Increasing children's creativity in outdoor kindergarten

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ABSTRACT: Childhood, as the first and most significant period of a person's life, is the founder of children's abilities and creativity (between 2 and 10 years of age). During these years, the child is highly affected by the environment and shows a high level of curiosity about the surrounding environment. Due to the presence of a majority of children aged 2 to 6 years in kindergartens and the need to pay serious attention to their open spaces for the education and development of children's creativity, this article explains the factors affecting the growth of children's creativity in the open spaces of kindergartens. In this regard, some of the effective factors in the development of children's creativity that should be considered in the design of the open spaces of these buildings are provided using the descriptive survey research method. The statistical population of the study included educators and kindergarten staff. Structural equations were used in SPSS and AMOS software to analyze the data. According to the results of the study, it can be stated that the development of children's creativity will not be possible only through educational programs but also through flexible spaces, using natural elements, and children's participation, which will also promote children's creativity. In this regard, the component of children's participation is the most effective in the growth and development of children's creativity. After that, space flexibility, natural elements, space playability, color and light, kind, sense of security, and space legibility, respectively, have the highest effect on the development of children's creativity.

Keywords: *Creativity, Open space, Child, Kindergarten.*

INTRODUCTION

Childhood is the first and most significant period of a person's life. In this period, the structure of human personality and behavior is formed. It determines the fate of the person (Makarau et al., 2022). The significance of this period in the formation of personality, education, and acquisition of knowledge is so much that, based on the Prophet, the acquisition of knowledge in childhood is like a sign carved on a stone (Mirzabeigi, 2011). Several architectural studies have shown that the environment can affect human behavior and performance and provide the conditions to guide them in a specific direction (Hesami et al., 2022; Sedaghati, 2022; Alexander & Joshua, 2021; Bynum et al., 2021; Sebastien, 2020; Albertini, 2021). Education experts have considered the child as a product of the interaction of nature-education, heredity-environment, and nature-experience (Shoari Nejhad, 2019: 3).

Knowing that taking care of children is a social issue, a significant difference was formed from terms such as keeping the child quiet or taking care of the child (Nora et al., 2022). and the need to pay attention to the special environments of children was determined. The significance of the effect of society on the formation of children's growth has not been hidden for other thinkers such as Maxwell (Gabriel, 2017). Amabile argues that the environment plays a more significant role than personality factors in creativity and considers it much easier to change

environmental factors than individual characteristics and talents.

We have seen worrying changes in children's daily habits in recent years. Children participate less in games and free activities in open spaces or public spaces and spend most of their time at home, schools, and extracurricular classes under the direct supervision of parents. This change in the life habits of Iran's children, which is taking place simultaneously with the global changes, has caused the emergence of a new approach at the international level, namely "modern childhood (Taghizadeh et al., 2023). Movements with the slogan of "paying attention to the comfort of children" have repeatedly stated in recent years. More than half of the children of industrialized societies live in cities that are not compatible with their physical and psychological conditions. The outcome of this limitation is that the majority of children grow up in environments that are boring to them. Children are looking for excitement, imagination, legends, and imitation of television and computer games instead of experiencing the environment and adventure in the surrounding world. Hence, they spend an artificial childhood provided by adults. The most significant negative outcome of such children's growth in today's cities is that we cannot expect these children to become bold, creative, and curious humans. Children who live in environments with low quality in terms of mobility, flexibility, and free activity will gradually become "consumers" of thoughts, not

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"producers" (Mansouri & Gharehbaglou, 2011: 64).

Based on the results of child psychologists, mental growth and human intelligence are not accidental; rather, they are coordinated and aligned with other dimensions of human development. Improving the child's environmental conditions will definitely be effective in increasing their mental and intelligence growth. It is often seen that the special space of this class is not designed and implemented, or it is formed without considering their real needs and based merely on the personal experiences of the designers to meet their physical and color diversity needs.

Nowadays, increasing urbanization and changing lifestyles have created many restrictions for children. It has made their lifestyle completely different from the previous generation. The high use of computer games confirms this issue. Architectural and urban planning solutions are required to allocate suitable space for this age group (Sapounidis et al., 2024). Based on Bloom's theory, about fifty percent of intelligence growth occurs from birth to 4 years old, 30 percent of this growth occurs between 4 and 8 years old, and only 20 percent of it occurs between 8 and 17 years old (Mofidi, 2019).

If a child is placed in a rich environment in the first years of life, the cortex of the brain grows, and glial cells that secrete memory-building enzymes increase. Thus, the brain is strengthened, and learning is facilitated. Thus, one of the crucial tasks of today's societies is to equip children. For this purpose, rich education is needed (Malekipour, 2014). Childhood is a period in which capabilities and creativity are formed in children. The best time for progress is between the ages of 2 and 10 years. During these years, the child is highly affected by the environment and shows a high level of curiosity about the surrounding environment (Victoryana et al., 2024). The child expresses their inner developments more in this group and looks at the world with a more abstract view. What is crucial in children's learning is the way they perceive the surrounding issues. Since the range of words they have learned has not been yet developed, many of their hopes and dreams and even their imaginations and dreams are manifested in the form of the games they make, the drawings they make, the spaces they like and play in, or even the poems, songs, and stories they are attracted (Dyer, 2019: 38).

Several studies have been conducted in recent years in this regard. Among the many factors affecting the development of children's creativity, the educational methods of children's emotional-cognitive aspects and educational issues have been investigated. However, the effect of the quality of architectural space in educational environments on the development of children's creativity has received less attention (Ebtekar & Fadaie Tmaidjanie, 2023).

Studies indicate that one of the most effective educational factors in modern education is the quality of architecture in learning environments. The relationship between the artificial environment of a child's individual identity, self-esteem, and academic performance is one of the factors affecting the children's growth. Growth in a space where the child feels that they belong to that space and feel like they are in their own home stimulates and promotes creativity (Kroner, 2009).

In order for children's educational environments to be effective in the development of their creativity, its design should be designed in such a way that the factors affecting children's creativity are used in the design (Ebtekar et al., 2023).

Increasing the sense of curiosity in children requires an appropriate architectural space. The power of creativity grows in children by stimulating their sense of curiosity and perception (Walaj, Anderson, and Crobley). Amabile also argues that the environment plays a more significant role than personality factors in creativity and considers it much easier to change environmental factors than individual characteristics and talents (Agustina et al., 2024). Many landscapes created for children do not pay attention to the different dimensions of the child's existence and are not in harmony with the perceptions, activities, and needs. In other words, these landscapes are formed based on the characteristics and perceptions of adults and not children. These landscapes do not help the child's growth in different dimensions. In many cases, it causes the child to feel bored, provides the conditions for abnormal behavior, and reduces the creativity of children (Sheibani, 2011: 133). Promoting creativity in childhood is effective throughout a person's life to the extent that it affects the progress and development of countries (Agustina et al., 2024).

By examining the opinions of scientists, it is concluded that they agree on the following points:

First, like other human talents, creativity is acquired to a large extent and is not specific to special people. Second, the development of creativity requires special conditions and stages of education. Third, various barriers to the emergence of creativity depend on the physical ability of people and are often related to social, cultural, and educational aspects (Mozaffar, 2007: 65).

Activities in kindergartens are primarily spent on taking care of the children to keep them quiet, and fewer programs are considered to develop their creativity. Since rented houses are allocated to kindergartens, or if a building is built for this purpose, less attention is paid to mental issues and the development of children's creativity. Whether it is a converted building or a new construction, it mainly has a play area, which can be seen as a place to cultivate creativity. Thus, the present study identifies the principles and basics of designing open spaces in kindergartens with the approach of promoting creativity in children.

In the present study, a definition of a child and the need to design with this approach from the perspective of thinkers is first presented. After explaining creativity and what a child needs for its development and analyzing the information from the received questionnaires, appropriate solutions in the design of open spaces with this approach are presented. This study presents important and influential principles in the architectural design process of kindergartens with the approach of promoting creativity in children. Architects can use them as principles and criteria in the design of open spaces.

Research Questions

What components should be considered in the design of open spaces in kindergartens so they can have a maximum effect on the development of children's creativity through the architectural space? Which of the components mentioned above is more effective?

Theoretical Framework
Child

The new theories of psychology recognize the child not as an empty mental entity but as a set of needs, motivations, investigations, persuasions, imaginations, and conscious mental forces. The Convention

on the Rights of the Child defines a child as a human being under 18 years of age unless domestic law sets a majority earlier (Lansdown & Vaghri, 2022). The best development time for children's creativity occurs between the ages of 2 and 10 years (Victoryana et al., 2024).

Child and outdoor space

Piaget argues that children see the universe differently from adults and perceive things through direct experience with the surrounding environment (Saif, 2017). The child first sees the phenomena generally and then describes them by distinguishing them, so the child's relationship with the environment is a TOPOLOGIC relationship. Instead of distances and dimensions, angles, and areas, relations such as Vicinity, Separation, continuity, and symmetry within each other are considered by the child in spatial recognition. The child first notices very basic rules based on symmetry, which are defined by continuity and proximity (Memarian, 2010). For example, when facing a tree, the child's attention is not focused on the height and proportions of the tree, but they perceive the centrality of the tree in relation to the surrounding environment (Bagheri & Azemati, 2011). In this regard, the presence of natural elements will also affect the level of people's attraction and their mental and physical health. Elements such as monuments, stairs, and water features also encourage people to be present in this space.

Creativity

Creativity is the power to create something new or invent an idea that did not exist before. Guilford considers creativity as an intellectual ability and creative thinking that leads to creativity, which is one of the types of divergent thinking (Frith et al., 2021). Amabile, a creativity university professor and expert, emphasizes cases such as levels of creativity and environment in defining creativity. This means that creativity is the generation of new and valuable ideas by a person or a small group of people who work together (Samoila & Ursuțiu, 2020). A glance at the reliable sources related to creativity, innovation, and creative thinking shows that this term is rooted in the type of human way of thinking. In other words, a creative person is someone who has a searching and creative mind. Based on this definition, creativity includes the ability to break boundaries or the ability to go beyond the framework of scientific, occupational, professional, and social standards. In other words, creativity includes both understanding and accepting previous patterns and forming and inventing new patterns in different fields. Halpern considers creativity as the ability to form a new combination of opinions and ideas to achieve a goal. From Perkins' viewpoint, creative thinking leads to new and creative results. The process of teaching and learning can foster creative thinking and educate people who are explorers, creators, problem solvers, innovators, and agents of change (Yesilyurt, 2020). Grutchfield (1962) defines creativity as a mental process composed of the power of initiative and flexibility against different situations (Green et al., 2023). Robbins (1991) defines creativity as the ability to combine ideas and opinions uniquely by creating a connection between them. Creativity factors cannot be created by force, but the context for its creation should be strengthened. Factors affecting the development of creativity are divided into two categories: personal and environmental (Sedaghati, 2023).

Ways to create creativity

This question is raised first: Is it possible to promote creativity? Torrance conducted a study and concluded that it is possible to teach children a set of principles that allow them to express their opinions better after receiving them. If appropriate conditions are provided, it is possible to promote creativity in many people. In this regard, we can also refer to childhood and its role in promoting creativity since a child raised in an inappropriate environment will have less creative ability, and most of the problems of people in the field of creativity are rooted in this period (Smare & Elfatihi, 2024). One of the most significant and fundamental lessons of the early years of children's lives is education and the ability of the learning process. Hence, it is necessary to provide opportunities for exploratory activities in education. This way of education makes the child become a creative and dynamic person in the future. If they do not receive such education, they will become a passive and imitative person and will be deprived of the power of creativity and dynamism (Hosseini, 2023). The design of children's spaces should consider various factors, including safety, inclusivity, bio-psychological needs, and ecological aspects, to create environments that foster creativity and support children's overall development (Guimaraes et al., 2023). The ways to create creativity in children behaviorally include;

1- Creating an appropriate environment and context for playing flexible games and avoiding forcing children to participate in stereotypical games under the direct supervision of adults (Clements et al., 2023).
2- Predicting and encouraging children to reach their goal and destination through a path other than the existing and specific path.
3- Creating and stimulating a sense of exploration and curiosity in the environment at a reasonable level (Setyaningsih et al., 2024).
4- Stimulating and encouraging children to participate in group games (Blinkert, 2004: 100).
5- Observing the children's scale (Moore, 1990: 35).
6- Using happy colors such as orange 7- Creating a context to increase self-confidence (Baker, 2021). 8- Creating conditions for imagination.

Children's tendency to run, play, and draw is instinctive and related to their special world and dreams. Regarding the significance of playing, researchers refer to three advantages of physical growth, intellectual growth (from two aspects of mental and cognitive growth), and social-emotional growth, leading to the creation of organizational power, education, and social recognition and knowledge (Amabile, 2010: 64). Children's free play is a complex concept that there is no an accurate definition for it. However, it mostly includes characteristics such as enjoyable, unplanned, active, and free from adult rules. During playing, the child gains experiences, and the learning process also takes place while enjoying it without being directly taught (Mahjoor, 2022).

Free play space is also a territory outside the house that has four characteristics, including availability, security, flexibility, and the opportunity to interact with other children (Blinkert, 2004: 100). Thus, the design of open spaces, like playgrounds, should be in line with children's learning about concepts, relationships, shapes, and sizes, colors and aesthetic issues (Christie et al., 2020).

All of these factors lead to the creation of a meaningful structure of learning in the child's mind through creating a meaningful connection between the mental knowledge of children and their experiences,

which is considered necessary for their growth. Thus, considering it as a marginal issue is a mistake. The physical environment of the open space is a factor affecting all users, including children. It is considered an effective factor in the growth and identity of the child (Abu-Ghazzeh, 1998: 800). Guilford, an American scientist, argues with advanced statistical methods that human intellectual powers can be divided into 150 separate factors. The most important factors that are effective in the development of creativity are fluidity (mental), producing a number of ideas at one point in time; flexibility: generating diverse and unusual ideas and different solutions for a problem, novelty (originality), using unique solutions, expansion: producing details and specifying implications and applications, combining: putting inconsistent ideas together, analysis: Breaking structures into constituent elements (Bagheri & Azemati, 2011). Some of the mentioned characteristics depend on the participation of the environment in the development of creativity. If appropriate conditions are provided, it is possible to develop creativity in childhood. A child raised in an inappropriate environment will have less creative ability. Most people's problems with creativity are rooted in this period (Hosseini, 2015, quoted by Bagheri & Azemati, 2011).

MATERIALS AND METHODS

This study is applied in terms of purpose. Also, since library study methods and field methods such as questionnaires were used in this study, it can be stated that the present study is a descriptive survey study in terms of the Nature and method of data collection. In the present study, after analyzing the opinions of thinkers about children and the ways of promoting their creativity, they conducted field observation of children's behavior in these spaces. They prepared and distributed questionnaires for kindergarten teachers to verify the effect of the items. Finally, principles and criteria for improving the quality of kindergarten open spaces in line with the development of children's creativity were presented. For this purpose, the primary fields of study and analysis include landscape design, the psychology of creativity, and child growth and development. For this purpose, 41 kindergartens in the cities of Tehran, Shiraz, and Urmia, which had relatively larger open spaces, were selected, and 276 questionnaires were collected from their teachers and staff.

The above questionnaire was developed by the researcher on a 5-point Likert scale, in which an open question was included to state if there is a need in addition to the listed items .The content validity of the questionnaire was examined using the opinions of thinkers and professors in this field. Cronbach's alpha was used to examine the reliability of the questions. Cronbach's alpha coefficient was obtained for questions greater than 0.76, indicating that the questionnaire has a high reliability. First, the normality of the data was checked using the Kolmogorov-Smirnov test. After confirming the normality of the data, Pearson's correlation and second-order confirmatory factor analysis were used. Calculations were made using Spss and Amos software.
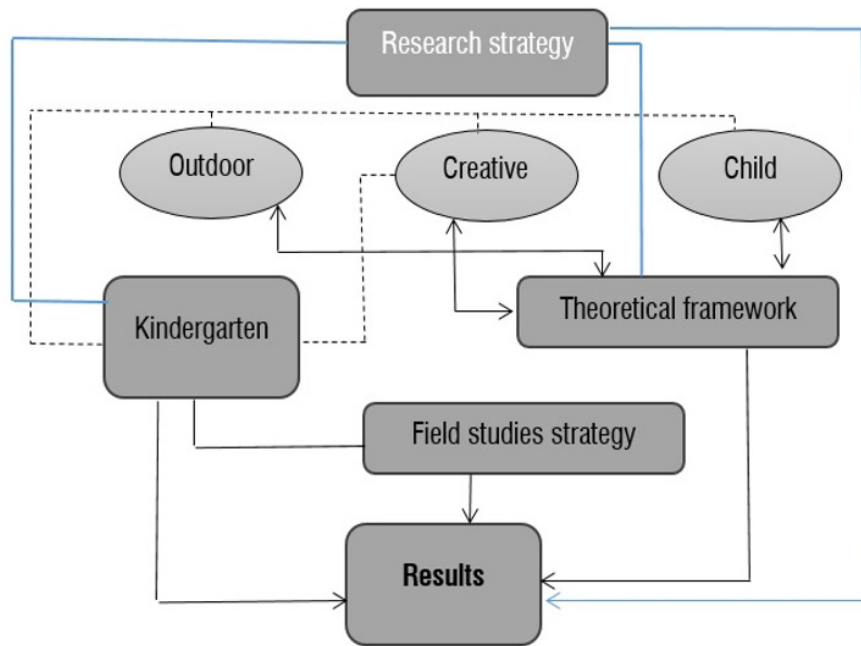

Fig. 1: Illustrates the research process

RESULTS AND DISCUSSIONS

Effective solutions in designing kindergarten open spaces with the approach of increasing creativity in children

The border between reality and imagination is very fragile and unstable for a child, so it is broken easily and frequently. The child plays with biscuits and considers them like small people. Then, they consider them food and eat them with pleasure (Lindon & Langston, 2010: 33). The fantasy world is universal, and everyone can understand and enjoy it. By seeing objects, the child remembers the elements of his symbolic world. For example, many 4-6-year-old children imagine that the moon follows them, and they force the moon to follow them (Piaget, 2015). Imaginations formed in early childhood are the basis of creativity in adulthood, and mental imagery depends on their imagination power.

Imagination is the most significant factor in promoting creativity (Shafaee & Madani, 2010: 36). Ittelson states that the corner of the street where the building is being built may be more responsive in terms of playing purposes than a newly-built playground equipped with various devices such as slides. (Ittelson, 1974). The child perceives the world only in the way they have experienced it (Piaget, 2015). Their primary goal is to get out of their world. Thus, children are interested in searching for a space for each of the activities to satisfy their interests (Douglas, 1995: quoted by Ataei & Torabi, 2021: 153).

Such an adventure and activities are important interests of children in this period. If they have more tools, their sense of curiosity and perception will be more satisfied. In other words, children like to learn from everything available to them, such as playing with soil, collecting objects, and touching objects. Other studies indicate that a person's curiosity is effective in the creative process, and creative people are mostly curious (Shafaee & Madani, 2010: 34). The surrounding environment should become a stimulus for creating imaginative motivations. Outdoor design can help children understand the concepts of sizes. Children learn about Nature by being in these spaces. They become familiar with society and social life through social interactions. Accordingly, they become familiar with their physical capabilities and limitations and gain a sense of self-confidence and self-esteem. Children's participation in urban management decisions also helps to increase their creativity. The most significant characteristic of a public space appropriate for children is to ensure the physical and psychological safety of children and their families. Jane Jacobs argues that the most important interests of children in the urban space are street safety, diversity of land uses, freshness, and vitality of the city. The primary concerns of the population will be solved by solving this concern of children.

The summary of the content is shown in Figure 2.

Fig. 2: Increasing Creativity in Designing Outdoor Spaces for Kindergartens

Given what was stated and careful examination of children's behaviors in field studies, effective factors in promoting children's creativity in open spaces of kindergartens, as illustrated in Figure 3, were presented and examined as follows;

Fig. 3: Theoretical Findings of the Research

Color and light

Using local colors and lights and the creation of light and shadow in the space of the area is effective in creating imagination and fantasy in the child and improving their creativity. Color and light, as inseparable elements of architecture, significantly affect the mood and behavior of the users of the space and the mental and emotional states of people. Studies have shown that color is more important than shape for young children, and it can bring happiness and vitality (Riyazi, 2013). Also, spatial diversity creates a sense of belonging and security. In other words, color creates different concepts and feelings that should be used in space design. However, the use of color should be based on the knowledge of color psychology; otherwise, it will not be efficient (Figure 4).

Fig. 4: The role of color and light in enhancing children's creativity in Kindergartens

Natural elements

Since children imagine the world around them as a kind of playground, Nature is an appropriate context to keep them busy for hours. It is because of three qualities of the natural environment, including endless diversity, they are not artificial, and the sense of immortality (Fjortoft, 2004: 23). Thus, environmental psychologists use the term "biophilia" for this sense of "love of nature." This means that humans are genetically and biologically dependent on Nature, and paying attention or not paying attention to this natural sense creates positive and negative feelings in them (Fjortoft, 2004: 23). Nature creates a feeling of timelessness and spacelessness for the child. Children's perception of Nature is totally different from the perception of indoor spaces. No educational aid can create a concentration in a child, such as watching the sun shining through the trees, ants gathering at the entrance of the nest, or seeing the beauty of a flower. These landscapes allow children to change the environment, discover it, and achieve a sense of wonder (Bagheri & Azemati, 2011). Natural elements such

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as water, light, green space, and wind in children's play spaces can stimulate curiosity and thus develop creativity in them (Shafaee & Madani, 2010). For example, playing with the created shadows, the light that breaks up in contact with colored glass, or the wind that causes movement and changes in the surrounding objects stimulates children's curiosity. Children should discover shapes, colors, designs, changes, transformations, growth, and development from the very early years. They should understand the concepts of ecology and respect the environment.

Gardening is a project that children can take responsibility for from beginning to end. Planting, watering, weeding, and harvesting, whether in a pot or a small garden, can make children familiar with the life cycle of plants and give them the opportunity to take care of a living being. The happiness and vitality in the kindergarten yard after the snowfall indicate several capabilities that are searched, discovered, or created by children in the playgrounds. Capabilities such as snow-playing, slides, making snowmen, paddling the path, change and diversity in the environmental landscape and trees and meadows, and even change the topography and slopes, and general surfaces and formal, sensory, and emotional contrast, environment relaxing sound (absorption of sound in snow surfaces), and generally creating a set of creative and innovative environmental capabilities are some them (Bagheri & Azemati, 2011). (Figure 5).

Fig. 5: The role of Natural elements in enhancing children's creativity in Kindergartens

Space flexibility

Albert Einstein argues that human society is always threatened by two things, namely order and disorder (Levenson et al., 2024). In today's modern cities, the willingness to create order is increasing for two reasons. One is the increase of differences followed by the need for standardization, and the other is the increase of cumbersome rules. What is currently threatening the lives of our children is cumbersome rules and order rather than disorder. Some of these rules are how to use and how to ensure the safety of playing equipment, as well as where and when to play. According to the children, today's cities are "a forest of rules." In other words, the modern city with cumbersome and strict rules causes the destruction of self-made spaces by users, including children. Contracted playgrounds with tools such as swings and slides are a predetermined type of playground. Although they are familiar and known to children, they lack cognitive values and social games suitable for children's development, and they keep children entertained for 14 minutes (Blinkert, 2004: 106). Experts propose a new type of playground that is flexible to children's needs. It affects their physical, social, and cognitive development. Since these playgrounds do not convey a ready idea and force children to discover or produce improvisationally, they are very valuable in their comprehensive growth and promoting their creativity. In other words, the characteristic of these playgrounds is to replace rules with some disorder. Children whose environment is uniform cannot use their cognitive abilities (Torrance, 2013).

Creating the possibility of change in the space by children or understanding and accepting this matter by children who can change the environment around them creates a sense of participation in children. The possibility of implementing sculptures and monuments or different arrangements with a series of devices included in the area or creating the possibility of painting in the surrounding environment or the possibility of changing the arrangement of the surrounding furniture daily or water playing, completing incomplete objects and touching objects and any other game that strengthens children's sense of curiosity helps them in creativity tests (Figure 6).

Fig. 6: The role of Space flexibility in enhancing children's creativity in Kindergartens

Material

In the perception of space, the sense of touch is one of the most important elements after vision. Regarding children, this matter is more important since they learn and are taught by touching. Creativity can be increased in them by stimulating the child to see, hear, touch, discover, and test.

Children's participation

In most societies, children, as specialized people of any culture or society and a reliable source for solving environmental problems, are neglected. Since children's understanding of the world is totally different from that of adults, their participation in designing, evaluating, and completing projects is very necessary. The philosophy of new architecture is also based on the fact that no matter how much the consumer of the architectural space has been involved in its production and has participated in the creation of that space, their interest in it and the degree of their participation in the activities within that space increases, leading to increased attractiveness of the space (Mortezavi, 1997). Games and group activities can be increased by using natural elements. For example, group games with water, planting plants and monitoring by children, playing with sand, and building castles and group spaces, and generally, the ability to play with natural elements can promote the creativity of children (Shafaee & Madani, 2010).

Sense of security

Security is considered a kind of inner peace and comfort achieved through the active components of the environment (Victoryana et al., 2024). A good picture of the environment gives the child a sense of peace and security. They can create a balanced relationship between self and the outside world. This is the opposite of the feeling of fear that they feel when they lose their path (Azemati et al., 2012). Hierarchy and defensible space have a supportive aspect. They gradually give the user a feeling of being protected, leading to a sense of security and peace, which is vital in the growing age (Day, 2004). The child is highly sensitive to environmental threats. They work in an environment in which their senses are balanced. Noise pollution, air pollutants, the lack of a suitable physical and psychological territory, and the feeling of crowding prevent interaction with the environment. Any threat to safety and security that disrupts the balance of the child's environmental and mental powers prevents the emergence of creative talents (Bagheri & Azemati, 2011).

Playability of space

The Nature of childhood is playing and exploring. The child is excited to discover their world from the moment they start walking skillfully. Children engage in fantasy and create ideas of different roles for themselves through symbolic games (Beigi, 1995: 18). For children, the process of interacting with the environment is more important than achieving a result. The sense of curiosity is affected by the curious and stimulating atmosphere of the environment. The curious atmosphere should stimulate curiosity. The curious atmosphere is affected by the complexity of the environment. Complexity is the characteristic of the environment that provides a curious atmosphere and increases the stimulation of the environment (Bagheri & Azemati, 2011). Children's playing takes place in the form of practice, i.e., sensory movement through interaction with the environment and movement in it. Regular games with peers are very useful for children and have a great effect on their social life. Games are a significant factor in creating vitality in children. Children's games with simple elements and imaginary games foster creativity in children. This pleasant feeling in children and the group makes children feel that they belong to the environment (Shafaee & Madani, 2010). (Figure 7).

Fig. 7: The role of Space Playability in enhancing children's creativity in Kindergartens

Space legibility

Providing clarity and legibility in the space is another condition for children to adapt to the environment. Kevin Lynch states that a decent image of the environment gives a person a sense of security. He also states the purpose of having a legible image of the environment so a person can easily recognize the components of the environment and communicate it in their mind in a connected way. In other words, organization and psychological security are the result of these two processes that create a pleasant feeling in the environment. Attractive signs and visual elements are effective in creating legibility in the space and inducing a sense of security and a lack of confusion (Kamelnia, 2010).

Fig. 8: Increasing Creativity in Designing Outdoor Spaces for Kindergartens

Analysis of results

Based on the mentioned items, the questionnaire was distributed and analyzed, the results of which are described as follows;

Out of the total studied samples, 89.5% are female and 10.5% are male. This is because the majority of those working in kindergartens are females. Regarding the education of respondents, 3.4% had a diploma and lower, 43.5% had an associate's degree, 45.1% had a bachelor's degree, and 8% had a master's degree and higher. Regarding their age, 16.3% were aged between 18 and 24 years, 46.1% were aged between 25 and 34 years, 25.1% were aged between 35 and 44 years, 9.6% were aged between 45 and 54 years, and 2.9% were aged between 55 and 64 years.

A code was assigned to each component to analyze the data according to Table 1 (research variables).

Table 1: Variables

Code	Items	Variable
CL	Color and light	
NE	Natural elements	
FS	Space flexibility	
M	material	
CP	Children's participation	Increasing children's creativity
SS	Sense of security	
PS	Playability of space	
LS	Space legibility	

Table 2 presents the mean, standard deviation, skewness, kurtosis, minimum, and maximum. The grades are considered in the range of 1 to 5. The mean participation of children is 3.82, the mean flexibility of space is 3.44, the mean sense of security is 3.39, the mean natural elements is 3.79, the mean material is 3.28, the mean color and light is 3.12, the mean playability of space is 3.29, and the mean space legibility is 2.94.

Table 2: descriptive indices of factors affecting the development of creativity in kindergarten open spaces

Variables	number	mean	standard deviation	skewness	kurtosis	minimum	maximum
Color and light	276	3.12	0.83	-0.24	-0.72	1.09	4.16
Natural elements	276	3.79	0.65	-0.39	-0.19	2.32	4.43
Space flexibility	276	3.44	0.69	-0.57	-0.27	2.06	4.39
material	276	3.28	0.87	-0.26	-0.74	1.27	4.07
Children's participation	276	3.82	0.61	-0.37	-0.27	2.11	4.84
Sense of security	276	3.39	0.69	-0.28	-0.53	1.34	4.67
Playability of space	276	3.29	0.79	-0.28	-0.69	1.29	4.12
Space legibility	276	2.94	0.75	-0.21	-0.67	1.02	3.96

The Kolmogorov-Smirnov test was used to examine the normality of the distribution of the variables. Based on Table 3, the significance levels of the variables were greater than 0.05, indicating that all the variables have a normal distribution.

Table 3: Kolmogorov-Smirnov test results to examine the normality of the distribution of variables

variables	number	statistic Z K-S	significance levels -Sig	result
Color and light	276	1.121	0.077	OK
Natural elements	276	1.114	0.069	OK
Space flexibility	276	1.374	0.071	OK
material	276	1.387	0.084	OK
Children's participation	276	1.151	0.083	OK
Sense of security	276	1.327	0.081	OK
Playability of space	276	1.245	0.079	OK
Space legibility	276	1.287	0.078	OK

Pearson's correlation coefficient was used to examine statistical relationships. The results showed that they are significant at the P<0.05 and P<0.01 levels (Table 4).

Table 4: Pearson correlation test

Items	CL	NE	FS	M	CP	SS	PS	LS
Color and light	1							
Natural elements	0.488	1						
Space flexibility	0.408	0.512	1					
material	0.431	0.541	0.381	1				
Children's participation	0.609	0.752	0.419	0.367	1			
Sense of security	0.427	0.574	0.341	0.299	0.319	1		
Playability of space	0.659	0.645	0.392	0.318	0.299	0.278	1	
Space legibility	0.422	0.502	0.412	0.398	0.305	0.281	0.277	1

Evaluation of model fit indices Chi-square, Standardized Root Mean Squared Residual (SRMR), Root Mean Square Error of Approximation (RMSEA), Critical N (CN), Comparative Fit Index (CFI), and Normal Fit Index (NFI) were used to fit the factor model. Table 5 illustrates the model fit indices. Based on Table 5, the obtained values are in the defined range.

Thus, it is concluded that the obtained fit of the model at this stage is a good fit. Therefore, it can be concluded that in addition to the fact that all research variables have an acceptable correlation with each other and each research hypothesis and predictor of the assumed variables in the model are well confirmed, the model set and research hypotheses are well developed.

Table 5: Fits of the redefined conceptual model

interpretation	obtained value	Allowed limit	Index	Index name
OK	0.0425	Less than 0.05	Standardized Root Mean Squared Residual (Perfect fit)	SRMR
OK	0.933	Above 0.90	Comprative Fit Index (Comprative Fit)	CFI
OK	0.046	Less than 0.080	Root Mean Square Error of Approximation (frugal fit)	RMSEA
OK	0.956	Above 0.90	Normal Fit Index (Normal Fit)	NFI
	(p=0.000) 302.322	p> 0.05	(Perfect fit)	X^2
OK	1.021	1<NC<3	Chi-squared	NC(X^2.df)
OK	265	Above 200	Critical N	CN

Factor analysis was performed in two steps. In the first step, the items related to each component and their factor loads were calculated. In the second step, the factor load of each component of creativity was calculated. Table 6 presents the results. Based on the table, the factor loads of the items related to each of the components are greater than 0.4 and are significant at the 95% probability level. Thus, all items remained in the model. Thus, the factor structures of the components are reliable and construct-valid. Also, the second-order factor analysis showed that the factor loads of all components are greater than 0.4 and are significant at the 95% probability level. Children's participation, with a factor load of 0.92, has the highest effect on the development of children's creativity, followed by space flexibility with a factor load of 0.87, natural elements with a factor load of 0.82, playability with a factor load of 0.79, color and light with a factor load of 0.74, material with a factor load of 0.72, sense of security with a factor load of 0.69, and space legibility with a factor load of 0.62, respectively (Table 6).

Table 6: Standard and non-standard factor loads of components

| independent variable (item)	dependent variable (factor)	estimated coefficient	standard error of estimation	critical ratio	significance level	estimated standard coefficient
Color and light	Increasing creativity	1			0.001	0.74
Natural elements	Increasing creativity	1.42	0.23	6.74	0.001	0.82
Space flexibility	Increasing creativity	1.11	0.16	6.74	0.001	0.87
material	Increasing creativity	0.73	0.14	5.19	0.001	0.72
Children's participation	Increasing creativity	0.69	0.12	6.42	0.001	0.92
Sense of security	Increasing creativity	1.08	0.18	7.34	0.001	0.69
Playability of space	Increasing creativity	1.57	0.25	7.87	0.001	0.79
Space legibility	Increasing creativity	0.64	0.12	5.41	0.001	0.62
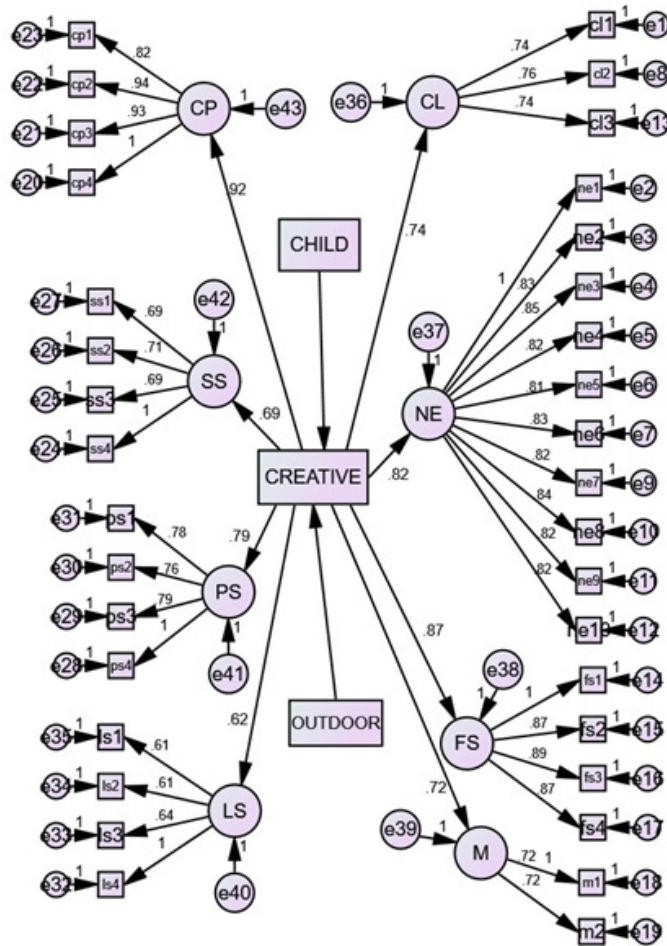
Fig. 9: Estimation of research model with standard coefficients

Table 7 and Figure 10 show the final structure of the model with the influencing effects of the components. It shows that the children's participation component, with a direct effect of 0.790 and an indirect effect of 0.151 has the highest effect on the growth and development of children's creativity, followed by space flexibility with a direct effect of 0.595 and an indirect effect of 0.312, natural elements with a direct effect of 0.727 and an indirect effect of 0.162, playability of space with direct effect 0.617 and indirect effect 0.182, color and light with direct effect of 0.598 and indirect effect 0.177, material with direct effect 0.389 and indirect effect 0.258, sense of security with direct effect 0.377 and indirect effect 0.221, space legibility with a direct effect of 0.318 and an indirect effect of 0.213, respectively.

Table 7: Significant direct and indirect effects on the research variables

| The effects on children's creativity development	standardized effects			regression weight (direct)		
	Sum of effects	Direct effects	Indirect effects	estimation	C.R	p
Color and light	0.775	0.598	0.177	0.301	4.51	001<
Natural elements	0.889	0.727	0.162	0.315	8.79	001<
Space flexibility	0.907	0.595	0.312	0.426	16.08	001<
material	0.647	0.389	0.258	0.241	13.42	001<
Children's participation	0.941	0.79	0.151	0.411	9.16	001<
Sense of security	0.598	0.371	0.227	0.261	14.18	001<
Playability of space	0.799	0.617	0.182	0.312	8.71	001<
Space legibility	0.531	0.318	0.213	0.241	15.08	001<
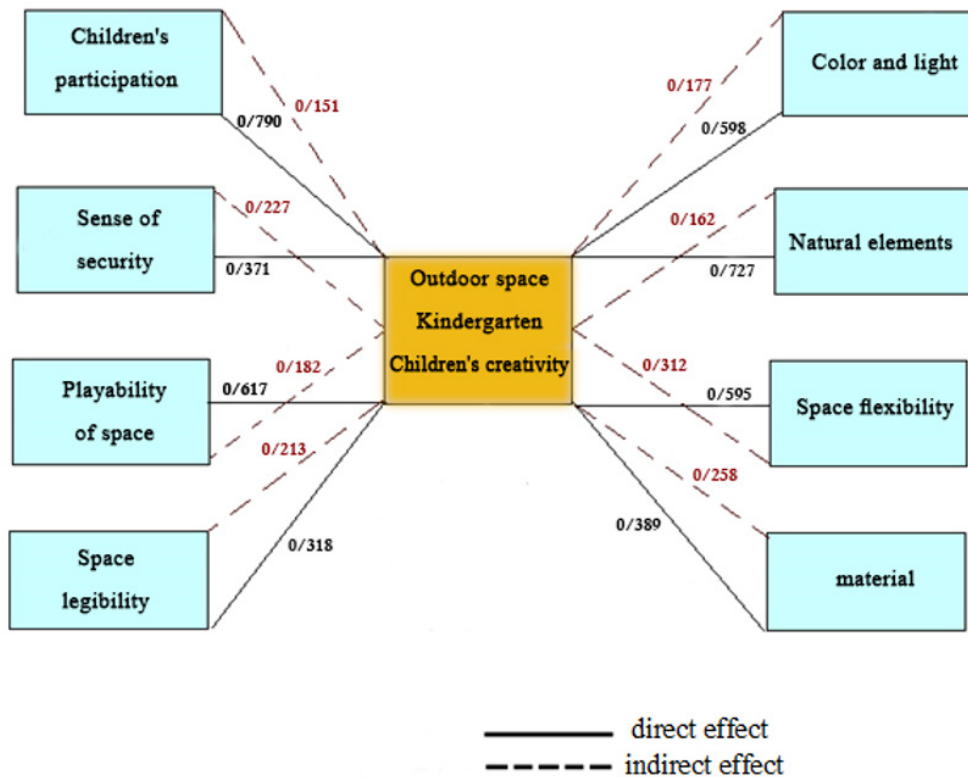
Fig. 10: Direct and indirect effects of influencing components

CONCLUSION

Kindergarten open spaces can be a place to develop and promote creativity. These places should be designed, so they create the safety and safety and ensure the health of children without forcing any behavior and movement, provide an opportunity for them to play various games with their imaginations, to have a sense of curiosity, and stimulate and create the basis for participation and group activities in them.

Generally, suppose the child is placed in an environment where all favorable conditions for developing creativity are provided, and the environment and external thoughts do not suppress individual factors. In that case, the environment will be an effective factor in developing the child's creativity. The present study examined the principles of designing open spaces in kindergartens with the approach of increasing children's creativity. The research literature suggests that children play with natural elements such as water, sand, and light. It will be effective in improving their creativity. Also, group games will be helpful in this regard due to the expression of opinions by all children.

Green vegetation is also effective in this regard. Various colors and the use of light and shadow are also effective in stimulating children's curiosity and ultimately developing their creativity due to the children's interest and creating a sense of dependence. In other words, the development of children's creativity will not be possible only through educational programs, but the existence of a space while observing the mentioned factors can help to improve children's creativity. However, the variability feature in the space created due to the creation of variety and stimulation of children's curiosity should be considered important since, based on the analyzed information, the component of children's participation has the most effect in creating the growth and development of children's creativity. After the children's participation, space flexibility, natural elements, playability of space, color, light, material, sense of security, and space legibility, respectively, had the highest effect on the growth and development of children's creativity. The result is presented schematically in Figure 11.
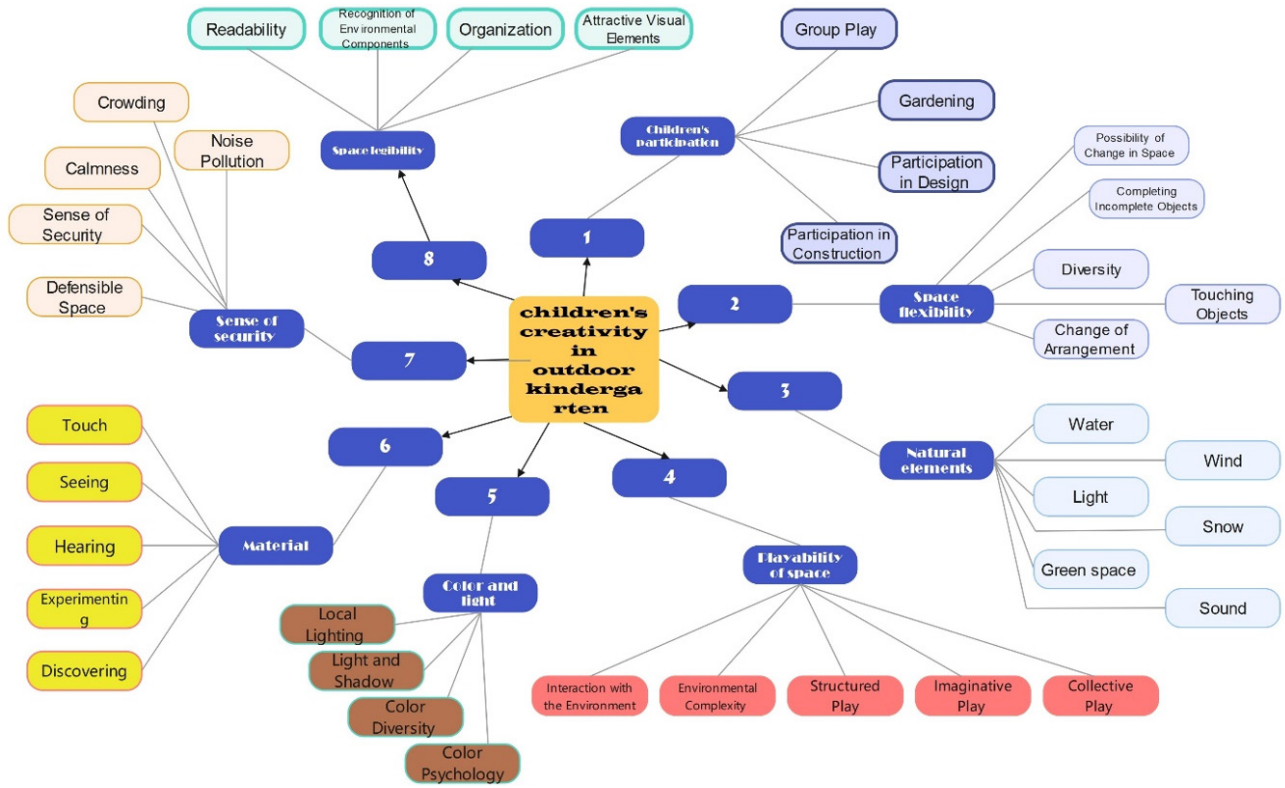

Fig. 11: Factors Influencing the Enhancement of Children's Creativity in Outdoor Kindergarten Spaces in Order of Importance

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