Providing Design Solutions for Children's Centers Based on the Factors that Improve Creativity

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Abstract
The world needs more and more creativity to solve difficult problems. Psychologists believe that improving creativity related to childhood. Therefore, communities should focus on fostering creativity in children. Children spend most of their time in schools, kindergartens and children centers. So in this paper, the architectural principles of children's center in order to enhance children's creativity have been extracted. To achieve this goal, the definition of creativity, characteristics of creativity and creativity factors have been studied. The influence of environment on creativity was also studied. Architectural solutions and design principles were expressed according to definition of creativity and factors needed to develop creativity such as Imagination, Initiative. These principles related to issues such as brightness of the space, colors of the walls, height of the furniture, movable furniture, the view and exposure to natural environment, security and protection of place, form of the building, dimensions and shapes of windows and plant species. These solutions can help architects to enhance children's creativity and create a creative generation.

Keywords: Creativity, Children, Architecture, Environment, Design Principles.

Introduction
Creativity is important and interesting to read, but is difficult in practice and applying it in different parts. Creativity has important role in technological innovation, education, business, arts and other fields of science. Many famous persons have earned their reputation of creativity (Runco, 2007). All children become adults who will make a difference in our world with their creative problem-solving skills (DeBord, 1914). Therefore it must be considered to improve creativity in children. To solve a problem creatively, children need to be able to see a variety of perspectives and to generate several solutions. Physical environments designed to stimulate the senses can enhance creative problem solving.

Researchs have demonstrated that the quality of the physical planned and designed environment of early childhood centres has an impact specifically on cognitive and social developmental behaviours (Moore, 1986; 1987). Children and young people ought to be brought into regular daily contact with top-quality architecture and design. They ought also to have their eyes opened to the fact that architecture and design is all around them. That the school they go to could have been designed by an architect. Architecture and design have an effect on the daily lives of all children. By endowing them with a greater understanding and a keen eye we can enhance their perceptions and creativity. So find architectural principles that affect children's creativity is very important which is examined in this paper.

Materials and Methods

Definitions of Creativity
- Torrance defined creativity as “the process of becoming sensitive to problems, deficiencies,
gaps in knowledge, missing elements, disharmonies, and so on; identifying the difficult; searching for solutions, making guesses, or formulating hypotheses and possibly modifying them and retesting them; and finally communicating the results” (Torrance, 1989).

- Sternberg et al. defined creativity as the “ability to produce work that that is novel (i.e., original, unexpected), high in quality, and appropriate (i.e., useful, meets task constraints)” (Sternberg et al., 2002).

- Rothenberg defined “creativity as the production of something that is both new and truly valuable” (Rothenberg, 1990).

Most theorists agree that the creative process involves a number of components, most commonly:

- imagination
- originality (the ability to come up with ideas and products that are new and unusual).
- productivity (the ability to generate a variety of different ideas through divergent thinking)
- problem solving (application of knowledge and imagination to a given situation)
- the ability to produce an outcome of value and worth.

**Creative Thinking**

While both Amabile and Gardner assert that thinking is a key aspect of the creative process, they address this topic at a high level. Amabile suggests that key aspects of creative thinking are:

- Comfort in disagreeing with others and trying solutions that depart from the status quo.
- Combining knowledge from previously disparate fields.
- Ability to persevere through difficult problems and dry spells.
- Ability to step away from an effort and return later with a fresh perspective (Adams, 2005).

Other theorists have addressed the topic of cognitive function from multiple angles. Sternberg’s article, “Creativity and Intelligence” in the Handbook of Creativity, provides an overview of the multitude of theories that have been proposed concerning the relationship between creativity and intelligence. While there is no consensus on the subject, multiple theories provide insight. Ultimately, Sternberg promotes a “triarchic theory”, asserting that there are three main aspects of intelligence that are key for creativity–synthetic, analytical and practical:

- Synthetic (creative): the ability to generate ideas that are novel, high quality and task appropriate. One aspect of this is the ability to redefine problems effectively and to think insightfully. Sternberg also notes that the basis for insightful thinking involves knowledge acquisition in three forms:
  - b) selective combination: combining bits of relevant information in novel ways.
  - c) selective comparison: relating new information to old information in novel ways.
- Analytical: Critical/analytical thinking is involved in creativity as the ability to judge the value of one’s own ideas, to evaluate their strengths and weaknesses and suggest ways to improve them.

- Practical: Ability to apply intellectual skills in everyday contexts and to “sell” creative Ideas (Sternberg, 1998).

**Development of Creativity**

Some theorists have studied the way in which creativity develops in children. Most theories of child development view young children as highly creative, with a natural tendency to fantasize experiment and explore their environment.

However, this high level of creativity is not necessarily maintained throughout childhood and into adulthood. For example, Meador (Meador, 1992) presents evidence from the USA that
creativity (as measured by divergent thinking tests) declines when children enter kindergarten, at around the age of five or six.

Runco (Runco, 1996) has studied how creativity develops. He explains that longitudinal research on trends in creativity suggests both continuities and discontinuities throughout an individual’s lifespan. In other words, a child identified as highly creative in early life may or may not consistently show creativity later on. He argues that this uneven development may result from the fact that certain traits and talents develop at different rates and are influenced by each individual’s environment and life chances.

It also has been known for a long time that in order to exercise creativity students need a responsive environment. Torrance defines the term as "one which involves absorbed listening, fighting off criticism and ridicule, stirring the unresponsive and deepening the superficial; one which requires that each honest effort to learn be met with enough reward to insure continued effort: the focus is on the potential rather than norms" (Torrance; 2005).

Creative processes can be encouraged in all instructional activities. Creative teaching could be said to consist of setting up a learning environment that encourages students to see the essence as well as the detail of the subject, to formulate and solve problems, to see the connectedness and interrelations between diverse areas, to take in and react to new ideas, and to include the elements of surprise in their work (Reid & Petocz, 2004).

Amabile by examining approximately 7000 articles on creativity, found that only 138 of them have creative variables. The study have major impact on creative professionals To investigate the role of environmental variables. Amabile believes that the environment is more important than personality factors in creativity and Change in environmental factors, according to the characteristics and individual talent is much easier (Amabile et al., 1994).
Environmental Factors That Impact on the Efficiency and Utility of Children Center

- lighting: Child centers must have access to generous amounts of natural light. Natural light should be the primary means of lighting the classroom space (ministry of children and youth services, 2006).

- air quality: Design for good indoor air quality using low- or non-toxic finishes and using acceptable ventilation levels and system design. Furthermore, studies suggest that the use of many types of indoor plants may improve indoor air quality by filtering pollutants out of the air. Certainly, indoor plants contribute to creating a more “home-like” atmosphere, and have been shown to positively affect the behavior and mental well-being of children (General Services Administration, 2003).

- Noise: The center should not be located near noise sources such as major highways, street intersections, railroad lines, or airport flight paths without mitigation. If proximity to high levels of noise is unavoidable, acoustical measures are necessary. Wall types with increased sound transmission class ratings (STC) should be reconsidered when sound control is important (ministry of children and youth services, 2006).

- Natural Features: Locate the center at a site with desirable natural features, such as trees, south facing slopes, and views of natural and pleasant man-made features or interesting urban vistas (Moore, 2001).

- Health and Safety: The location of children center must allow for the safe arrival and departure of children and must be free of hazards including fountains, wells, open pools, unprotected edges, drop offs and cliffs, and dangerous equipment. Play areas must not have open drainage ditches or openings to storm sewer systems (General Services Administration, 2003)

- Security: The center location must be readily identifiable and accessible to emergency response personnel. The security assessment may recommend that a guard station should be located near the center so that surveillance of comings and goings to the center are easily seen by posted guards. Alternatively, a form of surveillance will be provided (ministry of children and youth services, 2006).

- Approach and Access: If possible, the center location should be within walking distance of public transportation. Ensure that bicyclists and persons using mass transit also have safe approaches to the building and do not endanger child or adult pedestrians (Moore, 2001)

- Play Yards: Play yards are outdoor extensions of the classrooms, providing many of the same opportunities as indoor spaces. Play yards should provide for a variety of developmentally appropriate activities and include storage for curriculum equipment as well as wheeled toys, trikes and wagons. Spending time on the playground is undoubtedly the preferred activity of children. Therefore, to the greatest extent possible, the designer should arrange ease of access to the play yard from the classroom and maximum adult supervision (General Services Administration, 2003)
- Indoor-outdoor connections: Progressive childcare programs are run outdoors as much as indoors (weather permitting). No longer the elementary school model of learning indoors and "recess" outdoors, the developmentally appropriate activities of the best child care programs are held equally outdoors as indoors. Thus the need for wonderful visual and movement connections between in and out, low windows, wide doorways, etc (Moore, 2001).

- Colour: Preschool and Elementary school prefer a warm, bright color scheme that compliments their natural extroverted nature. Hallways can have more colored range than in the classroom and be used to give the school a distinctive personality. Libraries utilize a pale or light green creating an effect that enhances quietness and concentration. Overall, a functional color scheme should strive to successfully meet the following goals: Support the function of the building, and the tasks that are carried out in it. Avoid over stimulation and under-stimulation. Create positive emotional and physiological effects (Engelbrecht, 2003).

Other factors that impact on the efficiency and utility of Children Center are: organization of space, materials, windows and doors, Building entrance, Corridors and walls.

**Result and Discussion**
To enhance creativity, architectural solutions have been proposed. These solutions are Appropriate to factors that develop creativity. These guidelines are also according to environmental factors that impact on the efficiency of children center.

**Table 1. Design Solutions For Children's Centers Based On The Factors That Improve Creativity**

<table>
<thead>
<tr>
<th>Solutions</th>
<th>Design examples</th>
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<tbody>
<tr>
<td>Interior spaces should have a good relationship with nature</td>
<td>- The use of plant species by different shape, color and size in the interior spaces.</td>
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<td></td>
<td>- The combination of indoor and outdoor spaces with large windows.</td>
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<td></td>
<td>- Using the training yard.</td>
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<td></td>
<td>- Create favorable prospects for the indoor areas and outdoor spaces with transparent walls.</td>
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<td>The exteriors should appropriately be combined with nature</td>
<td>- Design a place for children to sit in natural spaces.</td>
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<tr>
<td></td>
<td>- The use of plant species by different shape, color and size in the outdoors.</td>
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<td></td>
<td>- Planting small trees and Shrubs that are attractive to children</td>
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<td></td>
<td>- Using a wide range of grass in landscape is attractive to children</td>
</tr>
<tr>
<td>Space must provide the child's mental and physical activities.</td>
<td>- The use of movable and flexible furniture for intellectual and artistic activities</td>
</tr>
<tr>
<td>Environment should be fun and stimulate children's curiosity</td>
<td>- Happy and diverse design by Using colors and shapes.</td>
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<td></td>
<td>- The combination and interaction of open and closed spaces.</td>
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<td></td>
<td>- Design ambiguous spaces like spiral paths that to be discovered by curious children.</td>
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<td>- Attention to details in order to attract children.</td>
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<td></td>
<td>- Using nature as a phenomenon with curiosity motivating elements.</td>
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Conclusion
The table shows that some elements of the physical environment that might play a role in enhancing children’s creativity could be:
- brightness of the space
- less use of cool colors and more warms colors
- visual exposure to more children-friendly objects that are composed of basic shapes
- the use of low height furniture or no furniture (sitting on the floor)
- an environment that increases the sense of security and protection.

<table>
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<tr>
<th>Increase children's fantasy through the environment</th>
<th>- Use of new elements that are not used in ordinary space.</th>
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| Ensuring the physical security of the environment for children | - Using fun and exciting lighting  
- Create different views to child centre  
- use of cartoon pictures on the walls of the centre to enhance children's imagination.  
- The use of colored light.  
- Design outdoor and use of nature. |
| Creating a sense of freshness in children by environment | - Control the height of fences and Turret.  
- Control of the steep ramps and stairs height.  
- Control installations.  
- Furniture design appropriate to the child's physical size  
- Control of dangerous and sharp corners, tough obstacles. |

Figure 3. develop creativity through environment

For future work we would like to test the impact of other elements and factors in the physical environment. These elements are:
- the view and exposure to natural environment
- the use of natural materials
- exposure to day lighting
- the use of other basic shapes such as triangles or squares for problem solving exercise.

The environmental factors can have a direct impact on the human psyche and utility spaces. So architecture directly affects the psyche of children and then impact on learning and performance of children and thus affects their creativity. As a result, children in poor architecture, where they do not feel comfortable their thinking and imagination can not improve. For this reason, design appropriate to stages of child development and in order to create a sense of space utility can be a good way to increase a child's creativity.

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