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MANUFACTURED ELEMENTS WITHIN
OUTDOOR PRESCHOOL SETTINGS

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1 ABSTRACT

Considering the significance of natural environments for children’s mental and physical development, outdoor preschool settings can be critical resources in providing chances for daily contact with nature. Based on Gibson, affordances are functional properties of the environment that suggest specific behavioral options to individuals. Through the application of affordance theory, this study aimed to explore how the physical environment features of two outdoor learning environments composed of a variety of manufactured and natural settings, can afford cognitive play behavior of children. Additionally, the research intended to extend knowledge relating to the association of naturally designed outdoor preschool settings and children’s cognitive play behavior. Through behavior mapping of 62, four-to-five year old children, 471 data points were collected. The results revealed the significance of natural elements in affording all five types of cognitive play behaviors. Natural loose elements had considerable potentiality in affording constructive, dramatic and exploratory play behaviors. In contrast, manufactured fixed elements mostly afforded one type of cognitive play behavior: functional. Exploratory play was the least afforded type of behavior within both outdoor preschool setting which suggests the increase of implementing natural features affording discovery and engaging play opportunities. The results of this study points out the reconsideration of implementing manufactured fixed elements that mostly afford a one-dimensional cognitive function for children. The findings also accentuate the importance of integrating natural elements that can be shaped, explored, and experimented by children in outdoor preschool settings, while providing them daily opportunities to acknowledge nature and develop a sense of stewardship.

1.1 Keywords

affordance, outdoor learning environment, cognitive play behavior, natural elements, manufactured elements
2 INTRODUCTION

Humans have a strong physical, mental, and spiritual connection with nature, explained with theories such as Biophilia (Maller, Townsend, Brown, and St Leger, 2002). Direct contact with natural outdoor environments enables children to develop a bond between themselves and nature (Kahn and Kellert, 2002; Kellert, 2002), while having many positive effects for child development (Freuder, 2006). However, current children in U.S. are growing disconnected from nature’s healthy benefits (Louv, 2005). In fact, urbanization has reduced nature-based recreation (Van den Berg, Hartig, and Staats, 2007) and contact opportunities with natural elements for children (Rivkin, 1990).

On the other hand, while today’s children have limited time for outdoor play and contact with nature spaces (Cosco, Moore, Thigpen, Verzaro- O’Brien, and Mendel, 2005), the physical features of outdoor learning environments are not corresponding to children’s appeal for diverse, stimulating learning environments (Fjortoft and Sageie, 2000; Francis, 1998). The association between the type of equipment and its assembly on children’s behavior and experience has been recognized by designers (Frost and Campbell, 1985). Several studies have explored the relationship of various outdoor environments on children’s play behavior (Frost and Campbell, 1985; Frost and Klein, 1983, etc.). However, these studies mostly focus of the association of outdoor equipment on children’s behavior, without considering the impact of the various existing attributes of the play environment (Kytta, 2003). Additionally, most of these studies have concentrated on school–age children, not providing adequate insight on preschool children’s environmental requisites (Hart & Sheehan, 1986).

2.1 The affordance theory

Gibson (1979) describes affordances as functional properties of the environment that suggest specific options to the individual. He explains that Individuals understand information by perceiving the relation between objects, and happenings, space layout and their abilities. Heft (1988) explains how describing and analyzing environments based on their functional significance alters the way we see and perceive the environment. Differentiating environmental features based on functional variation would be a more meaningful approach in terms of a psychological perspective. The taxonomy of outdoor environments based on their functional attributes can provide a standard form-based organization that has a psychological value (Heft, 1988). If specific environmental attributes can be related to children’s behavior, we can identify practical or pedagogical importance of the relationship between physical environment global quality and children’s developmental status (Kontos et al., 2002).

To understand the functional properties of an environment, the environment-behavior relationship can be explored associated with the type of occurred activities. Heft (1988) explains how each activity can be defined in relation to some functional characteristics of the environment, referring to the particular individual. In other words, each activity is conjunct with some affordance. Object classification based on their functional attributes distinguishes which of them have the same type of property, while differentiating objects that are usually considered similar but differ in terms of their functional properties (not all trees afford climbing). Hence, this taxonomy distinguishes objects based on functional properties than form (Heft, 1988).

Few studies have implemented the affordance theory to explore functional properties of the physical environment for children. For instance, the results of the study of 143, 8 to 9 year old children in Finland by Kytta (2002) revealed rural villages to have higher potentialities in affording social behavior than city environments. Rural environments also revealed a high potentiality in providing children’s play affordance. In another research by Kytta (2003), children were interviewed about their perceived affordances, focusing on children’s memories, perceptions, and activities. The interview was concerned about where the affordances were perceived, and to what extent children utilized them.

Sandseter (2009) conducted a qualitative research through observation and interview on risky play affordance of two type of Norwegian preschool playground (natural and traditional) based on Gibson’s theory of affordance. The results indicated natural playgrounds to afford higher risky play opportunities, compared to the traditional settings. In another research conducted by Cosco’s (2006), three childcare centers with diverse outdoor play environments were compared in terms of the physical activity affordance. The results from a sample size of 90 preschool children suggested diverse play areas, and natural elements to be more stimulating for children’s physical activity.

These examples points out how the concept of affordance can be applied to recognize functional properties of the physical environment. However, to date no research has systematically identified specific
environmental attributes affording cognitive play behaviors for preschool children. Complementing existing environment-behavior research, this study will focus on how the physical environment attributes of preschool outdoor settings composed of natural loose, natural fixed, manufactured fixed, toys and cycling elements can afford various cognitive play behaviors for young children. The following section will briefly define cognitive play behavior and how it can be coded through observation.

2.2 Cognitive play behavior

Play provides opportunities for developing cognitive skills. Studies have shown that children can learn “vocabulary, language skills, concepts, problem solving, perspective taking, representational skills, memory, and creativity” through directed or free play (Zigler and Bishop-Josef, 2006, p.22). Cognitive play is associated with a child’s a cognitive approach and ability to interact with the environment (Schaefer, Gitlin, and Sandgrund, 1991). The importance of recognizing afforded cognitive play behaviors within the environment can be interpreted through the implied interrelation of children’s cognitive development traced through play (Belsky and Most, 1981; Cornett, 1998; Farmer-Dougan and Kazuba, 1999; Malone, Stoneman, and Langone, 1994). Research indicates that poor cognitive development in children does not result from genetic but lack of learning experiences (Feuerstein, 1979), accentuating the significance of providing adequate learning opportunities for children in their associated spaces. Nevertheless, most of what is known about cognitive development is unexpected and without a scientific qualification (Flavell, 1992).

Design interventions can supplement educational procedures to contribute children with academic and learning difficulties, or disorders to learn effectively (Cornett, 1998). To extend knowledge about cognitive play behavior in relation to learning environments, the current study is intended to explore how children’s interaction with the physical attributes of the outdoor learning environments can associate with children’s cognitive play behavior. Through identification of special attributes of the environment stimulating cognitive play behavior, preschool outdoor environments can be designed to enhance children’s exploration, discovery, problem solving, and interaction with the environment, and subsequently cognitive development.

One of the major sources of knowledge is based on Piaget (1962). Based on observation he classified play behaviors into three successive stages: practice play, symbolic, and game with rules. Following that, Smilansky (1968) clarified Piaget’s categories and labeled them as: functional, constructive, dramatic, and game with rules. More recently, Rubin (2001) has enhanced this scale through incorporating the exploratory play behavior. This study will employ Rubin’s cognitive play behavior hierarchy described as:

- **Functional play** - Simple repetition of muscle movement, with or without objects. Functional play is concerned with repeated actions that are not always associated with other objects (Reifel and Yeatman, 1993).

- **Constructive play** - Constructive play is where the child links previous knowledge of functional play to manipulate objects towards a direct goal, which can be construction or creation (Cornett, 1998; Rubin, 2001).

- **Explorative play** - Exploration can involve the whole body movement supporting children’s physical, social, and cognitive development (Pellegrini, Horvat, and Huberty, 1998). Exploratory play is an indication of the current level of cognitive functioning, and environmental learning, correlating with cognitive development (Belsky and Most, 1981).

- **Dramatic play** – When meaning in play is detached from particular immediate representation of objects, persons, and circumstances constructive play evolves to a de-contextualized development termed as imaginative play (Belsky and Most, 1981). Dramatic play is the discovery of new situation and characters through implementation of language, concepts, symbols, gesticulations, and emotions (Wardle, 2000) to represent objects or words (Cornett, 1998).

- **Games – with – rules** - Games-with-rules is the final stage of development in which specific rules with associated meanings involve the play behavior (Reifel and Yeatman, 1993). The development of practice and symbolic play are necessary for the learning and development of children reflected in the acquisition of the game with rules stage (Rubin, 2001).

- **No Play** - coded during on looking, transitional, conversation, or unoccupied play behavior.

Several studies have applied this hierarchy to study children’s cognitive play behaviors within outdoor environments. For instance, Campbell and Frost (1985) observed 45 second-grade children’s
cognitive play behaviors in traditional and creative playgrounds. The results indicated game with rules, and then constructive play to be afforded the least type of behavior in both playgrounds. In addition, the traditional playground afforded the most game with rules opportunities. Similarly, Henniger (1985) employed Smilansky’s cognitive play categories to compare three-to-five year old children’s outdoor and indoor play. The results suggested equipped and stimulating outdoor environments to have certain advantages in supporting specific types of play. Pack and Michael (1995) also compared the cognitive play behavior of 30 five-year-old children within outdoor and indoor environments through Rubin’s categories. The results displayed children’s tendency to engage in functional play within outdoors more than indoors. The researchers assumed this result to be associated with the available play structures such as slides, climbing structures, etc. Additionally, excessive motor activities were not acceptable from teachers due to safety.

Although such studies have been conducted to explore children’s cognitive play behaviors, there is a requirement to study the functional constituents within outdoor learning environments that afford cognitive play behaviors. Based on a design perspective, it is necessary to understand what type of elements can afford which type of cognitive play behaviors, and which elements have more potentialities in affording these behaviors. In this way, children’s abilities can be amplified through interacting with these elements in play environments. Cosco (2006) has categorized children’s interaction with elements as: a) Fixed: such as pole, platform, trellis, bench, manufactured play structure; b) Natural – fixed: such as shrubs, trees, large rocks; c) Natural-loose: for instance flowers, sand, dirt, leaves; d) Toys: such as truck toys, dolls, shovels; e) Wheel: such as tricycle, cart, scooter. This study will focus in detail the extent natural loose, natural fixed, manufactured loose, toys, and wheel elements can afford different types of cognitive play behaviors.

3 METHOD

The purpose of this study was to determine the cognitive play behavior affordances of various elements in outdoor preschool settings. To address this purpose, the study pursued one main question: How do elements within a diverse outdoor environment afford different type of cognitive play behavior? The results of this study will provide an insight towards the type of cognitive play behaviors afforded in particular environments by certain elements. Through this understanding, we can enhance the opportunities for various cognitive play behaviors through the application of predefined elements.

For this study, two preschool settings were purposefully selected. The reason for this selection was due to the complexity and variety of elements existing in the associated settings, contributing to understanding the difference between elements. The playgrounds of these preschool settings have been designed by “Natural Learning Initiative” team to function as an “Outdoor learning environment.” Center 1 referred to as Bright Horizon’s SAS preschool, is located in Cary, NC. The playground was composed of various play settings, although based on school policy different age groups play in a certain area. The focused setting for this study was composed of plenty of climbing or fruit trees; bushes; pergola; wooden platform; movable boxes; graded garden plot; bicycle track around the grass and a storage area for bicycles. Center 2, called “First Environments” preschool, is located at Durham, NC. This site was also combined of various settings and elements. The areas under study included trees, hill, two sand-play areas, a combined manufactured play equipment, swings, a gazebo, a music wall, many toys, bicycles, and scooters. The environments consisted of grassed, dirt, or paced circulation surfaces.

Data were collected from 62, 4-to-5 year olds during recess, using the behavior mapping technique. Through this technique, the unit of analysis is not the individual children, but the actualized affordances provided by the elements (Cosco, Moore, and Islam, 2010). Prior to the data collection, the research methods, and parental consent forms were reviewed and approved by Institutional Review Board (IRB). Parental consent forms were printed and given to each child, and simultaneously emailed to all four to five year old children’s parents. The consent forms allowed the researcher to observe and occasionally capture photos from children.

Each center was observed twice, with observation sessions conducted during morning outdoor playtime (center 1 session = 50 min, center 2– 60 min). The outdoor play environments were divided into particular observational zones, with a specified location in each zone to stand and observe. The procedure included a 15-second for observing, and 20 second for recording each child’s behavior.

The observation procedure consisted of a systematic circulation of the observer through the playgrounds based on pre-defined zones. The observer coded for each observed child’s cognitive play
behaviors, gender, and the type of interacting elements during play (such as pole, tree, bike, etc.). For this paper the calculations regarding gender was not taken into consideration.

Each observational data point was later recorded in Geographical Information System (GIS) program. The data was then exported into SPSS program and analyzed for descriptive and crosstab statistic. Additionally, the type of elements were further congregated into manufactured fixed, natural loose, natural fixed, toys, and cycling devices (Table 1). Descriptive analysis allowed comparison of elements in relation to their afforded cognitive play behaviors. Observed cognitive play behaviors were considered as dependent variables, while the types of elements were recognized as independent variables. Correlational analysis was conducted to examine the association between the type of elements and afforded cognitive play behaviors. In some instances, chi square analysis could not be employed due to low cell values.

Table 1. Examples of Grouping Elements into Categories

<table>
<thead>
<tr>
<th>Manufactured-Fixed</th>
<th>Natural Fixed</th>
<th>Natural Loose</th>
<th>Toys</th>
<th>Cycling</th>
</tr>
</thead>
<tbody>
<tr>
<td>Examples of Elements</td>
<td>Play structure, green tube, swings, gazebo, climbing structure</td>
<td>Tree, bush, boulder, tree trunk</td>
<td>Stone, dirt, sand, leaves, stick, creatures</td>
<td>Shovel, bucket, doll, rope</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4 RESULTS

Through behavior mapping observation 471 data points were collected (SAS=234, and FEELC=237). Figure 1 presents the resulting GIS maps illustrating the distribution of these data points in relation to the site attributes.

Figure 1. Behavior Mapping Results of FEELC and SAS

In general, 33 types of elements were recorded during children’s play. Initially, elements were compared in terms of their cognitive play behavior affordances. Compared to other elements, children were highly observed during functional play within the pathways. The results indicated play boxes, pathway, bikes, tree, grass or dirt, and woodchip surfaces to significantly afford higher functional play
opportunities, compared to other elements (p<0.01, df=33). Sand had the highest capability to afford constructive play (p<0.01, df=33). Compared to other elements, adjustable pipes afforded a recognizable number of constructive and exploratory plays. Dirt and grass, sticks, and toys were the most potential elements in affording imaginative play. Finally, grass or soil, play structure, and platforms were the most potential elements in affording game with rules play behavior. In general, grass or soil, pathway, and sand significantly afforded more cognitive play behavior interactions compared to other elements. In addition, manufactured fixed structures were coded for functional, imaginative, game with rules, and no-play play behaviors (p>0.05, df=6).

To examine the relationships between the type of elements and cognitive play behaviors with a more generalized approach, the elements were classified into natural loose, natural fixed, manufactured loose, manufactured fixed categories (Figure 2). Table 2 compares different category of elements in terms of their cognitive play behavior affordances. Table 3 displays the percentage each category of elements afforded a type of cognitive play behavior. Chi square analysis was not conducted to compare these results as some cell values were lower than five.

![Figure 2. Results comparing different type of elements in terms of cognitive play behavior affordances. Diagram by authors](image)

**Table 2. Percentage of Afforded Cognitive Play Behaviors within Cognitive Play Behaviors.**

<table>
<thead>
<tr>
<th></th>
<th>Functional</th>
<th>Constructive</th>
<th>Exploring</th>
<th>Imaginative</th>
<th>Game.W.R</th>
<th>None</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manu_Fixed</td>
<td>20.8</td>
<td>0.0</td>
<td>11.1</td>
<td>30.2</td>
<td>39.6</td>
<td>24.7</td>
</tr>
<tr>
<td>Nat-Fixed</td>
<td>9.4</td>
<td>0.0</td>
<td>22.2</td>
<td>7.5</td>
<td>0.0</td>
<td>1.1</td>
</tr>
<tr>
<td>Nat-Loose</td>
<td>0.0</td>
<td>85.5</td>
<td>38.9</td>
<td>28.3</td>
<td>12.5</td>
<td>1.1</td>
</tr>
<tr>
<td>Toy</td>
<td>7.3</td>
<td>14.5</td>
<td>0.0</td>
<td>34.0</td>
<td>18.8</td>
<td>8.6</td>
</tr>
<tr>
<td>Cycle</td>
<td>15.1</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>1.1</td>
</tr>
<tr>
<td>None</td>
<td>47.4</td>
<td>0.0</td>
<td>27.8</td>
<td>0.0</td>
<td>29.2</td>
<td>63.4</td>
</tr>
<tr>
<td>Sum</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
</tr>
</tbody>
</table>
Table 3. Percentage of Afforded Cognitive Play Behaviors within Category of Elements.

<table>
<thead>
<tr>
<th></th>
<th>Functional</th>
<th>Constructive</th>
<th>Exploring</th>
<th>Imaginative</th>
<th>Game.W.R</th>
<th>None</th>
<th>Sum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manu_Fixed</td>
<td>39.2</td>
<td>0.0</td>
<td>3.9</td>
<td>15.7</td>
<td>18.6</td>
<td>22.5</td>
<td>100</td>
</tr>
<tr>
<td>Nat-Fixed</td>
<td>58.1</td>
<td>0.0</td>
<td>25.8</td>
<td>12.9</td>
<td>0.0</td>
<td>3.2</td>
<td>100</td>
</tr>
<tr>
<td>Nat-Loose</td>
<td>0.0</td>
<td>56.6</td>
<td>16.9</td>
<td>18.1</td>
<td>0.0</td>
<td>3.2</td>
<td>100</td>
</tr>
<tr>
<td>Toy</td>
<td>24.6</td>
<td>14.0</td>
<td>0.0</td>
<td>31.6</td>
<td>15.8</td>
<td>14.0</td>
<td>100</td>
</tr>
<tr>
<td>Cycle</td>
<td>96.7</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>3.3</td>
<td>100</td>
</tr>
<tr>
<td>None</td>
<td>52.3</td>
<td>0.0</td>
<td>5.7</td>
<td>0.0</td>
<td>8.0</td>
<td>33.9</td>
<td>100</td>
</tr>
</tbody>
</table>

As displayed in Table 2, functional play was mostly afforded when children were interacting with manufactured fixed, or no elements. The results suggested the presence of natural loose elements to be highly associated with children’s constructive play. Imaginative play was highly observed when children were interacting with manufactured fixed and toys. Considering hard surfaced pathways as manufactured fixed elements, the results indicated game with rules to be mostly observed when interacting with these elements.

Table 3 implies manufactured fixed, natural fixed, toys, cycling devices, and interaction without any elements to be mostly potential in affording functional play compared to other types of cognitive play behaviors. In addition, natural loose elements appeared to be mostly applied for constructive play. In addition, descriptive statistics imply toys to be highly affording imaginative play. The results point out functional play to be afforded the most (40.3%), and exploratory play the least (7.5%) type of cognitive play behaviors (p<0.001, df=5).

5 DISCUSSION

To date, some studies have compared the relationship between children’s cognitive play behavior and different type of play environments (Henniger, 1985; Hart and Sheehan, 1986; Pack and Michael, 1995; Sanders and Harper, 1976, etc.). On the other hand, some researchers have applied the concept of affordance to explore how outdoor environments can afford physical activity levels (Fjortoft and Sageie, 2000; Cosco, 2006), socialization (Clark and Uzzell, 2002), self-regulation (Korpela, Kytta, and Hartig, 2002), or independent mobility (Kytta, 2004). However, additional research is required to configure how specific elements incorporated in outdoor learning environments can afford different types of cognitive play behaviors. This research attempted to extend knowledge in terms of understanding the afforded cognitive play behaviors supported by various elements within outdoor learning environments for young children. Due to time and budget limitations, the observation sessions in this study were limited, suggesting future studies to strengthen the results through comparing multiple sites and conducting adequate observation sessions. Furthermore, it has to be into consideration that this research was conducted in only two early childhood settings and in a period of time, with specific children. Hence, different children or contexts may report non-equivalent results (Einarsdottir, 2005).

The results of this study are consistent with previous research suggesting defined pathways to have considerable functional play behavior affordance for young children (Moore, 1986; Cosco, Moore and Islam, 2010; Striniste and Moore, 1989). This potentiality may be a consequence of their flat and relatively smooth surface (Cosco, 2006; Cosco et al., 2010; Heft, 1988; Kytta, 2002) which afforded tricycle riding, running, etc. Additionally, as suggested by previous research (Cosco, 2006; Cosco et al., 2010), the curved pattern of the pathways may have contributed to children’s attraction into engaging in functional play behaviors. However, supporting previous research (Cosco et al., 2010) the results displayed a decreased level of functional play behavior on soft surfaces such as sand, woodchips, or soil compared to hard asphalt coverings. It can be assumed this quality is partially related to the fall observance, softness, and malleability dirt and sand possess, stimulating a sense of safety (Moore and Wong, 1997; Striniste and Moore, 1989).

Contradictory with previous findings (Campbell and Frost, 1985; Fjortoft and Sageie, 2000) which imply manufactured fixed elements to afford the least cognitive play behavior affordances, the results displayed these fixed structures to afford different types of cognitive play behaviors (functional, imaginative, game with rules, and exploratory). This can be explained by pointing out that the play structures in these two preschool settings were composed of different complex and engaging elements, affording gathering, exploring, climbing, pulling, hiding, or movement opportunities. This is in accordance
with the results of the study by Moore (1985) and Monore (1985) suggesting children’s preference for compound play structures than isolated items. However, future research on different types of play structures and cognitive play affordances can contribute to the accuracy of this finding. Additionally, the results confirm previous studies (Frost and Klein, 1983; Moore, 1985; Wolley and Lowe, 2011) that manufactured fixed equipment mainly develop children’s functional play behaviors.

The observational findings from this study accentuate how combining manufactured fixed elements with natural settings and elements (water, sand, etc.) can enrich play setting, affording various developmental opportunities for children. Confirming previous research (Bixler, Floyd, and Hammut, 2002; Fjortoft and Sageie, 2000; Lester and Maudsley, 2007), natural settings enabled children to engage in constructive, exploratory, and imaginative play behaviors. Supporting Moore and Wong’s (1997) research, the findings of this study points out how vegetations, trees afford functional, imaginative, exploratory play behavior (hiding, holding, climbing, etc.). The results also supported Moore (1986) and Sandseter’s (2009) results on how trees and vegetation can afford climbing, hiding, exploration, and fantasy play. As suggested by designers (Hart, 1979; Marcus, 1998), the existence of climbable fruit trees and bushes in playground settings stimulated functional and exploratory play behavior through stimulating children’s sense of curiosity. The climbable trees provided lookout opportunities, while adding to the variety, challenge, and complexity of the play setting.

Educational settings can be more appealing through the application of manipulative components or loose parts (Moore and Cosco, 2010). In fact, comfortable and less stressful environments possess elements that are soft or stimulate touch like sand, dirt, or water, called “loose parts” (Weinstein, 1987). Manipulative environments allow children to change, and engage in problem solving, while developing their imagination abilities (Johnson and Hurley, 2002). While this opportunity is not afforded in most built environments, research indicates that play environments that contain high amount of loose parts stimulate cognitive, social-cognitive and cognitive – motor play (Moore, 1985). Previous studies by NLI (2007) have reported how adding loose element such as toys can enhance children’s dramatic play and interaction. In support of prior findings, the results implied loose element such as sticks, toys, or dirt to be mostly potential in affording imaginary play. Loose elements provided opportunities for alteration, interaction and understanding their environment, developing imaginative and creative play (Woolley and Lowe, 2011).

Natural settings provided a variety of “loose parts” that enabled children to shape their environment, developing their creative and constructional cognitive abilities (Fjortoft and Sageie, 2000; Moore, 1985; Moore, 2003; Moore and Wong, 1997; Weinstein, 1987). Confirming the findings of Woolley and Lowe (2011), loose parts had the highest constructive and imaginarily play affordance and helped children to create imaginative spaces, elements and stories (Moore and Wong, 1997). For instance, the findings accentuate sand’s manipulative quality to enhance children’s opportunities to shape, pour, mold, move, and dig this element. Consistent with Moore and Wong’s (1997) finding sand noticeably afforded constructive and exploratory, and imaginative play. The results confirmed previous findings (Moore and Wong, 1997; Weinstein, 1987) that manipulative and less structured materials, such as sand, boxes, and pipes can afford greater variety of imaginative and games with rules play behavior. Interestingly, game with rules was mostly afforded by manufactured fixed, and toy elements.

Research indicates six to seven year-old children to be more engaged in game with rules behavior (Pack and Michael, 1995; Rubin, Fein, and Vandenb, 1983). Consistent with previous literature (Campbell and Frost, 1985; Pack and Michael, 1995), game with rules play behavior was one of the least afforded cognitive play behaviors. Recognized as manufactured fixed elements, the results suggested platforms, dirt surfaces, and play structure to have a high potentiality for this behavior. Platforms have been previously recognized as multi-purpose game settings, which provide opportunities for look out (Moore, 1989; Moore and Wong, 1997). Based on the observational results, these platforms offered flat, smooth surfaces that children gathered, compromised, and developed rules. In some instances, the platforms were combined in their games as a target point. In addition, the complexity of the play structure may have stimulated games in children. Children were observed, hiding, chasing, and developing self-initiated games, while interacting with the play structure. They also enjoyed running and chasing friends over the open grass or dirt surface. In support of Ozdemir and Corakci’s (2010) findings, the results suggest the requisite of adequate open spaces to stimulate game with rules.

Interestingly, children were observed interacting with no elements during many functional play behaviors. This stimulation may be associated with the environmental characteristics that promote children’s activities. As Cosco (2006) suggests, the variety, complexity, and responsiveness of the
physical environment can promote children’s physical activity levels. While functional play is essential for children’s health and was the most afforded play behavior in the environment, children require stimulation to engage in higher levels of cognitive play, such as game with rules, which are not adequately provided by the outdoor learning environments. Further research is required to understand elements, contexts, and conditions that promote this type of play.

6 CONCLUSION
Children will learn and play more effectively in engaging places that can be created through landscape architecture. Through the application of natural elements, outdoor preschool environments can be designed in such ways that stimulate children’s sense of exploration, wonder, and imagination. Nonetheless, despite the current attention for combining natural elements within children’s daily outdoor experience, the potentiality of these elements in affording cognitive play behaviors within educational settings is less acknowledged.

The data from this study contribute to a growing body of environmental behavior research that attempts to explain the significance of incorporating natural elements within outdoor learning environments to increase children’s opportunities for development. In general, elements such as fruit trees, compound play structures, sand, dirt, vegetation, grass, and trees offered considerable cognitive play behavior affordances. The results indicated how the flexible and complex quality of natural elements provided a variety of cognitive play behavior affordances that was more engaging for children than manufactured fixed elements. Natural fixed elements offered chances for exploratory and functional play behavior, while affording natural props for children’s constructive, imaginative, fantasy play. Future research with different contexts and multiple observations is required to address how various outdoor learning environments with different design characteristics and elements afford cognitive play behavior. Further longitudinal research will also be beneficial to explore if daily interaction with natural elements can directly support children’s cognitive development.

7 REFERENCES


