activity is outlined on the Child Drawing Worksheets contained in the appendices. Per the drawing instructions, children were asked to tell the researcher about what they drew at the conclusion of the drawing period due to presumed difficulty with fine motor drawing abilities of young children. If drawing abilities were limited, the researcher accepted the verbal description of the drawing expressed by the child (for example, scribbles and doodles as perceived by the researcher were accepted as a “slide” if that is what the child labeled the drawing). If children began to draw off-topic drawings, they were reminded of the drawing prompt by repeating the directions, but were not corrected or instructed to discontinue if they persisted with off-topic drawings, rather these drawings may not be considered when conducting thematic analyses.

Although thematic analysis typically involves the analysis of written text, the interpreted drawings and verbal description of the drawings documented by the researcher were used as the data for conducting thematic analysis. The drawings and their descriptions were reviewed several times by the researcher for familiarization of data as suggested as the first step of thematic analysis by Braun and Clarke (2006). After sufficient review of the drawing data, initial codes were generated and reoccurring objects or subjects of drawings were noted. Themes quickly emerged in both indoor and outdoor drawings as children often drew common play activities or concrete objects they associated with each setting. The themes were then reviewed and consolidated into larger thematic categories. Finally, the themes were defined and named in accordance with thematic analysis before results were reported.

In examining indoor drawings created by children in the pre-program phase, themes that emerged included playing with toys, technology, artistic play, and play with family. When drawing what they liked to do indoors, children often indicated playing with various toys

including superheroes and dolls. Children also indicated engagement with technology when indoors including drawing and describing scenes and characters from video games, play on tablets or computers, and images from television shows. Artistic play was another emerging theme when depicting indoor activities. Children drew and described dancing, playing music, and play with beads or other artistic media. Indoor drawings also depicted play with family. Children tended to draw and describe play with family including parents, caregivers, and siblings in the home. Pre-program, outdoor drawings reflected themes of play on built playground equipment, active games, nature elements, and play with peers. When children were asked to draw what they like to do when they were outdoors, nearly every participating child drew some variation of play on playground equipment including swings, slides, and sandboxes. These playground elements are all present in the outdoor play area at the research site school. Children also tended to draw or describe participation in active games including hide and go seek, tag, and t-ball or kick ball all of which are common games children were observed to play during their time outdoors. Nearly every child included some element of nature in their outdoor drawing. Children often drew elements such as the sun, grass or flowers as well as animals including lady bugs, dogs, and worms. These nature elements were generally not included in children's indoor drawings which may be reflective of their understanding of indoor vs. outdoor environments. Play with peers was also much more evident in children's drawings of their outdoor activities in contrast to indoor drawings which were more reflective of play with family.

A thematic analysis of children's drawings was also conducted at the post-program assessment period. Children were again asked to draw what they liked to do when indoors and outdoors in two separate drawings. Drawing data for the post-assessment period was collected in the same format as pre-program. After conducting each step of thematic analysis, themes were

defined. There were no marked differences in themes observed or interpreted from children's drawings of indoor activities when comparing pre-program to post-program drawing themes. Children's indoor drawings at pre-program generally reflected similar themes including playing with toys, play with technology, artistic activities, and play with family. While children's outdoor drawings were also generally similar when comparing pre-program themes to post-program themes, there were some slight differences. In terms of similarities, children indicated play on built playground equipment, participation in active games, nature elements, and play with peers in both pre-program and post-program drawings. The differences were evident in the types of nature elements that were drawn in post-program drawings. Instead of drawing concrete nature elements such as flowers, grass, trees, etc., students were more likely to draw scenes that were indicative of observations of weather related environmental conditions including the sun rays, rain, and rainbows at post-program when compared to pre-program drawings. Overall, children's drawings of what they liked to do both indoors and outdoors were not substantially different when examined post pilot NP program versus pre-program and were generally reflective of similar themes.

The themes derived from children's drawings aligned with components of creative thinking associated with nature-based education as described in the literature review. As mentioned, children often depicted active play with peers in the outdoor environment to a greater extent than in their indoor drawings which tended to reflect passive play with family members. Play with peers can allow for more open-ended, active play which is associated with the development of creative thinking. Nature-based education theory places a special emphasis on open-ended play, as it is believed to promote creativity through cooperative play, with its higher cognitive challenge for interacting with peers (Broadhead, 2004). Play-based learning

encourages creativity through imaginative play and personal autonomy, as children interact and communicate in various play-based situations. Play-based learning in the outdoor environment may add an even greater potential for creative development. Advocates of active play in schools believe that outdoor, play-based learning is imperative to a child's physical, emotional, cognitive, social, and communicative development (Hong, Shaffer, & Han, 2017) and this holistic development is believed to contribute to creative thinking abilities. Children also tended to draw natural elements in their depictions of what they like to do outdoors reflecting the understanding of indoor versus outdoor environments and the outdoor environment in itself can be associated with creative thinking. Unstructured, natural environments incite curiosity among children and inspire a child's motivation to explore the innerworkings of nature processes with one another (Sobel, 2016). In alignment with nature-based education theory, natural environments do not assume set learning expectations, thus children are empowered to use their imagination and creativity to make symbolic meaning of natural objects and engage in social interactions geared toward cooperative pretend play. Overall, children's drawings tended to depict more active play-based activities with peers with an understanding of outdoor environment characteristics when compared to their indoor drawings at both pre and post assessment periods. These attributes of children's drawings relate to aspects of creative development as previously referenced.

#### *Parent Questionnaire Responses*

Parents of participating children were asked to complete a short questionnaire at both pre-program and post-program assessment periods. This questionnaire form is contained in the appendices. The post program form was edited to omit the redundancy of collection of basic demographic data which would remain unchanged from pre to post assessment. Parents were

asked to briefly describe in writing what their child likes to do indoors and outdoors in two separate questions. A thematic analysis was conducted on parent's responses to these questions in accordance with the steps as suggested by Braun & Clarke (2006).

After thoroughly analyzing parent responses through the six steps of thematic analysis, there were no substantial differences indicated in overall themes associated with activities in the indoor and outdoor settings from pre to post-program. Themes were defined from pre-program responses and were reflective of children engaging in games, art activities, and technology in the indoor setting. Parents generally indicated that their children enjoy activities such as board games, card games and puzzles which were all consolidated into a theme of games. Art activities included activities relating to painting, drawing, coloring, and building. Technology may include activities such as watching TV, playing on tablet, or video games. These themes were consistent when compared to themes generated regarding children's indoor activities at post-program. Parents again generally indicated that their children liked to engage in games, participate in art activities, and utilize technology.

Parent responses describing what their children like to do when outdoors were also generally consistent across pre and post program assessment periods. At pre-program, parents indicated that their children liked to participate in active play and explore nature elements. The theme of active play was inclusive of activities such as jumping on the trampoline, sports, running, playing on playground equipment, and swimming. Exploring nature elements was a theme defined from activities including digging for rocks, hiking, and play with animals.

When analyzing these results, the differences in passive play typically described in indoor play descriptions versus active play typically described in outdoor play descriptions was apparent. Parents generally indicated activities that were more physically active and would

require a greater degree of gross motor movement in their description of outdoor activities versus indoor activities for their children. The analysis of themes comparing pre-program activities indoors and outdoors, to post-program activities in the same settings, however, were generally not reflective of marked differences as indicated by parent responses. Themes of activities were consistent in indoor and outdoor settings when compared across assessment time periods.

When comparing parent's responses regarding indoor activities of their children versus outdoor activities, their outdoor activities reflected similar themes relating to creativity as children expressed in their drawings. Activities described in outdoor environments tended to be more active in the sense of assuming more gross motor movement. Hong et al. (2017) advocate for active play in early childhood education as it is believed to contribute to multiple areas of child development including the cognitive development presumably needed to have a capacity for creative thinking. Parents also indicated children's desire to engage with natural elements. Some described the child's desire to discover or find elements of nature in the outdoor environment conveying perhaps a greater level of engagement and enthusiasm to explore when outdoors. This type of engagement may be associated with a greater likelihood for self-directed learning in the outdoor environment which is associated with creative development. Nature-based education proponents posit that students are more likely to creatively engage in their learning when their interests are considered and explored (Knight, 2013; Sobel, 2016). This desire for discovery of nature elements assumes that children do not sense imposed play parameters in the outdoor environment that may be more evident or implied in the indoor setting in that parents often described games or activities with clearly defined norms when describing their child's indoor activities.



## **Analysis for Research Question 4**

### *Teacher Interviews*

A thematic analysis of teacher interview responses was conducted to answer the fourth research question: What creativity-based themes are present in teacher interviews addressing implementation considerations, creative learning, and teaching strategies in the nature-based education context?

Teacher interviews were conducted at the conclusion of the pilot NP program. Two teachers directly involved in the program on a daily basis at the research site school participated in interviews. The interviews followed the sequence of questioning outlined in the Teacher Interview Guide contained in the appendices and each interview took approximately 20-30 minutes to conduct. Interviews were conducted independently with only the researcher present to prevent the influence of shared responses.

In examining teacher interview responses, thematic analysis focused initially on coding statements congruent with a priori suppositions of creativity based tenets of nature early education programs as outlined in the literature review. This was followed by exploration of additional potential mechanisms of the program not originally expected. When examining observed creativity-based aspects of the program, teachers indicated students expressed enthusiasm for time in nature and collaborative, imaginative play. Teacher reports of their pedagogy in the natural environment were reflective of provisions for self-directed/student centered play and active play. Challenges of the program indicated by teachers centered around preparation for natural elements and intervention in perceived risky or “unsafe” play. Unsafe play was defined as play with objects or actions perceived by teachers to be more likely to result

in child injury which could include but not limited to play with large sticks, sharp rocks, or high climbing, for example.

Teachers indicated that after exposure to the nature based preschool program, students were more enthusiastic to spend time in nature. Teachers reported that students looked forward to Wilderness Wednesdays (nature immersive day) and expressed disappointment when the official program timeline was complete. Teachers stated that the students wanted to go outside more frequently during the day, regardless of weather conditions that they would have previously wanted to avoid. Students were more interested in nature topics and often alluded to outdoor activities when engaging in pretend play indoors, for example, children would pretend to build a shelter when playing indoors. The students were also more likely to engage in collaborative imaginative play including role play scenarios when observed in nature immersive experiences according to teacher reflections. The teachers indicated that the “wilderness” environment fostered creativity in that children’s play was noticeably different than what they typically observed on the playground when children were surrounded by playground structures. The children would often want to work together to build structures out of natural elements and would create group play scenarios or games that included use of the natural space and natural objects. Creativity was also evident in the games that children played in natural environments tended to be novel games in which children created the rules for the games as they played rather than playing known games with set rules. Further, creative thinking was apparent as children engaged in play with original stories, roles, and themes.

In response to reflections of their own pedagogy, teachers reported they were more likely to act in a facilitative role in the natural environment in comparison to a leadership role in the indoor environment. Activities tended to be more student-lead; however, teachers did note that

this student-centered mindset had to be promoted in students as they became more engaged playing in outdoor environments without built playground equipment. Teachers reported that children tended to be reluctant to play on their own without adult direction at the start of the program, but observed that self-directed play skills developed in children over the course of the program. Student-directed play is associated with creative thinking in that students are encouraged to create their own play scenarios and are not bound by toys and equipment that have set uses imposed by societal norms. The teachers observed that children were more active in the outdoor environment, rarely sitting down, and tended to run and climb more than what they had observed in the built playground environment. Teachers also noted that the larger, open area tended to encourage students to explore the environment boundaries which required more movement and vigorous physical activity.

In describing challenges of implementing the program, teachers stated that children were often unprepared for the environmental elements and children tended to engage in more potentially unsafe play. Although parents were notified of the program and encouraged to prepare children for the weather on any given week, some student's clothing was still inadequate for cold temperatures at the start of the program which in turn may have impacted their engagement and enthusiasm for the program. The teachers noted that when children were prepared and appropriately dressed for the outdoor conditions, they were more likely to fully engage with the environment and one another and were more likely to express enjoyment. Unsafe play was perhaps one of the greatest challenges in planning and implementing the program. Being that teachers were trained in program philosophies relating to child-centered play, they reported having difficulty with determining when they should intervene in children's play for safety reasons. The guidelines of the program associated with student behavior were

generally for safety keeping in mind the nature of play in the outdoor environment, to protect the elements of nature in this environment, and to adhere to safety procedures for licensed childcare facilities. Teachers reported having difficulty acting in a facilitative role at the beginning of the program as they were accustomed to being in a directive role and often had to remind themselves to use an inquiry-based approach to encourage student-directed play. This pedagogical shift, while being one of the greatest reported challenges for teachers, was critical in adhering to the tenets of nature-based early education. In the program, the teachers regularly consulted with one another to ensure they acted in a way to preserve this philosophic perspective.

## **CHAPTER V: DISCUSSION, IMPLICATIONS, RECOMMENDATIONS**

### **Study Purpose and Summary**

While nature-based education programs are gaining popularity in light of recent attention to alternative education programs, few studies have explored developmental and formal learning outcomes for children enrolled in such programs (Leggett, 2017). Due to the novelty of the nature-based education movement in the United States, more research is needed to determine the educational advantages and efficacy of this model of early learning. The present study sought to analyze children's measures of creative thinking before and after exposure to an integrated 13-week pilot NP program which included regular nature immersive experiences and an entirely nature immersion day, Wilderness Wednesday. Children's characteristics of creative thinking were quantitatively measured using the Torrance Tests of Creative Thinking (TTCT) (Torrance, 1966, 2017) and a parent creativity characteristics inventory of their children, the Preschool and Kindergarten Interest Descriptor (PRIDE) (Rimm, 1981), and the resulting data was analyzed pre and post a 13-week pilot NP program. Qualitative data was also gathered from generic thematic analyses of themes associated with creativity indicated in children's drawings, parent reports of indoor and outdoor activities of children, and from teacher interviews addressing program implementation considerations and parameters for creative teaching.

In reference to the first research question assessing children's creative thinking prior to and after exposure to the pilot NP program, children's performance on the Figural version of the TTCT indicated that mean scores were significantly higher on the subscales of Fluency and

Elaboration as well as the overall Creativity Index following the pilot NP program. This suggests that children expressed significantly more ideas as measured by Fluency and included significantly more details in their responses as measured by Elaboration in their TTCT assessment following the pilot NP program. Children's overall Creativity Index scores which encompass all five subscales of the TTCT as well as the Creativity Checklist was also significantly greater following the pilot program. The hypothesis of research question one was supported for the subscales of Fluency and Elaboration and overall Creativity Index, but not supported for the subscales of Originality, Titles, Resistance to Premature Closure, and the Creativity Checklist. The second research question examined parent responses to a child creative characteristics questionnaire, the PRIDE, with pre and post program assessment results. Results of the PRIDE indicated that children's mean raw scores were significantly greater following the pilot NP program in the subscales of Many Interests, Imagination/Playfulness, and overall PRIDE total scores. Parents rated their children as having more interests in various activities as measured by Many Interests and conveyed a greater degree of exploratory and sociodramatic play as measured by Imagination/Playfulness according to their responses on the PRIDE following the pilot NP program. The hypothesis for research question two was supported for the PRIDE subscales of Many Interests and Imagination/Playfulness, and overall PRIDE total, but was not supported for the PRIDE subscales of Independence/Perseverance and Originality.

The third and fourth research questions examined qualitative data with a generic thematic analysis approach. The third research question examined children's drawings and parent reports of indoor and outdoor activities. Children were asked to draw what they liked to do indoors and outdoors in two separate drawings prior to and after the pilot NP program. Thematic analysis revealed themes including playing with toys, technology, artistic play, and play with family in

their indoor drawings and play on built playground equipment, participation in active games, exploration of nature elements, and play with peers in their outdoor drawings with these themes being consistent by setting from pre-program to post-program assessment periods.

While there were no marked differences in themes interpreted from children's drawings when comparing pre and post indoor and outdoor drawings respectively, children's outdoor drawings were reflective of themes associated with creative thinking as referenced in the literature review. Children's outdoor drawings tended to depict more active play-based activities with peers with an awareness of outdoor environment characteristics when compared to their indoor drawings at both pre and post assessment periods. Play-based learning, open-ended active play (related to self-directed play), and learning in the outdoor environment itself have associations with creative thinking as defined in the literature review.

Parent questionnaire responses relating to children's indoor and outdoor activities were also collected at both pre-program and post-program assessment periods. Again, while there were no clear differences interpreted from parent's responses of indoor and outdoor activities of their children when comparing pre and post-program responses, their responses did have some associations with creative thinking. When comparing parent reports of indoor versus outdoor activities, children were reported to participate in more active play and explore nature elements which are associated with play-based learning and nature as an environment for creative thinking as outlined in the literature.

The fourth research question involved examining teacher interview responses assessing program implementation, children's creative thinking observations, and teacher pedagogical approaches in the nature-based education context. When examining observed creativity-based aspects of the program using a thematic analysis approach, teachers indicated students expressed

enthusiasm for time in nature and imaginative play. Teachers indicated that their pedagogical approach was inquiry-based and facilitative (student-lead) which led to more physically active play according to their observations. Teachers reported implementation challenges associated with child preparation for weather elements and level of teacher involvement in potentially unsafe play scenarios. Student engagement, imaginative play, inquiry-based learning, and student-directed active play are all themes associated with creativity as defined in the literature.

### **Implications of Results**

The present study examined the implementation of a pilot NP program, children's outcome characteristics associated with creative thinking, and teacher feedback associated with creative thinking of children and program implementation considerations. The results of this study may provide evidence for those wishing to initiate a nature-immersive early education program or those wishing to implement program characteristics of nature-based early education into an existing program, as was the case in the present study. Those considering the implementation of a nature-based education program may be particularly interested in the challenges mentioned by educators in this study and may seek to problem-solve mitigating solutions to these challenges prior to initiating the program. Professional teacher training in nature-based education philosophies is also recommended for those interested in facilitating such a program as the inquiry-based and student-directed learning approaches are not easily developed in educators but are considered a vital part of the pedagogical perspective of nature-based education programs.

While nature-based educators tend to focus on curricula associated with environmental awareness and stewardship in such programs (Larimore, 2019), parents and traditional educators may also be interested in how nature-based early education programs contribute to children's



real world adaptability and school readiness. This study addresses their creative thinking as a real world aptitude and has implications for problem-solving, complex cognitive processes, and divergent thinking in adulthood and contributes to the literature documenting formal learning outcomes associated with such programs. Few studies have addressed school readiness outcomes associated with nature-based early education programs and those that do (Pikus, 2019) tend to only address immediate Kindergarten academic readiness. Creative thinking as assessed in the present study is thought to align with critical thinking through the lifespan and the outcomes associated with this study may have more long-term implications for adult creative characteristics.

Although teacher implementation concerns centered around intentional supervision of “unsafe” play of children in the NP pilot program, as these behaviors were perceived to be more likely to result in unintentional injury (i.e., bruises, scratches), research suggests that children in NPs are no more likely to experience illness or injury than those enrolled in traditional preschools (Fenkel, 2017). Much of the current research examining behavioral approaches emphasizing behavior management can often result in more incidents of undesirable behavior over time, rather when children take part in more independent and self-directed play in early childhood, they are more likely to learn self-regulation strategies (Durkin et al., 2022). While all play behaviors should be monitored, safety protocols should be regularly referenced to prevent “unsafe” behaviors and consideration should be given to when to appropriately intervene in children’s play for safety reasons.

In her study of indoor and outdoor learning environments, Larimore (2021) noted that the use of outdoor spaces must be intentional and not simply “going outside.” She highlighted the need to develop outdoor education spaces with features and materials that support children’s

ways of engaging with the environment. The thoughtful consideration of how children will engage with aspects of outdoor spaces and outdoor materials should not be minimized as teachers should seek to prepare for outdoor learning experiences in much the same way they prepare for indoor lessons with flexibility to accommodate for student-directed learning in the outdoor environment.

In addition, the present study may also have implications for those (children) living in areas with limited access to open, outdoor “green” space. As research relating the positive effects of nature exposure to education becomes more robust, parents and educators may seek creative ways to provide access to nature experiences for students living in urban areas and seek to address issues of accessibility to nature as an educational resource.

#### *Implications Relevant to School Psychology*

The results of this study and nature-based education programs in general offer a wealth of possible implications for the field of School Psychology. Since 2005, the number of studies assessing the impact of nature experience on human development has grown from a handful to nearly one thousand. Nature-based education practitioners have noted improvements in motor functioning, language development, self-regulation, and social skills among children enrolled in such programs (Sobel, 2016; Larimore, 2019). In multiple studies, nature exposure has been associated with improvements in emotional affect, biological response, cognition, and concentration (Bratman et al., 2015; Kuo & Taylor, 2004; Kuo & Sullivan, 2001). Specifically, researchers have found positive impacts of active nature experiences on the concentration abilities of children diagnosed with ADHD and other behavioral challenges (Faber Kuo & Taylor, 2009). Others have studied engagement and connection with nature as a protective factor against mental health disorders (Gullone, 2000). These results have implications for School

Psychologists in practice as they consult with other educators to provide assessment, program planning, and intervention for vulnerable student populations.

In his book, Louv (2005) suggested that the modern generation of children is at-risk for “nature-deficit disorder” or a disconnect from nature that has negative impacts for overall human development. A body of scientific evidence suggests that nature-deficit disorder contributes to a diminished use of the senses, attention difficulties, conditions of obesity, and higher rates of emotional and physical illnesses. These problems are linked more broadly to what healthcare experts call the “epidemic of inactivity,” and to a devaluing of independent play. With this knowledge, School Psychologists should advocate for regular nature experiences for children in schools to include not only daily outdoor recess, regardless of weather conditions, but for the exploration of nature beyond the playground and the incorporation of nature into traditional early education standards. To help bridge the science to practice gap, School Psychologists should have and share knowledge of alternative education models associated with positive developmental and learning outcomes for children and encourage their peers in education to consider how they can facilitate their student’s engagement with the outdoors.

Although creativity has been brought to the forefront of necessary skills of the next generation of children, educators are often unaware of their role in fostering creativity in their students and creating classroom environments that contribute to creative development (Leggett, 2017). Working in consultation with educators and parents, school psychologists may find the evidence of the present study compelling in their examination of non-traditional education environments that contribute to creative thinking and other higher order thinking skills for children.

In addition, while the traditional role of a School Psychologist often focuses on assessment for the purposes of eligibility for special education services due to disability or mental health condition, the scope of assessment should be expanded to examine non-traditional strengths of students including but not limited to creativity. Creativity assessments may be useful in the holistic assessment of students from a strengths-based perspective particularly for marginalized groups who are known to experience cultural bias with traditional cognitive and educational assessments.

### **Limitations**

There are several limitations associated with the present study that should be noted. Although study results revealed positive effects of the NP program, a single group pre, post-test design findings are limited with the inclusion of a control group. Being that the present study was conducted at a single school, the sample size of students that met criteria for participation in the study is small and the sample consisted of a convenience sample of students attending the research site school, and thus, results have limited generalizability to the general population of same age students. The fact that the sample consisted of a diverse group of students attending a traditional preschool which allows for enrollment of students from various socioeconomic backgrounds, however, does increase the generalizability to the general early-childhood education population when compared to the demographics of other existing nature-immersive education programs which tend to be more homogeneous with reference to racial, ethnic, and socioeconomic characteristics (NAAEE, 2017). Additional research examining creative characteristics associated with existing nature-based early education programs as well as programs in the implementation phase which include a diverse group of students is needed.

The impact of the pilot NP program on children's creative thinking was assessed in the present study within three weeks following the completion of the pilot program. Future studies may examine maintenance or longitudinal effects via follow-up assessment. In addition, use of more varied tasks to measure creativity, such as performance-based creativity products and creative behavior would provide further evidence for generalization.

#### *Limitations of Assessment Instruments*

The assessment instruments used in the present study also have limitations that should be discussed. Those in the field of creativity research may criticize instruments such as the TTCT for only measuring a narrow field of domains associated with creativity and for having limited predictive validity for adult creative accomplishment (Baer, 2011). Baer (2011) asserts that Torrance Tests are essentially divergent thinking tasks and that scores of creativity associated with this assessment tend to be dependent on fluency, or the number of unique ideas one can convey, before examining any other aspect of creative thinking. In many studies, the overall Creativity Index only is used as a measure of creative thinking rather than examining each domain score even though "Torrance has discouraged the use of composite scores for the TTCT. He warned that using a single score like a composite score may be misleading because each subscale score has an independent meaning." (Kim, Crammond, & Bandalos, 2006, p. 461).

The average age of study participants was 4 years, 11 months at the pretest period. Their results at that time were compared to TTCT Kindergarten norms which are generally consistent with age five norms. This may account for mean scores that were lower than the average range at pretest. At post-test, Kindergarten norms were again used, and while maturation may account for some increase in scores, it is not thought to be the primary factor contributing to the

significant change in certain subscores or overall Creativity Index due to short four month interval between pre and post-test periods.

The examination of domain specific scores and overall Creativity Index in the present study may contribute to the validity of the instrument as a more comprehensive measure of creative thinking. Although the PRIDE may also be criticized for similarly measuring specific domains of creativity while claiming to be a general measure of creative characteristics of children, this study examines each domain specifically in addition to PRIDE total scores which contributes to validity in reference to the holistic construct of creativity. As a parent perception scale of creative characteristics of their children, the PRIDE scores reflect parent's conceptualization of the measured domains of creative thinking in their own children.

#### *Limitations of Thematic Analysis*

The limitations of thematic analysis differ when compared to other qualitative research methods. The lack of extensive literature on thematic analysis, when considered against other types of qualitative analysis such as grounded theory or ethnography may cause a novice researcher to feel uneasy when attempting to conduct a rigorous thematic analysis (Nowell, Norris & White, 2017). Braun and Clarke (2006) acknowledge that a simple thematic analysis may be limited when compared to other qualitative methods, as it does not allow the researcher to make substantive claims, with the interpretation of language often being subjective. When examining larger sets of qualitative data, thematic analysis may be limited by semantics unique to the language of the individual, especially those studies utilizing analysis software. The small sets of qualitative data with little opportunity for subjective interpretation in the present study and direct analysis by the investigator helped to control for these limitations associated with thematic analysis.

## **Recommendations and Future Directions**

A recent study showed that less than 50 forest kindergartens or NPs were in operation in 2012, but as of 2017, over 250 such schools have emerged in 43 states in the United States, with estimations for continuous growth over the next decade (NAAEE, 2017). As the number of nature-based education programs have increased exponentially, the breadth of research surrounding such programs has not kept pace. In addition, much of the research involving such programs have sought to provide information regarding environmental identity, stewardship or awareness as the primary goals of such programs. Few studies have examined impacts on children's cognitive and behavioral development, formal academic learning outcomes, or components of life or school readiness associated with nature based early education (Pikus, 2019). Additional research is needed to assess the advantages and efficacy of nature-based early childhood education programs.

The need for future research examining nature-based early childhood education also illuminates the need to establish criteria for what defines a forest kindergarten or NP. Researchers in this field have attempted to describe nuances that separate forest kindergartens and NPs (Sobel, 2016), though there are few regulatory criteria to distinguish fully nature-immersive programs from those that intermittently incorporate nature experiences, in that, both types of programs may be identified under the same umbrella. Organizations associated with nature-based early education (i.e., American Forest Kindergarten Association) need to clearly define parameters and expectations for such programs so that future research in this field are not be confounded by program nuances. Such organizations should also seek to provide teacher training programs to prepare not only nature-based educators but should also provide immersive

outdoor education experiences to all teachers as part of holistic teacher training programs (Larimore, 2021).

In summary, the present study was comprised of a small group of preschool age students. Similar studies should be repeated with greater numbers of student participants to validate existing findings. Longitudinal studies including students who were enrolled in nature-based early education programs as children across the United States may also be of interest to follow-up and document the longitudinal impacts of such programs on academic success, mental health, life satisfaction or lifetime creative accomplishments. In addition, this study took place at a preschool in an urban area with the luxury of ample “wilderness” outdoor space with most of the participating children living in suburban communities just outside the city. Future studies that examine differences between nature-based programs occurring in different community contexts and studies disaggregating regular daily outdoor experiences of children in traditional school settings would be important to conduct. Future research could contribute findings for a better understanding of the optimal amount of outdoor time children need to experience in order to achieve desirable academic or developmental outcomes and identify cognitive impacts that may develop as a result of additional time spent exposed to nature.

Nature immersion education programs offer a means of recreating the wilderness childhood playscape that underlies the narrative of environmental activists and environmentally-conscious behavior, and NP programs seek to incorporate traditional academic early childhood education standards in the natural world. Cognitive changes associated with creativity that were investigated in this program are reflected in the creative characteristics of children. Programs that connect children’s cognitive development and learning outcomes with experiences in the natural



environment need to be expanded and their benefits for children's development documented through research.

## APPENDIX A: PARENT CONSENT FORM

**University of North Carolina at Chapel Hill**  
**Parental Consent and Permission for a Minor Child to Participate in a Research Study**

**Consent Form Version Date:** 11/1/2020

**IRB Study #** 20-2129

**Title of Study:** Seeds of Creativity: Assessing the Impact of an Integrated Pilot Nature Preschool Program on Children's Creative Development

**Principal Investigator:** Carrie Moore

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### CONCISE SUMMARY

This study will examine integration of a pilot nature preschool (NP) program into an existing preschool and the impact on children's creative development. Your child will be administered the Torrance Tests of Creative Thinking (TTCT), Figural Version prior to the start of the pilot nature preschool program and following the end the pilot period (13 weeks of exposure time). The child will also be asked to produce drawings about their indoor and outdoor activities at the same time frames. The total duration for these tasks is approximately 30-45 minutes at each time point.

As the parent, you will be asked to complete a brief demographic questionnaire inclusive of questions about your child's indoor and outdoor activities. You will also be asked to complete the Preschool and Kindergarten Interest Descriptor (PRIDE), a rating scale of your child's creative characteristics at the beginning and end of the pilot period. The parent questionnaire and PRIDE inventory will require about 30-45 minutes to complete at both data collection time points.

You, as the parent, will be debriefed regarding your child's participation in the study following the posttest data collection process.

Information regarding risk of maintaining confidentiality of data is addressed on page 2 of this document.

If you are interested in learning more about this study, please continue reading below.

### What are some general things you and your child should know about research studies?

You are being asked to allow your child to take part in a research study. To join the study is voluntary. You may decide to not allow your child to participate, or you may withdraw your permission for your child to be in the study, for any reason, without penalty.

Research studies are designed to obtain new knowledge. This new information may help people in the future. Your child may not receive any direct benefit from being in the research study. There also may be risks to being in research studies.

Deciding not to be in the study or leaving the study before it is done will not affect your or your child's relationship with the researcher, Seawell's Preschool, or the University of North Carolina-Chapel Hill. If your child does not participate in the research study, they will not be excluded from school-based activities in any way.

Details about this study are described below. It is important that you and your child understand this information so that you and your child can make an informed choice about being in this research study. You will be given a copy of this consent form. You and your child should ask the researchers named above, or staff members who may assist them, any questions you have about this study at any time.

### **What is the purpose of this study?**

The purpose of this research study is to learn more about the impact of the nature preschool model on children's creative thinking. Your child will be administered a formal assessment of creative thinking to determine if overall scores and subscale scores change over time as a result of exposure to this educational model. Parents will be asked to complete a creative characteristics inventory in relation to observations of their child and results will be analyzed from pre to posttest. Students will also be asked to produce drawings, and parents a brief written response to describe their child's play activities in outdoor and indoor settings to determine present themes relating to creativity in each setting.

Results will be analyzed and may be used in discussion of the advantages and efficacy of the nature preschool model.

### **Are there any reasons your child should not be in this study?**

Your child may not be able to participate fully in the study if they have visual or motor disabilities that may inhibit them from using visual testing materials, drawing, writing, and/or using a pencil. If you have concerns in any of these areas, you may discuss with the research investigator.

### **How many people will take part in this study?**

It is expected that approximately 12-15 students at Seawell's Preschool will take part in this study.

### **How long will your child's part in this study last?**

Data will be collected during data collection periods prior to the start of the pilot program (January 2021) and after the 13-week pilot period (May 2021). While your child will still be involved in the research study during the 13-week exposure period, no data collection will occur during this time and the researcher will only be present for Wilderness Wednesdays. The study will take place over the 2020-2021 school year and should fully conclude by May 31, 2021.

### **What will happen if your child takes part in the study?**

If you consent to participate in this study:

- Your child will be administered the Torrance Tests of Creative Thinking, Figural as a pre-test prior to the start of the pilot nature preschool program and approximately 13-weeks later as post-test. Children will also be asked to complete drawings of their indoor and outdoor activities at both pre and posttest data collection times. The total time expected for these activities at each data collection period will be approximately 30-45 minutes and may occur over multiple sessions.
- As the parent, you will be asked to complete an inventory about your child's creative characteristics and a brief demographic questionnaire regarding your child's activities in indoor and outdoor settings. The expected time to complete these forms is approximately 30-45 minutes at each data collection period.

**What are the possible benefits from being in this study?**

Research is designed to benefit society by gaining new knowledge. The benefits to your child from being in this study may be participation in assessment tasks related to creative thinking in children.

**What are the possible risks or discomforts involved from being in this study?**

While there are minimal expected risks for this study, a possibility of breach of confidentiality is a risk in any study that involves storage of data. In order to minimize the risk of breach of confidentiality, student and parent data will be coded prior to data entry and storage. Data files will be password protected and accessed only on secure servers and with secure devices that are also password protected. For the purposes of data storage, data results categories for students and parents will be coded in a manner that is indistinguishable to those outside the scope of the study.

**Will I receive testing results for my child?**

While institutional research parameters prevent the sharing of actual assessment protocols, the researcher will meet with each participating parent and will provide a summary of the child's performance on the measures.

**How will information about your child be protected?**

Records containing student names and information will be kept completely confidential by the researcher. Original testing documents will not be shared and are protected under copyright laws. When reporting scores for research study purposes, all student information will be coded and study results will be discussed more in terms of group data rather than individual data.

Drawings and parent questionnaires will also be kept completely confidential and no identifying student information will be attached to such documents.

Participants will not be identified in any report or publication about this study. We may use coded data from this study in future research.

Although every effort will be made to keep research records private, there may be times when federal or state law requires the disclosure of such records, including personal information. This is very unlikely, but if disclosure is ever required, UNC-Chapel Hill will take steps allowable by law to protect the privacy of personal information. In some cases, your child's information in this research study could be reviewed by representatives of the University, research sponsors, or government agencies for purposes such as quality control or safety.

Students should not reveal information regarding testing items to others including parents and peers.

**What will happen if your child is injured during this research?**

All research involves a chance that something might happen to your child. If your child is hurt, becomes sick, or develops a reaction from something that was done as part of this study, the researcher will help your child get medical care, but the University of North Carolina at Chapel Hill has not set aside funds to pay you or your child for any such injuries, illnesses or reactions, or for the related medical care. Any costs for medical expenses will be billed to your child, you, or your insurance company. You/your child may be responsible for any co-payments and your child's insurance may not cover the costs of study related injuries.

If you think your child has been injured from taking part in this study, call the Researcher at the phone number provided on this consent form. They will let you know what you and your child should do.

By signing this form, you/your child do not give up your right to seek payment or other rights if your child is harmed as a result of being in this study.

**What if you or your child wants to stop before your child's part in the study is complete?**

You can withdraw your child from this study at any time, without penalty. The investigators also have the right to stop your child's participation at any time. This could be because your child has had an unexpected reaction, or has failed to follow instructions, or because the entire study has been stopped. If you withdraw your child or your child is withdrawn from this study all data collected up until the point of withdrawal will be retained, however no additional information will be collected unless you provide additional written permission for further data collection at the time of your child's withdrawal.

**Will your child receive anything for being in this study?**

Neither you nor your child will receive compensation of any kind for being in this study.

**Will it cost you anything for your child to be in this study?**

There is no cost to you for participation in the study.

**What if you or your child has questions about this study?**

You and your child have the right to ask, and have answered, any questions you may have about this research. If there are questions about the study, complaints, concerns, or if a research-related injury occurs, contact the researchers listed on the first page of this form.

**What if there are questions about your child's rights as a research participant?**

All research on human volunteers is reviewed by a committee that works to protect your child's rights and welfare. If there are questions or concerns about your child's rights as a research subject, or if you would like to obtain information or offer input, you may contact the Institutional Review Board at 919-966-3113 or by email to [IRB\\_subjects@unc.edu](mailto:IRB_subjects@unc.edu).

**Parent's Agreement:**

I have read the information provided above. I have asked all the questions I have at this time. I voluntarily give permission to allow my child to participate in this research study.

\_\_\_\_\_  
Printed Name of Research Participant (child)

\_\_\_\_\_  
Signature of Parent

\_\_\_\_\_  
Date

\_\_\_\_\_  
Printed Name of Parent

\_\_\_\_\_  
Signature of Research Team Member Obtaining Permission

\_\_\_\_\_  
Date

\_\_\_\_\_  
Printed Name of Research Team Member Obtaining Permission

\_\_\_\_\_  
Signature of Witness (if applicable; e.g. literacy issues, visually impaired, physically unable to sign, witness/interpreter for non-English speaking participants using the short form)

\_\_\_\_\_  
Date

\_\_\_\_\_  
Printed Name of Witness

## APPENDIX B: TEACHER CONSENT FORM

### University of North Carolina at Chapel Hill Teacher Consent to Participate in a Research Study

**Consent Form Version Date:** 11/1/2020

**IRB Study #** 20-2129

**Title of Study:** Seeds of Creativity: Assessing the Impact of an Integrated Pilot Nature Preschool Program on Children's Creative Development

**Principal Investigator:** Carrie Moore

**Principal Investigator Department:** School of Education, School Psychology Program

**Principal Investigator Phone number:** (336) 210-2422

**Principal Investigator Email Address:** carmoore@live.unc.edu

**Faculty Advisor:** Dr. Rune Simeonsson

**Faculty Advisor Contact Information:** rjsimeon@email.unc.edu

**Study Contact Telephone Number:** (336) 210-2422

**Study Contact Email:** carmoore@live.unc.edu

#### CONCISE SUMMARY

This study will examine integration of a pilot nature preschool program into an existing preschool and the impact on children's creative development. You, as the teacher, will be interviewed regarding nature preschool program implementation considerations and your perceptions of children's creative development associated with this educational model. You will be interviewed following the conclusion of the pilot period (13-weeks). The interview will be approximately 20-30 minutes in length.

Information regarding risk of maintaining confidentiality of data is addressed on page 2 of this document.

If you are interested in learning more about this study, please continue reading below.

#### What are some general things you should know about research studies?

You are being asked to participate in a teacher interview as part of a research study. Joining the study is voluntary. You may decide not to participate, or you may withdraw from participating for any reason, without penalty.

Research studies are designed to obtain new knowledge. This new information may help people in the future. You may not receive any direct benefit from being in the research study. There also may be risks to being in research studies. Deciding not to be in the study or leaving the study before it is done will not affect relationship with the researcher, Seawell's Preschool, or the University of North Carolina-Chapel Hill. Deciding not to participate in the research study will not affect your employment.

Details about this study are described below. It is important that you understand this information so that you can make an informed choice about being in this research study. You will be given a copy of this consent form. You should ask the researchers named above, or staff members who may assist them, any questions you have about this study at any time.

**What is the purpose of this study?**

The purpose of this research study is to learn more about implementation of a nature preschool model and its impact on children's creative thinking. You will be interviewed regarding nature preschool implementation considerations and children's creative development as a result of exposure to this educational model.

Results will be analyzed and may be used in discussion of the advantages and efficacy of the nature preschool model.

**How many people will take part in this study?**

It is expected that two teachers at Seawell's Preschool will take part in the teacher interview portion of this study.

**How long will you take part in this study last?**

Interview data will be collected after the 13-week pilot period (May 2021). The study will take place over the 2020-2021 school year and should fully conclude by May 31, 2021.

**What will happen if you take part in the study?**

If you consent to participate in this study:

- You, as the teacher, will be interviewed regarding nature preschool program implementation considerations and children's creative development associated with this educational model.
- You will be interviewed at the conclusion of the pilot period (13-weeks). The interview will be approximately 20-30 minutes in length.

**What are the possible benefits from being in this study?**

Research is designed to benefit society by gaining new knowledge. This research study may benefit other educators interested in implementing a nature-based education program and those interested in the creative development of children in the outdoor environment.

**What are the possible risks or discomforts involved from being in this study?**

While there are minimal expected risks for this study, a possibility of breach of confidentiality is a risk in any study that involves storage of data. In order to minimize the risk of breach of confidentiality, teacher interview data will be coded prior to data entry and storage. Data files will be password protected and accessed only on secure servers and with secure devices that are also password protected.

**How will your information be protected?**

Records containing teacher names and information will be kept completely confidential by the researcher. Original interview transcripts will not be shared.

Participants will not be identified in any report or publication about this study. We may use coded data from this study in future research.

Although every effort will be made to keep research records private, there may be times when federal or state law requires the disclosure of such records, including personal information. This is very unlikely, but if disclosure is ever required, UNC-Chapel Hill will take steps allowable by law to protect the privacy of personal information. In some cases, your information in this research study could be reviewed by representatives of the University, research sponsors, or government agencies for purposes such as quality control or safety.



**What will happen if you are injured during this research?**

All research involves a chance that something might happen to you. If you are hurt, become sick, or develop a reaction from something that was done as part of this study, the researcher will help you get medical care, but the University of North Carolina at Chapel Hill has not set aside funds to pay you for any such injuries, illnesses or reactions, or for the related medical care. Any costs for medical expenses will be billed to you or your insurance company. You may be responsible for any co-payments and your insurance may not cover the costs of study related injuries.

If you think you have been injured from taking part in this study, call the Researcher at the phone number provided on this consent form. They will let you know what you should do.

By signing this form, you do not give up your right to seek payment or other rights if you are harmed as a result of being in this study.

**What if you want to stop before your part in the study is complete?**

You can withdraw from this study at any time, without penalty. The investigators also have the right to stop your participation at any time. This could be because you had an unexpected reaction, or have failed to follow instructions, or because the entire study has been stopped. If you are withdrawn or if you withdrawal from this study, all data collected up until the point of withdrawal will be retained, however no additional information will be collected unless you provide additional written permission for further data collection at the time of your withdrawal.

**Will you receive anything for being in this study?**

You will not receive compensation of any kind for being in this study.

**Will it cost you anything to be in this study?**

There is no cost to you for participation in the study.

**What if you have questions about this study?**

You have the right to ask, and have answered, any questions you may have about this research. If there are questions about the study, complaints, concerns, or if a research-related injury occurs, contact the researchers listed on the first page of this form.

**What if there are questions about your rights as a research participant?**

All research on human volunteers is reviewed by a committee that works to protect your rights and welfare. If there are questions or concerns about your rights as a research subject, or if you would like to obtain information or offer input, you may contact the Institutional Review Board at 919-966-3113 or by email to [IRB\\_subjects@unc.edu](mailto:IRB_subjects@unc.edu).

**Teacher's Agreement:**

I have read the information provided above. I have asked all the questions I have at this time. I voluntarily consent to participate in this research study.

\_\_\_\_\_  
Printed Name of Research Participant (Teacher)

\_\_\_\_\_  
Signature of Teacher

\_\_\_\_\_  
Date

\_\_\_\_\_  
Signature of Research Team Member Obtaining Permission

\_\_\_\_\_  
Date

\_\_\_\_\_  
Printed Name of Research Team Member Obtaining Permission

\_\_\_\_\_  
Signature of Witness (if applicable; e.g. literacy issues, visually impaired, physically unable to sign, witness/interpreter for non-English speaking participants using the short form)

\_\_\_\_\_  
Date

\_\_\_\_\_  
Printed Name of Witness

**APPENDIX C: PARENT DEMOGRAPHIC QUESTIONNAIRE  
(PRETEST)**

Parent Name(s): \_\_\_\_\_

Child's Name: \_\_\_\_\_

Best Method of Parent Contact (Email or Phone): \_\_\_\_\_

Child's Date of Birth: \_\_\_\_\_

Child's Gender:  Male  Female  Non-Binary

Child's Racial Identity:  White/Caucasian  
 Black/African American  
 Asian  
 Native Hawaiian or Other Pacific Islander  
 American Indian or Alaskan Native

Is your child's ethnicity Hispanic or Latino?  Yes  No

Please list the gender and age of any siblings of the child:

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Did your child attend a child care program before Seawell's Preschool?  Yes  No  
If yes, please list the programs and the dates of the child's attendance. If no, please explain their previous childcare situation:

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We are interested in learning about what children likes to do **indoors** and **outdoors**.  
Below, please briefly describe what your child likes to do **indoors**. This can include who your child is with and the indoor activities your child enjoys.

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Below, please briefly describe what your child likes to do **outdoors**. This can include who your child is with and the outdoor activities your child enjoys.

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Thank you

## **APPENDIX D: CHILD DRAWING WORKSHEET (INDOORS)**

Researcher Script:

“I would like to know about things children like to do indoors and outdoors.”

“Can you tell me the difference between indoors and outdoors?”

Thank you.

“Now, can you draw me something you like to do when you are indoors on this paper?”

You can draw anything you like to do while inside”

“Thank you. Can you tell me about what you drew?”

The child can draw below or on a separate sheet:

## **APPENDIX E: CHILD DRAWING WORKSHEET (OUTDOORS)**

Researcher Script:

“Now, can you draw me something you like to do when you are outdoors on this paper?”

You can draw anything you like to do while outside”

“Thank you. Can you tell me about what you drew?”

The child can draw below or on a separate sheet:

## **APPENDIX F: TEACHER INTERVIEW GUIDE**

- 1) What are some key components of a NP program?
- 2) How has transitioning to a NP changed your preschool program?
- 3) What has been most rewarding about the NP program?
- 4) What has been most challenging about the NP program?
- 5) What do children seem to like most about the NP program?
- 6) Do you have any thoughts related to implementation considerations that you would share with others starting a NP program?
- 7) How does your role as a teacher look different when in the outdoor classroom vs. the indoor classrooms?
- 8) What differences do you notice in what children do in the outdoor classroom vs. the indoor classrooms?
- 9) Can you provide an example of a child expressing creative thinking in the outdoor experiences associated with the NP program?
- 10) Describe an instance where you felt a child learned something in the outdoor environment. What was your role as a teacher in this experience?
- 11) What are some strategies you used as a teacher that you think is relevant to the creative development of children?
- 12) What improvements would you make to the program or outdoor classroom as you plan to continue the NP?

## APPENDIX G: DAILY PILOT NP SCHEDULE GUIDE

### **Wilderness Wednesday Schedule\***

8:00 – 8:30 – Student Arrival (Dress for Weather (bathroom), Transition to Outdoor Classroom/ "Wilderness" Location)

8:30 – 9:00 – Morning Meeting (day of week, weather, songs, sharing of gratitude, book, welcome of friends)

9:00 – 9:30 – Free Play/Student Lead Exploration

9:30 – 10:30 – Teacher Lead Activity

10:30 – 11:30 – Free Play/Student Lead Exploration

11:30 – 12:00 – Group Gathering (debrief, reflections, songs, clean up for lunch)

### **Other Daily Schedule during Pilot Program**

8:00 – 8:30 – Student Arrival (dancing, coloring, name writing)

8:30 – 9:00 – Morning Meeting (day of week, weather, songs, book, welcome of friends)

9:00 – 10:00 – Centers rotations (various activities – 10 minute rotations)

10:00 – 10:15 – Bathroom break, dress for outdoors, transition to outdoor classroom

10:15 – 11:15 – Free play/Student Lead Exploration in Outdoor Classroom

11:15 – 11:45 – Transition to play in (built) outdoor playground area

11:45 – 12:00 – Group Gathering (songs, clean up for lunch)

\* Times subject to change based on student interest

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