AMERICAN UNIVERSITY OF BEIRUT

THE LEARNING LANDSCAPE OF BIOPHILIA: OUTDOORS ACTIVITIES FOR KINDERGARTEN SCHOOLS WITH MARGINAL SPACE AND RESOURCES

by
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II

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AN ABSTRACT OF THE THESIS OF

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Contact with nature can have beneficial effects on people of all ages, gender, and socio-economic conditions (Sanesi, Lafortezza et al. 2006, Nilsson, Sangster et al. 2011). With respect to children, they spend less time in outdoor environments due to many factors including parental concerns for their safety and attraction of indoor entertainment and technologies (Bires and Schultz 2014, Skar, Gundersen et al. 2016). This has resulted in what Richard Louv has identified in his book, *"Last Child in the Woods (2008)",* as a nonclinical condition called "Nature Deficit Disorder".

Early Childhood is a critical stage where children are viewed as "thinkers" who are trying to understand the world around them (Santrock 2004). Children who have direct positive and regular interaction with nature feel more connected to the natural world and consequently their love for nature, "Biophilia", is strengthened (Schultz 2002, Sellmann and Bogner 2013, Bires and Schultz 2014). Therefore, exposing children to nature will help develop a sense of caring and desires to take small actions to protect their surrounding environment. Outdoor natural environments are ideal enabling environments, because they are dynamic and offer rich learning opportunities to foster children's senses, creativity, imagination and physical activity (Simmons 1995, Moylett and Stewart 2012, Campbell 2013).

Young children spend 30-40 hours per week in kindergartens and this may be one of the best opportunities to create a future generation that values and preserves nature by seeking to reconnect children with the natural world (Bires and Schultz 2014). However, the problem is that most schools lack the enabling environments in their kindergarten playgrounds, particularly in the public sector of many developing countries such as Lebanon; this could be due to limited physical, intellectual and operational resources (Abdou 2010, Soueid, Ghanem et al. 2014, Chami and Mikhael 2016).

The objective of this research study is to address the lack of enabling environments in Kindergarten schools with marginal resources. This research study is a

qualitative research, more specifically context-specific in that it informs about types of outdoor activities that promote and strengthen children's nature connection in the specific context of kindergarten schools with marginal resources. The methodological approach relies on existing theories and knowledge as evidence in order to develop and adapt outdoor activities for enabling environments of Biophilia.

Phenomenological focus group discussions will be conducted with kindergarten teachers from 8 different public or private/subsidized schools in Beirut, selected based on certain criterion including availability of playground space dedicated only for the kindergarten students. Focus group discussions conducted with KG teachers will assess their perception of nature and their preferences towards proposed enabling environments represented in photographs. Qualitative data will be analyzed based on thematic discourse analysis.

The research study developed a list of outdoor activities for enabling environments of Biophilia that are holistic, adopt new design concepts implied from literature and key theories and are culturally responsive, in order to contribute to the lack of awareness in this field and fill the gap in research. The types of spaces for conducting outdoor activiteis and the average area required per activity in each type of space were etablished.

Research findings show that space is neither a limitation nor a restricting factor for integrating outdoor activities for enabling environments in schools with limited resources. In addition, most outdoor activities for enabling environments of Biophilia were culturally acceptable among participants in relation to the Arab, Lebanese preservative culture.

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CHAPTER 1

INTRODUCTION

"If we want children to flourish, to become truly empowered, then let us allow them to love the earth before we ask them to save it", David Sobel. Therefore, how do we, as parents, guardians, teachers and educators, expect our children to protect nature when they haven't had a pleasurable childhood in it? Unfortunately, children nowadays are losing their connection with nature and are becoming more distant from the natural world; this is due to various reasons, such as changes in play patterns including more indoor commercialized plays spaces, increased parental concerns for safety and risk, high dependence on technology and social media, and decrease in outdoor green spaces especially in urban cities.

1.1 Thesis objective

The problem to address in this research study is the lack of outdoor enabling school environments at the kindergarten level, in order to achieve a healthy connection between children and nature during the early developing years. This research aims to contribute to the wellbeing of young children through the development of outdoor activities that help create a Biophilic learning environment. Specifically the objectives are:

   a) *What Biophilic outdoor activities can be implied from the literature and key theories?*

b) How can these Biophilic outdoor activities offer an enabling

environment in schools with marginal resources?

1.2 Focus and Scope

The emphasis of this research study is the kindergarten level particularly in the public and/or private –free school sector in Beirut, Lebanon. Most of the identified and surveyed schools in this study are ones with marginal and limited resources including physical, intellectual and operational.

Hence, the study seeks to explore, through focus group discussions, the kindergarten teachers' preferences and perceptions towards enabling environments and nature-related activities that strengthens children's nature connection. It is anticipated that the knowledge gained from the focus group discussions along with extensive desk research and on site observation for playgrounds' spatial condition, would help identify culturally responsive guidelines for outdoor activities and elements that will help guide preschools towards Biophilia. In other terms, the results of this research study will give insights to schools with marginal resources on how children can experience Biophilia in an urban environment.

1.3 Thesis Structure

The following thesis is structured into five main chapters. Chapter 2, Literature Review, defines the framework of the study, explains the purpose and significance of the study, and places the study in context within other published work. The first part of the literature review presents the therapeutic effects of nature on human's health and wellbeing

in general, and on children in particular, while focusing on the early years, a critical age in a child's development. The importance of outdoor play and the benefits it offers children is provided as well. The second part of this chapter, studies the schooling system in Lebanon, while having a closer look at the conditions of public and/or private-free schools in the capital city, Beirut. The limitations regarding schools' environment faced by many schools are identified. Chapter 3, Materials and Methodologies, outlines the qualitative research design used to collect and analyze the data in order to answer the research questions. Chapter 4 presents the results and findings of the study. Chapter 5, Discussion, highlights the propositions and implications of the study's results. The last chapter, chapter 6, concludes by providing the study's limitations and presenting its significance while opening the door for future research.

CHAPTER 2

LITERATURE REVIEW

2.1 Effects of Nature on people

Based on multiple research and studies conducted throughout the past 15 years or so, interaction with green spaces and natural elements, such as forests, parks, gardens, trees, plants, and even animals, has proven to enhance the health and well-being of individuals, and to encourage a better quality of life (Gathright, Yamada et al. 2006, Nilsson, Sangster et al. 2011). Furthermore, contact with nature can have powerful therapeutic effects on many people through providing opportunities to ameliorate poor health conditions related to modern lifestyles such as mental stress, and to support restorative relaxation (Nilsson, Sangster et al. 2011).

There are a lot of important theories in the literature targeting the therapeutic effects of nature on people's wellbeing; these include:

- *The Biophilia Hypothesis:* The word Biophilia was first introduced by a German social psychologist, Erich Fromm, in 1964, to describe the process of life. However, Edward Wilson popularized the term during the 1980s(Townsend and Weerasuriya 2010), to defined Biophilia as "the connections human beings subconsciously seek with the rest of life"(Wilson 1986). Therefore, The Biophilia Hypothesis refers to the theory that humans possess a biological need or an innate drive to affiliate with natural systems and processes(Bires and Schultz 2014). This

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orientation to connect with other forms of life has genetic determinants,

meaning that the Biophilia Hypothesis relies on how humans coexisted in a

close relationship with nature for millions of years. Hence, most

adaptations in humans, including those of the brain and related to

behavioral reactions, developed as an "evolutionary response to the needs

imposed by this environment"(Hartig, van den Berg et al. 2011). To

measure Biophilia, Schultz (Schultz) in his book entitled *"Inclusion with*

nature: The psychology of human-nature relations", explained the

different levels of either inclusion or exclusion with nature. Referring to

figure 2.1, "Connectedness" is the extent to which an individual includes

nature within his/her cognitive representation of self; "Caring for Nature"

refers to the feelings of intimacy, which involves a sharing of oneself with

another, and emotional affinity, which reflects an individual's emotional

bond with nature; "Commitment to protect nature" refers to a behavioral

commitment and motivation to act in the best interest of nature. "It is a

person's willingness to invest time and resources into the relationship"

(Schultz 2002)
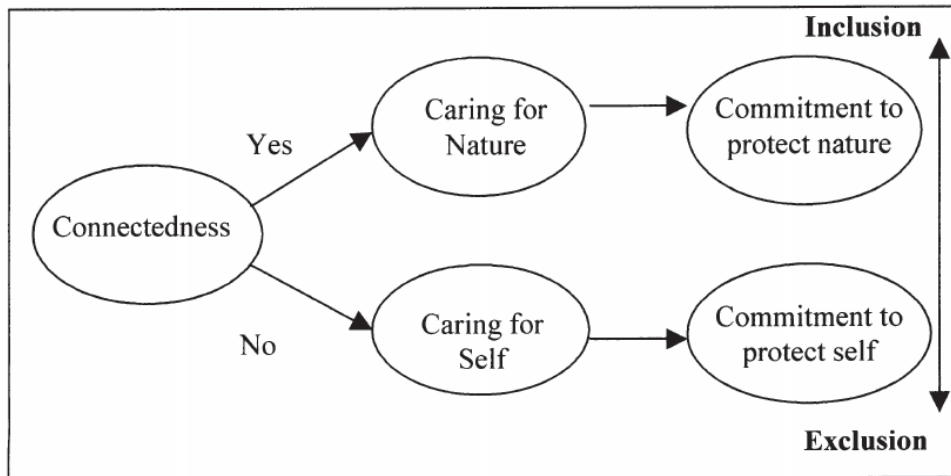
Figure 2.1: Levels of either inclusion or exclusion with nature(Schultz 2002).

To further measure the degree of inclusion with nature, the Inclusion of

Nature in Self-Scale (INS) (Figure 2.2) describes the human–nature

relationship as an inclusion of nature in the self and defines it as the degree

to which a person feels nature to be a part of his/her self. It is one of the

most commonly used scales for measuring nature connection (Schultz

2002).
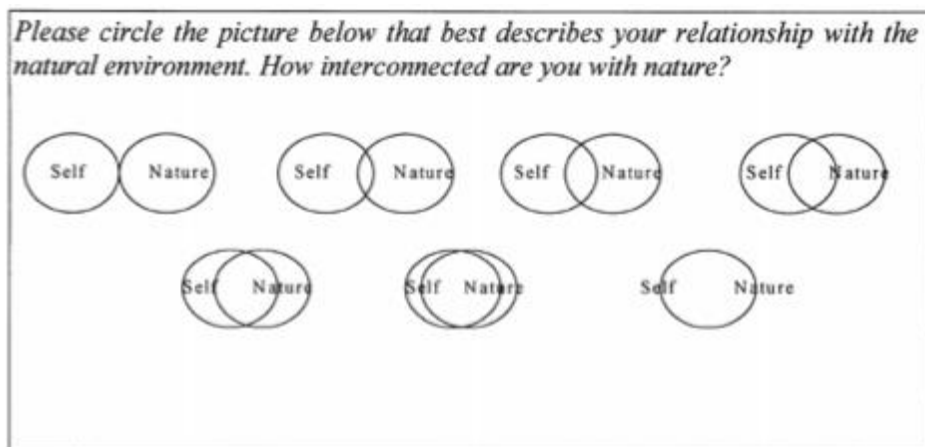
Figure 2.2: Inclusion of Nature in Self-Scale (Schultz 2002)

- *Attention –Restoration Therapy (ART):* This theory is based on the types of attention people use, which are directed attention or voluntary attention that requires effort; and fascination or involuntary attention that is effortless. Regarding the directed attention, it is the mental process we use to deal with cognitive data in our daily lives (Stigsdotter, Palsdottir et al. 2011). However, it is a highly limited resource, which can become overloaded and exhausted. This results in the decline in work performance and increase level of mental fatigue and stress (Townsend and Weerasuriya 2010, Hartig, van den Berg et al. 2011). Therefore, people need opportunities for recovering their directed attention. A good restorative environment is one where our directed attention system can rest and we can use other information system such as fascination. One of the best environments that offer such restorative experience is the natural environment (Stigsdotter, Palsdottir et al. 2011). According to Kaplan and Kaplan, contact with nature contributes to recovery in 4 ways (Kaplan and Kaplan 1989):

    a) <u>Being away:</u> both mentally and physically, moving to a totally different place makes it more likely to be able to think of other things. Natural environments afford being away because there are few reminders about work demands and daily life stresses (Stigsdotter, Palsdottir et al. 2011)

    b) <u>Soft Fascination:</u> occurs when there is enough interest in the surroundings to hold attention but not so much that there isn't room for reflection. This is associated with aesthetically pleasing features

found in nature, such as scenery, sunsets, clouds, snow patterns and vegetation (Townsend and Weerasuriya 2010)

c) <u>Extent:</u> "The extent of the natural environment can provide depth of experience in which one can become immersed where the mind is totally engaged and gains rest from other concerns"(Townsend and Weerasuriya 2010). Two characteristics define extent: connectedness (different parts of the environment are perceived to belong to a larger whole) and scope (experiencing the environment as large enough that one can move around without being careful to go beyond its boundaries)(Kaplan 1992). For Example, in a small area, trails and paths can be arranged in a way that makes the space feel much greater.

d) <u>Compatibility:</u> how well the content of the environment supports the needs and desires of the user.

- *Stress Reduction Theory (SRT):* Stress is defined as a process of respond to a situation perceived as demanding and threatening to our well-being(Hartig, van den Berg et al. 2011). Therefore, this theory proposes that natural environments, in contrast to urban settings, promote recovery from stress. It focuses on the emotional and physiological processes associated with stress response such as fear, anger, sadness, increased blood pressure and heart rate(Townsend and Weerasuriya 2010). SRT is based on the belief that viewing or visiting natural environments after a

stress situation rapidly promotes physiological recovery and relaxation (Ulrich 1983).

- *Maslow's hierarchy of needs:* The hierarchy of human needs developed by Abraham Maslow in 1970 is a theory of psychological health predicated on fulfilling innate human needs in hierarchical priority; where basic human needs (biological and physiological) are at the bottom of the pyramid, terminating in self-actualization at the top (Figure 2.3) (Maslow, Frager et al. 1970). Even though this theory does not specifically focuses on the natural environment, various analyses "indicate multiple ways in which nature and the natural experiences may contribute to an individual meeting his/her needs" (Townsend and Weerasuriya 2010). For example: at the biological level, people require basic essentials for survival like unpolluted air, clean water, sufficient food and shelter; whereas towards the higher needs, people require aesthetical needs, sense of spirituality, places for recreation and social activities. Therefore, these enlightening and spiritual experiences are often known to occur in the natural environments(Townsend and Weerasuriya 2010).
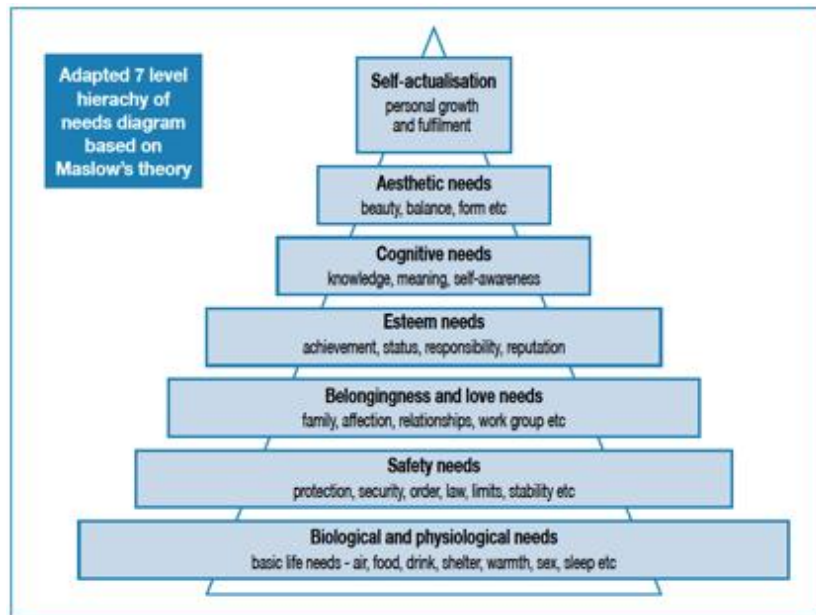
Figure 2.3: Maslow's Hierarchy of human's needs

- *Horticulture Therapy (HT):* According to the American Horticulture

  Therapy Association, HT is the engagement of people in gardening and

  plant-based activities in order to achieve certain therapeutic effects. HT is

  divided into passive involvement with nature through the senses or active

  participation through the practice of horticulture(Nilsson, Sangster et al.

  2011).

To sum up this section, it has been proven by many research throughout the years,

that the interaction with green spaces and natural surroundings can contribute significantly

to certain psychological, physical and social needs for people of all ages, gender, and socio-

economic conditions (Sanesi, Lafortezza et al. 2006).

2.2 Nature and Children

Special attention in research regarding nature connection and interaction has been directed towards certain groups such as children, the elderly, and the disabled, due to their special needs that differ from other groups.

"The movement pattern of children has changed remarkably in the last 10 to 20 years" (Fjørtoft 2001). Compared to previous generations, the nearby nature "was an important informal meeting place for children, across different age, gender and social status"; unfortunately, "children's nature contact has from the 1980s, become something that adults choose, to a much greater degree than before" (Skar, Gundersen et al. 2016). For example, during the 1970s, in a single generation, children's "radius of activity", defined as the area around their home where they can play freely without supervision, has declined by 90 % (Moss 2012). Not only this, but also the time children now spend playing outdoors has declined. According to a recent study that surveyed mothers in the U.S, it was found that 70% of the mothers when they were children had played outdoors on daily bases, compared to only 31% of their children (White 2004). Therefore, it is clear that the culture aspect, societal norms and parental concerns, all play a major role in directing children's contact with nature. "Children may be constrained from outdoor leisure activities by restrictions placed on them by adults due to concerns about safety issues and prevention of possible risk and danger (Drakou, De Vreese et al. 2011). Other factors explaining children's lack of nature contact include (figure 2.4):

- Changes in technology (more screen time and social media) where
  children's access to the natural world is becoming increasing limited as
  their daily dose of media is increasing (Bires and Schultz 2014)

- Changes in schooling systems which requires extra indoor curriculum
  activities (Skar, Gundersen et al. 2016)

- Introduction of indoor weather-proof recreational facilities and
  commercialized spaces (Malone and Tranter 2003) Hiscock, 2011)

- Increased traffic and busy parents' schedule (Malone and Tranter 2003)

- Decrease in green natural spaces due to population growth and hence
  urbanization (Malone and Tranter 2003)

Target groups	Most important constraints
Children	Restrictions placed by adults
	Transport infrastructure
	Local conditions
Women	Lack of time
	Existence of a relative in poor health
Third age	Accessibility
	Fear expectancy
People with disabilities	Transportation
	Programming issues
Immigrants	Fear of nature
	Avoidance of solitary activities
People of low socio-economic status	Lack of information/knowledge/awareness
	Budget constraints

Figure 2.4: Identification of constrains experienced by children (Drakou, De Vreese et al. 2011)

The above factors resulted in the disconnection between children of this generation

and the natural environment, which, as Richard Louv has termed in his book *Last Child in*

the Woods (2008), the *"Nature Deficit Disorder"(Campbell 2013, Warber, DeHudy et al.*

2015). According to Priscilla Gurath, in her thesis conducted in North Dakota, 2012, on how space design can support and encourage children to be more active and mentally engaged while promoting a healthy life style in urban areas; Natural Deficit Disorder (NDD) is the "combined psychological, physical, and cognitive costs we suffer due to our alienation from nature, especially affecting children in vulnerable developing years". Even though, NDD is a nonmedical condition (Warber, DeHudy et al. 2015), however, it leads to certain physical and mental childhood problems. For example: reduction in children's ability for physical activities, decline in children's cardio-respiratory fitness, vitamin D deficiency, increased rate of obesity, development of asthma, and depression (Moss 2012).

2.2.1 Early Years, a critical age group

According to the most widely used systems of classification of the developmental periods, early childhood, or preschool level, is the second phase in children's development; it extends from the end of infancy (2 years) to about 5 years (Santrock 2004). Other references, like the Montessori's Method, classify this developmental age group from 3 to 6 years old and refer to it as the "primary" stage. While in Piaget's Cognitive Development theory, this period extends till 7 years old and it is called the "preoperational Stage"(Steinberg, Bornstein et al. 2010). Some characteristics of early childhood include children becoming more self-sufficient and independent, developing school readiness skills like learning to follow instructions, developing language skills, engaging in pretended and symbolic play, learning to manipulate symbols, and beginning to scribble designs to represent aspects of the world, like people, cars, clouds, and trees(Santrock 2004)

Children form their values during the early years which is a very critical age because it's the period in life when the brain develops most rapidly and has a high capacity for change, and the foundation for health and wellbeing is laid(Organization 2017). Consequently, at the age of 2 to 3 years, children will begin to understand the meaning of perception, emotion, whether positive or negative, and desires. They will also understand how desires are related to actions and to emotions; all of which are part of the Theory of Mind (Santrock 2004).

To conclude from all of the above, early childhood (2-7 years old) is a critical stage in any child's life. During this phase, children have the ability to think of others, in terms of people. Hence, if children have this ability of thinking of others, then they can also think about their environment in terms of plants, animals, and space. Therefore, if children were exposed to nature in a proper setting and in an enabling environment, they will be able to develop a sense of caring and desires to take small actions to protect their surrounding environment. Consequently, these actions will make them feel happy and satisfied about one-self and eventually develop Biophilia. For example, according to a famous educator, David Sobel, activities during early childhood should be centered on enhancing the development of empathy, which is the understanding and sharing of other's feelings, between children and the natural world, more specifically with baby animals (Sobel 1996, Steinberg, Bornstein et al. 2010).

2.2.2 Outdoor Playing

2.2.2.1 Why do children play?

From day one, children are eager and determined to understand how the world around them works. They do this through play, using all the tools they have at their disposal

(El Chafei 2017). According to Maria Montessori, the famous Italian educator, "play is the work of the child". Therefore, "play is more than fun to kids, it's their JOB!" Nevertheless, children play in different manners depending on their age. Table 2.1 demonstrates the developmental play stages for the chosen age group (2-7 years old) (El Chafei 2017).

AGE	PLAY STAGE
2-3 years	• Development of symbolic play. • Engage in parallel play (children play independently alongside each other rather than with each other)
3 – 5 years	• Engage in associative play (children play with others in a similar activity; no overall goal to the activity)
5-7 years	• Engage in cooperative play (children are capable of playing games in groups that involves an agreed upon set of rules; common goal for the activity)

Table 2.1: Developmental play stages for early years(El Chafei 2017);Malone, 2003)

2.2.2.2 Outdoor environments for outdoor play

The nature of space and its components affect how children play (Acar 2013). Hence, comes the importance of enabling environments particularly outdoor environments and their enabling elements, regarding children's outdoor play. The concept of "outdoors" can range from the house backyard garden, neighborhood parks and open spaces, streets and alleys, school playgrounds, to forests and natural reserves. All of these environments provide the developing child with richer, more diverse and complex experiences and possibilities for risks taking (Clarke and Mcphie 2016). They offer more opportunities than indoor spaces (Acar 2013) for they are dynamic systems that are constantly changing and transforming and initiating exploration, curiosity and wonder to the developing child (Simmons 1995). In addition, the way the elements in a natural environment are structured,

allows for more movement opportunities and physical activities(Simmons 1995); for example: topography like slopes and mounds offer natural obstacles that children have to cope with; vegetation provides shelter; trees are used for climbing; and meadows are for running and rolling (Fjørtoft 2001). As a result, such dynamic environments will continue to attract the attention of children over time (Acar 2013). Furthermore, nature hosts a wide range of materials and resources (plants, biomass, rocks, leaves, soil, insects, shells, fruits seeds…) that could act as educational tools as well as playing equipment. Most importantly, the outdoor environment provides children with opportunities for outdoor playing (figure 2.5).

Figure 2.5: Outdoors interactive play at Diana, princess of Wales, Memorial Fountain, Hyde Park, London (photo by author)

2.2.2.3 Types of outdoor play

According to multiple research reviews, outdoor play can be defined as "free undirected spontaneous play; Play that is voluntary and intrinsically motivating; Play that is

child driven but supervised by an educator/parent; Play that strengthens physical activity and fosters creativity" (Campbell 2013, Skar, Gundersen et al. 2016). A qualitative study conducted in Norway by Margrete Skar (Skar, Gundersen et al. 2016) aimed to raise awareness of play as a spontaneous and child-initiated action that is not highly supervised by adult's presence and management. The results of the study revealed that, compared to a larger highly planned and organized nature activities, smaller events with fewer number of participants in which children are able to stay in one place, lower degree of adults' supervision, and with fewer formally organized activities, lead to more free and spontaneous play. Hence, this resulted in more physical, emotional and social interaction between the child and his/her surrounding (Skar, Gundersen et al. 2016).

　　Therefore, outdoor playing should include (Acar 2013):

1. *Creative play:* Play that develops the imagination. In an experimental study conducted in Norway in 2001, children, aging between 5 to 7 years old, from 3 different kindergartens, were divided into experimental and reference groups to study whether "natural environment is a stimulating arena for learning in general and for motor fitness training in particular". The experimental group was offered free and "versatile activities" in the nearby forest for 1-2 hours daily. While the reference group used their traditional outdoor playground for 1-2 hours daily and visited natural sites occasionally. As a result, in the experimental group, "free play fostered creative play" in children, where the forest provided a natural play-scape with natural objects and materials to play with. Children started to name their favorite places in the forest such as "The Cone War, "The Space Ship" and "The Cliff". Each of these spaces reflected

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how children interpreted the function of the landscape in terms of vegetation and

topography (Fjørtoft 2001). For example, dense shrubs were used for hiding,

building dens and shelters; trees and cliffs for climbing; slopes for sliding and

low herb woodland for running. This central concept guiding children's

examination of their environment is referred to as the "Affordance Theory". It

focuses on function rather than form; in which children perceive the functions of

the landscape and use them for playing (Fjørtoft 2001).

2. *Active play:* Play that includes a lot of action and physical movement and is

    important for the development of physical and motor skills.

2.2.2.4 Benefits of outdoor play on children's health and wellbeing

The benefits outdoor playing has on a child's health and well-being are numerous

and can be divided into different categories as follows:

Physical Development

To put it briefly, "it is not clear whether the same physical activity, when

undertaken in a natural setting, has a larger effect on human health and wellbeing than

when undertaken in an indoor setting, e.g. a treadmill in fitness center" (Nilsson, Sangster

et al. 2011). Nevertheless, it was shown that playing outdoors, for the growing child,

promotes the development of gross motor skills that involve whole body coordination like

running, hopping, jumping and climbing, and fine motor skills involving the coordination

and balance of more precise movements of muscles such as holding small items (Acar

2013). This in turn leads to improvements in stamina in young children (O'Brien, Burls et

al. 2011). In the same experimental study conducted on kindergarten children in Norway,

children's physical and motor fitness were tested among the experimental and the reference groups, using the EUROFIT (European Test of Physical Fitness, the Motor Fitness Test), once before the study started and once after it was done (study lasted for 9 months). The test results revealed that the experimental group had caught up with the reference group; significant differences between the pre- and post-tests were recorded in most of the items for the experimental group (mainly in balance and coordination abilities) whereas improvement within the reference group was not striking. Therefore, this study proved that "children using forest as a play scape would perform better in motor skills than children using traditional outdoor playgrounds" (Fjørtoft 2001).

Furthermore, when thinking of outdoor play spaces it is highly crucial to think of physical diversity in play. As a matter of fact, different studies investigated whether green elements found in the outdoor environment of pre-schools promoted children's physical activity. The results yielded 1,500 -2,000 more steps in a child staying seven hours at preschool and spending half the time outdoors (De Vries, Claßen et al. 2011). Likewise, in a study conducted by John Gathright in Japan, a comparison between the therapeutic effects of tree and tower climbing was examined on university students and faculty members (ages between 22-51 years). Participants were asked to perform the same climb on a tree and on a tower. Tests were conducted before, during and after each climb. The results of the psychological tests revealed that compared to tower climbing, tree climbing produced greater vitality and reduced tension, confusion and fatigue. This indicates that the body is more relaxed after tree climbing (Gathright, Yamada et al. 2006).

Social Development

Playing outdoors assists youngsters to become more social since it presents them with chances of interaction with other kids and develops their social play (Acar 2013). It also promotes language and friendship development as well as negotiation and listening skills (Malone and Tranter 2003). In fact, nature fosters pro-social behaviors, which are "voluntary actions intended to benefit others" like sharing, cooperating, helping, defending, and comforting (Steinberg, Bornstein et al. 2010). Also, based on several studies, outdoor play environments reduce and eventually eliminate anti-social behaviors like violence, bullying, vandalism and littering(Malone and Tranter 2003)

Physiological Conditions

The results of a study conducted by Grahn and Stigsdotter (Grahn and Stigsdotter 2003) "suggest that the more often a person visits urban open green spaces, the less often he/she will report stress-related illnesses". Therefore, laying out more accessible green areas close to apartments, houses, schools, and hospitals could have significant positive effects on the health and well-being of the users as this interaction will become part of their everyday urban life (Grahn and Stigsdotter 2003). Furthermore, natural environments help reduce childhood chronic conditions such as stress, depression, obesity, asthma, and Attention Deficit Hyperactivity Disorder (ADHD). For the latter one, studies show that children with ADHD are able to concentrate more during class sessions after exposure and contact with nature. Furthermore, according to parents' assessments, children ranging from 7 to 12 years old with ADHD functioned better than usual after participating in activities located in green settings. The same study concluded that the greener a child's play area was, the less severe his/her attention deficit symptoms were (Tzoulas, Korpela et al. 2007).

<u>Brain and Cognitive Development</u>

According to a study conducted by the Child and Family Development Center, at the University of Missouri-Kansas City, on the importance of outdoor play on child's brain development, being exposed to nature increases blood flow to the brain, hence enhancing child's alertness, awareness, mental focus and ability to learn. Furthermore, a child's cognitive development is also improved by heightening his/her reasoning, observation and collaborative skills. Besides, playing outdoors promotes creativity, imagination and sense of wonder (White 2004, Bires and Schultz 2014). Even more, according to Ruth Wilson, in his book, entitled "*Nature and Young Children: Encouraging creative play and learning in natural environments",* playing in nature, particularly during the critical period of early childhood, appears to be an important time for developing creativity and problem solving as well as boosting emotional and intellectual developments (Wilson 2012).

On a further note, outdoor playing and interaction with the natural word improves a child's naturalistic intelligence and skills, which is one of the types of intelligence according to Howard Gardner Multiple Intelligence Theory. These children, as they aspire their profession when they are old, might become brilliant farmers, botanists, ecologists, landscapers, or even chefs (Santrock 2004). For such reasons, children with a strong naturalistic intelligence may exhibit some or all of the following characteristics (Wilson 2012):

- Strong sensory skills
- Tendency to notice and categorize elements, patterns and forms of the natural world
- Enjoy being outdoors and engage in nature-related activities such as gardening

- Explore natural areas and observe natural phenomena (e.g. movement of clouds, singing of birds, effects of wind and rain…)

- Interest in and caring about animals and plants

- Enjoy collecting nature-related specimens (e.g. leaves, rocks, shells, seeds…)

- Awareness of and concern for the well-being of the natural world

- Understand ecological concepts

<u>Emotional Development</u>

Since nature evokes positive emotions, such as feelings of interest, enthusiasm, joy, and gives a sense of place, children who play in nature have more positive feelings about each other (Acar 2013) and feel more connected to the natural world. Children may also become more attached to a particular space and develop specific interest towards that space (O'Brien, Burls et al. 2011). That being the case, "engagement of all five senses through nature exploration affects childhood maturation"(Bires and Schultz 2014).

2.2.3. Biophilia and Children

Based on the above studies, contact between children and nature through outdoor playing, is not only crucial for the child's health and well-being, but also for his/her future in terms of developing environmentally responsible behaviors and attitudes. As educators desire to develop citizens with environmental ethics, in the early childhood years, they must first "develop children's love of nature"(Bires and Schultz 2014). Hence, children should be allowed to develop their own love for nature through greater exposure and interaction with the natural elements and landscapes (White 2004). This may be developed gradually through the following stages (Skar, Gundersen et al. 2016): stating with exposure to nature

which results in attachment to the specific space or certain elements and hence feelings of love towards that space/elements and finally care and protection actions. "Children will become attached to places through exploring them"(Skar, Gundersen et al. 2016). Afterwards, the sense of attachment will mature into love and hence feelings of care and protection will be fostered. According to theory and research, "feeling connected to someone or something motivates protective and self-sacrificing behaviors"(Frantz and Mayer 2014).

According to a famous social ecology expert, Stephen Kellert, children's exposure and contact to nature can be achieved through three different ways (Kellert 2002):

1. Direct (active participation); which involves close physical contact with nature

2. Indirect (passive participation); which involves limited and programmed physical contact with nature such zoos and botanical gardens

3. Symbolic (passive participation); which involves no physical contact with nature. Nature is recognized through materials like images, and films, or through a window.

Furthermore, research also argues that as the type of contact with nature is important, other factors play an important role, which are the duration of contact, whether short or long, and the frequency of contact, whether daily, weakly, or occasionally. "Relatively short exposure to nature, even via film or images or through a window, increases connectedness to nature"(Bires and Schultz 2014, Frantz and Mayer 2014). However, counterarguments state that "a new bond with nature may only be established and strengthened if nature-related experiences are longer and repeatedly applied"(Sellmann and Bogner 2013). Therefore, the best ideal connection with nature is through direct positive

contact for longer periods that are repeatedly applied on daily bases. In addition, it is not

enough to expose children to nature; learning activities should be fostered to encourage

children's interaction with the environment.

To conclude this section, children should be allowed to "develop their Biophilia,

their love for the earth, before they are asked to save it"(Bires and Schultz 2014).

According to Ruth Wilson, young children tend to develop emotional attachments to what

is familiar and comfortable for them (Wilson 1993). Therefore, the more personal a child's

experiences with nature is, the more environmentally concerned and active he/she are likely

to become as adults and hence as citizens.

2.2.3.1 Bio-phobia

The Biophilia Hypothesis emphasizes people's positive responses to nature.

However, nature can also elicit negative, fearful responses such as danger from predators,

venomous snakes or poisonous plants (Hartig, van den Berg et al. 2011). The concepts

presented to children should fall within their cognitive ability, which is one of the main

problems with many environmental education programs: "premature abstraction". When

kindergarten children are taught abstract concepts, like rainforest destruction, acid rain,

ozone holes and whale hunting, they can become anxious and might develop a phobia

towards the natural environment; this is referred to as Bio-phobia (Sobel 1996, White

2004). This is because young children do not have the coping skills to face the tragedies of

environmental crises and problems (Wilson 2012).

2.3. School Environment for children: The Kindergarten Outdoor Playgrounds

One of the best settings to achieve and develop Biophilia during early childhood years, while enhancing a child's health, wellbeing and quality of play are school grounds, and in particular, for the chosen age range (2-7 years old), Kindergartens. Kindergartens where young children spend 30–40 hours per week, may be the best opportunity to reconnect children with the natural world and create a future generation that values and preserves nature(Bires and Schultz 2014). In addition, kindergartens are the "stage" where children spend many years as members of a small society that exerts a tremendous influence on their socio-emotional development (Santrock 2004). It is the place where children connect with the social, cultural and ecological domains of childhood (Malone and Tranter 2003).

Developing Biophilia in the context of kindergartens can be achieved through Outdoor Learning, which is a broad concept without clear boundaries. It is based on the idea that children learn through experiences and richer and more diverse experiences and opportunities, are found in the outdoors (Clarke and Mcphie 2016). Outdoor learning is a child (learner)-centered approach and a sensory approach based on active playing and involves experiential learning (Bailie 2012) (Ernst and Tornabene 2012). Nevertheless, outdoor learning is different from environmental education, which can also take place outdoors but focuses solely at the environment. Unlike environmental education, outdoor learning can target any subject and any age range (O'Brien, Burls et al. 2011). There are two approaches to outdoor learning (O'Brien, Burls et al. 2011):

1. *Formal activities* taking place in schools and universities; follow a specific curriculum with certain learning outcomes; and led by teachers, biologists, or nature experts.

2. *Informal activities* done for personal interest and enjoyment or health and social outcomes; and are led by parents, nature guides, or therapists.

"Just going outside might not be as effective as combining nature experiences with learning activities that encourage students to actively and consciously deal with the environment"(Sellmann and Bogner 2013). However, another study reveals that: "children's self-initiated play in the kindergarten is challenged when the space increasingly shows signs of becoming a learning arena for children. This tends to lead to more adult-ruled activities with less time for children to self-initiate their own play"(Skar, Gundersen et al. 2016). Therefore, within school environment, there should be a critical balance between free and spontaneous outdoor playing and nature related learning activities.

Besides enhancing the health and wellbeing of children, improving their quality of play and strengthening their Biophilia, outdoor learning increases students' academic performance, leads to new capabilities and supports students' inquiry skills (O'Brien, Burls et al. 2011). According to studies conducted on the importance of implementing "greener" outdoor areas within schoolyards and settings, it was found that classrooms and cafeteria views with greater quantities of trees and shrubs were positively associated with higher academic performances, more creative play and lower criminal behaviors (Coutts 2016).

2.3.1 Limitations in School Environments: Case of Lebanon

Unfortunately, not all school environments are "enabling environments" to achieve the required connectedness between children and nature.

The schooling system in Lebanon is divided into four different types (Figure 2.6): public, private, and private-free and UNRWA schools. Most of the students are enrolled in private schools (54%), followed by (29%) in public schools, (13%) in private-free schools and UNRWA schools accommodate about (4%) of the total number of school students attend in Lebanon (Soueid, Ghanem et al. 2014).
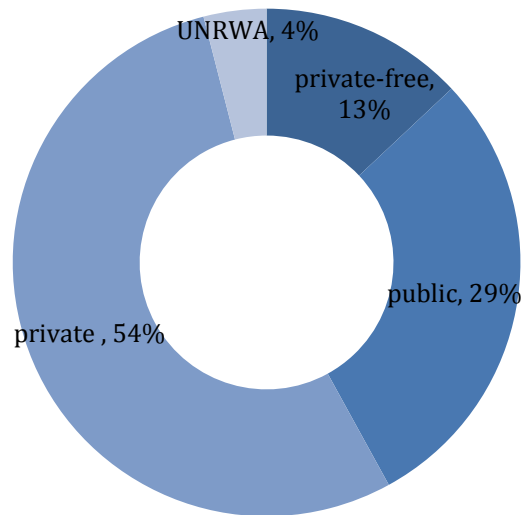
Figure 2.6: Distribution of students by type of schools during 2012 (Soueid, Ghanem et al. 2014)

Also, the schools in Lebanon are divided according to their region (Figure 2.7). A total of 2,882 schools are distributed along Lebanon's territory. Private schools are predominant in the capital city and its suburbs, which are the wealthiest areas of the country. Whereas public schools are located mostly in the Bekaa, Nabatieh, the North and the South areas of the

country. There are 70 UNRWA schools accepting only Palestinian children (Verena Balthes Kallas 2017).
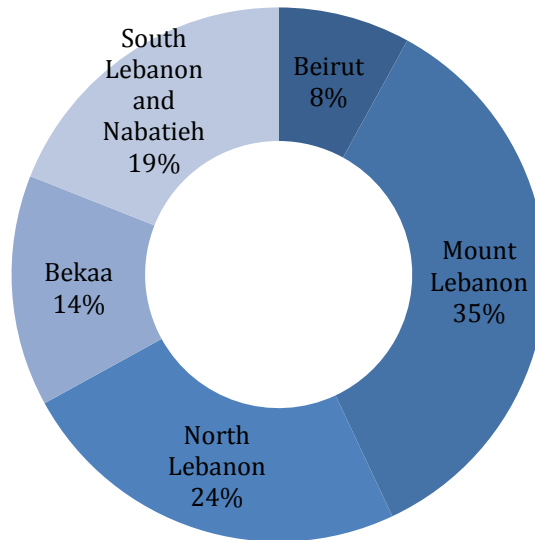
Figure 2.7: Distribution of students by Mohafaza during 2014-2015 (Verena Balthes Kallas 2017)

Moreover, the education sector in Lebanon including vocational and higher education, is under the authority of the Ministry of Education and Higher Education (MEHE). MEHE has complete control over public and vocational schools while limited control over private schools whom only follow general guidelines (Figure 2.8) and programs related to the official exams (Verena Balthes Kallas 2017). Furthermore, the general education system in Lebanon is divided into 4 phases (Verena Balthes Kallas 2017):

    a. Preschool: starting at the age of 3

      - Nursery

      - Kindergarten 1

- Kindergarten 2

b. Elementary Education: starting at the age of 5

- Cycle one: grade 1 to grade 3

- Cycle two: grade 4 to grade 6

c. Intermediate Education: starting at least 12 years of age

- Cycle three: grade 7 to grade 9; students obtain at the end a certificate known as "Brevet".

d. Secondary Education: starting at the age of 15

- First secondary year

- Second secondary years; students select between science or liberal arts secondary diploma

- Baccalaureate degree; students obtain at the end an official certification

However, there are several burdens characterizing public/subsidized schools in Lebanon. Several factors that interact and contribute to these limitations are mentioned below. First, there are the physical limitations. These schools are suffering from poor infrastructure; "there are few public schools that have adequate and renovated buildings to provide academic materials and extracurricular activities like music, arts, and sports" (Chami and Mikhael 2016). Also, outdoor space allocation for outdoor learning and playing is limited in size. Second, there are the intellectual limitations. Students are receiving lower quality of education compared to private schools, which is due to the substantial amount of under-qualified educators or non-specialized ones. Due to the lack of governmental supervision, 34% of teachers in the public sector are either holders of the

Lebanese Baccalaureate certificate or have only reached the last grade of the elementary

level (Chami and Mikhael 2016). Besides that, there is lack of awareness regarding the

importance of connecting children to nature, especially at the academic staff level (Abdou

2010). Last but not least, there are the operational limitations in terms of limited financial

resources (budget allocation to cater for new projects and infrastructure) (Abdou 2010).

The public expenditures on education during the year of 2011, represented 1.6% of GDP,

estimated at approximately USD 641 million; where as private spending on education represented 4.4% of

GDP, totaling USD 1,783 million (Soueid, Ghanem et al. 2014). Operational limitations also include the

lack of governmental support and execution of regulations and legal aspects. Furthermore,

the lack of specialized personnel in the field of connecting children to nature, in terms of

educators and designers, adds to the limitations. Lastly, the Syrian refugees' crises since 2011

overloaded public schools. The number of enrolled Syrian students in the public schools in Lebanon has

doubled from 6.9% to 13.8% from 2011 till 2015 (Chami and Mikhael 2016). The number of

enrolled Syrian students in the public schools in Lebanon has doubled from 6.9% to 13.8% from 2011

till 2015 (Chami and Mikhael 2016).

Educational Facilities in schools in Lebanon: Playgrounds

The average size of playgrounds at the private schools is greater than at public or subsidized schools. For public schools, the most common problem surveyed is the playgrounds' need for renovation, maintenance and safety measures.

Playground	Percentage of schools that have this facility		Total average surface of such facility at each school (sq.m.)	
	Public/subsidized	Private	Public/subsidized	Private
	97%	99%	943	1,325

Legal Aspect: The MEHE specifies space requirements for schools to obtain a license. One meter squared of classroom space and 1.8 meter squared of playground must be available per student. Playgrounds should not be less than 600-metered squared for secondary classes, 450-metered squared for elementary classes and 300-meter squared for preschoolers. Furthermore, school buildings and outdoor facilities should not be near factory pollution and noise; they should comply with general health standards and safety measures.

Figure 2.8: MEHE guidelines for educational facilities for schools on Lebanon (playgrounds) (Verena Balthes Kallas 2017)

CHAPTER 3

MATERIALS AND METHODOLOGIES

3.1. Research Design

The following study is a qualitative research, more specifically context-specific in that it informs about types of outdoor activities that promote and strengthen children's nature connection in the specific context of kindergarten schools with marginal resources. The methodological approach relies on existing theories and knowledge as evidence in order to develop and adapt outdoor activities for enabling environments of Biophilia.

A review of the literature was conducted to identify key parameters for the study and develop significant research questions. The literature helped identify important theories concerning nature connection and early childhood development. Sources used included peer-reviewed articles, scholarly books, general articles published on the web, YouTube videos, and TED talks.

Secondary sources for gathering evidence and credible knowledge included informal meetings with experts and specialized professionals from related domains including experts at the American Unviersity of Beirut in the department of Landscape Design and Ecosystem Management, the department of Education, and the Nature Conservation Center. In addition, experts from e-Eco-solutions Environmental Consultancy, a firm which offers a Green School Certification Program, was also consulted. Other secondary sources included conference lectures and workshops:

- *"Built it Green Conference 2017"*, Green School Certification Workshop by Eco-solutions Environmental Consultancy firm, held on Wednesday March 22, 2017, at the Monroe Hotel in Beirut.

- *"Taking Play Seriously"* workshop by child and play therapist and a certified peaceful parenting coach, held on Saturday April 08, 2017, at Sophia Maternity Center in Beirut.

- "*Schools: Mapping and Assessment in Lebanon*", book release and discussion session by the Ministry of Education and Higher Education (MEHE), The Lore Foundation and INFO-PRO, center for economic information. Session was held on Tuesday November 14, 2017, at the Monroe Hotel in Beirut.

3.2. Data Collection

Below is an overview of the different methods, deskwork and fieldwork, conducted in order to collect the necessary data to address the research questions.

3.2.1 Matrix for Enabling Environments

Inspired by key theories from the literature, a matrix for enabling environments was developed; it included a description of the benefits related to developing children's health and wellbeing, such as physical, social, physiological, brain and cognitive, and emotional development.

Children developmental phases were also identified (Wilson 2012), and each phase was linked to one of the three domains of learning of Bloom's Taxonomy(Blooms 1956),

which are cognitive, affective and psychomotor learning. The cognitive domain of learning involves constructing knowledge and developing intellectual skills. It includes the recall or recognition of specific facts, procedural patterns, and concepts that serve in the development of intellectual abilities and mental skills(Blooms 1956). On the other hand, the affective domain includes emotions, feelings, values, appreciation, enthusiasms, motivations, and attitudes (Krathwohl, Bloom et al. 1973); whereas the psychomotor domain includes physical movement, coordination, and use of the motor-skills(Simpson 1966).

Afterwards, the three domains of learning were translated into types of outdoor playing, which are divided into two major categories(Francis and Lorenzo 2002):

1. Creative play:
    a. Play with objects including sensory-motor play, sorting and classifying activities, construction and problem-solving play.
    b. Symbolic play including spoken language, reading, witting numbers, counting, visual media (painting and drawing) and music. This type of play helps support and develop language abilities, literacy, mathematical skills, visual literacy and "graphic vocabularies"(Whitebread, Basilio et al. 2012).
    c. Socio-dramatic play or pretend play, which can be incorporated with other types of play like playing with objects; for example when children are constructing something (shelter from recycled cardboard boxes), they are also often developing a story or narrative (Whitebread, Basilio et al. 2012).

2. <u>Active play</u> including physical exercise like climbing, running, rolling, and bike riding; fine-motor practice and hand-eye coordination such as grabbing, constructing, sewing, and coloring activities (Whitebread, Basilio et al. 2012).

The play level category was further demonstrated by a list of sample activities along with main play elements and spaces needed to conduct these activities which were inspired from Titman's article "*Play, playtime, and playgrounds*"(Titman and McGill 1992). Titman identified four main elements children look for in school playgrounds(Titman and McGill 1992, Malone and Tranter 2003):

1. "A place for doing" offering opportunities for physical activities, challenges and risk-taking.

2. "A place for thinking" offering intellectual stimulations for discovery and exploration.

3. "A place for feeling" offering opportunities through the five senses and developing the sense of ownership, belonging and care.

4. "A place for being" offering opportunities for children to be themselves, "to have some privacy in public spaces".

Hence, nine mutually inclusive categories for enabling environments were developed in a way that provides a diversity of play spaces and elements so that children can have maximum opportunities for interaction with each other, their surrounding environment and eventually with nature.
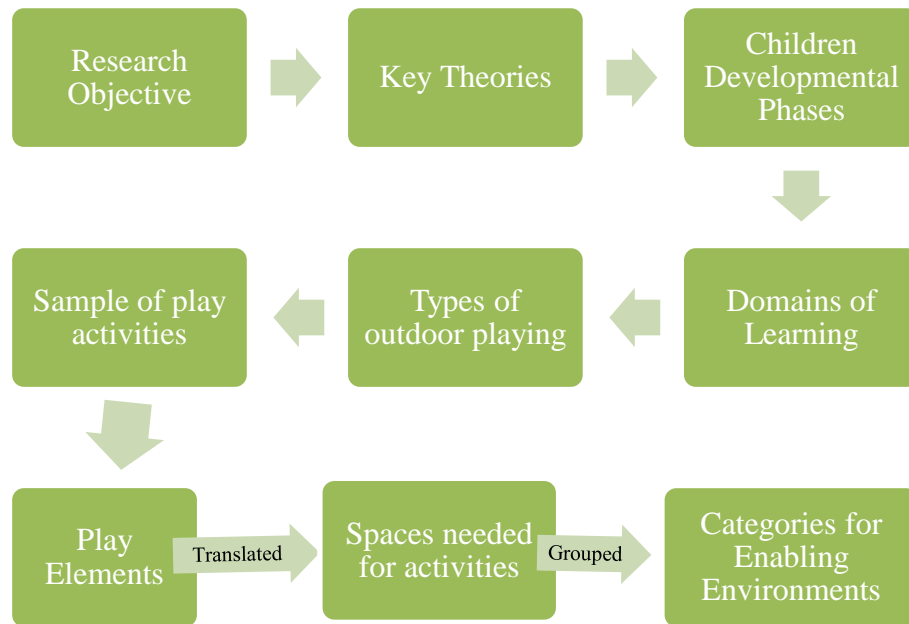
Figure 3.3: Flow chart for developing matrix for enabling environments

3.2.1.1. Matrix for elements of play level

Since "modifiable and malleable environments" offer more opportunities for free play and learning(Malone and Tranter 2003), elements defining the space are of high importance when designing such environments. Fixed human-made or natural components act as the anchor points of a landscape (Campbell 2013). Whereas, movable human-made or natural materials should be portable free and standing materials allowing children to change their places and take them together to build and create new objects(Acar 2013).

Therefore, in order to come up with the matrix for elements of play level, elements were inspired from the following resources, "*Experiential landscape analysis and design in schools*" (Thwaites and Simkins 2006), "*Landscape design for children and their environments in urban context*" (Acar 2013) and "*Landscape and Child Development: A design guide for early years kindergarten play learning environments*" (Campbell 2013).

3.2.2. Photo Selection Procedure (Photo Booklet)

The next step was to translate the nine categories of enabling environments into photographic representations. Carefully selecting photos that will be used in assessing participants' visual preferences towards enabling environments is a very critical step. According to Shahhosseini et al. (Shahhosseini, Kamal Bin MS et al.), using photographs is a "valid surrogate" for the represented environment only if the photos are appropriately sampled and respond to the context of the research question (Steen Jacobsen 2007, Pinto-Correia, Barroso et al. 2011, Shahhosseini, Kamal Bin MS et al. 2015). Like any other method, photo-based research has advantages and limitations as presented below in table 3.1 (Steen Jacobsen 2007, Chen, Xu et al. 2016):

Advantages	Limitations
Time-efficient	Doesn't reflect the complex reality of landscapes/environments (temperature, smell….)
Low cost	Doesn't provoke direct human experiences with the landscapes/environments
Offers experimental control over context, atmospheric and light conditions	
Easier for participants to simultaneously compare and evaluate different landscapes /environments	

Table 3.1: Advantages and limitations of photo-based research (Steen Jacobsen 2007, Chen, Xu et al. 2016).

They are various types of photo-based research in literature. However, this study included pre-selected photos as part of the focus group discussion conducted with participants. The photos act as a stimulus to evoke different types of responses including

open-ended replies related to participants' preferences and perceptions towards the nine

enabling environments (Steen Jacobsen 2007).

3.2.2.1. Selection of photographs

Step 1: For each of the nine enabling environments, an average of 10 photos were

adopted from Internet sources to represent the spatial configuration of these environments.

Search words used from the web included: space for outdoor art activities, land art by

children, outdoor construction activities for preschoolers, space for planting outdoors in

schools, kids digging pits outdoors, kids exploring nature, outdoor water play, mud play,

sand and snow play, students engaged in recycling activities outdoors, children learning to

compost, children climbing trees, children playing hide and seek in nature, active play

outdoors, outdoor classrooms, and animal compassion in children. The criteria for choosing

photos were:

- Selected photos should be colored (Lynch-Brown, Tomlinson et al. 1998).

- Selected photos should be of high quality/resolution and in JPEG format.

- Selected photos should approximately have similar brightness and weather
  conditions to reduce the potential influence on participants' preferences;
  they should be all selected in daylight (Chen, Xu et al. 2016).

- Selected photos should maximally frame the features of concern to reduce
  influence from nearby features (Chen, Xu et al. 2016).

- Selected photos should approximately have a similar horizontal angle when
  taken (inclined angles and Birdseye views are not feasible) to stimulate
  participants' actual view scope (Chen, Xu et al. 2016).

- Selected photos should include children and/or adults to better illustrate the purpose of the featured elements or space.

Step 2: Preparing the A3 photo booklet following the below instructions. Figure 3.2 represents a sample page of the photo booklet (refer to Appendix C for the complete photo booklet).

- One page with10 pre-selected photos for each of the nine enabling environments

- Photos should all be of the same size

- Photos should be all in landscape orientation

- Photos should be evenly spaced across the sheet

- Photos should be clearly numbered

Figure 3.2: Sample page of photo booklet; experts will be asked to select 2 photos per page, 1 photo that best represents the category of the enabling environment and 1 photo that least represents it.

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Step 3: To reduce the number of the10 pre-selected photos and achieve a representative sample for each category of the enabling environments, a panel of experts was asked for professional advice. According to multiple studies, a panel with a minimum of three to four experts would be appropriate to rate and select the photos (Shahhosseini, Kamal Bin MS et al. 2015). Therefore, to achieve precise results, the panel for this study included four experts in the field of photography, four landscape architects, and four early childhood education professors or practitioners. As a first step, several individual experts were identified from AUB and its wider community, and then through snowballing sampling technique other experts were approached.

Each member of the panel of experts was individually provided with a photo booklet. Members were asked to select two photos for each category of the enabling environment: one photo that bests represents the category and one photo that least represents it; based on evaluation criteria (Table 3.2), adapted from Kaplan's information processing theory for assessing visual features (Shahhosseini, Kamal Bin MS et al. 2015). While selecting the two photos, members were asked to keep in mind the intended purpose of the enabling environments: to strengthen nature connection in kindergarten children. The photos that were most frequently selected by experts were adopted in the photo-survey discussion as the best representative samples for each category of the enabling environments.

Evaluation Variables	Explanation
Legibility	- The purpose of the scene is clear. - The main feature in the scene is clear.
Coherence	- Different features in the scene help each other to provide better comprehension.
Complexity	- The scene has too many distractions

making it confusing.

3.2.3. Selection criteria for schools in Lebanon

To specify the sample group of the research study, a nonprobability purposeful sampling was adopted. "Purposeful sampling is based on the assumption that the researcher wants to discover, understand, and gain insight and therefore must select a sample from which the most can be learned"(Merriam and Tisdell 2015) and that mostly addresses the research questions (Deming and Swaffield 2011). The first step in conducting purposeful sampling was determining the criterion-based selection for choosing the sites, which in the case of this study were the schools. A list of attributes essential to the purpose of the study was created as shown in table 3.3.

Schools should be public or private-free/subsidized schools registered in the Lebanese government and located only in Beirut.
Schools should have a kindergarten section (KG1-KG3).
Schools should have a mixed gender education system.
Unit of Analysis: Schools should have accessible playground dedicated only for the kindergarten classes

Table 3.3: Attributes of criterion-based selection

After setting the attributes of the criterion-based selection, a list of all the schools located only in Beirut was compiled. Considering that there is no publically accessible database for all the schools in Beirut, different sources were used to build the list of schools. These sources adopted were:

- "*Schools Mapping and Assessment in Lebanon*", research study by Verena Balthes Kallas, Wael Kassem, and Barrak Dbeiss, 2017

- School Net Lebanon by the department of Educational Association for IT Development (EAID) in cooperation with the Ministry of Education and Higher Education; official website link: www.schoolnet.edu.lb

- School Guide by the Educational Center for Research and Development at the Ministry of Education and Higher Education; official website link: WWW.CRDP.ORG

To get a representative picture of the situation of schools with marginal resources in Beirut, only public and private-free/subsidized schools with mixed gender education were chosen from the compiled list. Approximately 28% of the total number of students attending schools in Beirut are enrolled in public and/or private-free/subsidized schools (Soueid, Ghanem et al. 2014). A rapid assessment was conducted to determine which schools had kindergarten sections, identify their location, and determine the total campus area, which ranged from 300 meters squared to 11,500 meters squared (Appendix A). As a result, 30 schools were identified, visited, and photos of the schools' campus external context were taken. Official approval was obtained on April 30, 2018, from the Ministry of Education and Higher Education in Lebanon to conduct fieldwork in the 30 schools (Appendix B).

The unit of analysis for the research study included eight schools (figure 3.3), selected from the 30, and based on the following criterion (unique purposeful sampling): school should have dedicated playground for kindergarten classes. Telephone calls were made to acquire the above information. Out of the 30 schools, 25 had separate outdoor playgrounds dedicated only for the kindergarten students. From these 25 schools, 8 schools

were selected as the unit of analysis based on convenient purposeful sampling (Merriam and Tisdell 2015), in terms of time issues and willingness to collaborate[1].
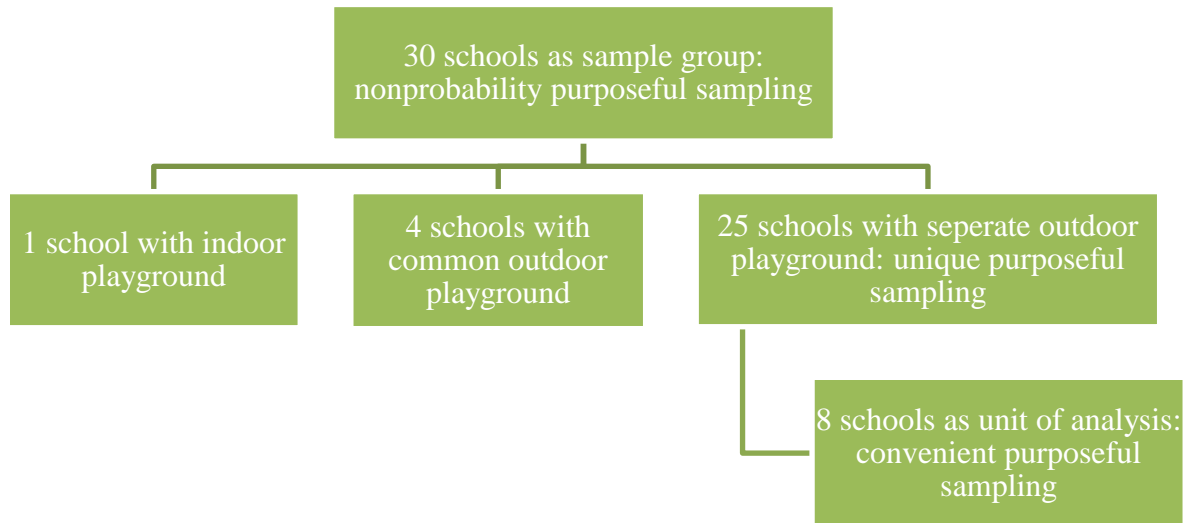
Figure 3.3: Different types of purposeful sampling conducted

3.2.4. Focus Group Discussion

3.2.4.1. Focus groups as method for collecting qualitative data

Focus group survey is a method for collecting qualitative data. It is an interview on a selected topic of interest with a group of people who know about the topic (Merriam and Tisdell 2015). Furthermore, focus group discussions can be a useful part of the interpretive strategy, which requires interpreting and "making sense" of the phenomena investigated, whether objects, events, words, actions, or images (Deming and Swaffield 2011). Interpretive strategy is well suited for the purpose of this study for the way people

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[1] Some schools were not interested in the research study.

represent, write or talk about nature and their interactions with landscape will be investigated.

The main advantage of conducting a focus group survey is the dynamic interaction among participants to generate data while providing insights into attitudes, beliefs, and opinions. Focus groups are usually led by a moderator, who creates a supportive climate, facilitates interaction between members, and provides transitional questions without interfering (McLafferty 2004). It is very important for the moderator to stay neutral and to ensure that all relevant ideas are covered (Millward 1995). Nevertheless, one drawback of this type of data collection is that "they can silence individual voices" who are in disagreement (McLafferty 2004).

A phenomenological focus group survey was conducted to assess participants' preferences (McLafferty 2004). Preference is a result of perceptions originating from acquired knowledge, innate experiences, and previous interactions along with cognitive processing (Merriam and Tisdell 2015, Shahhosseini, Kamal Bin MS et al. 2015). Therefore, this study will assess participants' visual preferences regarding certain enabling environments that strengthen Biophilia in kindergartens. Visual preferences will express participants' degree of like or dislike in terms of visual factors of a place or space (Shahhosseini, Kamal Bin MS et al. 2015).

Based on multiple types of research, smaller focus groups whose participants were familiar with each other were more manageable. Therefore, focus groups should be homogeneous rather than heterogeneous, in terms of age, status, class, occupation and other characteristics for it influences participants' interaction with each other (Carey 1994). Furthermore, regarding the number of focus groups that should be conducted, several

researchers stated that when new focus groups cease to provide new information, then the researcher should stop (McLafferty 2004). For example, Millward (1995) stated that the maximum number is ten focus groups (Millward); while Krueger (Krueger and Casey) suggested that the minimum is three and the maximum is twelve (Krueger and Casey 2014). For this study, eight focus group discussions were conducted, one in each of the eight schools. Focus groups are typically made up of eight to twelve people (Deming and Swaffield 2011). Nevertheless, according to McLatterty in her pilot study conducted on student nurses, there were difficulties facilitating a group of nine participants and instead used four to six participants to conduct the main survey.

3.2.4.2. Phenomenological focus group discussion with KG teachers

The sample size included one focus group for each of the eight schools of the unit of analysis (total of 8 focus groups with KG teachers) (Stewart, Shamdasani et al. 1990). Each focus group consisted of 4 to 6 KG teachers (McLafferty 2004) depending on teachers' availability and willingness to participate. Time for each focus group discussion was around 30 minutes. An audio recording method was used to document discussions.

Tools and instruments used to conduct the focus group surveys with KG teachers included:

1. Introduction: Introduce the participants to the purpose of the study and elaborate how their participation will be essential and helpful. Briefly explain the outline of the discussion that is going to take place.

2. Consent forms and background information: Distribute consent forms for the members willing to participate; and background questionnaire, which includes,

gender, education level, university major with year of graduation, and years of experience as an early childhood teacher.

3. <u>Open-ended questions with follow up probes:</u>

    a. Experience/Behavior questions (Cheng and Monroe 2012):

    - What do you remember about the outdoor activities in nature you used to do while you were young? Where did you play as a child? With whom you played?

    - Did you have any pet or animal inside or outside the house?

    - Nowadays/as a grown up/ did your relation with nature (as expressed above by the outdoor activities in nature) change? If so, whether it was a positive or negative change, what do you think are the drivers of this change?

    b. Opinion questions:

    - What do you think is a better learning approach for children in the outdoors/nature: Guided play or Free play? Positives and negatives of each of the two approaches

    - Other than the assigned school curriculum, what do you think is the best method to introduce students to natural experiences and to develop their love for nature through school's outdoor playground?

    - Other than the assigned school curriculum, and in the case of not being able to access the outdoors for various reasons, how do you

think you can extend the outdoor activities to the indoor classrooms? (Williams-Siegfredsen 2017)

    c. Feeling question: Do you feel capable, through your current knowledge and experience, to be a role model for your students in presenting love, care, attachment and protection to nature?

    d. Ideal position question: Describe the perfect ideal outdoor play space in your opinion that should be implemented in every school environment, whether public or private.

    e. Hypothetical question: Suppose an expert in landscape design and environmental education came to help in developing your school campus by creating a holistic environment through developing different spaces for conducting different activities related to nature, how would be the school's administration reaction to this scenario?

4. <u>Photo Activity:</u> Participants will be asked to comment on the nine representative photos of the enabling environments in relation to children's nature connection based on the following question: "Do you consider the elements or features presented in each of the photos crucial for strengthening children's love for nature?"

3.2.5. Site observation checklist

To evaluate the existing conditions of the playgrounds in the 8 selected schools, a site observation checklist was developed (Appendix A). According to Ruth Wilson, in his book "*Nature and Young Children: Encouraging creative play and learning in natural*

environments", besides focusing on safety, which is critical, when evaluating outdoor playgrounds, other considerations should be taken into account, such as comfort, beauty, opportunities for sensory stimulation, accessibility, flexibility, physical, social, mental challenges and opportunities for hands-on interaction with nature (Wilson 2012).

Therefore, inspired from Wilson's general guidelines for outdoor play spaces and from the "*Public Playground Safety Handbook*" by the U.S Consumer Product Safety Commission (Commission 2010), a site observation checklist was developed based in the following major considerations:

- *Safety* in terms of the choice of plants, fall-absorbing surfaces, and age appropriate play equipment with minimum "use zone[2]". Furthermore, the play space should be free from any possible playground hazards like sharp edges, tripping hazards or exposed electrical wires.

- *Comfort* in terms of providing a comfortable play space for children during extreme weather conditions; the play space should allow sunlight to penetrate but of course with shaded areas to shelter strong winter winds and extreme summer sun. A comfortable play space should also provide opportunities for pairs or small groups of children to come together for quite play like playhouses, porch swings or tepees.

- *Accessibility* in terms of how easily accessible the playground is from KG classrooms; and whether class balconies/windows and building's rooftop space are accessible and safe to use as well (no falling hazard).

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[2] Play equipment should have adequate space around them for safety measures.

- *Flexibility* in terms of inviting children for open-ended interaction and discovery through the availability of several elements, like: movable play elements, child sized tools supporting inquiry, non-structured spaces for free play, and natural or landscaped areas.

- *Dynamic and Challenging* in terms of containing natural elements, attracting wildlife, featuring different sensory play elements, offering areas of different heights and providing opportunities for healthy risk-taking.

It is worth noting that the developed checklist is not a maintenance and inspection checklist for playgrounds, but rather to assess the existing conditions of playgrounds and space suitability to develop potential enabling environments.

In addition to the site observation checklist, a quick sketch of the playgrounds' plan was documented. Base plans mainly included playground boundaries, access points, location of play equipment, vegetation, and total open area and whether it complies with the MEHE space requirements for school playgrounds. The MEHE space requirements states that a "preschoolers' playground should not be less than 300 meters squared" and a "1.8 meters squared of playground space must be available per students"(Verena Balthes Kallas 2017).

3.2.6. IRB approval and fieldwork

The Institutional Review Board at the American University of Beirut approved the study on September 18, 2018 (Appendix B) and consent forms were obtained for all participants. Fieldwork, including individual meetings with professional experts, school site

visits, playground observation checklist and focus group discussions, was carried out from October 16, 2018 to November 19, 2018.

The exclusion and inclusion criteria for recruiting experts for photo selection included advanced skills in photography, landscape architecture, and/or early childhood education. Criteria for selecting teachers were: participants should be employed by the school as KG teachers. Age range and gender were not applicable. Only participants showing interest and willingness to participate in the study and who agreed to sign the "Participation Consent Form" were included in the study. Confidentiality of participants' names was insured; participants were not asked for their names during the recorded discussion or while singing the consent forms.

3.2.6.1 Recruitment Strategy

Concerning the panel of professional experts, the researcher identified 12 individuals, with expertise in photography, landscape architecture, and/or early childhood education, from AUB and its wider community. Besides their expertise in the above fields, several experts occupied other positions like: Art Director at the communication office, lead university photographer, president of the photography club, preschool directors, architects, and author of multiple early childhood stories. Experts' years of experience in their specified field ranged from 2 to 33 years, with an average of 13 years (refer to Appendix A). Experts were approached via an email recruitment letter including a brief of the project and its objectives.

Regarding school sites, after securing an official approval from the MEHE, the selected eight schools were contacted to arrange for a preliminary meeting with the

schools' KG principal. During the meeting, the researcher briefed the principal about the project, its objectives and asked him/her to distribute "Participation Consent Form" to all KG teachers available at their school. Accordingly, only teachers, who showed interest and willingness to participate in the research study, were asked to participate in a focus group discussion. The logistics (time, day, and location) of the focus group discussion was arranged in collaboration with the principal where it was ensured that the principal would not be in the premises to avoid bias. In total, eight focus groups were conducted with 44 KG teachers with a range of 3 to 7 teachers per school (Table 3.4).

School Code	Number of KG sections	Number of KG students	Number of KG teachers	Number of participating teachers	Duration of focus group (minutes)
A	3	57	7	7	35
B	6	135	12	7	30
C	6	180	12	7	25
D	3	50	4	4	25
E	6	95	6	6	27
F	3	25	4	3	15
G	3	75	6	4	20
H	5	104	7	6	22

Table 3.4: Number of participants and duration of discussion for each focus group conducted in the selected schools

Table 3.5 wraps up all methods used for this research study and demonstrates how they help in addressing the research questions. In respond to the first research question, *"what Biophilic outdoor activities can be implied from the literature and key theories?"* desk research for key theories from multidisciplinary fields was conducted resulting in a matrix for enabling environments and for elements of play level. Furthermore, photo-based desk research was used to develop the photo booklet that helped in creating the list of

Biophilic outdoor activities for enabling environments. In respond to the second research question, *"how can these Biophilic outdoor activities offer an enabling environment in schools with marginal resources?"*, rapid assessment for schools in Beirut with marginal resources was conducted in order to select the unit of analysis for the study based on nonprobability purposeful sampling technique; focus group discussions with kindergarten teachers was needed to asses teachers' preferences and perceptions towards certain enabling environments; and playground site observation and analysis was establish to asses playgrounds' exciting conditions and space suitability to develop potential enabling environments that cater for Biophilic outdoor activities.

Method	Source of data	Data analysis method	Result
Desk research	Key theories from literature	Translating theories into nature-related activities/ play elements	Matrix for enabling environments and matrix form elements of play level
Photo-based desk research	Photograph adopted from internet sources to represent spatial configuration and elements found in enabling environments	Photo-based analysis	a. Photo booklet b. List of Biophilic outdoor activity for each enabling environment
Individual meetings with panel of experts (field work)	Photo booklet	Photos with the highest frequency ranking	Representative sample for each category of the enabling environments
Rapid assessment (field and desk work)	Different database sources (mainly MEHE) and site visits		Selection criteria for schools in Lebanon and unit of analysis
Focus groups discussion (field work)	Photo activity Open-ended questions Background	Thematic analysis	Cultural responsiveness towards Biophilic outdoor activities:

	questionnaire		teachers' preferences and perceptions
Playground site observations (field work)	Site observation checklist	Playground site analysis	a. Assessing space suitability for potential enabling environments b. Playground base plans c. Actions to be taken

Table 3.5: Summary of methods, data sources and data analysis methods used to answer the research questions

3.3 Qualitative Data Analysis

Qualitative data analysis is the "process of making meaning and sense out of the collected data"; it involves combing, reducing, and interpreting the data(Merriam and Tisdell 2015). This process helps researchers answer the addressed research questions. Below are the data analysis strategies used for this research study.

3.3.1. Photo-Based Analysis

A photo-based analysis was conducted in order to illustrate and better characterize outdoor activities for enabling environments of Biophilia in the context of kindergarten playgrounds. Photos presented in the photo booklet, 10 photos for each category of the enabling environment (total of 90 photos), were used as a starting point. More photos were selected from the web based on the list "sample of play activities" developed in the enabling environment matrix. The researcher stopped collecting photos when the message of every activity within each category was clearly delivered; therefore no specific number of photos collected. Afterwards, each photo was assessed according to three guidelines:

1. Type of activity conducted.

2. Description of the type of space required for conducting the activity, for example is it a horizontal or vertical space.

3. Minimum dimensions needed for the activity to be conducted per child (how much space a child needs to comfortably and safely do the activity) and per 1 KG classroom section with an average of 20 students[3].

However, in order to have more specific results, research was conducted to identify general anthropometric dimensions for kindergarten students, ranging between 3 to 6 years old. In the article *"The minimum area required for children aged between 3 to 5 years old in kindergarten"* presented in the 5th International Conference on Applied Human Factors and Ergonomics 2014, in Poland, the minimum area required by a 3 to 5 years old child occupying kindergarten was calculated through analyzing body postures using Computer Assisted Drawing Software. Three main gestures commonly used by students in their daily activities were identified: standing, sitting and laying down (Figure 3.4).
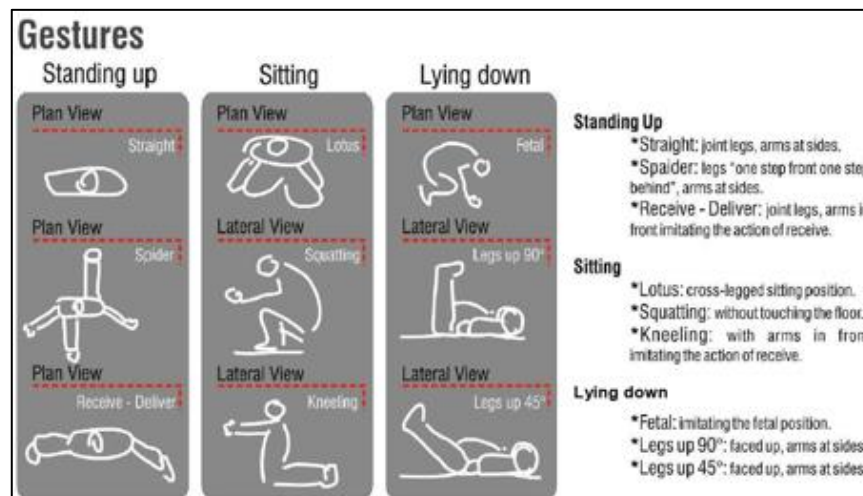
Figure 3.4: Child gestures related to daily activities in kindergarten (Julie Waldron 2014)

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[3] The average number of students (table 3.4) in the 8 selected schools was calculated and is equal to 20 students per class.

Using the results of the above study as a bench mark, an average of the minimum space needed by a KG child to stand, sit, or lay down comfortably was identified (Table 3.6). These dimensions are of the child himself/herself in a certain body position; they exclude the space needed for play materials, equipment and tools, which vary from one activity to another.

Child Gesture	Average dimension for a child's minimum space in meters
Standing (ranges from standing still to standing whiling doing a certain movement like the spider movement)	Width: 0.4 meters Length: 0.6 meters Area: 0.24 meters squared
Sitting (rangers from the lotus position to kneeling and squatting)	Width: 0.4 meters Length: 0.65 meters Area: 0.26 meters squared
Laying down (ranging from the fetal position to lying flat on the floor)	Width: 0.4 meters Length: 1.1 meters Area: 0.44 meters squared

Table 3.6: Average for the minimum space needed by a KG child performing certain body gestures(Julie Waldron 2014)

The final results are featured in table format with mood board pictures representing each category of the enabling environment. The general space dimensions contain the area of the space needed to conduct each activity including child's dimension and space for play materials/tools. At the end, a range of the minimum and maximum area or space needed per activity for each type of space across the 9 enabling environments is established.

3.3.2. Thematic Analysis

For analyzing qualitative data, a thematic approach was used. The objective of thematic analysis is to "systematically transform a large amount of text into a highly

organized and concise summary of key results (Erlingsson and Brysiewicz 2017).

Therefore, in order to analyze the 8 focus group discussions conducted with KG teachers,

the following method was adopted (Figure 3.5) (Sample transcript in appendix D)(Groat

and Wang 2002, Merriam and Tisdell 2015, Erlingsson and Brysiewicz 2017):

1. Raw data (audio tapes of the discussion in original language, Arabic).

2. Transcribed text or meaning units (transcribing data into linear text then translating into English).

3. Condensed meaning units or reduced data (reducing the text while still preserving the core meaning)

4. Coding (assigning codes to the condensed meaning units)

5. Constructing categories (the process of grouping codes together under categories)

6. Thematic data or themes (express the underlying meaning found in the categories)
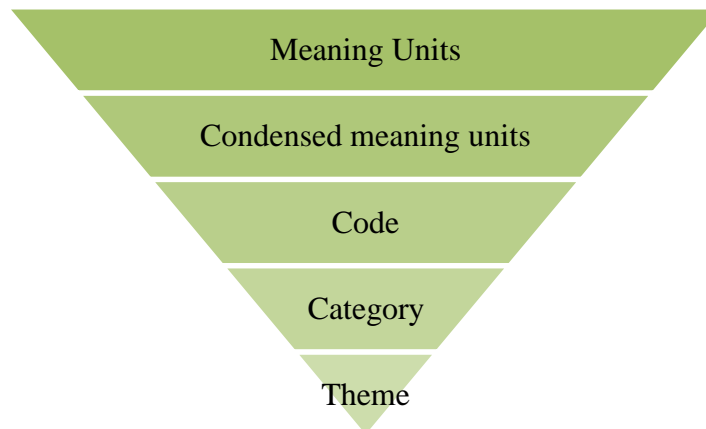
Figure 3.5: Method for analyzing qualitative data (Erlingsson and Brysiewicz 2017)

It is important to note that all recordings remained anonymous, and all identifying data related to participants' names or personal information was removed from the transcripts to ensure confidentiality.

After transcribing the data using the above method, results of the focus group discussions are presented in three ways according to whether they directly or indirectly answer the research questions. Thematic data related to the photo discussions are presented as descriptive narrative explaining participants' consents or dissents with each representative photo of the enabling environment. These results will help in tailoring the outdoor activities to be culturally responsive to the context of schools with marginal resources in Beirut. Then, results related to the opinion and ideal position questions are presented as themes. Whereas results related to experience, behavior, and feeling questions are presented as background information to provide a brief summary about participants past and present nature-related experiences.

3.3.3. Playground Site Analysis

General description of each of the eight school sites and playground spaces was completed based on the on-site observation and checklist. Accordingly, base plans for the eight playgrounds were prepared. Furthermore, existing playground typologies grounded by previous research conducted by several landscape designers, architects and development professionals and educators, was used to assess the kindergarten playgrounds in the eight selected schools. The four dominant typologies for outdoor playgrounds are outlined below (Malone and Tranter 2003, Kantz 2004):

1. *Traditional playgrounds* are characterized by large pieces of equipment made from metal or wood, such as swings, slides, climbers, gym equipment and sports fields. This type of playground is based on "play as physical exercise and recreation", more specifically focusing on gross motor play while excluding other areas of child development.

2. *Contemporary playgrounds* or *Designers playgrounds* are characterized by "aesthetically pleasing arrangements" of forms, textures, colors and heights. Gross motor development and exercise are still the major objective of such playgrounds, however they allow for a wider range of play experiences compared to traditional playgrounds.

3. *Adventure playgrounds*, originating from Scandinavian countries, are characterized by using the natural environment as a play space, which includes hills, shrubs, grass, water, trees, wood, mud and even tires and other recycled materials. Loose parts, natural and/or manufactured, are crucial in such playgrounds. In addition, adventure playgrounds have very limited "pre-designed areas" and are hence constructed through children's play. They also allow children to play in all types of weather, encourage risk taking like climbing trees, and provide chances for creative, imaginative and constructive play.

4. *Creative/comprehensive playgrounds* are a synthesis of all other types; they are the most diverse type as they accommodate great opportunities for informal and formal play. They combine sport fields and anchored equipment for the development of gross motor skills set among natural

pathways, water features, rich foliage and wild spaces. Loose parts play a

significant role as well. In addition, areas for special activities such as art,

gardening, and animal care are included.

Regarding elements in the checklist, "actions" that need to be taken and addressed

by the school in order to improve the playground space into a potential outdoor enabling

environment for Biophilia, are proposed as suggestions.

3.3.4. Triangulation Method

Triangulation is a method used to increase validity of research findings through

consciously seeking evidence from a wide range of sources, then comparing or contrasting

evidence together to achieve the indented result(Patton and Cochran 2002). Therefore, this

method is used to develop and adopt outdoor activities for enabling environments that are

culturally responsive to participants' preferences and perceptions and that are spatially

applicable to schools with marginal resources (Figure 3.6).
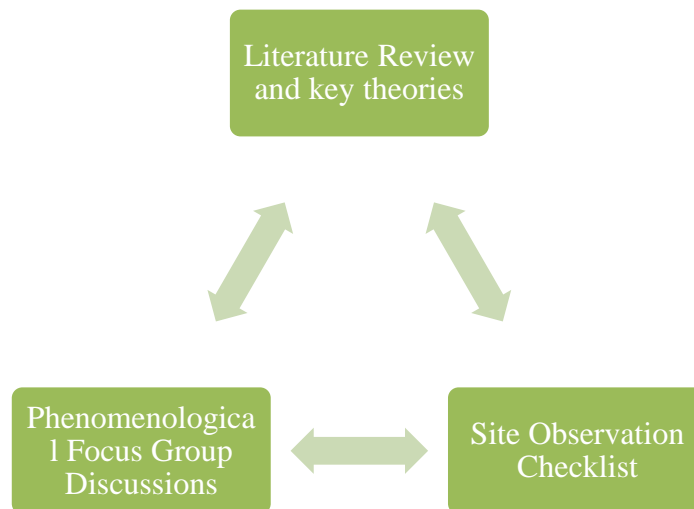
Figure 3.6: Triangulation Method for tailoring outdoor activities for enabling environments

Outdoors activities for the enabling environments based on literature were contrasted with each of the eight playground plans in order to check for space availability for implementing such environments. Then, how culturally responsive are these enabling environments based on teachers' preferences was addressed. Hence, the result is list of outdoor activities, for enabling environments of Biophilia, which are culturally responsive and integrates new design concepts, proposed for schools with marginal resources.

CHAPTER 4

RESULTS

4.1. Enabling Environments

Six key theories related to nature, play and children were identified from the literature, which are: Gadamer's Concept of play, Affordance Theory in natural settings, Free Play Approach, Horticulture Therapy, Naturalistic Intelligence from Howards Gardner Multiple Intelligence Theory, and Theory of Mind. The key theories were selescted based on their underlying context that will help in traslating landscape elements into feasable play elements.

Gadamer's concept of play (2004) expresses play as a "social and bodily action in active interaction with a space". This concept creates a bridge between the genuine qualities of play and a phenomenological perspective on the human being, where interaction and dialogue between living organisms and the environment forms the basis of human lived experiences(Gadamer, Weinsheimer et al. 2004). Furthermore, Gadamer's concept of play helps in developing children's social skills, by increasing pro-social behaviors, reducing anti-social ones and increasing the chances of friendship development. Children's social development is associated with the affective domain of learning of Bloom's Taxonomy. Hence, Gadamer's concept can be translated into creative outdoor play including symbolic play and socio- dramatic play; mainly including activities that focuses on children's interaction with other kids and with adults, in relation to the environment, such as painting and drawing, arts and crafts, sorting, counting, reading aloud stories, pretended play and

role playing games. In spatial dimensions, several types of spaces for "feeling" and "being" are needed to establish the above activities: space for arts and crafts, space for outdoor classroom, and special places for retreat.

Affordance Theory in natural settings states that children focus on the function rather than form and aesthetics. In other words, children perceive the functions of the landscape and use them for playing (Fjørtoft 2001). This theory helps in developing children's physical skills, including gross motor skills, which is related to the psychomotor domain of learning of Bloom's Taxonomy. Hence, Affordance Theory can be translated into outdoor active play, such as sliding and rolling on mounds, climbing trees, playing hide and seek through dense vegetation, and jumping across stepping stones or logs. Such activities mainly require a place for "doing", an open space for unstructured play and movement.

The Free Play Approach defines play as a "spontaneous and child-initiated action"; more specifically play that is not highly supervised by adult's presence and management and with fewer formally organized activities (Skar, Gundersen et al. 2016). Free play increases children's creativity, imagination and fantasy, which are related to brain and cognitive development, as well as increasing physical development related to fine motor skills. Hence, this approach is associated with the psychomotor and cognitive domain of learning of Bloom's Taxonomy. In terms of play level, Free Play can be translated into active and creative play more specifically, construction and problem solving play such as constructing shelters and dens, digging pits, building animal shelters and niches, and generating land art projects. Also, the approach to free play requires a place for "doing", which composes an open space for unstructured play, construction, and project displays

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Horticulture Therapy, as defined by the American Horticulture Therapy Association, is the engagement of people in gardening and plant-based activities in order to achieve certain therapeutic goals. It includes passive involvement with nature through the senses or active participation through the practice of horticulture(Nilsson, Sangster et al. 2011). Engaging children in horticultural practices increases their attention span, engages their 5 senses and reduces stress factors. Therefore, this theory works towards developing children's emotional and physiological health and wellbeing, which are related to the affective and cognitive domains of learning. In terms of play level, Horticulture Therapy incorporates creative sensory-motor play, including planting of various plants (vegetables, herbs flowers), irrigation and plant maintenance practices, seeding and composting activities, reading aloud stories, sitting around a fire pit or under tree shade, meditation and enjoying nature through yoga. Mainly, the above activities require a place for "feeling", which includes outdoor classroom space and space for gardening and composting.

Naturalistic Intelligence, according to Howards Gardner Multiple Intelligence Theory, "is the ability to observe patterns in nature and understand natural and human made systems"; also, it is the ability to function well in natural environments (Santrock 2004). Acquiring naturalistic intelligence skills develops children's sense of exploration and observation and increases their knowledge regarding flora and fauns, all while engaging their 5 senses. In other words, it fosters cognitive and emotional developments that are related to affective and cognitive learning styles. Concerning outdoor play, naturalistic intelligence can occur through creative sensory-motor play or through symbolic play, including sand, water, mud play, nature scavenger hunt, nature color wheel, and exploring the underside of plants and leaves. Regarding spatial dimensions, a place for "thinking" and

place for "feeling" are essential for the development of naturalistic intelligence, incorporating space for water features, space for sand or mud pit, and unstructured natural or landscaped areas for the gathering of natural treasures.

Developed by a number of contemporary developmental scientists, the Theory of Mind refers "to the ability to attribute mental states like beliefs, intents and desires, to oneself and others and to understand that others have beliefs, desires and intentions that are different from one's own" (Steinberg, Bornstein et al. 2010). This theory views children as "thinkers" who are trying to understand the world around them. The Theory of Mind develops as children grow, with main changes occurring at 2 to 3 years of age, 4 to 5 years of age, middle and late childhood (Santrock 2004). As the little "thinkers" mature, their sense of caring and empathy towards plants and animals will develop. Therefore, this theory works towards improving children's' emotional health and wellbeing through creative socio-dramatic play. The types of activities focus on children's interaction with the outside environment; for example searching for bugs, insects, frogs, snails, or worms; feeding birds or ducks, caring for pets, and engaging in recycling, sorting and reusing activities. A place for "feeling" is essential for the above activities, encompassing space for recycling units, space for animal shelters and a space abundant with natural elements for attracting wildlife.

Consequently, as the result of the matrix (Appendix E), the research study generated nine mutually inclusive categories for outdoor enabling environments, aiming to strengthen children's Biophilia. All the spaces and elements need to conduct the various activities inspired from the above key theories, were group under categories formulating the enabling environments, as shown below in table 4.1.

Places children seek in playgrounds (Titman and McGill 1992)	Spaces needed to conduct activities	Keywords	Categories for Enabling Environments
Place for Doing	Unstructured space for physical activity and movement	Physical activity	Little Gymnasts
	Unstructured space for construction and project displays	Construction	Little Builders
		Project displays (Land Art)	Little Artists
Place for Thinking	Unstructured space for exploration and discovery	Exploration and discovery	Little Explorers, Little Builders, Little Gardeners
	Natural or landscaped space	Nature	Little Explorers, Little Vets
Place for Feeling	Space stimulating the senses (water features, sand pit, mud pit, scented or edible garden)	Senses	Sensory World
	Space for arts and crafts	Arts and crafts	Little Artists
	Space for raising pets/ animal shelters	Pets and animals	Little Vets
	Space for composting and recycling	Composting and recycling	Environmental Care
	Space for gardening	Gardening	Little Gardeners
Place for Being	Space for privacy and retreat	Retreat	Quiet Retreat
	Space for group or pair socializing	Socializing	Quiet Retreat
	Space for outdoor classroom	Outdoor classroom	Quiet Retreat
	Space providing opportunities for creativity and imagination	Creativity and imagination	Little Artists, Little Builders

Table 4. 2: Table for generating categories for enabling environment

The nine mutually inclusive categories for the enabling environments are briefly explained below:

1. *Little Artists:* Outdoor art studio involving painting, drawing and creating arts and crafts using either elements from nature or recycled materials; and land art projects and installations.

2. *Little Builders:* Construction play involving digging pits for sand, water, mud, or fire; constructing dens, tepees, garden beds, or animals' shelters; and playing with child-size building blocks or similar elements from nature.

3. *Little Gardeners:* Gardening activities involving planting, watering, fruit picking and plant maintenance; and learning about green walls and horticultural practices.

4. *Little Explorers:* Nature study involving collecting and sorting natural treasures (scavenger hunts); discovering and exploring the underworlds; learning about life cycles and food webs.

5. *Sensory World:* Sensory play involving the 5 senses, including water play, sand and mud play, and snow play, musical instruments from recycled materials and fire pit.

6. *Environment Care:* Environmental awareness including composting, recycling and reusing activities; and learning about rainwater management, and renewable energy.

7. *Little Gymnasts:* Active play including traditional play structures (slides, swings); play games like hide and seek; physical activities like running and balancing logs; safe risk taking and challenges like climbing walls or trees.

8. *Quite Retreat:* Includes spaces for small groups to socialize like tree houses or child-sized houses; and outdoor classroom space for outdoor learning activities.

9. *Little Vet:* Animal allies including pet care like feeding and nursing, constructing animal shelters and niches, and attracting wildlife through various techniques.

4.1.1. Matrix for elements of play level

Various elements are important in order for the enabling environments to reach their highest potential in strengthening children's nature connection. Four categories were developed according to the elements of play level matrix (Table 4.2):

1. Fix - human made elements including horizontal and vertical structures.

2. Fix - natural elements including vegetation, topography, water features, and other landscape features.

3. Movable - human made elements mainly including loose materials for children to play with and create their own play activities and spaces.

4. Movable - natural elements including loose natural elements like rocks, stones, pinecones, leaves, and petals; and wildlife.

	BUILT (Human Made)	NATURAL
FIX	• Horizontal structures: Paths/ floor/ trails/ channel/ games /maze (labyrinth)/ stepping stones • Sun dial • Raised garden beds • Shade structures (pergola) • Vertical structures: activity walls/ climbing walls / chalk walls / artistic walls / green walls / murals • Structured games: slides / swings • Other structures: wooden	• Vegetation: Grooves of trees/ shrubs/ bushes/ ground cover/ wild flowers meadows/ vines/ grass/ herbs/ vegetable garden/ scented garden • Topography: Hills / mounds/ cliffs/ ponds/ ditch • Large rock circles/ stump seats • Large tree logs • Fire pit/ sand pit / mud

	houses/ cottages/ tree houses/ bridges/ tunnels/ decks/ ramps	pit • Water features: wetlands / bio-swales/ water falls
MOVABLE	• Recycling units = composting/ sorting/ re-using • Recycled materials: tires/ cardboards/ plastic bottles • Children-sized construction tools: ropes /fabric/ buckets containers / pulleys / wagon / digging tools/ pipes/ building blocks • Seats and tables • Art tools and supplies: art easels/ paint/ brushes • Animal shelters (bird houses, bug hotels) • Garden tools: watering devices/ child-sized shovel and wheelbarrows/ rakes • Tools supporting inquiry: hand lenses/ bug nets and catchers/ dental mirrors/ binoculars	• Free materials: water/ mud/ soil/ sand/ mulch/ stones/ pinecones/ gravel/ rocks/ logs/ petals/ twigs/ snow/ shells/ wood poles • Wildlife: insects/ birds/ cats/ butterfly/ fish/ water creatures/ frog/ snails/ worms/ caterpillars/ reptiles/ amphibians/ small mammals/ rabbit/ guinea pig/ farm animals

Table 4.3: Matrix for elements of play level

4.1.2. Photographic Representation of Enabling Environments

The best representative sample photos for each category of the enabling environments are presented below (Figures 4.1 and 4.2). The panel of experts showed consent and affinity towards most of the selected photos (refer to Appendix E for detailed results of panel of experts' photo selections), as they selected the photos that mostly showed children's freedom while playing and conducting the certain activity. Children's freedom was visually expressed in terms of the way children were sitting or standing to

conduct the activity, colors and materials they were using, what they were wearing, their context or surrounding, the interaction of all their senses together and how engaged they were in the activity. Furthermore, experts were eliminating photos that are very classical, cliché, highly depended on traditional structured activities, does not include hands on experiences in nature nor natural elements, and that are out of context, according to their understanding, perspectives and specialty.

For the Little Artists category, the picture (Figure 4.1a) with the highest frequency was selected because it expresses how "*children are using nature and their creativity to conduct the activity*" and that they are not using any "*tools other than the natural ones*", as explained by several experts. Also, a photographer explained that "*visual thinking*" for a child is very important because "*what children see as visuals, make them feel*". Whereas for the sample picture of the Little Gardeners (Figure 4.1c), experts' selection was based on the fact that "*children are watering the plants without the guidance of an instructor which gives them more freedom and confidence*". Regarding Environment Care and as explained by several experts, children in the picture (Figure 4.1d) are "*engaging the most in the recycling activity compared to other pictures, for they are holding the container by themselves and helping each other.*" However, only one member of the panel among the 12 believed that the same picture had more plastic than the idea of recycling, which for him was a contradiction. For the Little Gymnasts, the picture (Figure 4.1f) with the highest frequency was selected because it "*had no interference with the natural setup, unlike the rest of the pictures*" and it clearly expresses how "*children are feeling and touching the tree and hence connecting more with nature*"; in terms of photography the selected picture is colorful for to the eyes of children.

Figure 4.4: Representative sample photos for enabling environments "a" to "f"

For two categories of the enabling environments, Little Builders and Little Vets, two pictures occupied the highest frequency based on experts' selection. Therefore, the research team analyzed the two pictures and selected the one that best represents the category taking into account the remarks of the experts. For the Little Builders, the non-selected picture "*represents more the concept of camping as the setting is in a forest*"; whereas the selected picture (Figure 4.2g), according to a photographer "*is taken from a good angle which clearly represents what the children are doing*". Regarding Little Vets, the picture (Figure 4.2h) was simply selected for the fact that the type of animal is clearer compared to the other ones.

Finally, for the Sensory World category, the research team decided to select the photo with the second highest frequency since a lot of experts misunderstood this category

of the enabling environment. The selected photo (Figure 4.2i) includes the interaction of almost all 5 senses together unlike the non-selected one, as explained by an early childhood educator "*children are feeling the mud, smelling it, tasting it, while at the same time talking and listening to each other*".

g. Little Builders   h. Little Vets,   i. Sensory World

Figure 4.5: Representative sample photos for enabling environments "g" to "i"

4.2. Results of Outdoor Activities for Enabling Environments of Biophilia

Key results generated from the outdoor activities for the nine enabling envioment categories in the context of kindergarten playgrounds are demonstrated in the section below.

First of all, it is important to note that several major considerations were taken into account while developing and adapting the outdoor activities for enabling environment. International safety standards and regulations for kids' play spaces were considered; mainly "use zones" and "clear landings/platforms" around certain play structures and activities, for example, wall or tree climbing, pump ramps and fire pit. Regarding space dimensions, they include space needed per activity or structure plus the space needed by a child to safety and comfortably conduct the activity with a margin of movement for the activities that require moving around. Furthermore, spaces

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for enabling environments are flexible in terms of dimensions and multi-functionality,

providing mix uses for children rather than mono-functional zones.

4.2.1 Types of Spaces

The types of spaces for conducting all activities, regardless of the enabling

environment category, are divided into vertical space, horizontal space or combination

of both (mixed space), where the vertical space is as important as the horizontal one.

Table 4.3 presents the 3 types of spaces, their sub categories and exmaples.

Type of Space	Sub-Type of Space	Example
Vertical Space	Wall	- Cement wall - Green wall - Brick wall - Wooden wall (panel) - Climbing wall
	Fence	- Metal fence - Welded wire fence - Wooden fence - Chain link fence - Vegetated fence
	Boards	- Pressure treated boards - Plywood - Composite board - Peg board - Magnetic board
	Vertical structures (could be fixed or movable, free standing or attached to wall)	- Plexiglas art easels - Wooden frames - Wooden pallets
	Vegetation	- Tree trunks - Branches
	Horizantal Structures (could be fixed or	- Tables, desks, picnic table - Wooden planters/ raised beds/ tires

Horizontal Space	movable)	- Containers (any size) - Compost bins (wood, plastic, stainless-steel) - Compost tumbler - Recycling bins - Porch swings/ hammocks - Playhouses (plastic or wood) - Cat / dog houses
	Floor surface (pervious)	- Bare grounds - Planted with ground cover or grass - Gravel/mulch/fine stone - Soil/ sand - Vegetated swale - Small stream/ pond - Rubble tiles - Wooden deck
	Floor surface (impervious)	- Asphalted surface - Pavement
Mixed space (both vertical and horizontal)	Natural or landscaped areas/corners	- Vegetation (trees, shrubs, dense bushes) - Living or dead tree trunks - Fruit bearing trees /orchards - Ground cover/grass - Soil/mulch - Rocks/ tree logs or stumps
	Structures	- Wigwam wooden posts - Greenhouse - Mounds or hills (small to medium size) - Play structures (jungle gym) - Walk-in aviary for birds /butterflies - Cozy nooks/ tents/ wigwam tents/ teepees - Hen houses/ rabbit hutch - Outdoor stage/ performance area

Table 4.4: Types of spaces for conducting activities in enabling environments

4.2.2 Types of Activities in relation to types of space

Sample activities that might be conducted throughout the enabling environments are sorted according to the type of space needed: vertical space-related activities, horizontal space-related activities and mixed space-related activities. Table 4.4 summarizes the average area required per activity in each type of space. The tables for the list of outdoor activities for each enabling environment category are presented in appendix F.

Type of space	Minimum area/activity	Maximum area/activity	Average area/activity
Vertical Space	0.5meters squared	12.8 meters squared	7.3 meters squared
Horizontal Space	0.5meters squared	49meters squared	9.3meters squared
Mixed Space	2.5meters squared	38.5meters squared	14.9meters squared

Table 4.5: Average area required for conducting one activity in each type of space

Vertical space-related activities: For conducting one activity, an area of an average of 7.3 meters squared is required (minimum of 0.5 meters squared and maximum of 12.8 meters squared). Space dimensions were made based on the fact that children are standing in order to conduct the activities; hence all activities include a minimum width of 0.4m and length of 0.6meters(Julie Waldron 2014).Examples of wall/fence/ board related activities include: drawing, painting, paint bombs, sticky murals, bottle cap wall murals, building bug hotels, magnetic wall, peg board construction, planting on green walls, water canal, musical wall, and toddler climbing wall (Figure 4.3). Examples of vertical structures related activities include: nature-weaving frames, art easels, wooden planting frames, and cascading water structures

(Figure 4.4). Whereas for tree-related activities, they include tree bulk rubbings, in which selected trees should have a minimum Diameter at Breast Height (DBH) of 0.3 meters; other activities include hanging and observing bird houses/feeders where selected trees should have low branches that are easily accessible to children (Figure 4.5).

Type of Space	Sub types of space	Sample of Activities	Space dimensions	Mood Picture
Vertical Space	Walls / Fences: cement wall - metel fence - welded wire fence - wooden fence - chain link fence	Painting and drawing	Width= 0.8 m, Length= 0.6 m, Area / child= 0.48 m2 Area / 20 children= 9.6 m2	
		Sticky murals	Width= 0.8m, Length= 0.6m, Area/child= 0.48 m2 Area/ 20 children= 9.6 m2	
		Peg boards	Width= 0.8m, Length= 0.6m, Area/child= 0.48 m2 Area/ 20 children= 9.6 m2	
	Walls: cement wall - brick wall	Planting green walls (structures directly attached to walls, fixed planting medium)	Depends on the design of the planters; Width= 0.8 m, Length= 0.75m (including 0.15m wall planter thickness) Area / child= 0.6m2 Area / 20 children= 12m2	
		Musical wall (recycled materials)	1 musical wall for entire playground, accomodates 5 children at once Width= 2m, Height= 2m, Length=0.8m, Vertical Area/ wall= 4m2, Horizantal Area/5 children=1.6m2	
Vertical Space	Walls: cement wall - brick wall- pressure treated boards-plywood-composite board	Toddler climbing wall	1-2 climbing walls for entire playground Width=1.2m, Height= 2.4 m, Vertical area / 1wall= 2.88 m2 with 32 climbing holds Horizantal area/1 wall= 3.24m2, accomodating for 3 children with 1.8m to 2.4m clear landing	

Little Artists	Little Builders	Little Gardeners	Sensory World	Little Gymnast

Figure 4.6: Sample of wall/fence/ board related activities according to enabling environments

Type of Space	Sub types of space	Sample of Activities	Space dimensions	Mood Picture
	Structures: metal, plastic, or wood; could be fixed or movable	Nature weaving frames	Width= 0.85m, Length= 0.6 m, Area / child= 0.51 m2 Area / 20 children= 10.2 m2	
	Structures: free-standing structures (wooden frames)	Planting green walls on free-standing structures	Width= 0.8 m, Length= 0.75m (including 0.15m structure thickness) Area / child= 0.6m2 Area / 20 children= 12m2	
	Structures: free-standing structures (wooden pallets)	Cascading water wall	1 water wall for entire playground, used from both sides, accomodates 4 children at once Width= 0.8m, Length=2m(1m from each side), Area/wall=1.6 m2	

Little Artists	Little Gardeners	Sensory World

Figure 4.7: Sample of vertical structures related activities according to enabling environment.

Type of Space	Sub types of space	Sample of Activities	Space dimensions	Mood Picture
Vertical Space	Tree bulk / branches:	Observing birds on bird houses or feeders	Width= 0.4m, Length= 0.6m, Area/child=0.24m2 Area / 20 children= 4.8m2 (depends on tree parimeter)	
	Tree bulk: medium to big tree trunks with DBH (Diameter at Breats Height) ≥ 0.3m and perimeter ≥ 0.94m	Tree bulk rubbings/painting	Width= 0.4m, Length= 0.6m, Area/child=0.24m2 Area / 20 children= 4.8m2 (depends on tree parimeter)	

Little Artists	Little Vet

Figure 4.8: Sample of vertical tree-related activities according to enabling environments

Horizontal space-related activities: For conducting one activity, an area of an average of 9.3 meters squared is required (minimum of 0.5 meters squared and maximum of 49 meters squared). Measurements for horizontal structures related activities, where children are either sitting or squatting, include a minimum width of 0.4 meters and length of 0.65 meters(Julie Waldron 2014); examples are: doing arts and crafts, seeding activities, planting flowers, or vegetables, or herbs, or succulents, or scented plants in raised garden beds or containers, Nature Table activities, science experiments, cooking and eating outdoors, and making rain gauges (Figure 4.6). Other horizontal structures related activities require children to stand and move around, such as pretended play with tool kit table or mud kitchen, playhouses, composting, recycling and sorting activities (Figure 4.7). Floor surface related activities where children are either standing, moving around, sitting or lying down, include: land art projects, balancing activities, building tunnels from recycled materials, life-size building blocks, digging pits, "tangled in food web" game, child-size board games (snake and ladder or twister), sand and water play, landfill experiments, animal/nature yoga, puddle jumping, pump ramps for bikes, cars, scooters, or tricycles, balancing beams, and forming letters with body parts (Figure 4.8). For the floor surface related activities there should be a minimum width of 0.4 meters and length of 1.1 meters(Julie Waldron 2014).

Type of Space	Sub types of space	Sample of Activities	Space dimensions	Mood Picture
Horizantal Space	Structures: tables- desks	Nature Table Activities (sorting or counting with natural elements, exploring with patterns and textures)	Width= 0.65m, Length= 0.65m, Area/child 0.42m2 Area/ 20 children= 8.45 m2	
	Structures: tables- desks picnic tables	Eating outdoors /picnic	Width= 0.65m, Length= 0.65m, Area/child= 0.42m2 Area/ 20 children= 8.45 m2	
	Structures: wooden planters or raised beds	Planting flower, vegetables, herbs, or scented gardens (activities including plant irrigation, maintenance, monitoring and harvesting)	*Large garden bed=3.5m x 1m accommodating 20 children; Area/20 children= 2.2m x 4.7m= 10.3m2 *Medium garden bed=3m x 1m accommodating 18 children; Area/18 children= 2.2m x 4.2m= 9.2m2 *Medium to small garden bed=2.5m x 1m accommodating 16 children; Area/16 children= 2.2m x 3.7m= 8.14m2 *Small garden bed=2m x 1m accommodating 14 children; Area/14 children= 2.2m x 3.2m= 7m2	

Little Explorers   Quiet Retreat   Little Gardeners

Figure 4.6: Sample of horizontal structures related activities (children sitting) according to enabling environments.

Type of Space	Sub types of space	Sample of Activities	Space dimensions	Mood Picture
Horizantal Space	Structures: play kitchen desk/ setup	Mud Kitchen	1 mud kitchen for entire playground (dimension includes table with sapce around for children's movement) Width= 2.2m Length= 1.1m, Area/table= 2.42m2	
	Structures: containers of any size, compost bins (wood, plastic, stainless-steel) or compost tumbler, recycling bins	Composting	1-2 compost bins depending on amount of trash produced *Square compost bin Width=ranges 0.9m-1.5m, Length=ranges 0.9m-1.5m, Area/bin= ranges 0.81m2 to 2.25m2	
		Vermicomposting	Area/ 1bin & children= ranges 3.15m2 to 5.67m2 *Tumbler compost bin Width= 0.75m, Length=0.8m, Height= 1,2m, Area/bin= 0.6m2 Area/1bin & 2 children= 1.1m2	

Sensory World	Enviromental Care

Figure 4.7: Sample of horizontal structures related activities (children standing and moving) according to enabling environments.

Type of Space	Sub types of space	Sample of Activities	Space dimensions	Mood Picture
	Floor (any type):bare grounds, asphalted surface, pavement, surface planted with ground cover or grass	Tangled in food web game (learning how things in a system are coonected)	Width= 3m or 4m, Length= 2m or 1.5m, Area/ 20 children= 6m2	
		Building with recycled materials (ex: tunnels, bridges, other structures)	Width= 3m, Length= 3m, Area/activity= 9m2,	
	Floor (only pervious surfaces):surface planted with ground cover or grass, gravel, sand, soil	Digging pits / holes	Width= 3m, Length= 3m, Area/activity= 9m2,	
	Floor/Pits (only pervious surfaces): surface planted with ground cover or grass, sand, soil, gravel, vegetated swale, small stream, pond	Sand play	1 sand pit for entire playground Area / child= 0.75m2 Area / 20 children= 15m2	
		Puddle jumping	Several ones per playground, Width= 0.5m, Length= 1.10m, Area/child= 0.55 m2 Area/ 20 children= 11m2	

Little Explorers   **Little Builders**   **Sensory World**   **Little Gymnast**

Figure 4.8: Sample floor surface related activities according to enabling environment.

Mixed space-related activities: For conducting one activity, an area of an average of 14.9 meters squared is required (minimum of 2.5 meters squared and maximum of 38.5 meters squared). Structures related activities include: vertical posts for den making, green house, climbing and sliding on mounds, traditional play structures (jungle gym), outdoor stage or performance area, cozy nooks, tepees, wigwam tents, and

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walk-in aviary for birds or butterflies (Figure 4.9). Whereas examples of activities that

need to be conducted in a natural or landscaped area (corner garden or linear garden)

include: scavenger hunt, nature's color wheel, and wildlife explorations (Figure 4.10).

Last but not least, tree-related activities include constructing dens, fruit picking, tree

climbing, tire or rope swings, and tree houses (Figure 4.11). Regarding measurement

guidelines for structured tree climbing, a minimum DBH of 1 meters is required; for

unstructured tree climbing, first limb branches should be no more than 0.6 meters off

ground; for tree tire/rope swings, branches should have a minimum diameter of 0.5

meters for support and swings should be hanged no higher than 2 meters off ground.

Concerning tree houses or decks, trees should be relatively large, strong, mature, and

healthy to support the extra load.

Type of Space	Sub types of space	Sample of Activities	Space dimensions	Mood Picture
Mixd space (both vertical and horizantal)	Structures:Green House	Various planting activities (used during severe weather conditions and for extending plants growing seasons)	1 green house for entire playground, dimension depends on configuration Width= ranging between 2 - 3 m Length= can reach up to 6m Popular dimensions= 2x6m or 3x4m with Area= 12m2	
	Mounds or hills: small to medium size	Climbing up then rolling or sliding down (mound can include slide, tunnel)	Every 1m high mound, 3m to 4m width with 1 m landing sapce on top Width= 6m, Length= 6m, Diameter= 6m2 Rectangular area= 36m2, Circular area= 28m2	
		Gatherings (pais or samll groups of 3-5 children)	Height= 2.3m, Length= 2m, Width= 2.3m Area/tent= 4.6m2, accomodating 5 children at once	

Little Gardeners	Quiet Retreat	Little Gymnast

Figure 4.9: Sample of mixed space vertical structure related activities according to enabling environments

Type of Space	Sub types of space	Sample of Activities	Space dimensions	Mood Picture
Mixed space (both vertical and horizantal)	Natural or landscaped area/corner: ground cover or grass, soil, dense bushes or shrubs, big rocks, trees	Nature treasure hunt (scavenger hunt)	*Corner garden option1=1.5mx3.5m=5.3m2, option2=3mx3.5m=10.5m2, option3=3.5mx3.5m=12.3m2, option4=2.5mx5m=12.5m2, option5=3.5mx4.5m=15.75m2 *Linear garden option1=5.5mx1.8m=10m2, option2=8.8mx1.8m=15.8m2	
	Natural or landscaped area/corner: ground cover or grass, soil, dense bushes or shrubs, big rocks, trees	Wildlife sactuary (turtles, small reptiles, insects, snails)	*Corner garden option1=1.5mx3.5m=5.3m2, option2=3mx3.5m=10.5m2, option3=3.5mx3.5m=12.3m2, option4=2.5mx5m=12.5m2, option5=3.5mx4.5m=15.75m2 *Linear garden option1=5.5mx1.8m=10m2, option2=8.8mx1.8m=15.8m2	

Little Explorers   Little Vet

Figure 4.10: Sample of activities conducted in a natural or landscaped areas according to enabling environments

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Type of Space	Sub types of space	Sample of Activities	Space dimensions	Mood Picture
Mixed space (both vertical and horizantal)	Surrounding trees: living or dead tree trunk used as base	Den / shelters/ tepees construction	Width= 2m, Length= 2m, Height= 1.5m Horizantal area/activity= 4m2 Vertical area/activity= 3m2	
		Structured tree climbing	Tree diameter= 1m, Width with child= 0.4m, Length with child= 1.6m, Height for climbing=2.4m, Horizantal area/child=0.64m2, 1.8m to 2.4m clear landing	
		Tire swing	1-2 tire swings for entire playground depending on availability of suitable trees *Branch diameter= 0.3m, Height= 2m from ground to hanging point, *Width of tire= 0.7m, Length of tire= 0.7m, Area/tire= 0.5m2 *1.8m to 2.4m clear landing in all directions	
Mixd space (both vertical and horizantal)	Surrounding trees: tree trunks and branches	Tree house	1 tree house for entire playgroud, accomodates 4 to 10 children depending on platform dimensions Height= 2.7 m off ground, Platform width= ranging from 1m to 2m, Platform length=ranging from 1m to 2m, Platform area= ranging from 1m2 to 4 m2	

Little Builders **Little Gymnast** **Quiet Retreat**

Figure 4.11: Sample of mixed space tree-related activities according to enabling environments

Finally, the farm animal zone requires a horizontal space for children's movement and circulation, and a vertical fence to ensure that animals stay inside the dedicated space. This zone includes, henhouses, pond for aquatic life and rabbit hutches (Figure 4.12), with minimum area of 24 meters squared.

Type of Space	Sub types of space	Sample of Activities	Space dimensions	Mood Picture
Mixed space (both vertical and horizantal)	Floor (any type):bare grounds, asphalted surface, pavement, surface planted with ground cover or grass, soil, mulch, wooden deck Fence:metel fence - welded wire fence - wooden fence - chain link fence	Farm animals zone (including pond, hen houses or chicken coop, rabbit hutch)	Designed as a fenced zone including space for children's and animals' movement, Length=6m, Width=4m, Fence height=1m, Area=24m2, *Rabbit hutch, Length=1.5m, Width= 1m, Area= 1.5m2 *Pond, Width= 1.5m, Length=2.5m, Area= 3.75m2, *Chicken coop or hen house, Length= 2m, Width=1.8, Area= 3.6m2	

Little Vet

Figure 4.12**: Sample of farm animal zone and related activities**

1.2. Unit of Analysis: School's kindergarten playgrounds

Eight private -free/subsidized schools were selected as the unit of analysis for this research study. The following section includes the results of the site observation checklist conducted in the schools and lists possible actions that need to be taken towards improving the space into potential enabling environments of Biophilia.

4.3.1 Description of Schools' Sites

Generic descriptions of school campus sites are presented below. Base maps were developed for each kindergarten's playground.

4.3.1.1 School Code A

School code A is a single building school located in Al Basta area, a very crowded residential neighborhood. It is a religiously affiliated school funded by a religious organization. School campus area is equal to 500 meters squared.

The kindergarten playground is a linear space located between the classrooms; it is a traditional type of playground with an area of 65 meters squared. No greenery elements are found in the playground. Play equipment mostly include movable seesaws, slides, and a small basketball net (Figure 4.13); all of which are poorly maintained.
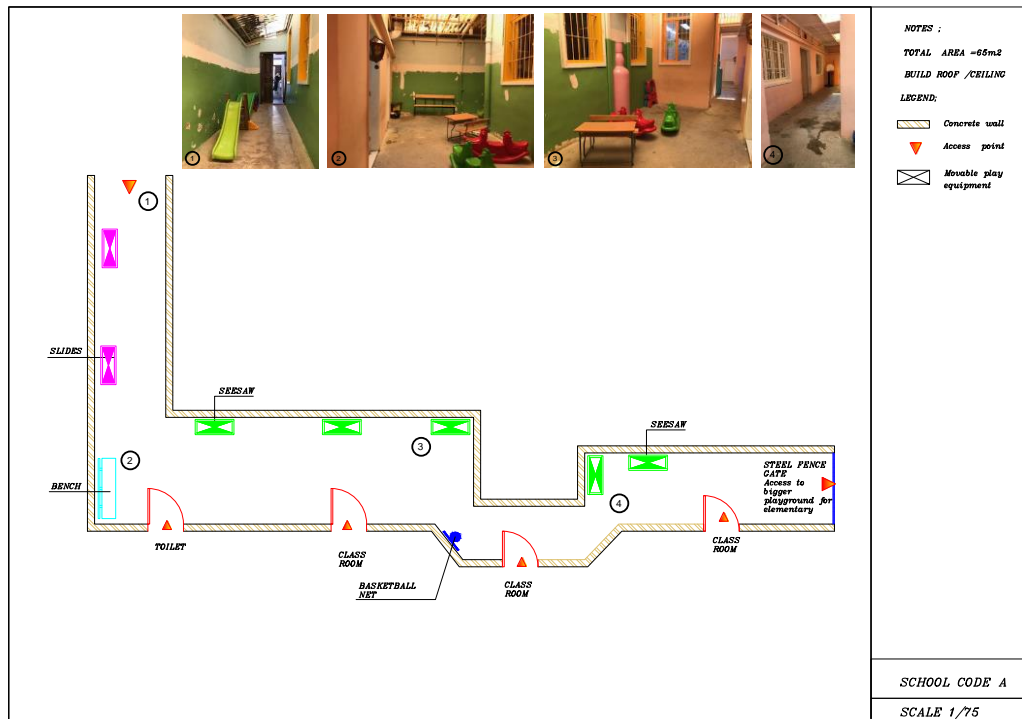
Figure 4.13: Base map for school code A

4.3.1.2 School Code B

School code B is composed of multiple buildings with a large campus of an area equal to 1,400 meters squared. It is located in a commercial neighborhood next to a

major road connection between Verdun and Al Mala area. The area gets very crowded during rush hours. Also, it is a religiously affiliated school; where it is one of the best assets of this certain organization.

Among all school sites, school code B is the only school having 2 kindergarten playgrounds, one traditional playground with an area of 460 meters squared (Figure 4.14) and one contemporary playground (sand playground) with an area of 225 meters squared (Figure 4.15). Both playgrounds are relatively rich with greenery and vegetation such as nectar-rich flower bearing trees, climbers and shade trees. Play equipment include play structures with slides and belt swings, playhouses, tunnels, cars, bikes, tricycles, and movable play elements like digging tools in the sand pit, art easels, and child-size building blocks. However some play structures are poorly maintained. Furthermore, the playground has an animal aviary where students raise small animals from time to time.
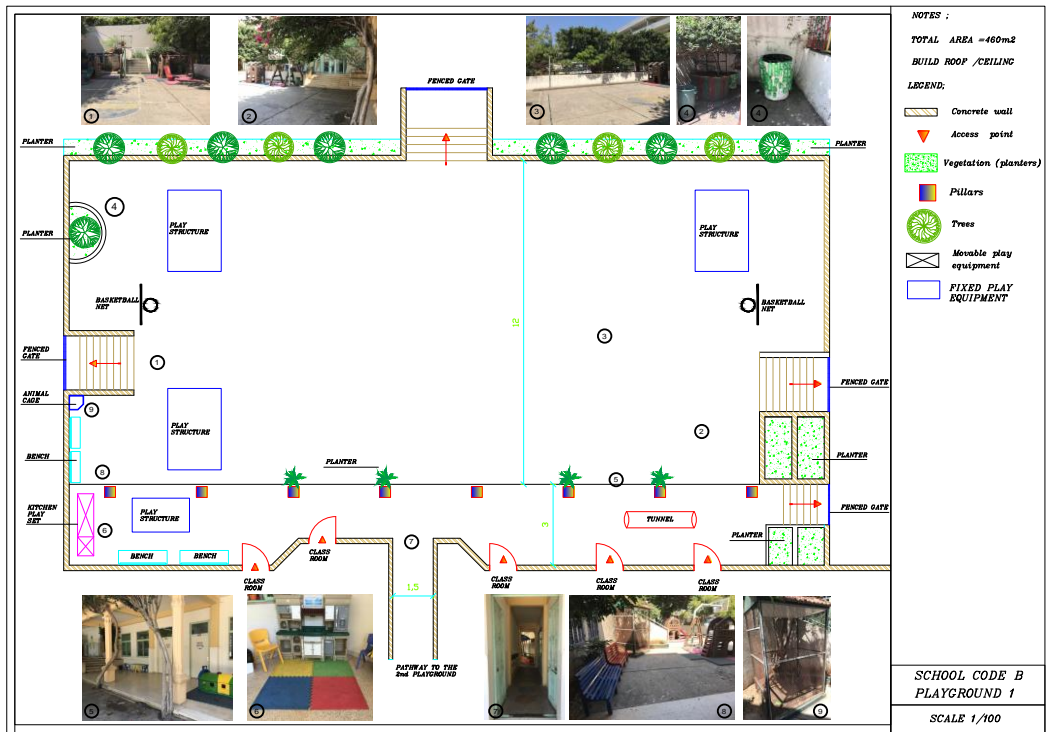
Figure 4.14: Base map for school code B, 1st playground.
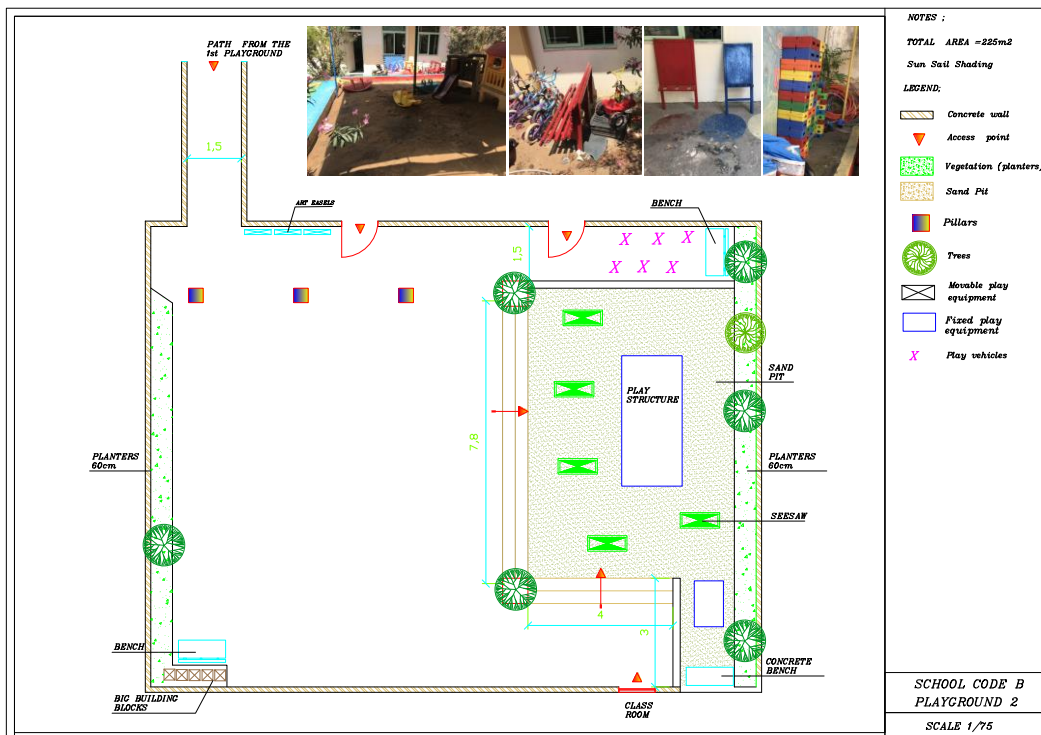
Figure 4.15: Base map for school code B, 2nd playground

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4.3.1.3 School Code C

       School code C is a single building located in Ras Al Nabeh area between a major high way and a residential neighborhood. The school's main entrance is directly accessed from the highway. Also, it is a religiously affiliated school. School campus size is equal to 1,000 meters squared.

       The kindergarten playground is a traditional one with an area equal to 178 meters squared (Figure 4.16). Few trees are available at the edge of the playground. Play equipment also include belt swings, spring rockers, climbing structures, and slides; all of which are in acceptable conditions.
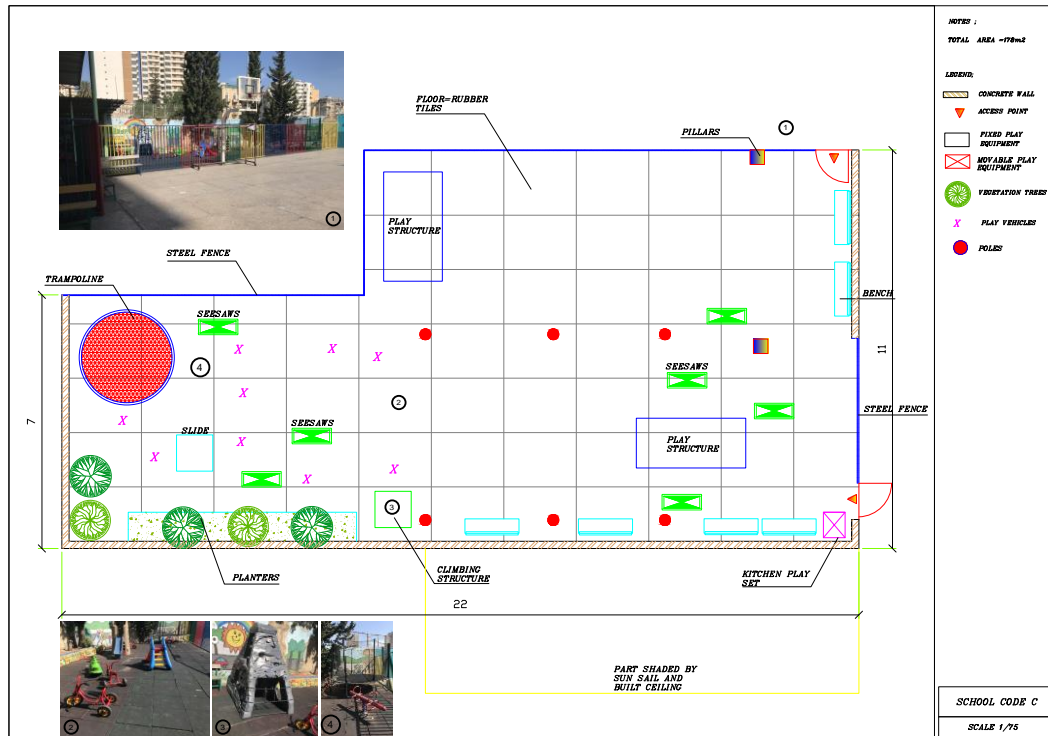
Figure 4.16: Base map for school code C

4.3.1.4 School Code D

School code D is a single big building located in Al Borj Al Barajni area, an informal settlement and residential neighborhood. Multiple carpentries and factories surround the school. School campus is equal to 1,200 meters squared.

The kindergarten playground cannot be even classified as a traditional play space for it contains nothing, no play equipment nor structures, nor any greenery elements. Simply, it is a fenced concrete space with an area of 112 meters squared (Figure 4.17).
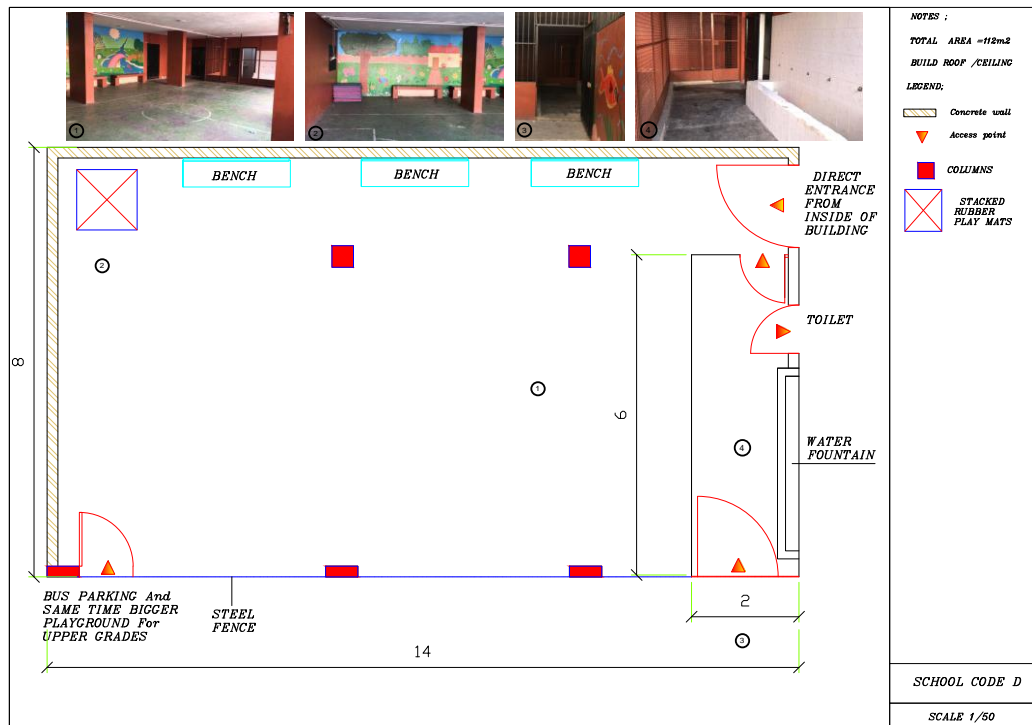
Figure 4.17: Base map for school code D

4.3.1.5 School Code E

School code E is a single building located in a quiet residential neighborhood in one of Koraytem's small alleys. Also, it is a religiously affiliated school. School campus is equal to 500 meters squared.

The kindergarten playground has an area of 112 meters squared and is a traditional one as well (Figure 4.18). Play equipment are similar to the other school examples above. The playground has a small corner shaded by two native trees.
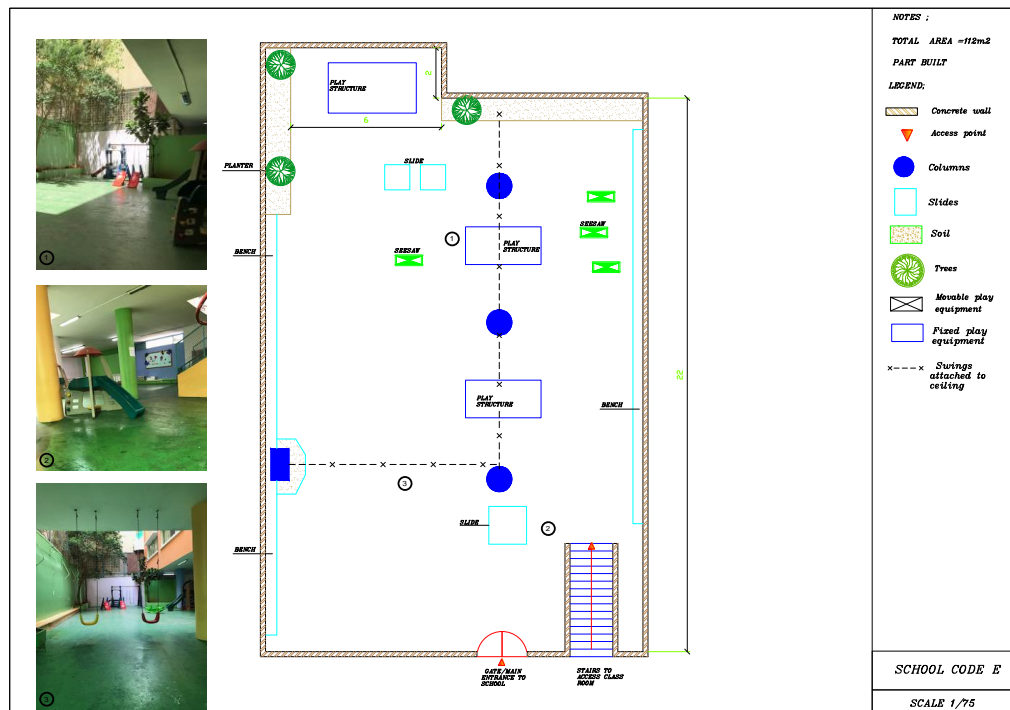
Figure 4.18: Base map for school code E

4.3.1.6 School Code F

School code F is composed of multiple buildings located in Salim Salam area, a commercial and residential neighborhood. Multiple universities and schools surround

the site. Also, it is a religiously affiliated school in a church setting. School campus area is 1,200 meters squared.

Kindergarten playground has an area of 195 meters squared and is a traditional type including nearly the same play equipment and structures as the other examples (Figure 4.19). However, play equipment are well maintained and in good shape. No vegetation and greenery elements are found.
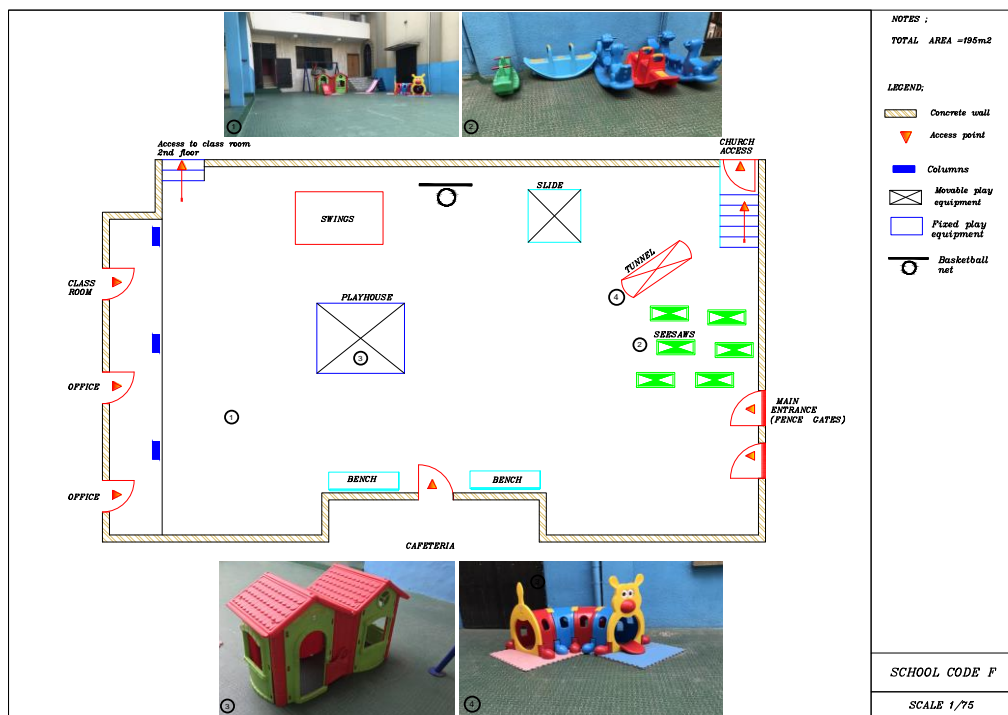
Figure 4.19: Base map for school code F

4.3.1.7 School Code G

School code G is composed of multiple buildings located between a residential crowded neighborhood (Tariq Al Jadideh) and a major highway. Other schools, colleges, and institutions surround the site. Also, it is a religiously affiliated school. School campus area is 3,000 meters squared.

Kindergarten playground is equal to 135 meters squared (Figure 4.20). Play equipment include one play structure with slides and swings, porch swing, cars, bike and tricycles. School code G has a contemporary play space for it is the only school having a vegetated corner with fruit-bearing trees, like pomegranate, orange, olives, lemons, and peach; scented climbers like Jasmine; and a water feature (but with no water inside).
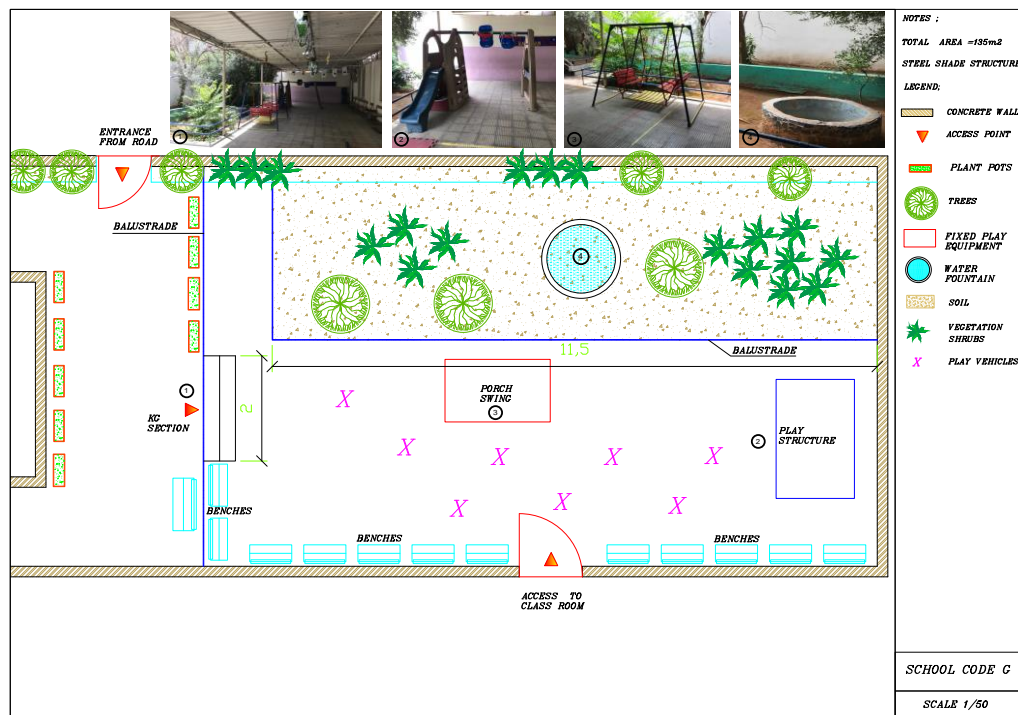
Figure 4.20: Base map for school code G

4.3.1.8 School Code H

School code H is composed of multiple buildings located on a secondary road in a residential neighborhood in Beirut's suburbs. School campus is equal to 850 meters squatted.

Kindergarten playground is a traditional one with an area of 178 meters squared (Figure 4.21). Play space is surrounded by shade trees that are located outside school campus. All play equipment is well maintained and in good shape; however they are all crowded on one side of the playground. Furthermore, the playground has an open non-structured space for free play covered with plastic grass like lawn.

Figure 4.21: Base map for school code H

To sum up this section (Table 4.5), the majority of school sites, expect for two schools (B and G), fell in the category of tradition playgrounds, having traditional playground structures that focus on physical play and recreation. In addition, the majority of schools do not comply with the MEHE space requirements, which states that "preschoolers' playground should not be less than 300 meters squared" (Verena Balthes Kallas 2017).

School Code	Campus Area (m2)	Playground Type	Playground Area (m2)	Compliance with MEHE
A	500	Traditional	65	NO
B	1,400	Contemporary	685	YES
C	1,000	Traditional	178	NO
D	1,200	NA	112	NO
E	500	Traditional	112	NO
F	1,200	Traditional	195	NO
G	3,000	Contemporary	135	NO
H	850	Traditional	178	NO

Table 4. 5: Comparison between school campus size, playground size and type for all the 8 school sites

4.3.2 Results of Playground Site Analysis

From the site observation checklist, 11 elements, related to comfort, accessibility, flexibility, and dynamism were chosen in order to access the potentiality of the 8 kindergarten playgrounds to be developed into enabling environments of Biophilia. School sites occupying the highest number of these elements have a greater opportunity and possibility to improve their playground space in order to accommodate for Biophilic outdoor activities that strengthen children's nature connection. Table 4.6 compiles the 11 checklist elements in relation to the 8 school playground sites. School code B has the greatest opportunity among all schools, followed by school code G and H, and ending with school code A, D and F with the lowest scoring rates.

Referring to table 4.6, more than half of the schools lack child-sized tables and benches, movable play materials whether natural or manufactured, and abundant natural elements. Also, most playgrounds are not accessible in all kinds of weathers, especially extreme summers and winters. Furthermore, most of the playgrounds do not invite children towards open-ended interaction and exploration, do not feature different sensory

experiences, do not offer areas of different heights, and do not provide children with opportunities for healthy risk taking.

Site Observation Checklist	A	B	C	D	E	F	G	H
Comfortable								
Play environment provides shade.	✔	✔	✔	✔	✔	✗	✔	✔
Play environment includes zones for quite retreat.	✗	✔	✗	✗	✔	✔	✔	✔
Accessibility								
Play environment includes child-sized tables and benches	✗	✔	✗	✗	✔	✔	✗	✗
Play environment is accessible in all kinds of weather (including extreme summers and winters)	✔	✗	✗	✔	✗	✗	✔	✗
Flexibility								
Play environment includes movable elements for children to play with	✗	✔	✗	✗	✔	✗	✔	✔
Play environment invites children for open-ended interaction and exploration	✗	✔	✗	✗	✗	✗	✔	✔
Dynamic and Challenging								
Play environment contains natural elements	✗	✔	✔	✗	✔	✗	✔	✗
Play environment attracts wildlife	✗	✔	✔	✗	✔	✗	✔	✔
Play environment features different sensory elements.	✗	✔	✗	✗	✗	✗	✔	✔
Play environment offers areas of different heights.	✗	✗	✔	✗	✗	✗	✗	✔
Based on the information from the previous categories, play environment provides opportunities of healthy risk taking	✗	✔	✗	✗	✗	✗	✗	✗
Total number of checklist elements available	2	9	4	2	6	2	8	7

Table 4.6: Site observation checklist in relation to the 8 playgrounds

4.3.2.1 Actions to be done in relation to checklist

Certain actions need to be taken towards improving the playground spaces to accommodate potential Biophilic outdoor activities. Actions include:

- Provide child-sizes tables and benches

- Provide proper drainage system, permeable surfaces, windbreakers and shade, to maximize play space accessibility and availability during all weather conditions

- Provide zones that accommodate different types of movable play materials

- Provide non-structured spaces for sand, mud, and water play

- Incorporate natural or landscaped areas/ corners to encourage open ended interaction and exploration

- Provide soft scape (trees, grass, ground cover, shrub…) featuring sensory elements like scented flowers, fruit bearing trees, herb….

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- Provide areas of different heights like viewing platforms, decks, mounds, or tree houses.

4.4. Results of Teachers' Focus Group Discussion

The following section includes a brief background about participants' memories of outdoor nature-related activities as children, and their current relation with nature as adults; their preferences and perceptions towards sample pictures of the enabling environments; and their opinions regarding outdoor learning approaches and methods to introduce nature through outdoor playground space or indoor classrooms.

It is important to note that all results shown below are based on teacher's opinions, perceptions, and understandings of the proposed questions or photos; results in this section are not based on literature or research.

4.4.1 Participants' background information

Due to the nature of the job as an early childhood teacher/ educator, all 44 participants are females. Most of them are well educated with a bachelor degree, however not all have their degree in early childhood education. Some teachers have their bachelor degree in Arabic or English language and literature, psychology, mathematics for elementary education, social sciences, law and political sciences, history and even in accounting. Only few obtained a master's degree. Furthermore, five participants only had finished high school level with a Lebanese Baccalaureate and directly engaged in the teaching domain. (Refer to Appendix E for complied background information of participants)

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Nearly all participants had some sort of memories regarding outdoor activities in natural settings. Even though most of them were born and raised in the city, they had a relationship with nature, as they have expressed during the discussion. A lot of them, as children, used to go with their parents to the mountains during summers or to the wilderness/open areas to do BBQ. A couple of teachers belong to different villages in Lebanon where they used to visit them on weekly bases with their families. It was clear that all participants enjoyed their time in nature because throughout the discussion they passionately described all activities they used to do, including: climbing trees, playing with sand or rocks, riding bikes in the mountains, constructing ant houses, collecting seashells when going to the beach, playing outdoor games like hide and seek and the seven stone game, running behind birds, and pretended play with natural elements like using blueberries to make lipstick and certain flowers as earrings or to make necklaces. In addition, some participants had street play experiences in the city.

However, when asked about their relationship with nature as adults, in the current present, and whether it had changed negatively or positively, most participants experienced negative change towards their nature connection. They blamed this negative change on the duties, concerns of life and house chores as well as on their tight schedules as working moms. Others said that this negative change is due to the very limited available outdoor green spaces and due to the lack of public gardens in Beirut. Others claim that pollution has a huge effect on their nature-related activities for there are no more places to do a proper picnic in. Furthermore, most of them admitted that Technology has distanced them and their children from nature; their children prefer going to indoor play areas and arcades rather than playing in natural places.

On the other side, few participants experienced a positive change in their relationship towards nature. They started to love nature and enjoy it more; for them nature has become a refugee for relaxation and contemplation. Others started appreciating the value of nature on human lives because they are witnessing how natural spaces are gradually diminishing and being replaced with buildings.

4.4.2. Results of Photo Activity

Participants were asked to answer the following question in relation to the photographic representations for the nine Biophilic outdoor activities: "Do you consider the elements or features presented in each of the photos below crucial for strengthening children's love for nature?" Photos representing Little Gardeners, Environment Care, Quite Retreat and Little Vets categories, showed full consent among participants. Other pictures raised discussion and confusion among participants, whereas only one picture related to the Sensory World category, provoked complete disagreement among many participants.

There was consent of most participants towards the photo representing Little Artists (43/44 agree) (refer to figure 4.1a) because children at this age like to collect things like fallen leaves and engage in artistic activities like forming the shape of flowers, sunflowers, or circles using nature. Also, according to multiple responses, this method would be great for teaching children about colors, shapes and textures, for strengthening their sense of touch through physical contact with nature, and for developing team work skills. However, one participant disagreed on this activity and did not feel that kids would get attached to nature because *"leaves will wilt or a blow of wind will scatter everything, so the child will no longer have a permanent result of his/her work; this will annoy the child"*.

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There was consent of most participants towards the photo representing Little Builders (40/44 agree)(refer to figure 4.2g) because kids enjoy construction games and building blocks very much at this age. Teachers believed that this activity is important and healthy because it strengthens children's sense of touch, fine motor skills, teaches them the concept of size and shape, develops their logical skills through balancing, and increases their concentration ability. Nevertheless, four participants showed descent for this activity and believed there is a discrepancy in the picture "*because anything that is supposed to link children to nature will have to start by teaching them not to cut down trees in the first place*". Yet, some participants responded to this controversy by explaining that dry wooden logs can only be used to do such activity, rather than cutting down living trees.

There was complete consent towards the photo representing Little Gardeners (44/44 agree) (refer to figure 4.1c) because planting is one of the most important activities that link children to nature and that educates them about how beneficial plants are to the environment. Teachers emphasized on how gardening activities teaches the child to appreciate plants and helps in developing their sense of responsibility by watering and taking care of the plants, and their team work skills.

There was consent of most participants towards the photo representing Little Explorers (42/44 agree) (refer to figure 4.1b) because the activity helps develop in children love for nature exploration and curiosity, observation skill and nourishes basic inquiry needs. A debate was initiated regarding this picture. Some participants explained how this activity should be free play by allowing children to seek and discover things alone without adults' guidance. On the other hand, some believed that it should be guided play with prior instructions and under teacher's supervision. They stressed on this point as some children

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do not have the passion and curiosity towards discovery while others lack interest or might be afraid. One participant did not agree on the idea of exploring insect due to safety concerns, claiming that some insects might sting or bike children. Hence, she suggested using insect toys or watching a movie about insects' life.

Around half of the participants showed disagreement (20/44 disagree) towards the picture representing Sensory World (refer to figure 4.2i) because, in their opinion, there was neither goal nor objective behind conducting such activity plus its time consuming. Teachers also rejected this activity due to safety concerns as mud might contain germs, cause certain diseases or allergies to children. The rest of the participants had neutral opinion and showed confusion; they expressed that children are happy and having fun, but yet they are not sure about this activity. Others believed that it could be applicable but definitely not in the context of schools. Finally, very few participants expressed how this activity can strengthen children's five senses especially touch, increase their social skills as they are gathered in a large group, help break the barrier of disgust and teach children to be empathetic toward animals.

There was full consent towards the photo representing Environment Care (44/44 agree) (refer to 4.1d) because recycling and reusing are very important themes that should be incorporated in all educational levels. Also, because recycling teaches children cleanliness, develops their eco-thinking and sense of responsibility, and teaches them the values of being a good citizen by contributing to keeping the country clean.

Many participants showed consent towards the photo representing Little Gymnasts (37/44 agree) (refer to 4.1f) because the activity is a very spontaneous and adventurous one and it helps develop gross motor skills, and social skills like cooperation. Some participants

looked at this activity as a way to release children's energy. On the other side, seven participants showed descent mainly due to safety concerns and risk factors such as: children might fall and hurt themselves.

There was full consent towards the photo representing Quite Retreat (44/44 agree) (refer to figure 4.1e) because it expresses the idea of enjoying and contemplating nature as it is. This activity develops children's social skills like sharing, reading and listening skills, and increases their concentration ability.

In the last sample picture representing Little Vets (refer to figure 4.2h), there was full consent among participants (44/44 agree) because children in general love animals and because animal care is an important topic to teach. This activity teaches children responsibility and empathy towards animals and develops their courage to get in contact with them.

4.4.3. Results of Open-ended Questions

When asked to describe the ideal outdoor play area that should be implemented in every school environment (figure 4.22, left column), and to mention methods to introduce children to nature through the use of outdoor playgrounds (figure 4.22 right column; refer to appendix E for full result table), teachers responses varied based on their playground exciting conditions. Afterwards, the responses were contrasted with the nine enabling environment categories in order to develop Biophilic outdoor activities that are based on scientific theories and culture acceptance. As a result, all enabling environments, except for Little Builders, were common across teaches preferences and perceptions.

Nature through:	Enabling Environments:	Ideal Playground:
•Gardening •Urban Vegetation •Exploration •Outddor physical axtivity •Compasion •Outdoor classroom •Arts	•Little Artists •**Little Builders** •Little Gardeners • Little Explorers •Sensory World •Environemnt Care •Little Gymansts •Quite Retreat •Little Vets	• Pet cages •Vegetation/ greenery •Safety (flooring material) •Sand pit •Sports fields •Natural corner •Enough play structures for all children •climbing tires / ropes •Tire swings on trees •Playing during rain (shade during winter) •Place for eating •Sensory play •Swimming •Physical games •Floor games with paint •Re-using plastic bottles to creat new things

Figure 4.22: Contrasting teachers' responses to enabling environments categories

Furthermore, according to most participants' opinion, space limitation and restriction, limits the introduction of nature-related experiences in the outdoor playgrounds. Others participants, mainly from school code D, state that the reason behind limiting nature introduction is the lack of preparations and materials available to teachers and students.

4.4.3.1 Free vs. Guided play Approaches

Based on the thematic analysis of the collected data and regarding the question of which is a better learning approach for children in nature: free or guided play; three main factors affected the choice of play approach according to participants responses (table 4.7 relates the factors to the different types of play approaches):

1. Child-related factors:

   a. Children's safety

   b. Children's age

   c. Children's level of nature connection

2. Educational goals (there should be a goal/objective for playing)

3. Conditions of play space:

   a. Safety measures of play space

   b. Familiarity of play space

   c. Duration/time

Choice of play approach depends	Child-Related factors	Educational goals	Conditions of play space
Free Play Approach	- *Child's age:* if child is old enough (child ≥ 6 years) - *Child's safety:* if accompanied by adults	- If there is no goal /objective from playing - If teachers/adults want a break time	- *Familiarity:* if place is familiar to children (location) - *Safety measures:* if place is safe and has safety standards - *Duration:* if there is time during class session
Guided Play Approach	- *Child's age:* if child is not old enough (child < 6 years) - *Child's safety:* if child might get hurt due to possible risks and dangers - *Child's level of nature connection:* if child has no	- If there is goal/objective from playing	- *Familiarity:* if place is not familiar to children (location) - *Safety measures:* if place is not safe and does not have safety standards - *Duration:* if there is no time during class session

	previous connection with nature		
Integrated Play Approach	**Play should be integrated between free play and semi-guided play based on the context of schools with marginal space and resources**		

Table 4.7: Factors affecting choice of play approach

In addition, both advantages and limitations of the two play approaches were identified among participants during the focus group discussion (Table 4.8 and 4.9).

	Advantages	**Limitations**
Guided Play Approach	Ensures children's safety	Limits, to a certain extent, children's freedom
	Works towards an educational goal/objective	No chances for risk taking
	Ensures children's cleanliness and avoid getting dirty	
	Ensures clear play instructions and avoid confusion	
	Inspires creation of new games	

Table 4.8: Advantages and limitation of guided play

	Advantages	**Limitations**
	Develops sensorial discovery	Do not work towards certain goal/objective
	Reasonable risk taking	Exposing children to dangerous risks and conditions
	Develops discovery	

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	learning	
Free Play Approach	Helps understand children's interests and preferences	
	Gives children freedom	
	Gives enjoyment by getting dirty	
	Expose creativity and innovation	
	Releases surplus energy	

Table 4.9: Advantages and limitation of free play

CHAPTER 5

DISCUSSION

Enabling environments are among the four main principals for children's development and learning (EYFS 2008). The Early Year Foundation Stage (EYFS) states that enabling environments provide rich, varied, safe and comfortable spaces in a certain setting that encourage children to play, explore, and learn (EYFS, May 2008); in addition, three aspects together make up enabling environments: indoor environment, outdoor environment and emotional environment. Most research discusses the benefits of being outdoors and the value of outdoor play on children's health development and knowledge acquisition, while providing design considerations that focus mainly on safety measures, which is of course a critical aspect. However, there is no clear link between outdoor play and the intimate contact and love of nature, Biophilia. This study attempted to create a framework that links outdoor play and biophilia by developing categories for enabling environments and linking them to key attributes related to children's development, domains of learning of Bloom's Taxonomy, play level, play elements play and activities. Hence, the study revealed a list of Biophilic outdoor activities that would allow children to experience Biophilia within restricted urban context (schools with marginal resources).

Outdoor enabling environments of Biophilia are child-centered spaces that support the social, emotional, physical, and cognitive development of children through spontaneous play and exploration. Such environments should offer stimulating resources specific to each culture, rich learning opportunities through playful teaching and discovery learning, support

healthy risk taking and challenges, foster children's senses, creativity and imagination, stimulate natural curiosity and nurture children's connection with nature (Moylett and Stewart 2012), White, 2004). Unlike traditional playgrounds centered on equipment-based play, outdoor enabling environments, as described by Herrington et al. in the article "*Landscape interventions: new directions for the design of children's outdoor play environments*", are "landscape-based play spaces" containing plant materials and vegetation, land forms, and other landscape elements such as water features (Herrington and Studtmann 1998). Randy White, in his article "*Young Children's Relationship with Nature: Its Importance to the Children's Development and the Earth's Future*", referred to such outdoor enabling environments as "naturalized play environments" inspired from the Danish Concept of Forest Schools (White 2004). They have become a growing movement in North America and Europe to transform traditional playgrounds in preschools and kindergartens into naturalized play spaces. Therefore, enabling environments targeted towards promoting nature connection could either be in a completely natural setting such as forests or natural reserves, which is not the case for schools with marginal resources located in urban Beirut; or they could be outdoor spaces featuring manmade landscape features and integrating natural elements. The later works perfectly for schools located in the urban environment and with playground space restrictions.

Furthermore, the foundation or "affordance" of the play space is more important than aesthetic when it comes to planning and designing environments for children(Hiscock and Mitchell 2011); this is because the way a playground is designed will inform the way children will play. Therefore, well designed outdoor enabling environments of Biophilia should include a minimum number of manufactured play equipment integrated within

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landscaped spaces with natural elements, while providing greater opportunities for free play and exploration. The way natural or built play elements are arranged and organized within the space, especially in an urban setting, definitely plays a role in promoting nature connection. Loose natural free play elements and materials, like pinecones, leaves, petals, twigs, rocks, also inspires children to get closer to nature and have a little grasp of the natural life; and fosters creativity and imagination. Hence, the priority should be towards "enabling elements" that support Biophilic outdoor activities, and provide for outdoor play experiences not available indoors.

In the research study, the enabling elements helped develop and introduce a list of Biophilic outdoor activities that are holistic, adopt new design concepts implied from literature and are culturally responsive, in order to contribute to the lack of awareness in this field and fill the gap in research. A lot of information on the types of activities that can be possibly incorporated in such environments, materials needed and instructions can be easily accessed through various resources. Nevertheless, most of these resources lack the spatial dimensions regarding the outdoor activities in the context of schools with limited playground space and resources; this formulated the challenge for the research team. There are no direct researches linking the types of activities with the exact space dimensions per child or per classroom needed to conduct the activities, and in relation to children's experiences. Most research articles and books focus on the types of activities, their objectives and outcome with very generic space description in terms of what should be and should not be available. For example, in Ruth Wilson's book, "*Nature and Young Children: Encouraging creative play and learning in natural environments*", several different areas should be included in a play space: open area for large-motor activities, climbing/crawling

area, "messy" materials area, building area, nature art area, music and movement area, a garden and/ or pathway through plantings, a gathering area; six additional "supplemental" areas might be added as well: water area, dirt-digging area, sand area, wheeled-toy area, area for swings or other dynamic equipment, and a greenhouse (Wilson 2012). Where as in Acar's article, "*Landscape Design for Children and Their Environment in Urban Context*", the author explained about the nature of the site that should incorporate the activities and the elements that should be included based on children's needs: nature, plant, water, animals, topography, socialization, use of five sense, and creativity (Acar 2013). In another example, "*Outdoor Learning through the Seasons: An essential guide for the early years*" by Ann Watts, the book provides ideas for activities during all seasons, weather conditions and in relation to the four elements of nature: earth, air, water and fire (Watts 2013). Other references, such as handouts and guides for designing playgrounds[4], provide site considerations, in terms of drainage, appropriate safety surfaces, circulation, signage, maintenance; as well as tradition pre-fabricated play equipment (like climbing walls, jungle gym structures, playhouses, slides, swings, ready-made tents or tepees) design specifications mainly in terms of safety measures concerning height and use zones (Commission 2010). Therefore, in this research study, Biophilic outdoor activities incorporate types of spaces need, types of activities in relation to types of spaces, and the spatial dimensions for children to safety and comfortable engage in each activity. Regarding space dimension per child and per 1 KG classroom, anthropometric dimensions (Julie Waldron 2014) were calculated for KG students in three different gestures and then

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[4] Kidsafe: Child Accident Prevention Foundation of Australia, official website: https://kidsafe.com.au/
The Pentagon for learning and play, official website: https://www.pentagonplay.co.uk/
IJSLANDER: Urban sport and play solution, official website: https://www.ijslander.com/en/

were added to the spatial calculation depending on the type of activity in relation to child's gesture. For example, certain vertical-related activities require certain setup where the child is standing, like drawing on big piece of clothes or banners fixed on walls/fences, sticky murals, tree bark rubbings, peg or magnetic boards. Other activities require children moving around from one place into another like collecting natural materials to make land art projects, scavenger hunt or color wheel, constructing tunnels and bridges from recycled cardboard boxed or den construction. Moreover, certain structures are not usually found in the context of KG playgrounds like compost bins, henhouses, rabbit hutches, or fire pits, because they are not thought of as elements for children's play; the research team adopted spatial dimensions for such elements and incorporated the activity in playgrounds where some activities require the supervision of teachers, like: roasting food around a fire pit. Furthermore, the literature stresses a lot on the importance of having vegetation and greenery elements in school's playgrounds, as a space for gardening, exploration and free active play rather than for aesthetic purposes (White 2004, Wilson 2012, Acar 2013, Campbell 2013, Watts 2013, Mårtensson, Jansson et al. 2014, van Dijk-Wesselius, Maas et al. 2018). However, there is no clear spatial dimension defining this space in the context of kindergarten playgrounds. Hence, this study established, for the context of schools with limited space, an average of 11 meters squared (ranging between 5m to 15m) for corner natural/landscaped areas (Figure 5.1) or an average of 13 meters squared for a linear natural/landscaped area. The input of such areas would provide a great example of multi-functional spaces as they encompass loose elements that children can move from one place to another hence, allowing children to remodel the space according to their own desires. In addition, natural or landscaped areas are described as spaces where plants and animals are

given priority thus providing opportunities for children to explore seasonal change and develop empathy towards small animals.

Figure 5.6: Photograph presenting a sample corner natural/landscape area that can be implemented in school playgrounds (Photo taken by author in the Sioufi Garden, Beirut)

Biophilic outdoor activities incorporating enabling elements are considered to be flexible and dynamic, multifunctional, efficient as they are designed to maximize space use even during extreme weather conditions by creating comfortable microclimates within, and are part of continuous learning. The concept of sustainability translated in the application of the "3R's": Recycling, Reducing and Reusing, acts as an umbrella for all the types of outdoor activities; such concepts related to environmental awareness and sustainable practices (storm water management techniques, energy production for renewable energy, and eco-friendly landfills) that are hard for children to grasp at this young age, are

articulated into simple and fun experiments to create a closer picture of the actual practice.

Several examples on how the suggested Biophilic outdoor activities can be part of

continuous learning and playing are demonstrated below; this means that an activity does

not simply stops at one task but rather continues into other activities triggering children to

be creative and imaginative. Figure 5.2 and 5.3 demonstrates multi-functionality in terms of

photographs of real life applications for kindergarten playgrounds across the world.

- *Example 1:* Children can learn to collect and harvest rain water during

    rainfalls using plastic containers and coffee filters (Environment Care);

    collected water can be used for water play activities (Sensory World);

    then children can work together to construct a river from aluminum foil

    (River Foil) and using the collected rain water to fill the river and play

    (Little Builders).

- *Example 2:* Children can work together in large groups to construct

    dens, shelters or tepees (Little Builders); final installation can be kept in

    the playground for some time before children engage in another design,

    where small groups (2-3 children) or pairs may enjoy sitting inside for

    some private social time (Quiet Retreat).

- *Example 3:* Water features in playgrounds, like pond, vegetated swale,

    small stream, or small fountain, would be a perfect space for creating an

    environment for aquatic life, such as; insects, small fish, water based

    plants, ducks and frogs. Through this setup, children can investigate and

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study aquatic life (Little Vets and Little Explorers), as well as engage in

water play activities (Sensory World).

Amanenomori Nursery School in Japan

East Sydney Early Learning Centre

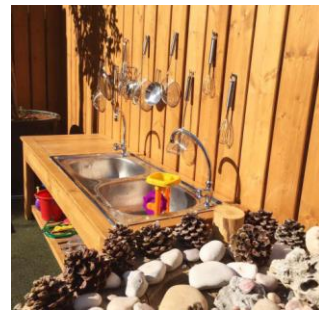Aidan Montessori School in Washington, DC

Bright Horizons Church Crookham Day Nursery
And Preschool in England

Figure 5.2: International examples of multi-functional spaces including enabling elements

Private day Care and Eco-center in Beirut

Private Kindergarten school in Dubai, UAE

Figure 5.3: Examples of multi-functional spaces including enabling elements in the Middle East and The Gulf.

To sum up the findings of this section, it is the space than encompasses the enabling elements with which Biophilic outdoor activities can be tailored according to each playground spatial conditions and space availability. Such outdoor activities, especially in the context of kindergartens, should feature(Thwaites and Simkins 2006, Rudd 2008):

1. Different types of multi-functional play areas acting as centers or points of focus;

2. Transitional spaces, weaving all areas together to create a synchronize whole or a netwerk and to allow for a sense flow and movemnt between the different activities(Kantz 2004).Transitional spaces, which are spaces connecting enabling environments together and highlighting the certain activity in place, could be, depending on space availability, pathways, foliage, rocks or stepping stones, built structures such as bridges or ramps; or, in the case of limited space, signs posts, or even different colors, shapes, or textures drawn on the ground (Kantz 2004, Thwaites and Simkins 2006, Wilson 2012).

Neverless, each school site should be offered the oppurtuniy to personalize and tailor the outdoor activities and their corresponding areas accordimg to sapce availability, school's cultural, academic and religious values, financial situation and budget allocation, as well as community needs.

Our findings show that space is neither a limitation nor a restricting factor for integrating Biophilic outdoor activities in schools with limited resources. In accessing the suitability of outdoor activities according to playground size (Appendix G: Triangulation method), the research results showed that for school Code A, with the smallest area equal to 65 meters squared, a maximum number of 8 vertical-space related activities can be incorporated in the playground; a maximum of 6 for horizontal space

activities and a maximum of 4 for mixed space activities (calculations are rounded up to the smallest number to ensure more movement and flow between spaces)[5]. Hence, the research results support the notion that schools do not have to be restricted in providing rich outdoor activities that promote nature connection for their students simply because of space limitations (Malone and Tranter 2003). One to two outdoor activities per enabling environments category translated in simple spaces like hanging flower boxes, small vegetable garden, small readers' corner, all made from affordable or recycled materials, are enough to help promote Biophilia in young children as an initial step.

Furthermore, the findings showed that most schools with marginal resources in terms of restricted playground space have traditional playground designs. This is due to how culture perceives the notion of playground space, which is for recess and recreation only more than a potential space for informal education. This concept relates to the "Surplus Energy Theory", a model that has been so powerful in the design of school grounds for centuries; it states that the main reason children play is to get rid of the surplus energy before starting school work again (Malone and Tranter 2003). Therefore, in most schools with limited resources, playgrouds are considered less important spaces compared to the indoor classrooms. Most of them are simply concrete or asphalted open spaces where play structures are randomly distributed where in some cases disregarding use zones and maintenance issues. Such traditional playgrounds view children as passive learners and do little to encourage children to explore, construct and investigate their surrounding (Malone and Tranter 2003). On the contrary, school playgrounds

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[5] Area for School Code A (65 meters squared) is divided by the average area required to conduct one activity in each type of space (65 divided by 7.3 for vertical space related activities; 9.3 for horizontal space related activates; and 14.9 for mixed space related activities).

should offer opportunities for outdoor activities that allow children to develop into active learners and should act as an extension to the indoor classroom learning experience. Nevertheless, when teachers were asked about the issue of not using the playground space for potential outdoor activities, they felt that this was the school's administration responsibility to provide the necessary financial resources. Others felt that parents are not receptive to such activities.

> **"I believe that it's rare to find in this country people who are dedicated to improve their children's school playground"**

Most Biophilic outdoor activities were culturally acceptable among participants in relation to the Arab, Lebanese preservative culture. The ones that were highly accepted included activities related to the Little Gardeners, Environment Care, Quiet Retreat and Little Vets.

All participants agreed that gardening activities are one of best method to develop children's nature connection. They understand that when children love something and take care of it, they will feel attached and responsible towards it.

> **"When children take care of plants and water them, this will develop their love towards these plants"**

> **"Children are raising something from when it was small; when humans raise something form a young age, even if it was a plant, they will get attached to it; this results in attachment and care towards the plant"**

Furthermore, according to teachers' responses during the focus group discussion, most of them engage their students in tradition gardening activities, like planting lentils and beans in plastic cups inside the classroom; or incorporate gardening as part of the science lesson in order to teach students about the stages of plant growth, growth requirements and plant parts.

"Planting inside the classroom is the most important activity"

"Planting lentils, chickpeas and beans in small pots or plastic cups is the closest and most applicable concept"

Regarding Environment Care, participants sympathized with the representative sample photo (Figure 4.1d) because it directly relates to the issue of waste management currently faced by the country.

"We lack clean environments nowadays, everywhere you go, and garbage is on the streets and roads"

"It is a very important topic especially after the waste problem we faced"

Concerning outdoors classrooms (Quiet Retreat), whether in the sense of being in nature or simply outside the classroom walls, teachers support such activities due its powerful effect on children. According to a teacher in sample school C, her students have learnt and memorized the alphabets in a much faster way when she conducted the lesson outside by drawing the letters using chalk on the playground's floor compared to when written on the white board inside the classroom. In addition, outdoor classroom provides the "perfect setting" for all subjects in a way that makes learning more engaging and fun for young students. A simple example can be reading a story under the shade of a tree or a quiet reading corner (figure 5.4).

"By conducting the lesson outdoors, you are breaking the routine and this way information we are trying to deliver will be firmly established in children's minds"

"Just by the fact of going outside the classroom, this will be imprinted in their memories"

Figure 5.4: Examples of outdoor reading corners

Despite the fact that some teachers personally do not like animals or are afraid of them, all teaches understand the importance of engaging children with animals at a young age. School code B already has a small animal aviary to raise animals from time to time. School code F once raised a caterpillar in a box inside the classroom. School code G has a cat that stays always in the playground and children love it a lot.

"I encourage such activities but personally I do not like animals. However, children are supposed to learn about animals"

Concerning the little gymnasts enabling environment category, different preferences among participants had been raised during the discussion. The most prevailing question was "*how dangerous is this activity*?" Some teachers accepted the idea of the activity presented in the sample picture (unstructured tree climbing) (Figure 4.1f); however, they are not supportive of implementing it in their school context in order to remove the responsibility of exposing children to danger and risk off their shoulders.

"There is the risk of falling and getting hurt, which is our responsibility as teachers. Parents can blame us for not taking good care of their kids"

"Such activity is suitable for summer camps more than for schools"

Nevertheless, research has proven that a certain level of risk taking and challenges are healthy for children's development (Figure 5.5 and 5.6). According to the Norwegian Council of Repetitive Strain Injuries, the greatest health risk for children is not dangerous play tools. A much greater health risk is that children are afraid to use their bodies actively and take new physical challenges (Steinsvik and AS 2004). Children need to learn how to assess danger and employ their own judgments and skills (Steinsvik and AS 2004). In addition, according to Gever Tulley in a TED talk in 2007 about "*5 dangerous things you should let your kids do*", there are 5 dangerous things that children should be exposed to, which are: playing with fire, owning a pocket knife, throwing a spear, deconstructing appliance and breaking rules. Therefore, it is important to establish a delicate balance between safety measures and dangerous risk elimination on one hand, and opportunities for healthy risk taking and developmental appropriate challenges on the other(Kantz 2004); for there is a very thin line between the two aspects as many practitioners, especially KG teachers, get overwhelmed with following safety measures to the degree of forgetting children's desires for discovery and exploration.

Figure 5.5: Example of healthy risk taking: Tree climbing activity with a hummock in Fuji Kindergarten, Tokyo

Figure 5.6: Example of healthy risk taking: rock climbing in public garden in Turkey (Acar 2013)

The one category that was culturally not acceptable was the picture representing the sensory world (children playing a mud tub) (Figure 4.2i). The issue of cleanliness and susceptibility to diseases and germs was participants' main concern. In most forest schools in Scandinavian countries and other parts of the world, there is a policy which allows children to get dirty while wearing boots in the playground and changing into classroom shoes or slippers afterwards (Malone and Tranter 2003). However in other cultures, like the Lebanese one, schoolteachers regard this activity as untidy and consider mud as dirt. This issue of keeping children clean; avoid getting dirty and always having aesthetically pleasing appearance, is a matter of cultural and religious concern. Regarding exposure to germs, Professor Jack Gilbert, the director of the Micro-biome Center at the University of Chicago, established in his thesis study conducted in 2017 on Amish children who lived in farms that are usually rich in microbes, that exposure to microbes dominant outdoors established a stronger immune system and lower rates of asthma in the immune profiles of these children (Gilbert, Knight et al. 2017). Therefore, as he has proven, "dirt is good" for it stimulates humans' immune systems. The picture in figure 5.7 presents a way that can get children exposed to mud and engage them in an outdoor activity in a culturally acceptable manner. Rather than swimming in mud, a mud kitchen can be used as an initial step to get society to gradually accept the idea of mud play.

> *"We do this activity with water, not mud because it is hard"*

> *"You need to consider the medical condition of each and every child before conducting such activity and that will not be easy"*

> *"It is not practical and convenient for us as teachers, who will shower the kids!"*

> *"If I see my child like this, I would commit suicide"*

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"Mentality of society we live in, parents do not accept such activities for they are concerned about their children's safety"

"Sometimes our students return home with paint on themselves (hand, clothes...) and this causes us a problem, so What if it was mud?"

Figure 5.7: Example how to introduce mud play in Lebanese Culture; mud kitchen (Photo by author during outdoor activity for children in Beirut)

To wrap up, the list of Biophilic outdoor activities was developed according to a spatial lens taking into consideration space dimensions and availability; however, social factors including culture and socio-economic conditions of teachers, parents and schools has greatly contributed in molding the outdoor activities that are to be implemented in kindergarten school context with marginal resources. In other words, the cultural force, presented in imbedded values and beliefs, has shaped teachers' preferences towards

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accepting or rejecting photos representing enabling environments, and hence this dictated the types of activities they imply with their students. For example, children in Scandinavian countries play outdoors in all temperatures and weather conditions, whereas children in Europe enjoy the challenge of building with hammers and nails or cooking over an open fire pit (Kantz 2004). Therefore, according to The Encyclopedia on Early Childhood Development, "culture shapes experiences and influences children's development", for through society and religion, children will come to learn which behaviors and actions are acceptable preferred and which are discouraged. A preschool director (from the panel of experts), has explained, "*Children's imagination is limitless and by time, unfortunately, it is defined by their surrounding environment*". Thus, a child in his nature is neither afraid nor disgusted to experience new things, however parents nor guardians tend to unconsciously create this barrier of fear or rejection in children due to cultural and even religious concerns.

Another picture that had raised a discussion among participants is the Little Explorers (Figure 4.1b). Even though most participants showed consent towards this activity, the controversy was on how to conduct this specific activity, where the child is holding a magnifying glass and exploring his surroundings. It was argued that this activity could be a free play or guided play approach and hence general debate about both approaches was initiated.

Advocates for guided play are highly concerned with children's safety as children may harm themselves and underestimate danger and possible risks, like easting poisonous mushrooms, falling off a cliff, if they were left to play alone. In addition, children of this generation have no previous experiences of playing in nature. Therefore, in this case,

guidance is highly important prior to play and during play as well, because children might

not know how to play in nature or might not have game ideas. According to an Early

Childhood Educator (from the panel of experts), with 24 years of experience in the field,

"*the eyes of young children do not see details unless you point it to them*"

Advocates for free play approach say that when the play space is safe and have

safety measures then children can play freely; this will increase their curiosity for discovery

in its different forms: sensorial discovery through the five senses and discovery learning

through experimentation and discovery of facts based on prior knowledge. Free play gives

children freedom and enjoyment especially when they get dirty, it will be a new experience

for them; but of course, according to teachers, there is an acceptable extent to getting dirty.

Also, freedom while playing is so important because it will act as a platform to expose

children's creativity and innovation skills and release their surplus energy.

> " *We used this method last year to discover ants and bugs, we took the students to all green spaces in our school to conduct this activity; students learned because it is basic inquiry and they are the ones discovering the information*" **teacher from School Code B**

Advocates for integrated play (semi guided and free play) say that it is very

important to integrate both approaches together; both complete each other. Hence, in the

context of schools with marginal space and resources, it is best suggested to use the

integrated play approach as an outdoor learning approach for children. There are to ways

this can be applied; both of which should be child-centered but under the supervision of an

adult but definitely without overwhelming the child.

1. Start with free play approach in order to observe what children like to do then based

   on their preferences activities will be tailored following the guided play approach in

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order to achieve a certain objective. This method helps educators and instructors understand children's interests and preferences and work accordingly in order to strengthen them.

2. Start by guiding the children at first and giving them instructions and explaining the goal and objective of the activity but without spoon-feeding them; then leave children play on their own freedom, while adults observe. This method will allow discovery and innovation.

Hereafter, integrated play approach should be part of the education system and curriculum of such schools. The integrated play approach can be labeled under the umbrella of the Reggio Emilia Approach to education (Wilson 2012), in terms that children learn through nature or the outdoors, which is part of the child's environment serving as a "third teacher". Long uninterrupted periods of outdoors play time is a very crucial part of this approach as it allows for self-directed play (Wilson 2012) where the child uses constructive knowledge and "action-related knowledge" (Hewett 2001, Frantz and Mayer 2014).

Last but not least, despite participants' answers, which promoted their awareness towards the importance of connecting children to nature through outdoor activities, unfortunately it was not reflected in the conditions of their existing playgrounds nor in most of the activities they already conduct with their students. Some thought that the ideas presented in the pictures are so ideal to be true and that it is impossible to achieve them in their school due to their limited resources. Their interpretation of playground is based more on aesthetics rather than functions. This is important because the way teachers and school staff perceive playground spaces and outdoors activities influence the way children play and utilize the spaces (Malone and Tranter 2003). It is felt that teachers do not want to put

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the effort to go an extra mile other than teaching the conventional. Most teachers perceive themselves as traditional homeroom teachers where their role ends when children are in the playground. Some believe they are not responsible to teach and educate children during playground time, which goes back to the notion of playground in culture as a recess time only. Furthermore, teachers always stressed during the discussion on the point that activities should always have a goal or object following the lesson plan.

In conclusion, it is clear that teachers have the necessary know-how to value outdoor play to promote nature connection. On the other hand they lack the skills to translate and model outdoor activities for creating enabling environments of Biophilia within existing playground space. They need this support to develop their contribution as effective role players working towards creating active learners using informal learning styles. Furthermore, teachers today consider outdoor recess time as a break time that is limited to student supervision. Dedicated faculty need to actively engage with children during these periods. According to a study conducted by Karen Malone and Paul Tranter, teachers playing with children resulted in two significant consequences: first, it conveyed a message about how teachers regard the value of play and second, it allowed children to participate in risk-taking activities under the supervision of teachers whose job was to monitor and respond to children's inquires (Malone and Tranter, 2003).

CHAPTER 6

LIMITATION AND CONCLUSION

6.1. Research Limitations

Several limitations of this study must be noted. Due to limited time and resources, this research study did not include more than one representative sample picture for each enabling environment category during the focus group discussion. Based on the triangulation method checklist (Appendix G), a couple of outdoor activities have no gathered information regarding cultural acceptance. So, bias may exist in the findings regarding the cultural acceptance of outdoor activities that promote Biophilia, which should be examined in future research by using more than one representative picture for each category of the enabling environment. Furthermore, although the unit of analysis for the surveyed schools was selected based on purposeful sampling technique, it is difficult to generalize the findings to the entire Lebanese school population. This is because the findings were specific to schools in the urban context (Beirut). Future research can examine the situation of schools in the rural context of Lebanon regarding Biophilic outdoor activities.

Another limitation of this study is related to the proposed Biophilic outdoor activities. The developed list of outdoor activities is not for schools to imitate and exactly copy the proposed activities; rather this research study aimed to develop examples of Biophilic outdoor activities that are inspirations for schools with marginal resources. The

goal was to create tangible elements, tools and resources that would allow towards

establishing nature-related environments and spreading the awareness of the Biophilia

concept; however the findings of this study are not the ultimate end results by themselves.

Therefore, it is expected from schools to get inspired from the developed list of Biophilic

outdoor activities in order to customize their own nature-related spaces and activities.

6.2. Holistic Approach

Reconnecting children with the natural world don't happen with a "magical

bullet". The concept of Biophilic outdoor activities should be implemented as a holistic

approach, where there has to be collaboration between all parties, in order to ensure a long

lasting effect on individuals and develop future Eco-citizens. This will require long-term

changes across the entire society at three different levels(Moss 2012):

- Individual (families, parents and children)

- Collective (teachers, health practitioners, journalists and conservationists)

- Political (politicians and policymakers)

There has to be a philosophical commitment among all parties to the value of outdoor

activities for developing children's learning and nature connection. Regarding teachers,

there has to be orientations, workshops, and trainings in order to provide them with the

right tools to develop themselves and their teaching styles towards free play that promotes

Biophilia. As for the parental level, there has to a continuation of the outdoors activities

initiated in the context of schools. Furthermore, spreading awareness among parents about

the value of Biophilia and outdoors activities on their children's health and development is

a crucial step as well.

6.3. Future Research

This research study can be used as a framework for accessing other playground sites, not necessary only kindergarten schools, for having the potential into developing outdoor activities for enabling environments that promote mature connection. Furthermore, since this research worked from developing theory into practice, it would be relevant for future research to design and create a modular kit for each outdoor activities within the enabling environment categories; then apply this modular kit to kindergarten playground sites across different schools to study children's level of nature connectedness before and after the installation.

In conclusion, no matter how limited the school playground space is and whether the schools have sufficient financial resources or not, school grounds are always rich in potential opportunities to develop Biophilic outdoor activities. This study gives hope to schools with limited resources and allows them to contribute and develop their playground space into enabling environments in any way suitable for their capabilities.

CHAPTER 7

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