"Design Patterns of Kids Spaces to Help Kids to be Friend with Nature"

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Abstract: *The importance of sustainability as a way to save energy for future has caused to focus on educating it. Many researchers have emphasised in educating sustainability at early ages. "A child who grows up learning sustainable habits won't have the struggle of making significant lifestyle changes when he or she gets older and suddenly learns about environmental challenges."[19] Also, many kindergartens have scheduled to make a sustainable culture. But, there is less concern about the environment which is suitable for this education.*

The goal of this study is to present the role of architecture of kids' spaces, in teaching them to be friend with nature. The study based on survey research, is searching architecture factors that could influence in kids characteristics in order to get them most familiar with nature. According to the literature, the most important characteristics and needs of kids at ages 3_6 are imagination, curiosity, play and collaboration. Factor analyzing shows two factors: a) Natural stimuli like plants, light, water, sand, etc. and b) Flexibility of functions. The results represent patterns for designing flexible spaces by using natural stimuli which can improve kids' imagination, curiosity and their tendency to collaboration through playing. In a few words the patterns are: a) multiplicity, diversity and dispersion of outdoor green spaces within indoors, b) the continuity of outdoor spaces along with indoors and c) the use of shadow –maker partitions to separate the space`s boundaries, d) the use of natural elements like water, plants, sand, etc. to design interior of kids spaces and e) Using folding colored transparent door/ window/wall to separate the boundaries outdoor and indoor space.

Key Words: *Architecture, Design Patterns, Natural Stimuli, Kids, Friendship with Nature*

1. Introduction:

The importance of sustainability is because of respecting to nature and saving natural energy for future. The aim of green architecture and sustainability is preparing a better life for human beings. "Sustainability has been defined as the need to preserve existing natural resources so that the earth is able to continue to provide these resources for future generations. Put more simply, a sustainable system is one that survives or persists (Costanza and Patten, 1995)". [21]

In order to have a sustainable environment, many researches and education have done. "Since the end of the 1980:s when OECD published the Brundtland report, in which the concept of sustainable development as a critical global issue was introduced, the role of education for global survival has been frequently discussed and explored, by politicians as well as researchers." [10] Also, some researchers paid attention to begin educating sustainability, from early ages.

Sustainability isn't just for adults: Kids should be encouraged to learn about environmental issues and to think about the consequences of their purchases, choices and behaviours, just as we adults do. [19]

The early years as a critical and highly children's development, investments are considered cost –effective. Early investments around sustainability issues, too, can be expected to lead to positive individual and societal outcomes. [6] "By teaching a child sustainability behaviours at an early age, he or she will have an easier time developing sustainable habits that will last a lifetime..."[19]

Hägglund and Pramling Samuelsson (2009) discuss some aspects of early childhood education with a bearing on its role in education for sustainable development. Peterson (2013) counts 4 reasons for teaching kids about sustainability:

- Character Development;
- Habit Development;
- Encouraging Conscious Consumerism;
- Positive Peer Pressure [19]

There are many educational methods through entertainments to teach kids the importance of sustainability toward a green life. Also there are some informal educating methods such as the animation "Dr. Seuss, The Lorax-2012". All of these attempts are because of making a friendship between kids and nature.

But, most of researches have rarely mentioned the role of architecture for making kids friend with nature.

From the vision of this study, learning green life for kids is possible and also more pleasant through architecture. The main questions of this research are:

- How could architecture be a way for helping children to be friend with nature?
- Which architecture factors have effect on kids at early ages?

2. What Are Kids' Characteristics at Ages 3-6?

Because, during preschool ages, the child takes more effects from environment so, 3-6 years old children were studied in this research. According to the literature, Children at ages 3-6 are very curious, imaginative and very interested in playing.

2.1. Imagination:

"In a broad sense, `imagining` means thinking in some way of what is not present to the sense". [3] The imagination is very important because, child's creativity depends on the power of imagination and the best time of development for creativity and imagination occurred in 2 to 10 year olds [14] Pre-schoolers are highly imaginative, they love pretending to be animals, and acting out creative fantasies about these characters. [11] Three to four years old children play most in the realm of the imagination. [8]

2.2. Curiosity:

"Curiosity has been consistently recognized as a critical motive that influences human behavior in both positive and negative ways at all stages of the life cycle. It has been identified as a driving force in child development…" [15]

"Freud referred to curiosity as a "thirst for knowledge" (1915, p.153)." [15] However, human is curious at any ages during his/her life but there is a powerful tendency of curiosity at early ages. "Young children are active and experienced learners with a natural curiosity". [11]

2.3. Play:

"Play is not just for fun; it is the work of childhood. Through play, children learn to give meaning to objects, to tease out relationships, to try on and practice different roles, to exercise their growing capabilities (Vygotsky, 1999)...play is the best preparation for future life…plays is self-education (Vygotsky, 1998, pp.26 & 28)." [17] Play is children's work and play is powerful for children because it is linked to learning, growth and development. Play can influence the development of social competence, intelligence, language development and creativity... Throughout the world, children play alone and in groups, actively creating meaning and exploring their environment. [8] "…A child`s greatest self-control occurs in play" [22] Accordance to Vygotsky, Piaget and Freud, play leads to later creativity. [17] "Play has many functions: it gives children a chance to be together, to use their bodies, to build their muscles and to test new skills. But above all, playing is a function of imagination..." [1]

The centrality of freedom and free play is just as important within 3-6 years old kids. [18] There is a possibility to experience environments during play. "Experiential learning is a powerful and proven approach to teaching and learning that is based on one incontrovertible reality: people learn best through experience." [13] " Five to six year's old children can begin to learn formal reading, writing and number skills, but the foundation still needs to be play through interesting activities to explore and discover in order to preserve love and learning and maximize brain development". [8] In addition, playing helps children participating actively in group activities and collaboration. [16] How about collaboration through playing?

2.4. Collaboration:

Pre-schoolers are beginning to form friendships and enjoy short group activities. [9] The importance of collaboration is as Vygotsky emphasized the role of social interaction in development and creativity. [17]

Recently, researchers have paid more attention to the importance of social interactions and collaboration in creative works. [2], [4], [5], [12], [16]

Developing imagination, curiosity, play and tendency to collaborations could be a window to kids' world at early ages and help them to grow their abilities.

The goal of this study is to find the architecture factors that could develop kids ' imagination, curiosity, play and collaboration based on making them friends with nature.

3. Methodology

Based on survey research method, children's mentors' attitude was gathered through random cluster sampling of 219 mentors and 72 architects and psychologist by researcher-developed questionnaire. The reliability and validity of the questionnaire were measured. The Cronbach alpha "0.96" was significant. Then by making factor analysis, the effective variables (factors) on the research were known and labeled. To analyze data, the path analysis method was used. The results showed 2 architecture factors are effective on "imagination", "curiosity" and "collaboration through playing". These factors are: a) Flexibility of functions and b) Natural stimuli. Then to be sure about the results, a figural test was held with 90 kids at ages 3-6.

4. Discussion

The factors found in this study, will be explained:

Factor 1- Natural stimuli: This factor is related to those questions that focus on the relation between "natural elements" like water, light, plant, etc. and kids' "curiosity" and "imagination". For instance using partitions with colored glasses which convert white light to colored lights can have effect on kid`s curiosity; nonetheless, the variety of colored lights is a natural element cause kids' curiosity. Here, these partitions could be named as "rainbow-maker walls". Also, playing with water can improve kid`s motivation and imagination, in that case water - a natural stimuli- causes kids motivation for imagination. The literature, too, confirms that playing with water and sand can enhance kids' motor creativity and imagination [7]

Factor 2- Flexibility of functions: It means the space can be changed for different usages according to different educational programs. Here, the flexibility of functions has 2 different meanings: a) The potential of the space to allow kids to have various activities in the same space in different times and b) The potential of the space that allows several groups of kids to have different activities in the same time in different parts of the same space [20] The result of architects and psychologists' test showed that "the flexibility of functions" can be achieved by designing multi-function rooms, through designing open plans with movable partition and walls.

Another architecture factor is "natural stimuli". So, the continuity of outdoor spaces along with indoors can help to have more natural flexible space. Also, the multiplicity, dispersion and diversity of **outdoor spaces among indoors**, that cause the potential of continuity of open green spaces along with inside the building (Fig1)& (Fig.2) can make a more natural space for kids.
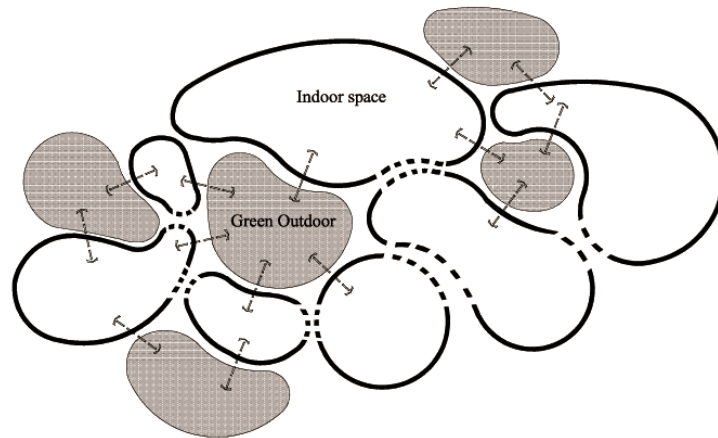
Fig 1: Dispersion diversity of green spaces among indoors

There could be sand playing area, trees, grass area, planting area and water in green outdoors or inside. So, children can feel they are in a green garden with different aspects of nature. They will experience water, enjoy playing with sand and explore light characteristics. According to this research stimulus of natural elements can promote their imagination, curiosity and tendency for playing which is in accordance with preschool kids' characteristics and needs. So, it could have a rich effect on their cognition of nature, they may feel kindness of nature. It is a remembrance not to forget happiness of playing with natural elements and this can be the beginning of "the friendship with nature".
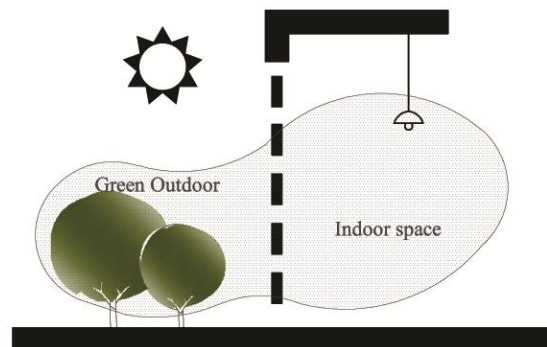

Fig 2: continuity of outdoor space along with indoors

The continuity of outdoor spaces along with indoors is possible with folding colored transparent door/ windows. (Fig 3) There can be colorful transparent plastic or glass blocks that analyze the white light to a rainbow. So children can have a various, imaginative space at any time with different shapes, colors and lights. Using shadow-maker and rain bow –maker partitions to separate the boundaries, makes an ability for playing with light and make children more imaginative.
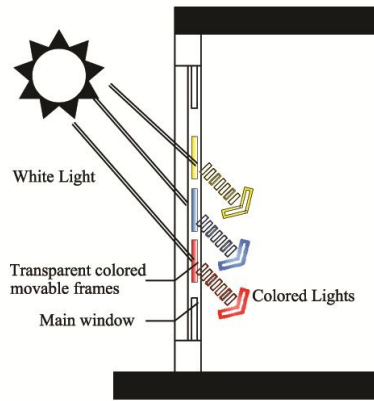
Fig 3: Colorful transparent wall/window

4.1. The Result of Kids Test

During kids test, the situation was described for them by figural stories. The interesting point was that they discussed about limitations and negative points of patterns. For example in case of continuity of outdoor spaces along with indoors, they were concerned about making class dirty by spreading muddy and garden soil all around when planting in the class. But they were still eager to have a small garden not only along with indoor but also, in the class to collaborate for planting (Table1). The result showed: kids eagerly want to play, interact with each other and the most important thing is that they unconsciously need to feel nature all around.

TABLE I: The Result of Kids Test

Factor	Example	Percentage of kids agreement	Limitations
Natural stimuli	Existence of water Inside the space/class	100	To catch a cold, getting wet, going to doctor and have an terrible injection
	Variety of colorful lights	90	Failure to recognize colors truly
	Playing with water	100	To catch a cold, getting wet, going to doctor and have an terrible injection
	Existence of plants Inside the space/class	100	Causing a dirty class
	Planting	100	Causing a dirty class
Flexibility of functions	Indoor and outdoor interaction	100	To catch a cold

5. Conclusion

However there are so many researches about educating kids about sustainability and respecting nature but, there is less concern about the influence of architecture of kids spaces in their relations with nature.

This study led us to 5 design patterns by analyzing the relationship between preschoolers' characteristics with 2 architecture factors: **"Natural Stimuli"** and **"Flexibility of functions"**.

The patterns can be used to make a more semi-natural environment for kids and make them more eager to go to kindergarten and enhance their motivation to be friend with nature. The patterns are:

- The multiplicity and dispersion of outdoor green spaces among indoors by designing several small yards in the middle of building;
- Using natural elements like water, plants, sand areas and etc. inside kids spaces;
- The continuity of outdoor spaces along with indoors by using folding, revolving, movable walls/windows for separating outside and inside space.

- Using shadow-maker and rainbow- maker partitions to separate different parts of space.
- Using folding colored transparent door/ window/wall for separating the boundaries outdoor and indoor spaces.

Using these patterns helps children to experience more various spaces that enhance their curiosity, tendency to play, motivation for collaboration and evoke them to imagine. Furthermore, this kind of architecture is as a remembrance to kids not to forget kindness of nature. This study emphasizes that educating sustainability habits could be better concluded by using these patterns to design kids spaces. Although, there are some limitations such as climate conditions, safety and budget that may be the subject of future researches. Also, there are creative architects and also technology to make the patterns adaptable to any circumstances.

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