



Design Guidelines of Residential Environments to Stimulate Children's Creativity

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Abstract

Because of age growth, activation, promotion of creativity in children is extremely valuable. In order to improving creativity, there are some methods to encourage children's mind to new thinking and develop the creativity. One of these methods is the impact of natural or artificial environment to increase children's creativity. Because children spend a lot of their time with family at home, physical environment of house, effects on the children talent development and creativity. In the present study, based on combining analysis of the survey, we proposed some design principles of residential spaces to enhance children's creativity.

Keywords: Children creativity; quality of life; residential spaces; design principles

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1.0 Introduction

Creativity is important and interesting to read, but is difficult in practice, and applying it in different parts. Creativity has an important role in technological innovation, education, business, arts and other fields of science. Many famous persons have earned their reputation of creativity (Runco, 2007). Creativity is the ability to fluently solved problems with original, innovative, novel, and appropriate solutions (Amabile & Gryskiewicz, 1989; Guilford, 1967; McCoy & Evans, 2002). Until 1950, the creativity concept was little known, only a few researches were done on mental and intellectual ability. Since 1950, psychologists found that intelligence and creativity are not the same and need to understand of creativity was felt and gradually began extensive research in this area (Shafaie & Madani, 2010). Creativity is made possible in individuals by a confluence of cognitive, emotional, environmental and motivational variables. Psychologists have identified many cognitive factors related to creativity, such as divergent thinking (Guilford, 1950; Guilford, 1959), styles of thinking (Sternberg, 1997) and openness to experience (George and Zhou, 2001). Environmental factors involved in creativity have been studied from a socio-psychological perspective (Chien & Hui, 2010). The focus of creativity research has been on personal characteristics to the exclusion of potential contributions by the physical setting (Amiable, 1983; Barron, 1969; Guilford, 1968; MacKinnon, 1962; Stein, 1974; Torrance, 1966). Yet many creative thinkers themselves have recognized the potential role of the environment to influence creativity.

Theories about the restorative qualities of nature also allude to creativity as a process that is enhanced by contact with natural elements (Kaplan & Kaplan, 1989). Creativity as achievement is the production of works that are novel or innovative in the public sense. In Iran, according to Census 2010 statistics, the population of children and people with developmental age compared to other age groups is significant (Table 1). On the other hand, childhood especially the stage of pre-school ages, is the beginning of the cognitive perception that is component of the creative process (Shafaie, 2010).

Table 1. Population by sex and major age groups (Source: SCI, General Population and Housing Census, 2010).

Major age groups	Male and female	Male	Female
Total	70495782	35866362	34629420
(Less than one year)	1141967	586423	555544
(1-5 years)	5433658	2785719	2647939
(6-10 years)	5601390	2867710	2733680
(11-14 years)	5504614	2823485	2681129
(15-24 years)	17738183	8954752	8783431

(25-64 years)	31419379	15919889	15499490
(65 years or more)	3656591	1928384	1728207

Children and adolescents are important groups of users of residential spaces in the scale of the house, and neighborhood spaces, local streets, children's garden and local parks (Azamati, 2009). These places are allocated to the major part of children's daily life. For this reason improving the quality of these spaces to be effective on personal development, social interaction, enhance of the sense of cooperation and even their education.

Therefore, recent research looking for a set of elements of residential space designed to achieve a positive impact on the child's psychology, and make him creative and innovative, so that the accomplishment of these elements in the design and construction of houses, especially the interior spaces, child's imagination will be stimulated.

1.1 Factors in the development of children's creativity

Several factors have an impact on increasing children's creativity; these factors can be included time, encouragement, materials, and relationships with parents, child rearing and the stimulating environment (Bohm, 1998). All environmental factors including physical environment (living), family environment, learning environment, and the educational programs are also effective to enhance a child's creativity. Housing has an important role in increasing children's creativity with appropriate incentives in the usage of materials and objects. Space has a main role in quality education and creativity presence. Bohm (1998) believes that the human has innate creativity, and it has a relationship to the environment that his mind grows up.

1.2 The role of environment in fostering children's creativity

In recent years, there have been an increasing number of studies on the effect of environments (natural or artificial) on humans and their creativity. There is much evidence that being in natural environments, or just looking at nature, promotes recovery from stress (Shibata and Suzuki, 2004). For example, inpatients assigned to a room with a view of nature recovered faster than those assigned to a room with windows facing a brick building (Ulrich, 1984). In the workplace, Heerwagen and Orians (1986) found that the lack of a window in the office is associated with the quantity of decor containing nature-dominant visual materials, substituting for the view from the window, suggesting that visual contact with nature may be important to the room occupants' well-being. In the residential context, it has also been suggested that views of nature from windows enhances residents' sense of well-being (Kaplan, 2001). Several studies about the effects on of the environment on the increasing

creativity prove that some factors of the physical environment are effective in growing creativity. These factors include:

Natural environmental elements: natural landscape has a correlation with creativity potential. The existence of plants in the interiors helps in increasing creativity level.

Materials: use of natural materials and less use of synthetic materials will promote creativity (McCoy & Evans, 2002). Appropriate materials to be used for children's spaces will help to develop their creativity (Edwards & Springate, 1995).

Color: colors had a significant correlation with creativity potential. Environments with a primarily cool color temperature were not perceived to be conducive to creativity (McCoy & Evans, 2002). Pleasant, colorful and exciting images have been considered as the basis for motivation of creativity by many scientists (Torrance, 1966).

The shape and size of the spaces: the shape and size of the places cause to gather individuals and groups to create social interactions and relationships. In the theory of social interactions, the type of group relations has a positive correlation with creativity process.

Decorations (furniture and visual detail): both furniture and visual detail would be most conducive to the creativity potential of a setting (McCoy & Evans, 2002)

Variety of shape, color and other environmental factors increase children's ability to discover, understand, and grow their creativity. The research also shows that the diversity of the physical environment has a positive effect on creativity, because of the variety of the environment is led to the evolution of creativity (Thorisson, 2004). Other researches show that the individual curiosity is effective in the process of creativity and creative persons are curious. Now, there may be a question:

Which factors can promote the child's imagination, play and curiosity in design of residential spaces and through this; children's creativity will be increased?

2.0 Methodology

2.1 Procedures

In order to achieve the research objectives, the survey research is used as the primary data collection method. The aforementioned method includes three steps: 1) description, 2) explanation, and 3) exploration of environmental variables of creativity. After selection of sample and collecting data by questionnaires, the effective factors are analysed with method of factor analysis. Then, based on the relation of variables, a hypothetical model is proposed and is reviewed by the method of path analysis.

After approval of the proposed model by a survey of experts' attitude (architects and psychologists), design principles based on the model are extracted. The aforementioned results are presented in a figure format and 125 children aged 4-7 years old are surveyed.

The findings explore design principles of residential spaces that will be presented in the followings:

2.2 Effective variables

In this study, two environmental factors and three creativity factors were identified as the effective variables in the research (table 1). These factors include:

Stimulation of the natural environmental elements: The present research showed that using of natural elements (water, light, and plants), the child's curiosity and excitement for the play can be increased.

Child's Play and Participation: This factor is associated by participation rate of children for any change in the space, for example, their participation in planting and maintaining flowering areas, drawing on the walls and their participation in changing the decoration.

Flexibility of functions: The purpose of flexibility is to provide one or more solution adapted to the context of the application in order to provide the ideal solution. A space can be used proportionate with the function by changing spatial aspects of housing.

Curiosity: The purpose of curiosity is to encourage children to ask questions and learn. The children try to find the answers.

With this background study, the relation between the factors of "stimulation of the natural environment elements (water, light, and plants) and "flexibility of functions" and two factors of play-participation, and curiosity as the characteristics of creativity will be investigated and analyzed in this paper.

Table 1. Reliability coefficient of factors

Factors	Cronbach's alpha
Stimulation of the natural elements	0.868
Child's Play and Participation	0.785
Flexibility of functions	0.774
Curiosity	0.789

3.0 Findings and Analysis

3.1 Investigating the frequency distribution of factors

Investigating the frequency distribution of the reported answers based on "the stimulation of natural elements" shows that 19.5 percent of respondents agreed moderately, and 80.5% of them agreed strongly to this item. Thus, it can be said that the respondents identified "the stimulation of natural elements" as a factor. Investigating the frequency distribution of the responses based on "play-participation" showed that 1.2% of respondents weakly agreed, 7.2% of them agreed moderately, and 91.6% of them agreed strongly to this issue. Therefore, it can be said that the respondents identified "play-participation" as a factor.

Investigating the frequency distribution of the responses based on "the flexibility of functions" indicates that 0.8% of respondents weakly agreed, 17.5% of them agreed

moderately and 81.7% of them agreed strongly to this item. Thus, it can be said that the respondents identified “the flexibility of functions” as a factor. Also, investigating the frequency distribution of the responses based on “the curiosity” showed that 28% of respondents agreed moderately, and 72% of them agreed strongly. Therefore, it can be said that the respondents identified “the curiosity” as the main factor.

3.2 Explaining the research model

The present research has demonstrated a correlation between two factors that are effective in the creativity (child's curiosity, and play-participation) and some other architectural characteristics such as “stimulation of the natural elements” and “flexibility of functions” in the residential spaces. The direct effects of all these factors are shown in Table 2 and Table 3. Also, the p-value in each case shows the significance of direct relations between factors.

The model in Figure 1 is a proposed model. This model shows that “the stimulation of natural elements” is the independent variable and the factors of “flexibility of functions”, and “play-participation” are the intermediate variables, and the factor of “curiosity” is dependent factor. The relationships were statistically significant at the 95% confidence level (Table 2 and Table 3).

By this model, the relation between the variables can be described descriptively. According to the proposed model (Fig 1) and (Table 2) -that determine the significance level of effect of “stimulation of natural elements” on the factor of “play-participation” ($p < 0.05$)- it can be found that the “stimulation of the natural elements” is effective and significant on “play-participation” in confidence level of 95%. Possibility of playing with water, planting the flowers by children, playing with sands and other things are effective in improving children's motivation and emotional release and are known as the best base for getting involved with children's group activities. According to literature, play can increase children's curiosity. Also, their creativity is related to their curiosity (Krippner, 1999; Shafaie, 2010).

According to the model (Fig 1) and (Table 2) -that show the significance level of effect of “stimulation of natural elements” factor on “curiosity” factor ($p < 0.001$)- it can be concluded that “stimulation of natural elements” is effective and significant on the “curiosity” factor in confidence level of 99.9 %. Differences in natural elements (water, light, and plant) and applying them in different ways can make a question in the child's mind and encourage child's curiosity. Hence, the diversity of natural elements is effective in promoting the child's creativity. For example, plants having different form and the color of leaves in different seasons can add to the space diversity. Also, presence of different colors in the light spectrum using multicolored glasses or making the pool, fountains and aquariums are effective in space diversity. Therefore, natural elements can be used in the design of residential spaces and open spaces.

Table 2. The direct effect of standard (Weighted regression)

Relationships	Assessment	p
Stimulation of natural elements is effective on the flexibility of functions.	0.418	$p < 0.001$
Stimulation of natural elements is effective on the curiosity.	0.603	$p < 0.001$
Stimulation of natural elements is effective on the play-participation.	0.126	$p < 0.05$

The flexibility of functions is effective on the play-participation.	0.583	p < 0.001
The flexibility of functions is effective on the curiosity.	0.124	p < 0.05
Play-participation is effective on the curiosity.	0.426	p < 0.001



Fig. 1. Proposed model of relationship of variables

According to the proposed model (Fig 1) and (Table 2) -that indicate the significance level of effect of “flexibility of functions” on “play-participation” factor ($p < 0.001$), it can be known that the effect of “flexibility of functions” on the “play-participation” is significant in confidence level of 99.9%. The purpose of flexibility of functions is to be responsive to change and adaptable to different usage scenarios.

The results show that natural stimulus element and flexibility of functions increase the curiosity and the excitement of play and participation in the group activities and thus improve children’s creativity. According to the analysis done, the design principles of residential spaces that can increase the curiosity, and game-playing motivation of children and in accordance with the literature, is effective in promoting the creativity and can be explained according to below principles:

- Principle 1: “connectedness and continuity of open and closed spaces (natural spaces)”.
- Principle 2: “a free plan design form and presence of small walls or movable partition walls that children create places for themselves by help of their parents”.
- Principle 3: “to create diversity by natural elements”. Natural landscape has a correlation with creativity potential. The existence of plants in the interiors helps in increasing creativity level.
- Principle 4: “play making by natural elements”.

Using the aforementioned principles in designing the residential spaces can be prepared the base of increasing the curiosity and “play-participation”, and thus improving the child’s creativity by applying the variables such as “natural stimulus elements” and “flexibility of functions”.

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