

**Playing with Nature:
Supporting Preschoolers' Creativity in Natural Outdoor Classrooms**

Christine Kiewra

Dimensions Educational Research Foundation, USA

Ellen Veselack

Child Educational Center, La Cañada, USA

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ABSTRACT

Conducted at two separate natural outdoor classrooms with preschool-aged children from three to five years old, this qualitative research study investigated how outdoor environments supported children's creativity and imagination. Although many studies have explored the development of creative arts in the young children, few have focused on creativity with regard to problem solving, ingenuity, and construction, as did this study. Four factors in natural outdoor classrooms that enhance children's creativity and imagination were revealed: (a) predictable spaces, (b) ample and consistent time, (c) open-ended materials, and (d) caring, observant adults who support creative play and learning.

Keywords: Affordances, creativity, environmental education, natural outdoor classrooms, young children

The continuing sustainability of our planet will require people to solve problems, adapt to a variety of situations, and communicate effectively with others. Our future world will need people who seek adventure and are on the lookout for better ways of doing things; people who have had opportunities to develop and express their creativity, who carry those experiences inside, and who can apply this quality in a wide range of life circumstances. People with these characteristics and experiences tend to live more fully and have more control over what happens to them because they have a creative outlook towards life (Bruce, 2004). For these reasons, creativity plays an important role not only in schoolwork, but beyond the school environment. Furthermore, creative problem-solving drives economic growth and factors in solutions to societal challenges. In essence, creativity can maximize human potential, people's sense of well-being, and positive societal change. Creativity can be the motivation to learn and develop skills that allow people to do what they want to do (Pratt, 2014). Bronson and Merryman (2010) report that children with high creative self-efficacy are better able to handle stress and are more "confident" about their futures than those who lack this characteristic.

Although the need to support creativity in children today is becoming increasingly evident, research indicates that it has been declining significantly on a global scale over the last 20 years. One recent report states that our approach to education in the United States and elsewhere is one of creativity's biggest threats. This decline in creativity was evident in children's responses to the challenges they faced in school, life, and work. "Children have become less... expressive... energetic... humorous... imaginative... unconventional... less likely to see things from a different angle" (Kim, 2011).

A challenge for educators who want to address this decline in creativity is that much of the literature primarily shows examples of creative experiences for children in the visual arts and dramatic play. Ideally, creativity resources would include examples of innovation and imagination from all domains of learning. Educational theorist and creativity researcher Howard Gardner remarks, "I don't think creativity is particularly connected to the arts—I think you can have creativity in any realm from business to politics to technology" (Gardner, 2012, p. 46).

Educators can support creativity in young children by encouraging flexible thinking and wide-ranging play experiences. Play can be used as a springboard for teachers to scaffold and support. Educational theorist John Dewey's work urges educators to give children something to *do* not something to *learn*. In these cases learning becomes a natural result of play. Dewey's theory supports early childhood educators who strive to offer provocations for learning in their environments and plan open-ended play-based experiences. To the untrained eye, this may look unproductive and like "messaging around." However, creativity guru Sir Ken Robinson urges educators to invite this kind of "messiness" into learning for both children's sake and their own. "Creativity is not the opposite of discipline and control. On the contrary, creativity in any field may involve deep factual knowledge and high levels of practical skill. Cultivating creativity is one of the most interesting challenges for any teacher" (Robinson, 2015).

The environment's influence on the creative experience

The *Learning with Nature Idea Book* includes guiding principles for designing effective natural outdoor classrooms as learning environments (Arbor Day Foundation & Dimensions Educational Research Foundation, 2007). Natural outdoor classrooms designed with those principles in mind are environments that stimulate children's creativity and enhance their learning opportunities. Research on these natural outdoor classrooms indicates that teachers who use them credit the enhanced aesthetic value and natural, open-ended materials available to children in these spaces as two key ingredients for supporting all learning opportunities, including creativity. A recent post-occupancy study describing the attributes of natural outdoor classrooms that teachers describe as effective states, "The most successful outdoor classrooms provided: maximum choice, many child-sized spaces, pathways and borders as play affordances, flexible spaces, and support for stakeholder engagement" (Dennis, Wells, & Bishop, 2014). An earlier study conducted at a Nature Explore Classroom in Minnesota also stated that the well-designed environment filled with natural materials supported creative play. The implementation of the guiding principles for designing outdoor classrooms supported the children's freedom to choose what, how, and where to play with materials (Bohling, Saarela, & Miller, 2010).

The role of the adult in supporting and documenting play

Prior Dimensions Foundation research also explored how adults who support experiential learning were key to enhancing children's creative play. Children's experiences in their environment are shaped by the design of the space and also by the adults who share it with them. It is important for teachers to employ open-ended questions that further scientific inquiry. They should also ensure long blocks of time for deep exploration (Veselack, Cain-Chang, & Miller, 2010). "Play is the way children discover the world around them. They explore, invent, and transform it to suit their needs" (Almon, 2013, p. 6). During child-directed, open-ended play, children can try something over and over until it satisfies them and their companions. They are not forced to compete with each other or be evaluated by adult standards. They participate when and how they feel comfortable. Children's play outdoors is often seamless, moving from one interest to another reflecting the natural rhythms of children's concentration and curiosity (Nelson, 2012). When opportunities for play occur in nature-rich environments, children develop the skills across all learning domains. Teachers must be keen observers of children's play in order to see and document this wide-ranging learning as it occurs. Caroline Pratt, in her book *I Learn From Children*, first published in 1948, describes children's play and teacher's experiences observing and facilitating play in this way, "How hard they work, only we who have watched them really know. They do not waste one precious moment. They are going about their jobs all the time" (Pratt, 1948, p. 13).

Effective teachers begin with close observation of children's explorations, then strategically support children's processes and thinking to enhance learning. (Bohling, Saarela, & Miller, 2010). "The teacher's role is critical to supporting children's skill development in self-initiated experiences in a Nature Explore Classroom. The teacher needs to be physically in proximity of children, offer observations, ask thought-provoking questions, follow children's lead without taking over, and trust children to make decisions" (Veselack, Cain-Chang, & Miller, 2010). Conversation is a vital aspect of teacher support. Dialogue among children and with their teacher provides opportunities to take others' perspectives and learn about problem-solving with others. "Encouraging creative exploration and play across all domains of intelligence allows the children to develop their individual strengths into a product uniquely theirs" (Cline, Edwards, et al, 2012, p. 107).

The value of natural materials

Natural outdoor classrooms filled with intriguing natural materials invite creative play inspired by children's imagination. This is in contrast to many manufactured toys, which often encourage children to act out familiar scenarios filled with predictability. A mistaken belief is that an effective way to support creativity is by providing toys in which the inventor has already done all the creating. Premade props for dramatic play do not offer the challenges or opportunities that arise when children must find natural items they can use to represent what they envision. Natural loose parts such as sticks, logs, sand and snow can be anything children want them to be and are ever changing.

Playing with materials provided by nature has the added value of helping children learn to care about nature. "If we encourage children to hone their own imagination and inventiveness, they are less apt to need the transient novelty of a new toy to generate capacity for creative play. We are helping them develop skills and values that lend themselves to better stewardship of the earth and its natural resources" (Linn, 2008, p. 200).

This study was designed to gather information to address the challenges teachers face in incorporating time for play in their curriculum, creating environments that support it, and recognizing creativity in all its forms when they see it. We hoped to learn more about opportunities to support creativity specifically for preschool children. For the purposes of this study we identified creativity in terms of children's capacity to engage in both divergent and convergent thinking. We analyzed teacher's documentation of children who discovered ways to solve their own problems in play with three-dimensional materials as evidence of their creativity. We focused on the learning environment, the materials available, and the teacher's role.

Research Approach and Procedures

This study was conducted in collaboration between Dimensions Educational Research Foundation and the Child Educational Center. We focused on two aspects of creativity, specifically looking at children's problem-solving and ingenuity. We further narrowed the scope of our exploration of creativity to investigating how the natural outdoor classrooms supported creative thinking and imagination through opportunities for building and construction, rather than through the creative arts. Thus, we chose to focus our project on three-dimensional manifestations created by preschool-age children as evidence of their creative processes.

This qualitative research study was conducted using a case study approach (Creswell, 2007). The cases or sites selected for this study were Dimensions Education Programs in Lincoln, Nebraska and the Child Educational Center (CEC) in La Cañada, California.

Teachers as co-researchers. Research is an ongoing focus at both Dimensions and the CEC. All teachers at both centers receive training on documenting children's experiences using Nature Note forms, a protocol tool designed for Dimensions research (Appendix B) as part of their orientation. These Nature Notes include written narrative and photographs and/or sketches of children's visual-spatial work. Teachers observe and record Nature Notes regularly to document all aspects of children's experiences to inform the teaching and learning cycle. Teachers then share their Nature Notes with the analysis team. Nine out of 14 (64% of staff) of Dimensions preschool teachers accounted

for 33 or 63% of the Notes. 10 out of 18 CEC teachers (55% of staff) contributed 19 Nature Notes or 37% of the Notes analyzed for this study. Dimensions began implementing the teacher/co-researcher model in 1998 whereas CEC began implementing the model in 2009. Excerpts of several teachers' observations are included in this paper. In order to protect the anonymity of the children who participated in this research, pseudonyms instead of real names were used.

Site Details - Dimensions Education Programs

Participants. Dimensions Education Programs (Dimensions) serves infant, toddler and preschool age children throughout the school year and adds school-age children in the summer. Participants in this study were enrolled in the preschool program and included approximately 80 children. Half of the children attend the program Monday through Friday full day while the other half attend part-time. Teachers/Co-researchers at Dimensions all hold 4-year degrees in education and staff turnover is low. They are professionals who spend many hours planning and studying together each week.

Setting. The Nature Explore Classrooms on site and the program policy of going outside each day provide children daily access to nature. The Nature Explore Classroom was designed with the Nature Explore Guiding Principles (Arbor Day Foundation & Dimensions Educational Research Foundation, 2007). The natural outdoor classroom is rich with plants, trees and a variety of surfaces intended to create an aesthetically appealing, predictably arranged space that lends itself to children's self-discovery and adventurous play. The Nature Explore Classroom includes the following clearly delineated areas:

- a. Entry feature to signal entering a special place and Gathering Area
- b. Climbing and Crawling Area for large-motor activities
- c. Building Area with natural blocks and mini-bricks
- d. Nature Art Area and Artist Garden with an easel and art table tucked into flower, vegetable and herb gardens
- e. Music Area with permanently installed and hand-held instruments adjacent to an Open Area to encourage movement
- f. Messy Materials Area filled with natural loose parts to encourage dramatic play and large-scale building

The space also has many unique features such as a greenhouse, mural, brick sculptures, mosaics and native prairie plants.

Curricular Approach. Dimensions provides a hands-on, experiential approach to learning that is based on the needs and curiosity of young children. Its mission is to inspire children, families, and educators to connect more deeply with the world around them. Each day children are involved in creative, interest-based experiences that provide them with many opportunities to develop a foundation for life-long learning as they grow socially, emotionally, physically, and intellectually. In the preschool program, approximately 80 children used the outdoor classroom daily. Two groups of children (20 total) and their teachers are scheduled in 45-minute outdoor time blocks during each half-day (3 hour) session. With the understanding that the environment is the third teacher, each teacher plays a part in caring for and thoughtfully readying the natural outdoor classroom for children. When they are outdoors with children, the teacher's role is to facilitate and scaffold children's learning modeling and supporting a sense of wonder.

Site Details - Child Educational Center

Participants. There were 88 children sharing the outdoor classroom for preschoolers ranging in age from two years 11 months to five years 11 months. Eighteen teachers are divided among the four classrooms: two Master Lead Teachers, six Lead Teachers, seven Associate Teachers and three Teacher Assistants over all. There are two classrooms of 22 children ages two years 11 months to four years 11 months and two classrooms of children ages

three years 11 months to five years 11 months. Teachers and children are assigned an indoor classroom but share the outdoor classroom.

Setting. The CEC is a private, nonprofit program and is located just north of Los Angeles. Nestled near the foothills of the San Gabriel Mountains, the CEC serves infants through preschool children as well as providing after-school programs for kindergarteners through sixth graders. The programs serve as the model for the Outdoor Classroom Project, (an initiative of the CEC) There are two distinctive characteristics of this site: the amount of outdoor space children have to play in and the emphasis on natural beauty outdoors. Each age group of children, from infants through preschool, has their own outdoor space which allows the spaces to be specifically designed for the ages of children using them. The program recognizes the importance of children learning through outdoor play and connecting to nature, both of which are reflected in its daily practice with children and through its consulting and educational outreach with the Outdoor Classroom Project. The space is designed to be complex and challenging and to assist preschoolers in becoming capable and knowledgeable with a strong sense of themselves and the world around them. The size of the natural outdoor classroom (over 15,000 square feet) provides ample space for a full range of outdoor activities that support extensive development of children's physical, cognitive, social-emotional, and language skills and abilities.

The design concept emphasizes supporting children as active, independent learners. Permanent equipment (swings, climbing structure, and outdoor cabin) occupies little space relative to the whole space so that children can exercise flexibility and creativity in how they use their environment. Some areas are established to support specific child-initiated experiences, including the garden, wild grass nature area, climbing tree, nature art area, messy materials area, block area, music area and two sand boxes (one of which also includes a dirt digging/mud pit area). A large, open space in the middle provides children with opportunities for whole-body movement and for children to create their own experiences using materials throughout the outdoor classroom. Trees supply shade and provide opportunities for children to have daily experiences with trees. Several storage areas in different locations assist children and teachers in setting up and cleaning up materials.

All teachers contribute to the daily set up of the art area, cabin/dramatic play area, sand boxes, music area, reading area and science exploration area. Teachers also make sure there is an abundance of loose parts available to children. A wide variety of natural materials can be found in the outdoors for children to discover as they move about the space or to use in their play. Natural items such as rocks, shells, pinecones, seed pods, twigs, leaves, tree cookies and acorns can be found throughout the outdoor classroom. Large branches are also available for children to carry, construct with or simply lift to feel the weight of the branches. Some of these materials occur naturally in the space and teachers bring others into the outdoor classroom.

Curricular Approach. The CEC is a play-based program in which children spend their days engaged in play either indoors or outdoors. Each classroom has direct access to their outdoor classroom. Doors are open throughout the day to allow children free and easy access to the outdoors without having to wait for an assigned outdoor time. This fluid indoor/outdoor flow allows children to spend as much time in the outdoor classroom as is needed by children. Children also understand that an open classroom door is an invitation to enter and use not only their own assigned classroom, but the other three classrooms as well. Children are encouraged to do what they would typically do indoors in the outdoor classroom. Teachers bring a selection of equipment and play materials outside from storage sheds and classrooms daily based on several factors: teachers' observations of and response to children's needs; children's articulation of their needs or initiative in bringing items outdoors themselves; staff members consideration of the weather or other factors.

Teachers use an Emergent Curriculum approach in which they develop curriculum based on children's interests and developmental needs. Teachers observe children engaging in their environment, listen to their conversations and questions and then they provide provocations and curriculum based on their observations. In this way, the environment is every changing and dynamic, meeting children's developmental needs on a daily basis.

Comparing and Contrasting the Sites

Both of the research sites are intentionally created outdoor learning environments. Both include the guiding principles developed by the Dimensions Educational Research Foundation therefore share many important similarities. See Appendix A for the Dimensions Education Programs Nature Explore Classroom concept. The CEC research site also reflects the Nature Explore Classroom principles as well as the principles that guide the Outdoor Classroom Project. In both spaces, plantings and a variety of natural surface materials are used to clearly delineate interest areas that include a complete mix of experiences to support comprehensive child development. A clear difference between the sites is that the CEC outdoor classroom is larger.

The curricular approach and teacher's roles are also quite similar at both sites. Both programs follow the children's lead with teachers closely observing and scaffolding experiences. Daily time outdoors is important at both sites but a noteworthy difference is that at CEC children always have the choice to work outdoors so many spend longer blocks of time outdoors. The climate in California facilitates this practice particularly well. There is common vocabulary used by staff and children to name and describe the areas, all of which are accessible to children daily in the same general location. An emergent curriculum educational approach is used at both sites in their outdoor classrooms so that the majority of time children are encouraged to choose for themselves the materials and experiences that most pique their interests. Teachers join children in relationships that scaffold learning (Vygotsky, 1962).



Dimensions Education Programs, Lincoln, NE



Child Educational Center, La Cañada, CA

Analysis

The research director at each site coordinated the collection of teacher's documentation (Nature Notes) and served together as the analysis team. The Nature Notes were digitally scanned and shared electronically. Each week the directors jointly analyzed the Nature Notes shared by teachers using an analysis protocol specifically designed for this study (Appendix C). The Nature Notes were read multiple times for clarity and new insights. Fifty-two Nature Notes were individually analyzed using this systematic, methodological approach. Teachers/co-researchers at both sites were involved in member checks after analysis on their Nature Note to capture their views on the credibility of the analysis interpretations and to offer elaborations if or when appropriate.

After each Note was analyzed it was put into spreadsheets to more fully study, understand, and sort the data looking for themes. The key themes emerged and analysis continued until the team was satisfied they were the salient themes and each included examples with breath, depth and richness.

Findings

Four Key Research Themes

Our grand tour question for this research was, “How do natural outdoor classrooms support children’s imagination and creativity?” As we analyzed teachers’ Nature Notes, four key themes emerged that seemed to be consistently present: (1) the value of predictable **spaces**, (2) the need for ample and consistent **time**, (3) the power of open-ended **materials**, and (4) the essential role of caring, observant **adults** who support creative play and learning (see Table 1).

Table 1

Teacher identified themes related to supporting children’s imaginations in natural outdoor classrooms

Key Themes*	Sub-themes
Space	flexibility predictability adequate space
Time	large blocks of uninterrupted time
Materials	abundance of natural materials large selection of open-ended materials
Adult Role	caring observant participating as needed

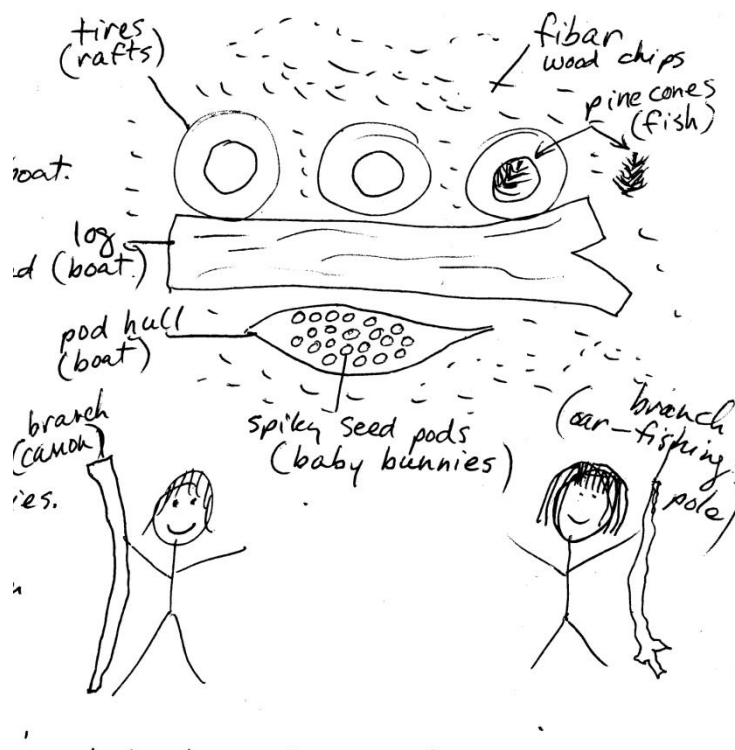
* It is somewhat artificial to talk about these separately because they are so interlinked, but it was important to look at each key theme as a separate element to fully understand the impact each had overall on the creative experiences of children. Thirty-six of the 50 Nature Notes (72%) included elements of 2 or more of the key themes and 28% had three or more.

The following Nature Note illustrates all of the themes evident in the analyzed documentation. This scenario reflects the value of providing children with predictable spaces that encourage freedom; ample time; ample supplies of open-ended materials; and the chance to be with caring adults who support rich play and learning.

Nature Note: *Boating on a Log*

Kip and Isabella decided the log was their boat. The wood chips became the water as they pretended to swim to the boat. They sat and stood on the log as they “stirred” the water with branches. Tires became rafts attached to the boat made of a large pod hull, and they gathered small seedpod balls to fill it. “This is a boat and these are baby

bunnies,” said Isabella continuing to share with her teacher that her stick was an oar and though “this is a speed boat, sometimes we need to row. Also they have fishing poles so they can get fish for dinner.” The important aspects that Kip described included “This is my cannon to keep sharks away. It just puts the sharks to sleep until we are far away.” Eventually the children’s attention turned from the teacher and toward each other again as Isabella gathered pine cones for fish and they continued to discuss boats and bunnies. Kip launched into a story about a “mysterious sound that everyone heard.... until it was never....heard....again.” (With very dramatic pauses noted the teacher.) (V. Forest, 2014)



This type of play is not unusual in early childhood centers, but the depth and complexity is really noteworthy. At five years old, these children are experienced in working together and are able to elaborate with the storyline, scenario, and props. The children had to think about what they needed as props to play out their story. Every material they chose transformed into something else. This could not have happened indoors because of the amount of space required to build a boat large enough to get inside of themselves. The amount of time these children had to explore meant they could be fully engaged in their process and create a more detailed scenario. Just the boats and bunny aspect of the play lasted about 15 minutes, though they spent additional time prior to the teacher’s capturing the story collecting and arranging their materials.

The value of predictable spaces

Space was the first of the four key themes that became evident from the data we collected. Past Dimensions research in natural outdoor classrooms has frequently documented the role of intentional design so this has been well supported over time. Many of the Nature Explore and Outdoor Classroom Project design principles hinge on items such as well-defined areas, a rich mix of activity areas, and pathways that encourage movement throughout. As we considered creativity specifically in this project, we looked for indications that nature-filled environments were

uniquely supporting preschool children's imagination and creativity. We noticed that when children have the ability to spend regular daily time in a predictable outdoor environment, it becomes known to them, understood by them, and familiar. In other words, its predictability empowers children to explore their own ideas. This predictability showed up in teacher's documentation as children formulated plans for their work in the designated interest areas that they knew would have the right materials and ample space. Upon entering the outdoor classroom, teachers frequently noted that children went directly to the areas of their interest and were often able to begin again in places where they had left off previously

Because we targeted children's creativity specifically as it was revealed through their construction or manipulation of materials, it was not surprising to us that the majority of the documentation we analyzed occurred in the Messy Materials Area and the Building Area or a combination of those areas (31/50 Notes or 62%).

We found the idea of scale to be an important differentiator in outdoor spaces as compared with indoor classrooms. Many of the Nature Notes indicated children built full-scale structures that they could fit inside. Children even discussed in one Nature Note the benefits of replicating an indoor experience outdoors because they could "make it bigger." The large size of much of the construction seemed to encourage group involvement. Many notes included scenarios with three or more children (23/50). An example of the value of space with freedom to move comes from one Nature Note in which four children made a block structure and named it the "honey house." The teacher noted that after the children built the house they created an elaborate pretend scenario that revolved around their structure as a home base and included opportunities for children to take turns walking around "exploring." At one point when children were disagreeing about what would happen next, a child named Lanny left to go out and explore. When he returned back to the group and told them about a "half-crocodile half-lizard thing" he found, this changed the focus of the group's play. In our analysis of the scenario it seemed that Lanny was using exploration to give himself time to come up with a plan (a social problem-solving strategy) to shift the group's dynamics so he could lead some of the experience.

In another Nature Note, children pretended to be birds building their nests with logs, sticks and large pieces of fabric. They built two structures large enough for them to get inside of and far enough apart that they enjoyed "flying" back and forth. The teacher/observer reflected that the large body movement involved in climbing, balancing and flying were quite important to the children and enhanced their play.

It was also interesting to see that in many (16/50 or 32%) of the notes teachers documented, children working independently. This was not surprising because earlier natural outdoor classroom research (Dennis, Wells, & Bishop, 2014) indicates that the design of a natural outdoor space with a rich mix of activity areas allows some children to spread out and work together collaboratively, while others enjoy solitary exploratory play at their own pace without conflict.

One Nature Note based on independent play included a four-and-a-half year old girl named Tara. She used a variety of types of blocks (bamboo, tree, and small square) and other materials to work by herself to "build a village" and then sketch it. She put the materials together in the way that best represented what she was thinking about. She had a concept of what makes up a "village" – which is a variety of buildings for various uses. Typically if a child wanted to create a village with pre-made toys, it might include a post office, pet store or other scripted pre-formed items. The child would not be required to use imagination to conceive what these building might be, but would instead simply place items that adults had conceived and manufactured. Since Tara was using open-ended natural materials, she completely wrote her own script as she created her village, choosing materials to represent what she was picturing in her mind. With pre-made toys she would not have needed to use nearly as much problem-solving and engineering.

This scenario could not have played out at all on a typical playground without natural loose parts. Tara went on to synthesize and deepen her own learning when she sketched her village with a clipboard, paper, and pencil which are consistently available to her in her outdoor classroom.

Flexibility in use of the space also showed up as a noteworthy aspect in both the sites. Children often carried materials from one area to another or occasionally their play spilled over from one designated area to another. Children felt comfortable to move around in ways that worked best for them. At times, nature provided some dynamic elements and new materials that were included in teacher's documentation such as when snow became a pie ingredient or a pumpkin that froze overnight became a canvas for chipping into. This element of unpredictability brought forward opportunities for children to engage in problem-solving, ingenuity and flexible thinking.

Another insight worth noting includes the frequency of peer-to-peer learning. It was evident in many of the Nature Notes that teachers shared with us. There were examples of children taking turns being experts and sharing information and past experiences with each other. In the scenario below children created and played on a motorcycle. Analysis revealed that the space to move about enhanced their opportunity to work together and create what they envisioned. It seemed to be a critical factor in their imaginative play.

Nature Note: *The Motorcycle*

Ani, a teacher, approached Camden playing in the area in a front of the bike shed. He was sitting on a tree stump making loud sounds and leaning side to side. As the teacher sat quietly nearby and continued to observe, Jake, a child who had been following her, came and sat too. Camden looked at them and said, "I am driving my motorcycle to Hawaii!"

Jake quickly replied, turning to his teacher, "I know Hawaii, I went there, do you remember?" He then quickly picked a piece of paper off the ground and showed it to Camden telling him, "I have a map." Camden replied, "We need to go that way."

They both decided that the motorcycle needed gas and agreed to go pump gas and bring it to their motorcycle. Camden suggested a wheelbarrow to deliver the gas (see pictures below). Taking turns pushing the wheelbarrow they circled around the cabin and stopped in a front of the mailbox. "We have mail!" Camden exclaimed grabbing a stick from the ground, Jake pushed it into the mailbox and said, "No, this is the gas place." Using the same stick, he put the stick next to the wheelbarrow's wheel. Ani supported the boys by asking them, "I wonder what you are doing?" "I am putting gas for my motorcycle!" Jake answered. After pumping gas, they negotiated their way back to the motorcycle and delivered gas to it. (A. Ivanov, 2015)





This is a rich authentic play experience that we believe happens often in natural outdoor classrooms where children are empowered to let their imaginations and bodies roam free to transform, invent, and create. The space outdoors allowed the children to exercise their gross motor skills at the same time as their cognitive ones.

Creating this play scenario required open-ended materials, sharing ideas, and some schema or prior knowledge about getting gas and driving a motorcycle. The children seemed to be creating the story of their play as they went along; as they encountered challenges they created solutions such as when the first child came upon a mailbox and commented on having mail, the second child redirected back to the needing gas scenario.

The stationary log that they pretended was a motorcycle allowed for nuanced dramatic play and gross motor practice itself that included leaning and holding handlebars. Because the 'motorcycle' couldn't actually move they creatively had to find a way to bring gas to it.

Freedom of materials and space outdoors allowed these children to make their play their own. In turn this encourages authentic play that is not influenced by media or acting out something seen on a screen. With each piece of documentation we considered and discussed whether or not the experience could have happened similarly indoors. We noted in this example that a motorcycle could be built with blocks indoors but the nature of that log seemed to encourage the child to call it a motorcycle. Our interpretation is that the attributes of the log reminded him of a motorcycle. The fact that natural materials are all different seems to suggest different things to different people at different times.

Natural materials require children to recall images, asking themselves, "what does this look like to me?" This process promotes flexible thinking and searching for analogies that represent the necessary play props: a stick becomes a pump, a mailbox a gas station, the wheelbarrow is now the vehicle to bring gas back to the empty motorcycle.

Another example of a documented of an experience that required ample and flexible use of space is the story below of a girl using natural materials to build something that represented a door to her.

Nature Note: *The Door*

"Can I make a cabin again?" asked Elizabeth. She was referring to a structure her friend Alex had recently built for her in the Messy Materials Area. Her teacher encouraged her to build her cabin and asked if they should get her friends to help lift the heavy wood pieces that had been used before. "I can lift the heavy stuff!" Elizabeth assured her teacher and proceeded to pick up a large tree cookie and carry it to the Open Area leaning backwards a little to balance herself as she walked (see pictures below). She placed it on the ground and said, "see" with pride as she walked past again to gather more materials. Elizabeth chose one piece at a time (3 sticks, bark, chunks of wood, tree cookies, bamboo poles, and large yellow fabric) and carried them to the Open Area. Next, she arranged it piece by piece, continually changing the placement and then eventually saying "I'm decorating it now" as she added a

pheasant feather and small bricks. As Elizabeth eliminated the materials she had gathered but chosen not to use, she tossed them back to the Messy Area. "That is the door knob," she declared as she added a tree cookie and seemingly making it complete. She then tossed the yellow fabric inside the structure saying, "Wait, one more thing," and slid aside the longest stick. Elizabeth then entered the door once and left her door creation for another plan. The teacher asked Elizabeth if other friends could use her door and she agreed so it was announced to other children as they passed by that Elizabeth had made a door. Several children entered and told each other where they were going. The first was going to a "unicorn place." (J. White, 2015)



What was especially unique about this Nature Note was that this child, Elizabeth, created a flat structure, that she called a door, which is typically vertical. She searched for and collected natural loose parts that fit her visual image. According to her teacher, she at one point indicated she wanted to build a cabin. She chose to do this in the Open Area adjacent to the Messy Materials Area in what seemed to be a nice, blank canvas. Elizabeth purposely chose one material at a time, carried it to her workspace, and piled it up where she had plenty of space to work independently.

The amount of space that Elizabeth was able to claim to work in seemed important to her experience. She gathered materials from a variety of places then sorted and returned the ones she did not need. There is a sense of freedom in this experience as well as respect from her teacher that seemed not to view this as merely just cute. The teacher documented the experience, materials and words Elizabeth used to be able to see the learning that occurred.

The Need for Ample Time

Time is the second key theme that emerged from our data. Children were afforded large blocks of time to work in the natural outdoor classroom. In 20 of 50 nature notes (40%), our analysis revealed that time was a key factor in children's creativity and engagement. We had multiple nature notes revealing children working on single experiences for 30-90 minutes at a time. The majority of nature notes where time was found to be a significant contribution to creativity took place at the Child Educational Center where children are able to flow freely between the indoor classroom and the outdoor classroom throughout the day, allowing very large blocks of time for children to engage in their experiences. The importance of ample time for children to engage in play has been documented in past research projects related to children's skill development. (Veselack, Miller, Cain-Chang, 2015; Veselack, Cain-Chang, Miller, 2013)

Longer periods of time give children the chance to think about what they are doing, consider and test solutions to their problems and be elaborate in their constructions. For example, five children were engaged for over an hour pretending to travel to South Carolina. They gathered materials, such as milk crates, big sticks, and palm fronds, to construct their vehicles. They worked with one another sharing ideas, thinking creatively to use the materials and craft their stories. In another example five other children started with an idea of building a castle and had to find materials, make decisions about what they wanted their castle to look like and then construct it. There were multiple opportunities for creative problem solving during the 45-minute observation. Another story described a group of children spending the morning building bird nests with tree cookies, logs and fabric. Once their nests were complete they planned a Halloween party for the birds, including pondering what a bird should be for Halloween. They were

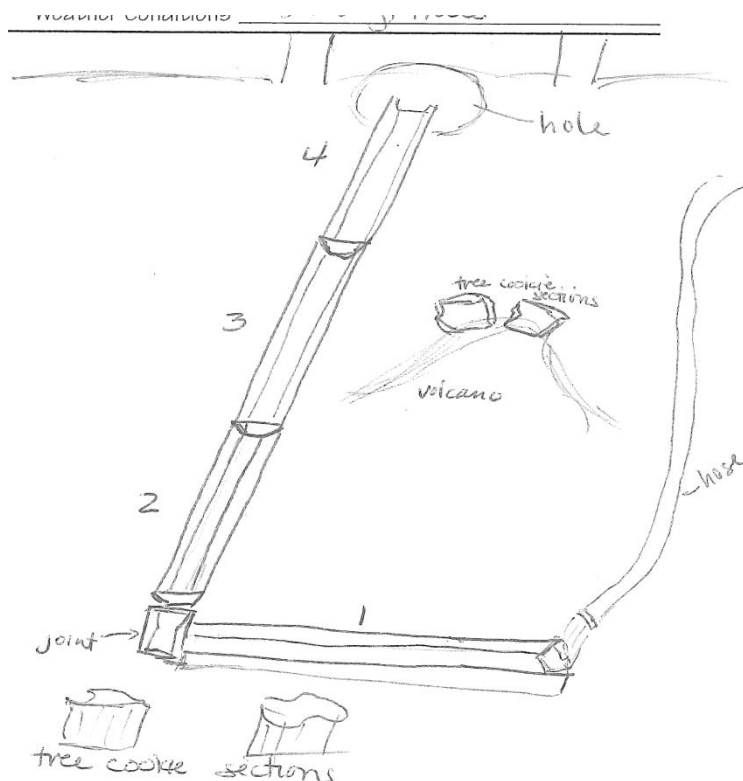
not only able to take their time to be thoughtful about their building but also in creating a play scenario. They engaged in creative problem-solving as they built and creative thinking as they crafted their play scenario.

We found the longer children had to engage, the deeper their engagements with the materials and each other were. Extended periods of time in the natural outdoor classrooms gave children the chance to immerse themselves fully in their tasks at hand. They had ample opportunity to engage in their experiences fully, to find problems that needed solving, and then solve them.

The following two stories fully demonstrate how time played a factor in children's creative experiences.

Nature Note: *Gravity with Gutters*

Five children, all boys, were recreating a waterfall from the previous day. The plan was to run water from the hose, along four gutter pieces into a hole they had dug at the other end. As they began running water into it, they discovered the water leaking at the joint. They tried various ways to solve the problem, first by adding some tree cookies sections under it, which lifted it up. In doing so, it lifted the gutter piece up enough so that the water flowed back towards the hose. One child observed, "It's going up hill!" There was a great deal of conversation about who should hold the hose, where the hose should be (in the gutter or in the volcano they had built.) Lyle expressed frustration that the water continued to flow back out of the gutters. He began lifting the gutter at the hose end every so often so the water would flow down towards the joint. When Jason commented that the water was flowing uphill, Lyle exclaimed, "No! That's wrong! Jason's wrong! Water doesn't go uphill!" His teacher prompted him to consider why the water flowed in the right direction when he lifted up the end. He watched, thought about it, then removed the tree cookies pieces that were under the gutter at the joint and the water began flowing in the right direction again. (S. Walsh, 2015)



This is a good example of what can happen when children have time to work through their process to the end. These children had ample time to fully explore their process, to problem solve together, to negotiate and debate and to have support from a caring adult. They were able to work, rework, consider, test, posit theories and discover.

Learning is a long process in which children must be fully engaged and involved. The child who observed the water going “up hill” had the opportunity to express his discovery, share it with others and then get input from Lyle about the impossibility of water going up hill. Lyle had lots of time to consider what was happening when he propped up the gutter and the water began going the wrong way. He tried several solutions to fix both the leaking and the water flow problems. Had they only been given 35 minutes outdoors, they would not have had the time to get fully immersed in their experience, nor would they have had time to question their process and consider solutions.

Nature Note: *The Dinosaur*

“Waahoo! I’m so excited I found a saber tooth fossil. Be careful, it’s very fragile.” William had been exploring the natural materials in the nature sandbox when he came upon his discovery. He began collecting and piling up more natural materials, calling them fossils. He was narrating his process out loud. “I found the entire remains of a stegosaurus, so many fossils. Now I have to put it together. He began to construct the stegosaurus and said, “The stegosaurus’ brain is the size of a walnut.” (See pictures next page.) He held up a small piece and said, “This is the tiniest piece ever! It’s the brain.” He continued to move around putting together the skeleton, grabbing like pieces from the pile. “It’s finished! Come and see. I’m the discoverer.” He then started to add more pieces to the stegosaurus and said, “It can switch into a jet. It’s a switch and go dino!” (A. Fiore, 2015)



William started this project early in the morning when the yard was fairly quiet and with few children around. He worked independently gathering materials into a pile, being selective about which sticks and natural materials he put in his pile. He then began to meticulously construct his dinosaur. His teacher, Amy, watched him but largely left him to his own process. He showed her the brain and explained its size, but his other narrations were really to himself. He truly got lost in time constructing this dinosaur. He spent nearly an hour and a half in his process, unimpeded by adult interruptions or schedules. He worked until he decided he was finished. This time allowed him to think creatively, problem solve his construction and to work with great detail and care. He was not rushed to completion or expected to conform his ideas to fit into a shorter time frame. Time was a critical component in the success of this experience for William.

Open-Ended Materials

Our analysis uncovered that the most commonly used materials were plants or plant parts. See Appendix D for a list of materials children used. Teachers documented at least 23 different natural materials in the Nature Notes they recorded. The most commonly noted were living plants or the small loose parts they create such as acorns, leaves, and pinecones. Many play scenarios also included very flexible items such as mulch, dirt, and sand. The second most commonly used materials were parts of trees such as sticks, branches, logs, and stumps.

Real open-ended materials that have no prescribed use seemed to support children's divergent thinking and therefore ingenuity. Our analysis shows that the non-standardization of the materials (really no two sticks are alike), the quantity of materials, and the freedom to combine materials were all important because those three aspects were frequently noted in Nature Notes. Children created many things including teeter-totters, ice cream trucks, campfires, a playground, many forts, a conveyor belt and even a ski ramp.

In one Nature Note taken over two days' time, two four-year-old girls worked to make a bridge out of a stump, a log, and a plank. The children experimented with making a bridge sturdy enough for walking across. They employed creative problem-solving to get the plank balanced. The materials allowed for lots of problem solving because the materials were not uniform and with their goal, they had to consider stability and height as they worked. On the second day, the children were successful in creating a bridge that they could walk across. It was significant that the girls did not solve their design problem the first day but worked together a second day until they were able to make a bridge they could move across. Also, the cooperation of these two girls and their interest in working together to move heavy objects stands out. They used positive language such as "we just have to try" and "we can do it together."

Another important variable in many Nature Notes considering the impact of open-ended materials was that children knew where to find what they needed and could independently access them. Children also needed time to mess about with materials exploring their properties and then to create and explore new functions. The data indicate that both the frequency of access to natural materials over time as well as the duration of the time spent with materials is important. The many play affordances supported by open-ended materials is also supported in earlier Dimensions research (Veselack, Cain-Chang, & Miller, 2010 and Miller, Tichota, & White, 2013).

The following is a documented example of children demonstrating ingenuity by using natural loose parts to test hypotheses about how they will travel down a ramp.

Nature Note: *Ramps and Balls*

The children first worked together to assemble a set of chutes (see pictures below). They set it up to traverse a slope from the low brick wall in the Messy Area all the way across the Open Area to the sidewalk. They looked for balls but when only finding a few, they looked around for more things to use. They tried pinecones, acorns, and corncobs. They found out that the pine cones and acorns worked better than the corncobs. Next, one child, Alice, invited another, Thomas to do a "corn cob race" on other constructed ramps with varying angles of incline. They sent the corn cobs down their ramps and even compared it to how pine cones traveled down the slide as well. When discussing this process with the teacher and how each of their tested materials performed, Thomas said, "The corncob does better cause it slides down and flips over on turns because it's going so fast." (C. Heinzman, 2015)



These children engaged in an investigation using ramps and not just balls but also tested their pathways with pinecones, acorns and corncobs. It seems the children had a plan and devised alternatives. They had theories and tested them out. This may be the clearest example of testing hypotheses that we analyzed. The open-ended materials provided some problems for the children to solve. Because they didn't have enough balls, they discovered which other materials they could test to see how they worked. Alice, comparing the acorns with the corn cobs, said, "They work better because they are round."

The children also had flexibility in their thinking, especially when posed with the challenge of not having enough balls to use and perseverance to continue testing things. Thomas hypothesized that the cobs ability to flip over was what made them go fast on the turns.

Creativity requires more than remembering information but also understanding, analyzing and evaluating. It requires both divergent and convergent thinking. The children used divergent thinking to gather materials to test out. As they were testing out materials they needed to analyze and evaluate how each worked. The next step was critical and required some adult scaffolding. The children then synthesized what they had learned and used convergent thinking to communicate their new understandings of the properties of the materials that traveled down the ramps most quickly.

Another Nature Note that exemplifies the value of natural materials is Corn Pies below. In this example children combined many loose parts in a frequently occurring outdoor classroom project, imaginative cooking.

Nature Note: *Corn Pies*

On this day, six children joined in a cooking project (see pictures below). Placing the large, metal bowl on the ground in the Messy Area, the children carried small containers as they searched the ground for kernels of corn. Another teacher had brought ears of corn from her farm for her group to shell and there were kernels of corn everywhere. The children gathered the corn and added it to the bowl of dirt and mulch. Lucy announced, "We're making corn pie. It's for the squirrels so they can eat it for the whole winter." Chelsea added, "We're getting corn so the squirrels have enough food to eat." Evie was scouring the area for corn. She told the children around her, "We need another shovel so we can get it big. I have to use my hands. Here's more corn and dirt too." Carmen used a large plastic spoon to scoop more dirt into the "corn pie." She also used the spoon to stir the ingredients. Chelsea scooped the mixture into several small containers and said she needed to boil it.

The focus of the play then shifted suddenly to selling corn pie to other children. Chelsea began asking other children, "Corn for sale, anybody want corn?" Lucy said, "We can only have seven customers because we only have seven pots." She added that the cost for each was one dollar. (K. Tichota, 2014)



These children are cooking and selling corn pies while sharing control of materials and ideas. The natural materials they used included corn kernels and whole ears, mulch, dirt, and an oak leaf all of which are clearly not standard in size. They also used a variety of other materials and did not limit themselves. When they did not have enough shovels, they used their hands to dig. We also got the sense from this teacher's documentation that the experience seemed to feel free because they were outdoors, more so than if they had been indoors. There was enough space for this large group of children to work without conflict. Also noteworthy to us as we analyzed the Nature Note was that many learning domains were simultaneously being supported. This scenario is an example of the ways in which creativity thrives at the same time as learning occurs across multiple domains. The open-ended materials provided the opportunity for children pretend it was anything they wanted it to be. Sometimes, as in this case, the materials seem to suggest an idea to children. The corn seemed to say corn pie to them at first. Then it morphed from being pie for squirrels to corn pie for sale to other children and so on.

We also noted the plethora of opportunities provided by the sheer amount and variation of natural loose parts available in the natural outdoor classrooms. The materials tended to provoke creativity, divergent thinking and problem solving. Many of the Nature Notes we analyzed were examples of children building in some shape or form. Often the process occurring during building was the important aspect because it was frequently noted that children didn't actually use the creations they worked hard to make. Many times children didn't seem to identify what they were building until they are at least partially done with it. As we analyzed we came to understand that often the important thing for young children is the joy in creation and not as important to them to elaborate, modify, or even use their structure. In much of the literature about creativity, many creative people do their work and move on. This was true in both the door and dinosaur scenarios shared earlier.

The Essential Role of Caring, Observant Adults

The role of the adult is important to the development of creativity outdoors in some ways that are different than indoors. We recognize that adult support of children's learning is not unique to development of creativity but it was essential that teachers supported children in several key ways in the Nature Notes we analyzed. First, we noticed that teachers often allowed children to stretch boundaries, were nearby the creative play but were careful to stay out of the way, avoiding undue influence and encouraging children to explore and solve their own problems. In many cases, the teacher's primary role was to stay back and allow the events to unfold, stepping in only when needed.

One example of this was as a four-year-old girl (Clara) tried to get another child to understand how to make their seesaw work properly. Clara constructed a simple seesaw out of a tire and a plank. She invited Bradley to sit on the other end and told him to "push up" while she pushed down. He didn't follow her directions though she tried several ways to get him to understand her directions. Janet, the teacher, observed them without interrupting their process. She could have stepped in to tell Bradley how to work the seesaw but she allowed the two children to own their process and explore the physics of working the simple structure. As a result, the children had the chance to problem solve, experiment and use their creative thinking to make it work.

The earlier example of William building the stegosaurus is also good example of this. His teacher, Amy, was nearby and checked in on him frequently, but stayed back and let William do his own work. She didn't tell him how to do it, suggest materials or interrupt the flow of his work.

Teachers play a very important role in children's creative thinking. It was by allowing children to engage in their own thinking that teachers noted they saw children working through their own problems, coming up with solutions, creating new ways to use materials and stretching the boundaries of convention. The next Nature Note documented by Janet as well exemplifies this type of support.

Nature Note: *Planting Children*

Janet, the teacher, was working in the garden with several children (see pictures on next page). They were getting the beds ready for planting, turning over the soil with trowels. Children began digging holes and piling up soil and

Janet talked with them about the possibilities of finding worms or roly-polies. During the 20 minutes they worked, children came and went, eventually leaving 2 children, Brandon and Eloise. Brandon wanted to get into the raised bed to better reach the depth of the hole he was digging. Janet helped him dig a hole big enough for Brandon to sit in. He wiggled around in it, still moving soil with his trowel and hands. Soon he was laying down in the soil, rolling over and allowing himself to be covered with the soil. "I'm taking a mud bath," he said as he continued to move the soil.

Eventually, Eloise asked if she could get in too and promptly did so. Both children walked, sat and shoveled soil onto their feet, and digging holes to sit in. Brandon asked Janet to pour soil onto his feet and as he rolled in the soil said, "I'm having a dirt bath!" They asked Janet to pour soil onto their bodies and as she did, the soil tumbled down their backs and bellies, sometimes rolling down inside their shirts. Eventually they both wound up back in their respective holes. Janet covered their feet, mounding it up over their legs. Brandon slowly began standing up, bent over then pulling up to his full height. He waited a bit and said, "I'm a daisy" as his hands spread to his sides and upwards near his face. He continued to want his teacher to "water" him with soil. After a while he said, "I'm dying" and his body shrank back into a small ball. He did this several times. Eloise joined in, becoming a different flower, and growing as Brandon did. Janet asked them what season their flower was in as they were in different positions. They responded with spring, summer or fall. Janet then introduced the word "dormant" when they were in a crouched position. They spent approximately 40 minutes in this activity. Brandon actually continued this play throughout the day being a flower in various states of growth throughout the yard. (J. Sedhom, 2014)



This experience happened because the teacher provided support for the children. Brandon was demonstrating some flexible thinking, creating a story of a flower's life cycle. His teacher, Janet, allowed him to push the boundaries by getting up into the planter box. She participated as she was invited by Brandon but didn't take over his play or change it to suit her own needs. She remained respectful of Brandon's ideas and demonstrated respect for them by following his lead. She also extended the children's thinking with her questions and by adding new vocabulary.

In summary, the data revealed four significant ways natural outdoor classrooms support children's creativity and imagination: predictable space, extended blocks of uninterrupted time, an abundance of natural, open-ended materials, and a caring adult to support their work. The educators documented children working for long periods of time, engaging in creative problem solving, building and storytelling in their nature-filled spaces.

Discussion

Children must have opportunities to engage in creative endeavors, whether it is solving a problem, planning and building a structure or creating a venue to tell a story. Flexible thinking and creativity are critically important skills for children to develop in order to be productive, contributing adults. This happens best in environments that allow children the freedom to think for themselves, ponder problems and dream up creations; where they have time to work until they are done, space and freedom to move about while they work, an abundance of open-ended, natural materials to use and caring adults to support their efforts. The natural outdoor classrooms we studied had all of these elements to support young children's creativity.

The Nature Notes we included in this paper illustrate the unique value a natural outdoor classroom adds to support children's creative play and imagination. The combination of all four of the themes that emerged from our data; space, time, materials and adult support, are all essential ingredients to experiences for children's opportunities to drive their own learning process and imaginative play. We recognize that creativity and imagination occur indoors, but found that the open-ended loose parts and inspiration that nature provided enhanced the freedom and opportunities for children's inventiveness to flourish.

Space

In well-designed natural outdoor classrooms where children spend time daily using plenty of loose parts they are able to play with information and concepts. This play that children engage in is the most serious work they can do. Children must experience things for themselves, process information in a way that is right for them, struggle with problems and use their ingenuity to create their own solutions. These are the seeds of learning for young children.

Children need rich environments for these seeds to grow. They must have spaces that are conducive to learning, spaces that are predictable and reliable. Natural outdoor classrooms should have an element of predictability to them so that children know where to routinely find the materials they need to carry out their work. Children should be able to envision where they want to be and where the materials they need can be found.

While children benefit from predictability, the element of flexibility in the environment is equally important: flexibility that allows children to move materials from area to area based on their needs. The space should bend to the needs of the children, ebbing and flowing with them, adaptable and flexible enough to become anything children can imagine.

The environment should also be spacious enough for children to build and create on a grand scale. Children benefit from being able to spread out, unconcerned about spilling over into the area next to them, or needing to elbow for space with the children working next to them. While children may still put themselves next to other children and may need to negotiate that area, when there is ample room they have greater freedom to expand their play, to spill over the edges without impeding on other children's experiences. A well-designed natural outdoor classroom provides the space children need to work, to expand and contract and most of all to create and imagine.

Time

There is a tendency in early childhood programs to artificially divide time into easily manageable blocks but the data suggests that children's engagement and creativity is enhanced with longer periods of uninterrupted time in the schedule. Quantity of time is especially critical to experiences that support creativity. An important concept for young children's deep engagement is the opportunity to get lost in their play. They do not have to think about what their next task will be, who will be interrupting them or how quickly will they need to be done and to move on. They are truly able to work on their project or activity until they decide they are done. Children need to be able to work until they are finished or they may be reluctant to engage in a deep and meaningful ways.

Children have the capacity for deep focus and sustained attention when their play is meaningful to them and they have lots of time to formulate, process, engage, evaluate, trouble-shoot, construct, rethink, rework and discover. This is where the true learning takes place, when the child's brain is engaged and working hard. This all takes time. Lots and lots of time, uninterrupted by well-meaning adults who want to move them on to the next activity. Large blocks of time allow children to go deeper in their exploratory processes resulting in creative problem-solving and original ideas, freeing the mind of the young child to ponder and dream, to think over a problem critically and try a variety of solutions, an important activity for learning and growing the capacity for flexible and divergent thinking.

Materials

Natural loose parts are the bread and butter of early childhood creativity in a natural outdoor classroom. Children gain so much from working with these materials because they have to think for themselves while being creative in problem-solving, constructing and imagining. Natural materials can be anything children want them to be and this ambiguity spurs their imagination. Some bits of nature are suggestive, looking like a motorcycle, for instance, or a piece of pie. While children may choose to play with the materials with that in mind, they are also free to use them in completely unique and inventive ways. When children have mostly closed-ended materials, or items that are authentic replications of items in real life, there is little room for imagination and creativity.

Children need to have a wide variety of natural loose parts available to them that offer a nearly limitless set of options for them to imagine and create. Nature offers a wealth of interesting and intriguing shapes, textures, colors and smells. This variety provokes a child's imagination and creativity. Children have to think so much harder to imagine that pile of sticks and logs transforming into a stegosaurus skeleton for example. Their play is less scripted as well when they are using natural materials. The objects are their own creation, not what they've seen on television, and the dialogue is whatever they imagine it to be. That kind of scripted character driven play is often about repeating lines memorized by children and not conducive to creativity and imagination.

Children are also processing daily life through their play. Children can recreate their own family or community culture through the use of open-ended, natural materials. They naturally weave together prior experiences into their play scenarios and nearby adults who are closely observing can use that get to know the children better.

Adult Support

The role of the adult in supporting children's creativity in natural outdoor classrooms is crucial. Too much teacher direction can shut creativity down before it ever develops. Teacher's view of children's creative capacities and respect for their experiences inform how they support imaginative play. There are many supporting roles that educators take with children ranging from observing from a respectful distance to being fully immersed in the child's play. The most supportive role is one that balances the two extremes. Teachers should make themselves available and be nearby the children and then participate, as it seems necessary. There is a delicate balance that must be achieved by teachers: stepping back while still remaining open to engagement, and interacting with children without taking over.

Many Nature Notes reflected observations from teachers who did less managing of children because the children were managing themselves, with support from a teacher, while involved in their own creative thinking and problem-solving. When teachers step in too soon and provide answers, solutions and their own ideas to children, it often interrupts children's flow of inspiration or takes away their opportunity to resolve a problem themselves, or create and imagine.

Opportunities for further study

This research adds to the growing body of knowledge about the value of natural outdoor classrooms. Further study is needed to understand the influence of frequent access and use of nature-filled environments on learning and wellbeing. Examples of research questions that would be helpful to study include:

- What are teacher's perceptions of their ability to effectively use nature-filled spaces to support educational outcomes?

Identifying how effective teachers feel when they are working with children outdoors might reveal the administrative support and professional development opportunities that could enhance their ability to teach in natural environments.

- How does frequent use of natural outdoor classrooms influence children's behavior?

Nature is often described as calming and peaceful. Identifying the attributes of natural outdoor classrooms that support positive behavior in children would be helpful for people who make decisions regarding children's daily schedules in early care and education settings.

- How do natural outdoor classrooms support children's development of executive function skills?

In educational literature executive function skills are often referred to as including flexible thinking, self-regulation, and working memory. Investigating how open-ended natural materials might uniquely support development of executive function could add to the perceived value of unstructured time outdoors.

- How do opportunities for children to use natural open-ended materials support inclusion of children with varying abilities and cultural backgrounds?

The role of natural open-ended materials in supporting children with special needs deserves more research. In this study, we were intrigued by the ways in which use of hands-on materials can be used to document children's abilities with less reliance on verbal language skills than traditional indoor supplies. Another area that could be studied in greater depth is the impact of children engaging in creative play in natural outdoor classrooms without looking 'wrong'. An investigation that identifies if or how experiences with natural loose parts are potentially more inclusive of children's varying needs, abilities, and backgrounds.

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Appendix A: SAMPLE NATURE EXPLORE CLASSROOM CONCEPT PLAN



Appendix B: Dimensions Educational Research Foundation Documentation Form



Documentation Form

- Nature Notes
- Visual Notes
- Other Developmental Notes

Teacher/Observer: _____
 Date: ____/____/____ Time of Day: _____

Brief description of activity :

Why you believe this is significant:

- Teacher Initiated Activity
- Child Initiated Activity

How Long Observed: _____

Weather Conditions: _____

Child(ren)	Age/Birthdate	Gender

- | | | | | | | | | |
|---------------------------------------|--|---|--|--------------------------------|--|---|---|--|
| Location of Activity | <input type="checkbox"/> Block area | <input type="checkbox"/> Climbing/Crawling area | <input type="checkbox"/> Music/Movement area | Resources/Materials | <input type="checkbox"/> Akambira | <input type="checkbox"/> Scarves | <input type="checkbox"/> Shovel | <input type="checkbox"/> Large Hollow Blocks |
| | <input type="checkbox"/> Toy area | <input type="checkbox"/> Messy Materials area | <input type="checkbox"/> Open area | | <input type="checkbox"/> Nature Art Table | <input type="checkbox"/> Garden Tools | <input type="checkbox"/> Rake | <input type="checkbox"/> Fabric/Clips |
| | <input type="checkbox"/> House area | <input type="checkbox"/> Block/Building area | <input type="checkbox"/> Gathering area | | <input type="checkbox"/> Tree Cookies | <input type="checkbox"/> Clipboards | <input type="checkbox"/> Hand Trowel | <input type="checkbox"/> Paint/Watercolors |
| | <input type="checkbox"/> Art area | <input type="checkbox"/> Nature Art area | <input type="checkbox"/> Dirt Digging area | | <input type="checkbox"/> Tree Blocks | <input type="checkbox"/> Magnifying Glasses | <input type="checkbox"/> Nature Image Cards | <input type="checkbox"/> Reusables |
| | <input type="checkbox"/> Materials Exploration | <input type="checkbox"/> Garden/Pathways | <input type="checkbox"/> Sand area | | <input type="checkbox"/> Square/Rectangle Blocks | <input type="checkbox"/> Tape Measures | <input type="checkbox"/> Writing Materials | <input type="checkbox"/> Other _____ |
| <input type="checkbox"/> Science area | <input type="checkbox"/> Greenhouse | <input type="checkbox"/> Brick Wall | <input type="checkbox"/> Rainstick | <input type="checkbox"/> Water | <input type="checkbox"/> Unit Blocks | <input type="checkbox"/> Other _____ | | |
| <input type="checkbox"/> Snack | | | | | | | | |

DF PRE Rev August 2011

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Appendix C: Analysis Form

Analysis Form **Nature Note #:** _____

Teacher/Observer: _____ Observation Date ____/____/____ Analysis Date ____/____/____

Time of day: _____ am/pm Duration of experience _____

Analyzed by:

Child(ren)'s Name(s):	Birthdate/age	Gender

What are children doing? What is the activity/story?

Teacher Initiated

Child Initiated

What materials did children use?	Natural materials	Other materials
Where in the Natural Outdoor Classroom did this experience take place?		
How is the fact that the child is using open-ended materials enhancing imagination/creativity? (If this is a natural open-ended material, how is the fact that it is a nature item enhancing imagination/creativity?)		
How is this imaginative/creative experience unique to the natural outdoor classroom? (In other words, how is it one that could not have happened indoors as well?)		
What skill(s) are being developed or enhanced through the creative/imaginative work being demonstrated?		
What is the most important aspect of this nature/visual note?		
Is there something in this nature/visual note that, to your knowledge, you have not observed before?		
Other important insights worth noting?		

Appendix D: MATERIALS TABLE

Natural Materials Children Used	Other Materials Children Used
acorns bamboo pole branches bushes corn (cobs, kernels and ears) dirt feathers frozen snow hedge apples ice chunks large palm fronds large wood chunks leaves logs mulch/wood chips pinecones pumpkins recycled evergreen (Christmas) trees rose quartz rock sand squash sticks stones sweet gum seed pods their own body tree cookies tree stumps water willow branches	balls bamboo blocks blocks bricks buckets cameras cardboard boxes chalk climbing structure clips garden hand tools hoe hose large exercise ball large fabrics low brick wall magnet blocks mailbox mat milk crates measuring cups metal cake pan muffin tin paper and pens/pencils pipe cleaners plastic bat plastic cones plastic shovels raised garden bed ramps scarves shovels small containers spoons sunglasses tables

Christine Kiewra is Research Director for Dimensions Educational Research Foundation. She can be reached at chrisk@natureexplore.org.

Ellen Veselack is Preschool Director at the Child Educational Center. She can be contacted at ellenve@caltech.edu.