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Analyzing the Effect of the Interconnected Role of Educational Space on Promoting Self-Efficacy in Children Aged 3 to 6 Years (Case Study: Isfahan Fooladshahr Preschools)

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ABSTRACT

A child needs a space to stimulate understanding, recognition, and self-efficacy. Educational spaces play a significant role in the development and behavior of children. If these spaces are formed with the aim of promoting self-efficacy and based on the social, emotional and behavioral needs of the child, the child's interaction with the built spaces will be compatible and understandable. Self-efficacy is directly affected by the physical environment in the integration of children's educational spaces. This research has investigated the role of children's educational environment on the self-efficacy of children aged 3 to 6 years. The theoretical propositions of this study have been investigated in the field and survey in 5 samples of preschools in Foladshahr, Isfahan. The research method of this study is combined (qualitative and quantitative) and descriptive-analytical. The map of the educational spaces under study was drawn using Autocad software, and Depth Map software was used to analyze the degree of interdependence of the spaces. The level of children's self-efficacy and the correlation coefficient between the variables were measured using data from a researcher-made questionnaire in the Pressline system through Spss software. The results of the study indicate that educational spaces have spatial interdependence differences and significant effects on children's self-efficacy in the indicators under study.

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Introduction

Educational spaces play a significant role in raising children. A child's understanding of the place and the surrounding environment is achieved by his dynamic interaction with the environment and during numerous activities and environmental behaviors that he expresses

(Murphy and Murtagh, 2010: 5). Over time, the child's interactions with the environment and the correlation of environmental experiences can bring a sense of competence and skill. The growth of children, experiences, and opportunities to see new places help them to support the development of competence (Lim and Barton, 2010: 329). The quality of the place needs to know the behavioral patterns of the users. Therefore, in order to improve the quality of the effective place on behavioral patterns and establish the interaction between place-behavior, behavioral-spatial studies are necessary.

A person's performance is affected by various factors such as motivation and excitement, environmental conditions, fatigue, and illness (Saif, 2001: 33). Self-efficacy determines whether or not a person initiates an activity, as well as his effort to do the work and his persistence and perseverance in facing obstacles and problems while doing the activity (Lent and Brown, 2013). Compared to any other motivational structure, self-efficacy has been introduced as the most consistent predictor of behavioral outcomes (Pajares, 1997; Yousefi, 2011). Addressing the quality of children's interactions with the world around them is necessary because the child's knowledge in the case of the environment is both a function of cognitive abilities and depends on the level of his experience in the environment (Hart and Moore, 1973).

Educational spaces are virtual spaces where children experience a deep connection with place and group interactions. Therefore, it is necessary to examine the quality of educational places and use physical and spatial qualities based on self-efficacy criteria to attract and strengthen children's behavior. Most children spend a long time in the educational space. The educational spaces should provide the platform for growth, learning, motivation, and self-efficacy in children according to age, culture, social, etc. However, the structure of some children's educational spaces is based on the age spectrum, preferences, and environmental patterns and self-efficacy has not been considered and neglected. Accordingly, the lack of these items will cause negative behaviors in children.

The physical structure of educational spaces should have motivational elements to improve the motivation to be in the space. Children communicate with the environment through direct experience and perceive it (Arghiani, Yazdanfar, and Feizi, 2019; Kaplan, 2002; Saif, 2001). The educational environment can create many capabilities in a child, and one of these capabilities is motivation. Therefore, the child needs a space to create self-efficacy to achieve the processes that give strength and direction to his behavior and improve his sense of worthiness and competence. Nevertheless, the effort of a single child alone is not enough to understand and coordinate the space and create self-efficacy, and it will create limitations for the child's presence in the space and place. The child's lack of recognition, understanding, and satisfaction with the space and lack of self-efficacy will disturb the interaction with the space and cause abnormality and suppression of belief and feelings of disappointment and unworthiness in the child. Nevertheless, creating an

atmosphere that matches the child's behavioral and perceptual needs and responding to his needs creates motivation and self-efficacy and achieves a positive behavioral pattern.

This study aims to investigate the spatial and physical factors of spaces that effectively improve children's self-efficacy. In other words, this research seeks to answer the central question of what physical and spatial characteristics of educational spaces can strengthen self-efficacy in children. One of the essential qualities concerning physical and spatial factors is the coherence of spaces. In other words, the premise of this article is that integrating more spaces in educational spaces can lead to improving self-efficacy in children. This study is based on the theory of space syntax. Connection, depth, accessibility, and the ability to choose are among the criteria of spatial structure discussed in this article as an interconnection index. Based on this, using software analysis, the degree of interconnection of spaces and thorough surveying, the degree of self-efficacy has been measured, and this relationship has been investigated with statistical analysis.

Five examples of kindergarten educational spaces based on the components of the space structure affecting self-efficacy in children aged 3 to 6 years have been investigated. Questions are raised in this research: How is the cohesion of the educational space measured? The cohesion of space What effect does education have on the self-efficacy of 3-6-year-old children? The article's central hypothesis is that the space connection directly affects children's self-efficacy in educational spaces.

Research Background

Several types of research have been done in the direction of educational spaces in Iran or the role of combining spaces with other functions, which can be referred to in Table 1.

Table 1. The background of the compilation research (Source: Authors, 2024).

Author	Year	Subject	Methodology	Objective
Turkman, Jalalian, & Dezhdar	2019	The role of architecture and physical factors of the educational environment on facilitating children's learning.	Qualitative - logical reasoning	The purpose of this article is to explain how the design of educational spaces is suitable for children's lives and at the same time effective in the field of education.
Tabatabaiyan	2015	An analysis on the influence of built environments on children's creativity (examination of environmental characteristics affecting children's creativity in children's centers in Tehran).	Analytical-qualitative and case	In order to find those characteristics of the built environment that affect the child's creativity.
Malinin & Parnell	2012	Reconceptualizing School Design: Learning Environments for	Reviewed article	Aim to develop

		Children and Youth		understanding of the relationship between a school's physical environment, the processes undertaken to create that environment, and students' learning and self-development.
Monsur	2013	Transitional Space and Preschool Children's Play& Learning Behavior in Childcare Environment	Case study	Aim of this research is to influence design awareness and design policy for childcare environment
Shawket	2016	Improving sustainability concept in developing countries Educational Methods Instruct Outdoor Design Principles: Contributing to a Better Environment	Analytical	Spaces' design principles should be for each educational system individually in order to reach maximum benefits of the educational process
Vero, & Puka	2017	The Importance of Motivation in an Educational Environment	The study was based on several theories like, socio - educational	The study will be based on a framework familiar with some of the main definitions of the term motivation and some socio - educational and psychological theories, theory of Maslow, Herzbergs, McClelland, etc., to take a point of view from some of the perspectives and cognitive educational skills that realizes the motivation of students in the academic environment
Shaari & Ahmad	2016	Physical Learning Environment: Impact on Children School Readiness in Malaysian Preschools	literature review	this study aims to investigate and propose a clear relationship between the physical environment and school readiness in Malaysia
Sarraf, Alborzi, & Amini	2023	Effect of Physical Elements in Educational Spaces on Children's Creativity Promotion Using Graphic Analysis of Painting	Survey quantitative and qualitative	Investigating the impact of architectural elements and physical factors on the development and promotion of children's creativity and prioritizing the desired

				components.
Gerami Moghadam	2023	Analysis Effect of the Visual Quality of Body´s Educational Space on Improving Self-Efficacy of Children 4 to 6 Years Old (Case Study: Isfahan Preschools)	Analytical quantitative and qualitative	Understanding the dimensions of visual quality, visibility, and visibility play a significant role in shaping children's behavior.

By examining the background of the studies conducted in this field, researchers have conducted comprehensive and separate studies concerning educational and creative spaces, learning environments, and child psychology. However, in a study that plays a joint role, it is not possible to measure the educational environment on children's self-efficacy. Therefore, for the first time, this research is trying to achieve criteria in the design of kindergarten educational spaces to improve self-efficacy and motivation in children aged 3 to 6 years by addressing the relationship between the quality of the integration of educational spaces.

Research Method

The research method in this study is mixed in nature (quantitative and qualitative) and in terms of its process, it is descriptive-analytical using a survey. The method of collecting information is a documentary study and field collection and the use of maps and valid documents as well as a questionnaire. The statistical population in this research is children aged 3 to 6 years as users of educational spaces, parents and teachers as observers and recorders of the questionnaires, and 5 experts to analyze the questionnaire items. The statistical population of Isfahan preschools and the sample size of 5 educational spaces for children in Isfahan (Fouladshahr city) were selected purposefully and clustered. The present research has been analyzed and examined in two parts: spatial correlation analysis and children's self-efficacy. Simulation of preschool maps using computer drawings and Depth Map software. First, the plan of the samples was drawn in Autocad software and transferred to Depth Map software. Then the correlation parameters were analyzed and evaluated and the results were extracted in the form of graphical and quantitative data. The investigated connection factors are: connection, integration, line length, depth and number of nodes, which were studied separately in each of the preschools based on the space map.

To measure children's self-efficacy, a researcher-made questionnaire (Chari, 2007; Nazarpouri, Gadiri, and Shiravand, 2020) was used, and the questions were revised according to environmental conditions by experts. For this purpose, 4 self-efficacy factors "cognitive, social, behavioral and emotional skills" in the form of a questionnaire, in 20 items and with 4 answers (very easy, easy, difficult and very difficult) were designed in the press line system and available to the statistical community. The child's parents and teachers are asked by the child). After collecting information from questionnaires and entering into SPSS software, Cronbach's alpha coefficient has been measured.

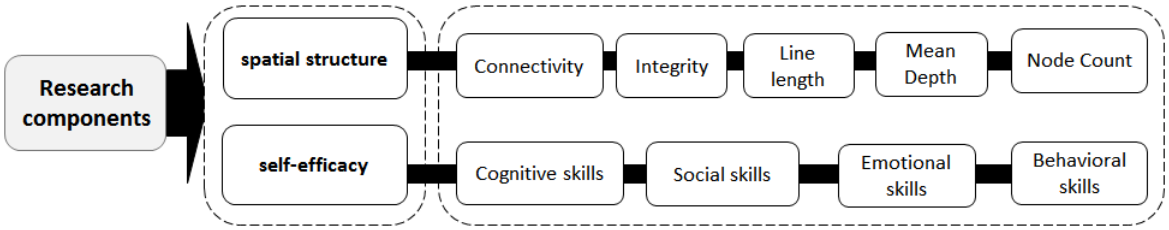


Figure 1. Components to be evaluated (Source: Authors, 2022).

Figure 1, shows the components evaluated in this study.

After research and studies on the research variables, the relationship between attachment and self-efficacy of children in preschools has been evaluated.

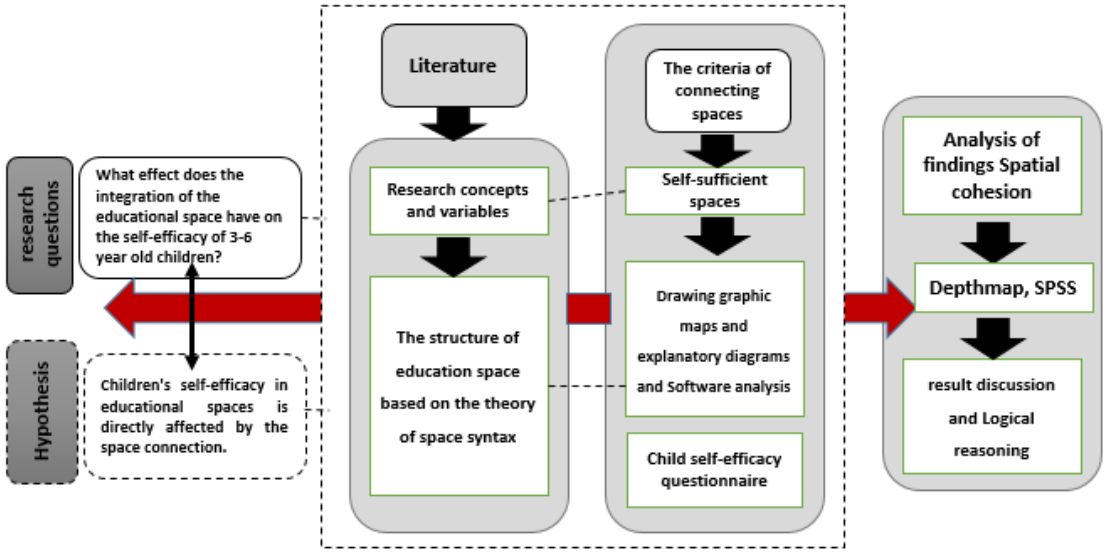


Figure 2. Process diagram of the research method Source: Authors (2022).

Figure 2, shows the process diagram of the research method in this research.

Theoretical Foundations

During the stages of his life, human beings are trying to control the environmental factors and achieve their goals. One of the abilities is self-possession and motivation. In the meantime, the need for a cohesive educational space for children based on self-efficacy is emphasized. In this regard, it is necessary to understand the concepts and the relationship between the variables in order to be able to interact with the environment.

Child and Self-efficacy

Children are comprehensible, objective, and measurable beings, and all behaviors, perceptions, knowledge, or organized concepts are general or universal (Davis, 2009). According to Vygotsky, what children can do with the help of others is more representative of their actual ability than what they can do alone (Brown, 2001: 31). Self-efficacy is one of the motivational constructs that can be adapted to environmental factors. Self-efficacy is a constructive ability by which human cognitive, social, emotional, and behavioral skills are effectively organized to achieve different goals Figure 3, (Pastorelli et al., 2001). The construct of perceived self-efficacy reflects an optimistic self-belief that facilitates goal-setting, striving, perseverance in the face of obstacles, self-discovery after facing failures, better health, more success, emotional adjustment, and better social integration. It is communication (Bandura and Locke, 2003). Self-efficacy occurs when a person feels worthy and competent because he believes in himself and expects himself to be able to do something effectively. Children who lack a sense of self-efficacy feel hopeless and unworthy (Hartley Brunner, 2011).

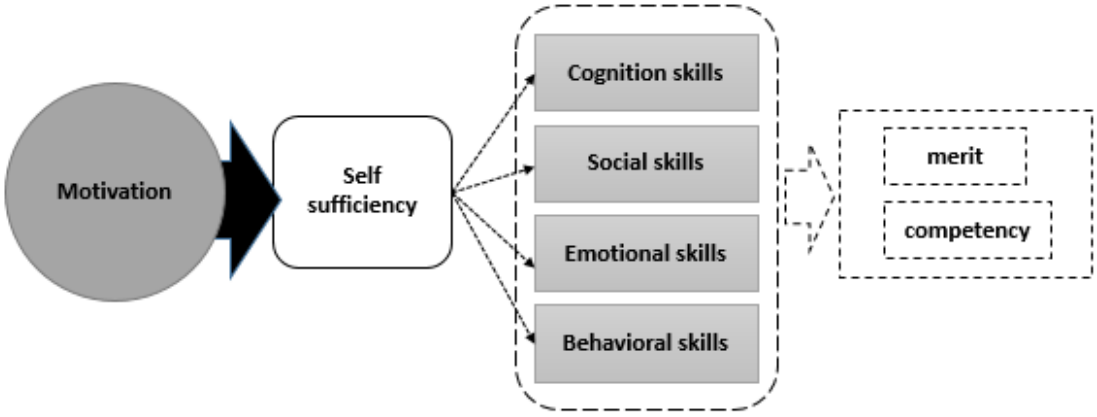


Figure 3. Conceptual model of self-efficacy.

The interaction between the learner and his social environment is the main determinant of his cognitive development. A child's cognitive development is generally dependent on the people who live in his world (Bentham, 2010). According to Bandura, environmental events affect behavior, the environment affects behavior, personal factors affect behavior, and vice versa. In Bandura's view, mutual and three-way influence of behavior, environment and cognitive factors is emphasized. In his opinion, man is an active and influential being on the environment, but at the same time, he is influenced by the environment in a lawful way. In this way, the person and the environment have a mutual effect on each other (Hassanzadeh, and Mehdinejad Gorji, 2019: 391). The child cannot express and solve the problems alone, so the child can be helped to solve them. A child's problems can be found through his behavior. By using the stages of development, the child's behavioral domain will be obtained. Children who cannot adapt themselves to the

conditions of the surrounding environment will often suffer emotional and behavioral problems in the later periods of their lives. To create the child's self-efficacy in the space, the existing space must respond to the child's skills so that the child can achieve competence and success.

Educational spaces for children

Public spaces are complex patterns of functions and contain diverse concepts and meanings, and recognizing and understanding how these relationships can be effective in designing the architectural body with quality (Khozaei, et al., 2010). Herman Hertzberger considered the school a space for children from different cultures to live, and in the design of schools, he sought to improve social relations between them (Tabaian, 2013: 394). Children's environments can be designed to support a wide range of movement possibilities and body balance control. Surfaces, texture patterns, and motifs of spaces can be provided for the exploratory movements of children curious about nature (Tabaian, 2014: 75). A successful design for children's facilities is "a design that gives the child opportunities to explore, grow and learn." Preschool educational spaces support children's growth by providing external and internal areas (Sahin and Türkün Dostoğlu, 2012). People who design for children should know how children explore and are familiar with the environment in which they grow (Lueder, and Rice, 2014: 57). It is necessary for the child to be physically, emotionally, and mentally developed enough to enter the school. The educational environment is different from the home environment. The child may have emotional reactions or behavioral incompatibility upon entering this environment. In the children's educational space, the two-way relationship between the child and the space is intended to lead to a better understanding of the child and a feeling of satisfaction from that space.

Spatial integrity

The combination of spaces forms a spatial structure that consists of relationships and internal actions of spaces. Spatial structure causes special perceptual qualities that play a fundamental role in experiencing and understanding architectural work (Dorri, and Talischi, 2017: 41). The organization of the space should encourage children to follow their interests, answer their questions, show what is on their minds, build healthy relationships, and love learning (Nikolova, 2012). The space syntax technique, the science of space configuration, was founded by Bill Hillier in collaboration with Julian Henson (Hillier and Hanson, 1989). The method of space arrangement is a developed approach to analyzing the spatial structure of artificial environments, the purpose of which is to describe spatial models and display these models in the form of graphic forms and, as a result, to facilitate scientific interpretations of the desired spaces. (Manum, 2009: 3; Mustafa and Hassan, 2013: 445). One of the tools for analyzing space structure is justification diagrams, the basis of which is derived from the theory of graphs. The structure of each environment is drawn in the form of a graph (Brown, 2001), taken from (Heydari, 2016).

The syntax technique indicators of space structure analysis include connection, depth, coherence, and accessibility. The coherence of each space in spatial configuration means the degree of continuity or separation of that space compared to other existing spaces. Space has much interconnection that has more integration with other spaces. To move from any space with a high amount of co-connection to all other spaces in the system, fewer changes are formed in the person's orientation (Peponis, Zimring, and Choi, 1990: 765; Penn, 2003: 45). The greater the number of connections with a space from its neighboring spaces, the more connected that space is (Heydari, 2016: 24). Cohesion is the most basic concept of space arrangement. The connection of each line (space) is the average number of lines (spaces) of its interface from which all other spaces can be reached Figure 4, (Abbaszadegan, 2002: 69).

The greater the connectivity, the greater the accessibility, the presence of people, the optimal space circulation and the ability to use the space (Hillier, 2007: 202). In the spatial configuration, the more the spatial depth increases, the more private the space will be. A large depth is not suitable for public uses and causes a decrease in access to space and a decrease in access to space and a decrease in permeability (Mustafa and Hassan, 2013; Heydari, 2016).

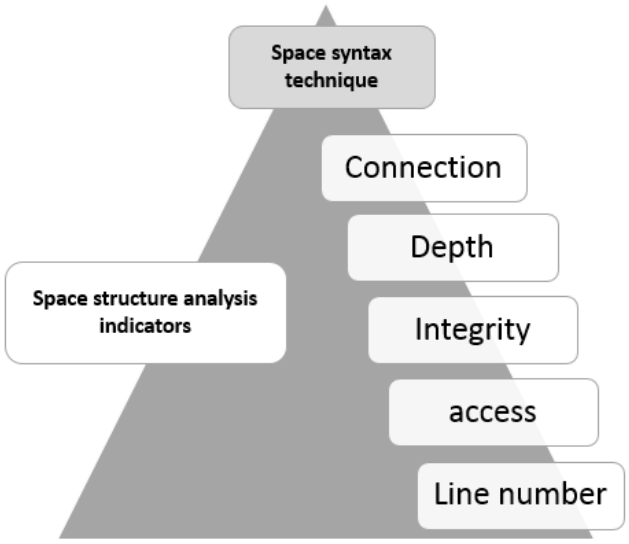


Figure 4. Space structure analysis indicators.

This research used the space coherence index, including space integration, to determine spatial relationships and the degree of children's self-efficacy orientation.

Improving self-efficacy through space integration

Interconnection is the main concept of space composition, which was developed based on the method of space arrangement (Abbaszadegan, Mukhtarzadeh, and Bidram, 2013: 50). It can be explained that spatial arrangement is not directly responsible for environmental behavior, but

finding the mental structure of spatial arrangement based on spatial cognition is responsible for environmental behavior. For this purpose, there is a two-way relationship between spatial cognition and spatial arrangement. Besides being a driving force in human behavioral activities in the artificial environment, spatial arrangement is the only means to influence the spatial knowledge obtained by human movement in the artificial space (Heydari and Taghipour, 2017). Self-efficacy is the assurance that a person successfully implements a specific behavior and expects the obtained results (Bandura and Schunk, 1981). they are setting goals and making commitments (Strobel, Tumasjan, and Sporrle, 2011). there is a relationship between the person and the environment, a relationship that leads to the occurrence of individual behaviors. The environment and people are a function of the living space, so to understand, we must get to know the environment and personality of the person (Khozaei et al., 2010: 149) (taken from Abdi, 2019).

Theoretical basis model

Based on the theoretical foundations and background of the research, the theoretical model of this research is shown in Figure 4. Based on this, children's self-efficacy in educational spaces varies according to the factors of educational spaces. Self-efficacy skills have been investigated by examining children's educational spaces.

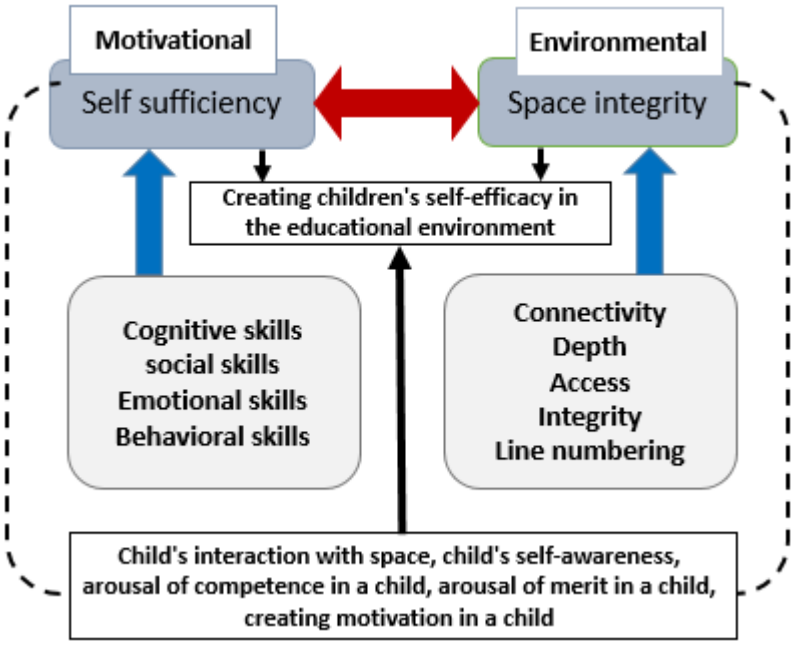


Figure 5. The theoretical model of the research (Source: Authors, 2022).

The assessment of this model, examining and analyzing the concepts and operationalizing them in the research framework is given.

Results and Discussion

Introduction of studied samples

The educational environment is responsible for creating opportunities for growth, character formation, discovery and learning. Environmental designers should respond to the needs by creating special educational spaces for users. Some preschools in the country are designed based on various plans and some are working in residential houses. In order to investigate the effect of the integration of educational spaces on improving the self-efficacy of children aged 3 to 6 years, 5 samples of preschools in Fooladshahr, Isfahan have been studied. To find and understand the spatial structure, Figure 6, Stare preschool (Mirmiran Engineer's design), Figure 7, Shaperk Mehr preschool (change of use from commercial to educational with interior space changes), Figure 8, Deserving Child preschool (residential space), Figure 9, Bagh Khatereh preschool (residential space), Figure 10, Mehr and Mah preschool (residential space) have been selected.

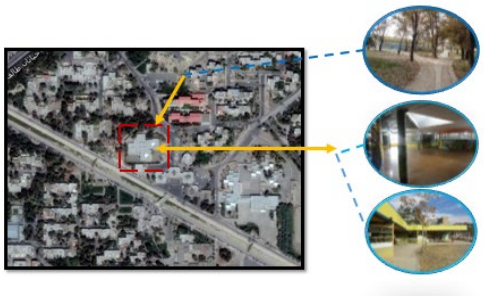


Figure 6. Setare preschool, neighborhood A2.

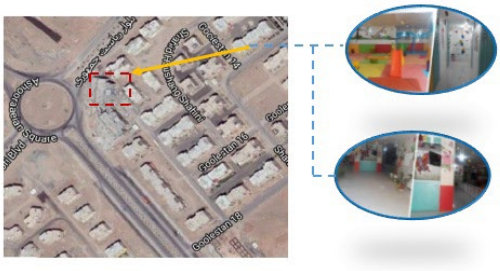


Figure 7. Shapark Mehr preschool, neighborhood E6.

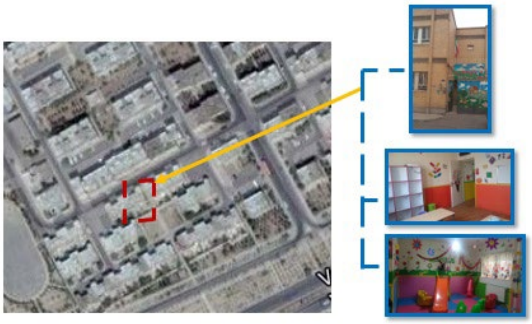


Figure 8. Deserving child preschool, neighborhood B1.

Figure 9. Bagh Khatereh preschool, neighborhood B6.

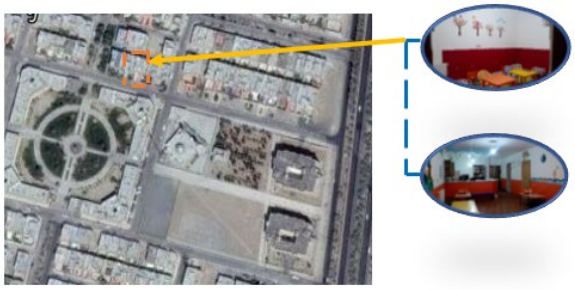


Figure 10. Mehr and Mah preschool in neighborhood C5.

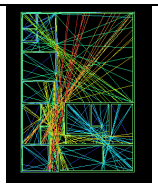
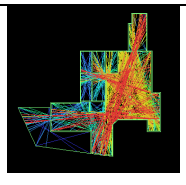
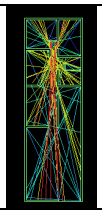
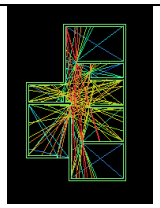
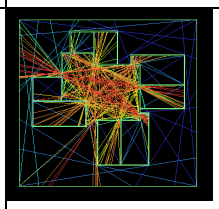
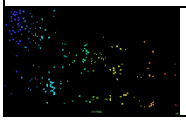
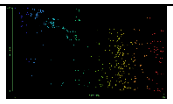
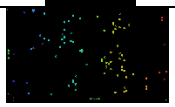
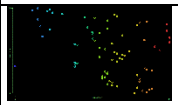
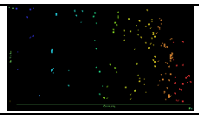
Research findings

The findings of the research have been analyzed based on the spatial structure and examination of interconnection indices in connection, integration, line length, depth and number of nodes. In the following, the findings are presented separately.

a. Spatial structure analysis

For the quantitative and syntactic analysis of the studied spaces based on preschool maps, depth map specialized software has been used. Spatial communication analysis based on graphic and visual representation. According to Table 2, the analysis of the space structure of the studied preschools is presented separately.

Table 2. Analysis of the spatial structure of the studied preschools (Source: Authors, 2022).

Analysis of the maps of the studied preschools					Parameters	Analysis of preschool spaces
Kodadk shayesteh	Shaparak mehr	Mehr Mah	Baghe khatereh	Setareh		
					Connectivity	
						

Based on the Axial movement test and the ability to understand the space, the plan of each preschool has been checked. The explanatory graphs of each preschool have shown the criteria of connection in connection, integration, depth, line length and node, which express the difference in the structure of connection of spaces.

b. Analysis of the degree of connection between spaces

In order to achieve better and more accurate results for this research, the degree of connection between spaces and the interconnection of space has been investigated. Table 3, shows the evaluation of spatial structure indicators in the studied preschools quantitatively (based on the results of Table 2). In this table, the highest correlation with bold red color and blue color shows the least correlation.

Table 3. Evaluation of the indicators of the structure of preschool spaces (Source: Authors, 2022).

Kodakshayesteh	Shapark Mehr	Mehr Mah	Bagh Khatereh	Setare	Indicators	
94	318	75	64	115	Connectivity	Space structures
6.78	16.48	25.39	22.5	18.27	Integration	
19.13	35.45	22.19	17.52	34.25	Line Length	
1.78	1.38	1.16	1.17	1.26	Mean Depth	
235	458	90	78	155	Node Count	

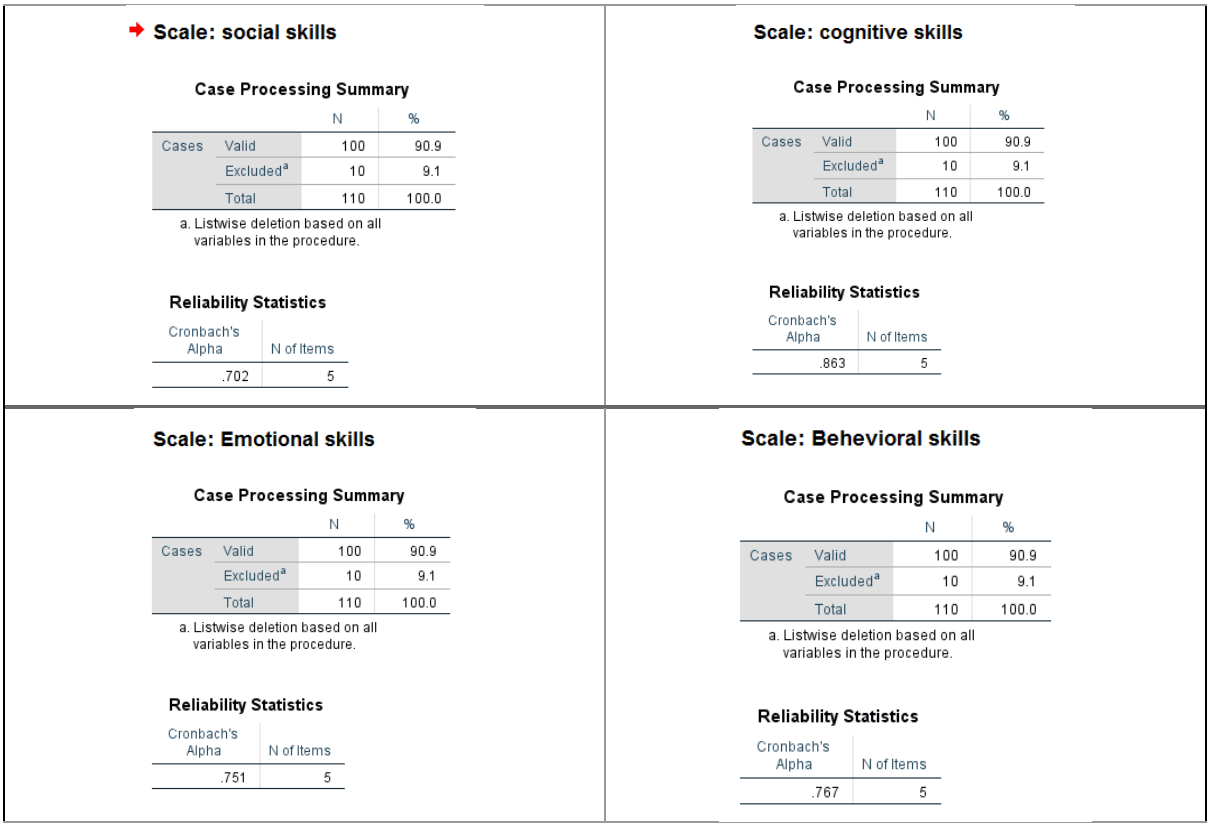
Based on the movement test and spatial understanding in Shapark Mehr Preschool, it has the highest level of connectivity of 318 among the preschools, the level of connectivity is 16.48, which has a suitable space in terms of connectivity, and it has a high depth of 1.38, which It indicates a decrease in access to space and a decrease in permeability. Due to the presence of a large hall and easier access to classes, Stare Preschool has a high spatial connection, 115 connectivity and 18.27 connectivity, and a lower depth of 1.26, which indicates proper spatial integration and connectivity. Due to the location of the classes on two different fronts and the access of some classes directly to the yard and the only connection to the yard, the preschool of the worthy child is more deep by 1.78, has more nodes and fewer connections by 94. In Bagh Khatereh Preschool, due to the two-story building, two separate sections, the communication space of the two floors is connected to the divided corridor by a staircase, has the lowest connection factor of 64 and the highest connection ratio of 22.50. Mehr and Mah Preschool is spatially connected to all classes through a communication route of corridor, which has the highest connection rate of 25.39 and the lowest connection rate is 75.

c. Analysis of self-efficacy scale items

In order to check the validity of the research, statistical indicators related to questions and coefficients are presented. In total, the questionnaire was completed by 100 respondents (based on the statistical population). The questions and how to answer them were explained by the authors for the questioners (parents and teachers). The results of the questionnaires in the press line system, which were completed by the parents and the teacher from the child's questions, were collected. Next, to check the reliability of children's self-efficacy, Cronbach's test coefficient was used in 4 self-efficacy skills such as cognitive skills, social skills, emotional skills and behavioral skills to measure internal correlation.

After entering the information of the items in SPSS software, the analysis was done and the results of Cronbach coefficient of self-efficacy were obtained shown in Table 4.

Table 4. Example of the evaluated skills and Cronbach's coefficient in SPSS software.



Scale: social skills

Case Processing Summary

		N	%
Cases	Valid	100	90.9
	Excluded[a]	10	9.1
	Total	110	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.702	5

Scale: cognitive skills

Case Processing Summary

		N	%
Cases	Valid	100	90.9
	Excluded[a]	10	9.1
	Total	110	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.863	5

Scale: Emotional skills

Case Processing Summary

		N	%
Cases	Valid	100	90.9
	Excluded[a]	10	9.1
	Total	110	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.751	5

Scale: Behevioral skills

Case Processing Summary

		N	%
Cases	Valid	100	90.9
	Excluded[a]	10	9.1
	Total	110	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.767	5

The results of the 5 preschool children studied in SPSS software are given in Table 5, in the form of Cronbach coefficient reliability values.

Table 5. Reliability values of Cronbach's coefficient (Source: Authors, 2022).

Cronbach´s results in children´s self-efficacy						
Index	**Reliability Statistics**	**Setare**	**Bagh Khatereh**	**Mehr Mah**	**Shapark Mehr**	**Kodak shayesteh**
Cognitive skills	N of Items	5	5	5	5	5
	Cronbach´s Alpha	0.762	0.672	0.667	0.784	0.672
Social skills	N of Items	5	5	5	5	5
	Cronbach´s Alpha	0.754	0.595	0.516	0.761	0.702
Emotional skills	N of Items	5	5	5	5	5
	Cronbach´s Alpha	0.667	0.536	0.61	0.7	0.614

Behavioral skills	N of Items	5	5	5	5	5
	Cronbach´s Alpha	0.767	0.444	0.541	0.615	0.602
Cronbach´s Alpha Average		0.738	0.562	0.538	0.716	0.648

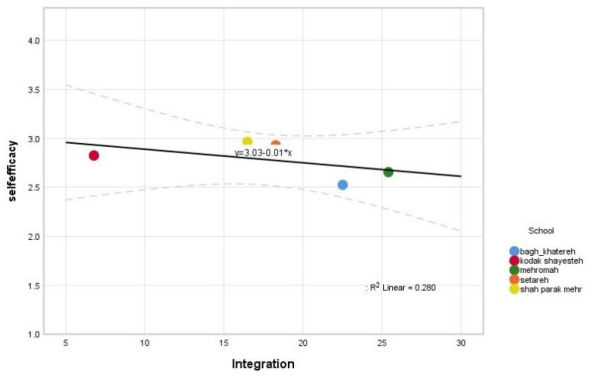
The reliability of the Cronbach's coefficient of children's self-efficacy with indicators of cognitive, social, emotional and behavioral skills with 5 items in Stare, Bagh Khatereh, Mehr and Mah, Shaparak Mehr and Kodak Shayesteh preschools shows that the average Cronbach's alpha coefficient in Setareh primary schools with a score of 0.738 (r= 0.738) and in Shaparak Mehr preschool with a score of 0.716 (r= 0.716) and this indicates that there is a significant positive relationship between self-efficacy in Setareh and Shaparak Mehr preschools. Cronbach's alpha coefficient is lower than 0.7 in Bagh Khatereh, Mehr and Mah and Kadak Shayesteh preschools. which shows the lack of significant correlation of children's self-efficacy in existing spaces. The mentioned findings show the convergent validity of children's self-efficacy scale in two preschools of Setareh and Shaparak Mehr.

d. The relationship between attachment and self-efficacy of children in preschool

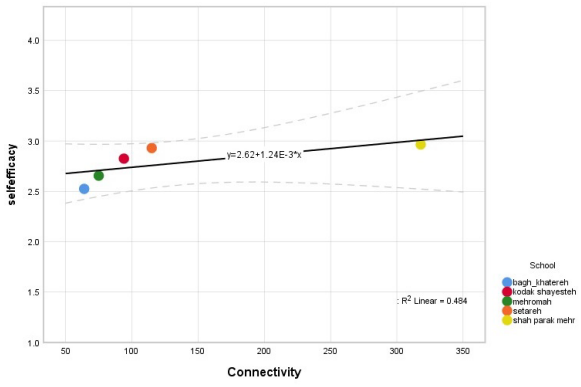
In order to achieve the results in this study, after understanding and examining the spatial structure of each of the preschool spaces and evaluating children's self-efficacy, the correlation between spaces and children's self-efficacy was measured, which is shown in Table 6.

Table 6. Evaluation of diagrams of the effect of spatial integration on children's self-efficacy (Source: Authors, 2022).

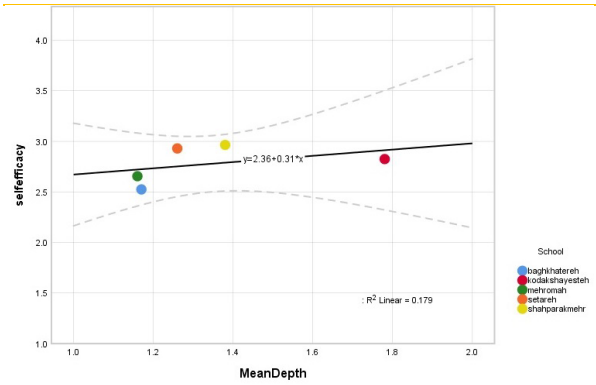
Diagram of the effect of space on self-efficacy



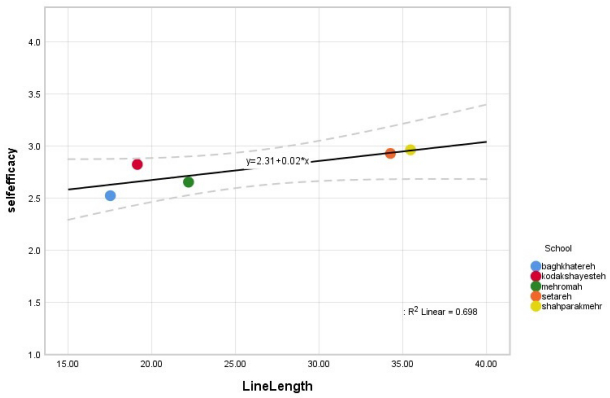
The effect of integration on self-efficacy



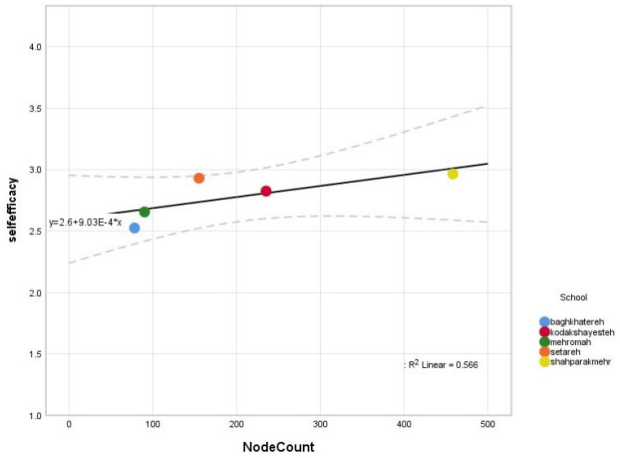
The effect of connection on self-efficacy



The effect of mean depth on self-efficacy



The effect of line length on self-efficacy



The effect of node count on self-efficacy

In the Table, the points around the line show the uniform distribution of the data. The way Shapark Mehr and Setareh preschools are placed on the top of the line shows the more significant influence of space on self-efficacy. Since there is a direct relationship between the connection and the connection, according to the above Figure, the correlation is positive. As connectivity increases, children's self-efficacy increases.

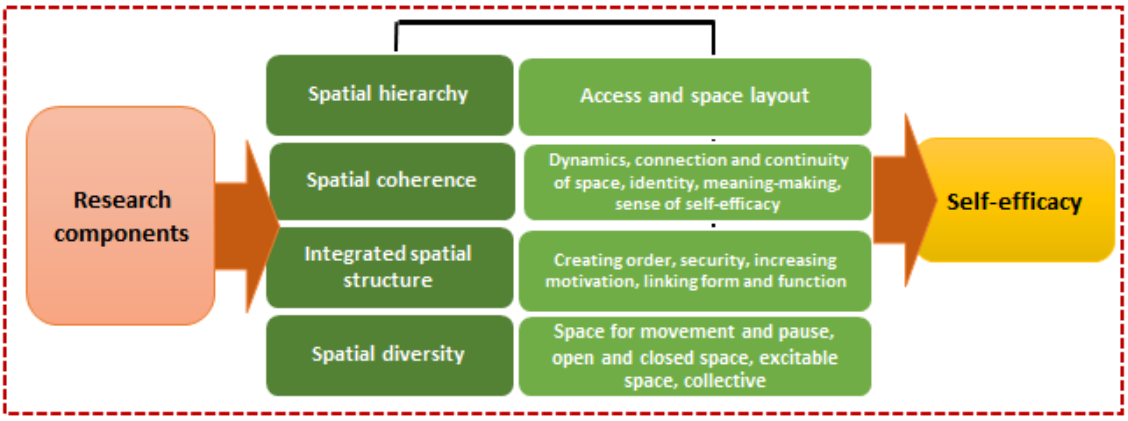


Figure 11. Relationship between spatial structure and self-efficacy (Source: Authors, 2024).

The results of studies conducted on the relationship between research components are presented in Figure 11, which shows that studying, understanding, and applying spatial structure and behavior in child-specific designs leads to quality environments that will lead to children's growth and satisfaction.

Conclusion

Children's educational spaces are known as one of the key factors in the learning, growth and motivation process of children. The appropriate architectural design of these spaces plays a significant role not only in academic achievement, but also in the emotional, social, cognitive and behavioral development of children. In this regard, the architecture of educational spaces using natural light, open spaces and creative designs based on location and motivational components can provide a safe and inspiring environment.

The investigations carried out in the current research revealed the identification and understanding of the role of the educational environment. The research literature shows that cognitive, social, emotional and behavioral skills are effective in improving the child's self-efficacy. In Table 2, the indicators of preschool space structure analysis are evaluated using depth map software and shown in graph form. In Table 3, the evaluation of spatial structure indicators quantitatively shows that each of the spaces has a different connection based on the layout and accessibility of the spaces. The findings of the research indicate that in the samples that have more spatial connections and less depth, there is also more connection.

Psychometric findings for children's self-efficacy in cognitive, social, emotional, and behavioral skills are given in Table 5. The reliability of Cronbach's alpha coefficients obtained indicates a significant positive correlation between self-efficacy and spatial coherence. Since coherence is directly related to connectivity, according to Table 6, the correlation is positive. With increasing connectivity, self-efficacy in children increases. According to the research

conducted, a correlation between the coherence variable and connectivity has been achieved among Setare and Shaparak Mehr preschools, and the level of spatial understanding for children is higher, indicating that the plan has higher accessibility and readability, which indicates a suitable model for preschoolers. The results obtained confirm that in educational spaces where coherence is higher, the level of cognitive, social, behavioral, and emotional skills in children is higher, and this indicates the effect of spatial coherence on children's self-efficacy. Also, the results based on Figure 11, showed that the child's self-knowledge and interaction with space cause self-efficacy and create arousal of competence, competence, satisfaction and security in the child.

Accordingly, the optimal design of preschool spaces based on the components of spatial hierarchy, spatial coherence, integrated spatial structure and spatial diversity creates a sense of security, self-confidence, enthusiasm and satisfaction in children. Such design patterns can lead to the creation of spaces that stimulate children's self-efficacy. By understanding educational spaces, analyzing spatial structure and identifying children's developmental-psychological, environmental and skills needs, spaces specific to children can be achieved.

Author Contributions

All authors contributed equally to the conceptualization of the article and writing of the original and subsequent drafts.

Data Availability Statement

Not applicable

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Ethical considerations

The study was approved by the Ethics Committee of the Islamic Azad University, ShK.C. The authors avoided data fabrication, falsification, plagiarism, and misconduct.

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Conflict of interest

The authors declare no conflict of interest.

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