

Child-friendly kindergarten architecture: Perspectives of children in Iran

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Abstract

Currently, architects are aware of the impact of the environment on children's development. This study investigated children's attitudes and mental images of a child-friendly kindergarten in order to identify its architectural indicators. The research was conducted in Gorgan, Golestan province, Iran. The statistical population of the study consisted of 251 children aged 3 to 7 who were randomly selected from 17 classes in 6 governmental institutions and 5 private institutions prepared for this age group. To discover the expressed interests of children, field studies were used with participatory tools such as semi-structured draw-and-tell interviews about what they had drawn or failed to draw. Concepts extracted from children's drawings and interviews were coded by MAXQDA10 software and classified into five categories: Built environment, Landscaping, Natural environment, Conceptual-symbolic themes and so on. Data were analysed using statistical methods. The results indicated that by linking the natural environment, landscaping and the built environment, a child-friendly kindergarten can be created and that the importance of the connection between architecture and nature is well represented in the mental images of children through landscaping. The results of study, which are applicable in similar fields, raises architects' awareness of the importance of collaborative design with children.

Keywords: child-friendly architecture, kindergarten, collaborative design, Iran

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Introduction

The main part of human personality is formed during the first seven years of life. There is increasing awareness that the quality of physical environment plays a critical role in young children's behavior and cognitive and social development in early childhood education and care (ECEC) by offering opportunities for exploration and interaction (Rustin, 2016; Berti et al., 2019; van Liempd et al., 2020). This requires that in addition to paying attention to the inferred needs of children that others infer from them, they ought to pay attention to their expressed needs (Noddings, 2005, pp. 147-148; Noddings, 2019).

An effective method to determine children's perception of the physical environment and to discover their inner world is to draw pictures and analyse it (Günindi, 2012). During the process of drawing pictures, the child synthesizes his thoughts and feelings on the issue with his observations, and expresses them through colors, shapes and lines. Children reflect the way they perceive the world by combining their daily observations with their own thoughts (Anning & Ring, 2004; Burkitt & Barrett, 2011; Huntsinger et al., 2011; Günindi, 2012; Mavers, 2013; Macleod et al., 2016; Farahnak, 2016; Campbell & Bond, 2017; Agarwal et al., 2021).

Despite concerns that information obtained by children may be unreliable, recent studies have shown that by using appropriate data collection techniques, such as participation, children are able to express their opinions from an early age (Coyne, 2006; Water et al., 2017, p. 4). They are very aware of their environment and can express their environmental needs (Driskell, 2002; Xu & Izadpanahi, 2016; Water et al., 2017, p. 4; Coyne, 2006). Numerous collaborative design projects with children have been formed in America, New Zealand, Turkey, Japan, Denmark, France, Italy, and other parts of the world (Driskell, 2002; Wake, 2011; Government of South Australia, n.d.; North Carolina State University, n.d.; Önder, 2013; Xu & Izadpanahi, 2016; Tomokawa et al., 2020). It Therefore, child participation can be put on the government and local community planning agenda (Winge & Lamm, 2019).

A child-friendly city is a city created with their participation and is loved by the people (Riggio, 2002; Huang, 2020). Numerous scientific sources have mentioned cases in relation to child-friendly city indicators, including: safety and security, access to facilities and

activities and services, access to nature and green spaces, participation and valuation of children, creation and design of recreational environments and entertainment for children, the possibility of innovations for the child in space (creative space), proper access and communication in the environment, and the existence of various public spaces for interactions (Driskell, 2002; Howard, 2016). Given the importance of child-friendly environments, this research aims to identify the architectural design indicators of child-friendly kindergartens. By examining the researches done in this field, it can be concluded that categories such as physical environment, landscaping, natural environment, conceptual and symbolic themes are important and can be examined (Driskell, 2002; Howard, 2016).

Collaborative designs with children under the age of 7 is less common than other age groups (Hiniker et al., 2017), the target population of this study encompass children under 7. As a child under 3 years of age has not yet acquired the necessary motor skills to hold crayons to draw, the purpose of this research is to identify the design indicators of a child-friendly kindergarten in Gorgan city in Iran for children aged 3 to 7 years. The following questions are meant to be answered in this investigation:

- 1- Which of the following subcategories is more effective in creating a child-friendly space? And what are the connections between each other?
- 2- Are the views of girls and boys the same about each of the mentioned dimensions for designing their lovely space?
- 3- Do Children 3 to 7 years old notice each of these dimensions identically so as to design their lovely space?

The main hypothesis of the present study is that by linking the extracted concepts from the children's drawings and interviews, child-friendly kindergarten architecture can be created. Using this hypothesis, it is possible to test different hypotheses consisting of two correlated parts that are related to these categories. After evaluating these relationships, only one hypotheses was accepted and is as follows: using the natural environment in the design of the kindergarten, through landscaping while having a positive effect on the built environment of the institution, creates a child-friendly environment in the design of the kindergarten. It is also assumed that children's perspectives in the two groups of boys and girls, as well as the age groups of 3 to 7 years, are different in each area of built

environment, landscaping, natural environment, and conceptual and symbolic themes for the design of their beloved space.

Methodology

Research setting

This study has identified the mental images of children in the city of Gorgan, a brief description of the natural features of Gorgan is given. The study site is Gorgan, the capital of Golestan province, on the northeast side of Iran. The city has a temperate climate with a population of about 480,000. In terms of natural features, the city has three plain, foothill and mountain areas. The environment of the region is very diverse and includes mountains, forests, meadows, plains, plains, deserts, dunes, seas, bays, rivers, wetlands and agricultural lands (Figure 1) (Gorgan Municipality, n.d.). The historical texture of Gorgan, that has its own architectural style, is regarded as the most unique historical texture of northern Iran and was recorded on the list of Iranian national monuments in 1310 (Ministry of Roads and Urban Development, n.d.).

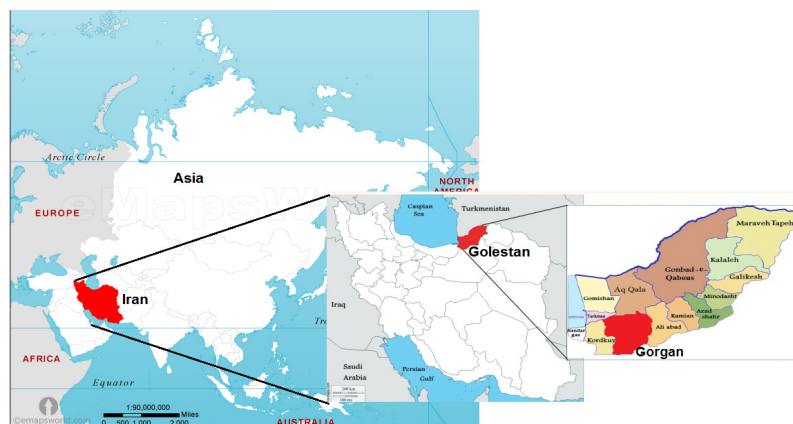


Figure 1. Map showing the location of Gorgan

Participants

Since the subject of this research was to study the views and mental images of a child-friendly kindergarten, any space where there was access to children and relevant institutions cooperated was used to select the target community from. At this point, there was no need for children to be selected from kindergartens. It was also observed that during field studies families with impoverished backgrounds would take their children to governmental culture houses. For this reason, the statistical population of the research consisted of 251 children aged 3 to 7 years in Gorgan who were randomly selected from 17 classes in six governmental institutions and five private institutions prepared for this age group. Of this number, 124 were boys and 127 were girls (Table 1). The statistical population was randomly selected because the mental images of children in different age groups and with different social and economic status vary, both in the high-income and low-income groups, and also based on the level of cooperation of institutions.

Table 1. *Participants Demographic by Age and Gender*

		year					Total
		3.0	4.0	5.0	6.0	7.0	
gender	Female	12	5	29	21	60	127
	Male	17	4	25	26	52	124
Total		29	9	54	47	112	251

Data collection

In this study, the process of fictional inquiry were used with participatory tools such as drawing and semi-structured interviews about what they have drawn or failed to draw. In the process of fictional inquiry, a fictional theme named "City of Kids" was used in which children pretended to play a role. Children's City is a fictional and favorite city of children, which the kind angel makes for them according to the children (Robson, 2012; Xu & Wong, 2013). Draw-and-tell interviews, which is an arts-based approach, also provides an opportunity for children to gain insight into their surroundings (Linder et al., 2017; Stokas, Strezou, Malandrakis, & Papadopoulou, 2017, p. 10).

Prior to entering the research institutes, formal permissions were obtained from relevant organizations such as rehabilitation, municipality and education in order to ensure research ethics. They were assured that paintings and interviews would not be used where they behaved inappropriately, and that this only served a research purpose. Additionally, during or even after the research, the children of the participants will not be harmed, and if the interview causes problems for the participants, it will be cancelled. They were also assured that the information collected was confidential and anonymous, not leaking, with the authors being responsible for such shortcomings. Since the participants in this research were children, an informed consent form containing goals, research procedures and the necessary points, was distributed among parents so that they could complete the form with awareness.

After a friendly chat with the children to establish a warm and comfortable relationship with them, the first author read “children’s city”, a fictional theme composed with the assistance of one of the child educator, in a childish language to introduce the children to the scope of the study. After the first author read the fictional story related to the research, A-4 size sheets of white paper were distributed to the among the children. The children were then asked to paint their favorite building that would be built by the kind angel (one of the fictional characters) in the children’s city (Figure 2).

After giving the child educators necessary knowledge about the subject and purpose of the research, the first author asked that it be done without giving the children a mental images. They were also given the comfort that if they could not paint the image in their minds, after drawing they would be able to describe it to the first author, who is in the role of the kind fairy, during their interviews. The children then painted individually. They were not allowed to use any extra drawing tools, such as rulers and templates or other printed or electronic images, or to consult with their classmates; but they were allowed to paint with any color.

At the end, each child was interviewed about the content of her/his drawing and their voice was recorded. The final readings of the drawings were also done in consultation with their instructors. This way, the instructors assisted the researcher with the ambiguity in some of the drawings, given their personal knowledge of each child. These steps were initially tested in one of the classes, the defects were fixed, and then implemented in other

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Figure 2. Examples of the children's drawings

institutions. In each class, drawing by children and interview afterwards was done during two-hour sessions. The entire data set was collected over a period of about two months; part of this time was spent on coordinating and taking time from the instructors and collecting

the informed consent forms.

Procedure

Drawings and interviews were collected from children on the subject of the research. In the next step, all drawings, in the form of image files, as well as all interviews, in the form of text files, were entered into the MAXQDA 10 qualitative data analysis software for analysis and coding. After the initial coding, all the concepts seen in the children's drawings and interviews were divided into five categories: 1 – built environment 2 - landscaping 3 - natural environment 4- conceptual and symbolic themes and 5- others, each containing their own subcategories and concepts. Only their subcategories are shown in this section (Diagram 1). In this research, built environment means architectural issues. Although abundantly found in children's drawings and interviews, the others category, which includes people, vehicles, toys and food, was excluded because of its lack of relevance to the subject of architecture. All data extracted from MAXQDA 10 software were manually entered into SPSS software for statistical analysis.

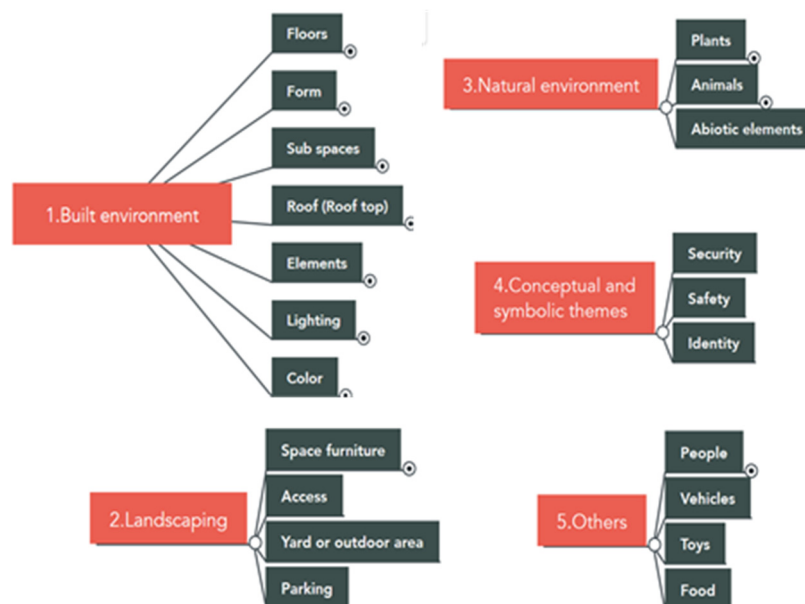


Diagram 1. Categories and subcategories extracted from the children's drawings and interviews

Data analysis

In SPSS software, reliability results obtained using Cronbach's alpha coefficient was 0.738, so the reliability is desirable (Table 2). Frequency comparison of each category of built environment, landscaping, natural environment and conceptual and symbolic themes as well as their subcategories, also frequency comparisons of each of the said categories by age and gender are described in the results section. Shapiro-Wilk test for all variables with significance level of 0.000 showed that the variables have abnormal distribution, so nonparametric tests were used for inferential statistics. Using Friedman test, their categories and again their extracted subcategories, was ranked and their relationships were evaluated using Spearman correlation coefficient. In order to identify differences in the concepts extracted in boys and girls, the Mann-Whitney U test, and to identify differences in the concepts extracted at different ages the Kruskal-Wallis test was used. The method of reasoning in this research is completely inductive. Also, this study, while being practical in terms of purpose and descriptive-analytical in terms of research method, has a quantitative-qualitative approach.

Table 2. *Reliability Results Using Cronbach's Alpha Coefficient*

Cronbach's Alpha	N of Items
.738	60

Results

The results of the descriptive statistics show that the most frequency is related to the built environment category, followed by natural environment, landscaping, and finally the conceptual and symbolic themes. In terms of built environment, the subcategories of form, elements and then ceiling and floors and levels had the highest frequency and the category of sub spaces was the least frequent; such that the right angle and one-part form had the highest share among the form subcategory. Windows and doors had the largest share in the elements category, with the most common being right angled windows and doors in their

subsequent subcategories. Also, in the ceiling subcategory, children preferred gable roofs and flat ceilings rather than curved ceilings. In the floors and levels subcategory, the most common type was the tall building (five floors and up) followed by the one-story building. Also during the children's drawing and interviewing processes, the emphasis was on interior lighting rather than facade lighting. In landscaping category, yard or outdoor area was the most frequent and parking the least. In natural environment category, the subcategory of abiotic elements and plants had the highest frequency and the subcategory of animals had the least. Among abiotic elements, the sun and clouds were the most abundant; among plants, flowers and grass were most preferred by children and among animals, birds and insects were the most frequent. In the category of conceptual and symbolic themes, the most frequent was the subcategory of identity, followed by security and, finally, safety (Table 3).

Table 3. *Frequency of categories' subcategories and concepts*

Built environment	Floors (21%)	First floor (37%)	
		Second floors (7%)	
		Third floors (13%)	
		Fourth floors (4%)	
		Tall building (39%)	
	Form (23%)	Right angle form (48%)	
		Curved form (3%)	
		One-part form (45%)	
		Multi-part form (4%)	
	Sub spaces (2%)	Play and sport room (37%)	
		Service and support (26%)	
		Stairs and elevator (37%)	
	Roof (Roof top) (22%)	Curved ceiling (13%)	
		Flat ceiling (33%)	
		Gable roof (54%)	
	Elements (23%)	Door (34%)	Right angle door (85%)
			Arched door (12%)
			Curved door (3%)
		Window (38%)	Right angle window (71%)
			Curved window (11%)
			Windows with different geometries (4%)
			Attic window (14%)
		Chimney (10%)	
		Antenna (2%)	
		Exit slide (1%)	

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		Entrance stairs (5%)
		Furniture (10%)
	Lighting (5%)	Interior lighting (90%)
		Exterior lighting (10%)
	Color (4%)	Colored windows (67%)
		Colored door (20%)
		Colored roof (13%)
	Landscaping	Playground equipment (76%)
		Entrance sign (24%)
		Space furniture (23%)
		Access (6%)
		Yard or outdoor area (68%)
		Parking (3%)
	Plants (32%)	Broad-leaved tree (23%)
		Needle-leaved tree (13%)
		Grass (32%)
		Flower (32%)
	Animals (20%)	Birds (30%)
		Domestic mammals (14%)
		Wild mammals (9%)
		Reptiles (9%)
		Aquatic animals (15%)
		Insects (23%)
	Natural environment	Sun (38%)
		Cloud (31%)
		Sky (7%)
		Star (4%)
		Rainbow (4%)
		Rain drops (3%)
		Water (3%)
		Lake (2%)
		Snow (2%)
		Sea (2%)
		River (1%)
		Moon (1%)
		Stone (1%)
		Wind (1%)
		Sand (1%)
		Mountain (1%)
Conceptual and symbolic themes		Security (36%)
		Safety (22%)
		Identity (42%)

Descriptive statistics were extracted to study the differences between boys and girls of different ages regarding the four categories of built environment, landscaping, natural environment and conceptual and symbolic themes. According to these statistics, girls, at 88.2 percent, were more likely than boys, at 82.3 percent, to refer to the built environment in their drawings and interviews, with 7-year-old children, in both groups of boys and girls, paying the most attention to it (Table 4). Also, girls, at 58.3 percent, were more likely than boys, at 42.7 percent, to consider landscaping, with 7-year-olds once again being most interested in it in both gender groups (Table 5). Additionally, girls, at 85.8 percent, mentioned the natural environment more than boys, at 71.8 percent, in which 7 year old children were again the most interested in both groups (Table 6). But on the subject of conceptual and symbolic themes, in contrast to previous results, boys, with a frequency of 24.2 percent, were more interested than girls, with a frequency of 8.7 percent, with boys in the 7-year-old group being more likely than others to mention it (Table 7).

The Friedman test was used to rank the categories as well as their subcategories that were effective in creating a child-friendly environment. As Table 8 shows, the highest rank is the built environment variable, followed by the natural environment, landscaping, and finally

Table 4. *Output of the Descriptive Statistics of the Built Environment Variable by Age and Gender*

gender			year					Total	
			3.0	4.0	5.0	6.0	7.0		
Female	Built environment	No	Count	8	1	3	2	1	15
			% of Total	6.3	0.8	2.4	1.6	0.8	11.8
		Yes	Count	4	4	26	19	59	112
			% of Total	3.1	3.1	20.5	15.0	46.5	88.2
	Total		Count	12	5	29	21	60	127
			% of Total	9.4	3.9	22.8	16.5	47.2	100.0
Male	Built environment	No	Count	10	2	4	2	4	22
			% of Total	8.1	1.6	3.2	1.6	3.2	17.7
		Yes	Count	7	2	21	24	48	102
			% of Total	5.6	1.6	16.9	19.4	38.7	82.3
	Total		Count	17	4	25	26	52	124
			% of Total	13.7	3.2	20.2	21.0	41.9	100.0

Table 5. *Output of the Descriptive Statistics of the Landscaping Variable by Age and Gender*

gender			year					Total	
			3.0	4.0	5.0	6.0	7.0		
Female	Landscaping	No	Count	12	5	17	9	10	53
			% of Total	9.4	3.9	13.4	7.1	7.9	41.7
		Yes	Count	0	0	12	12	50	74
			% of Total	0.0	0.0	9.4	9.4	39.4	58.3
	Total	Count	12	5	29	21	60	127	
		% of Total	9.4	3.9	22.8	16.5	47.2	100.0	
Male	Landscaping	No	Count	16	4	20	10	21	71
			% of Total	12.9	3.2	16.1	8.1	16.9	57.3
		Yes	Count	1	0	5	16	31	53
			% of Total	0.8	0.0	4.0	12.9	25.0	42.7
	Total	Count	17	4	25	26	52	124	
		% of Total	13.7	3.2	20.2	21.0	41.9	100.0	

Table 6. *Output of the Descriptive Statistics of the Natural Environment Variable by Age and Gender*

gender			year					Total	
			3.0	4.0	5.0	6.0	7.0		
Female	Natural environment	No	Count	3	2	7	3	3	18
			% of Total	2.4	1.6	5.5	2.4	2.4	14.2
		Yes	Count	9	3	22	18	57	109
			% of Total	7.1	2.4	17.3	14.2	44.9	85.8
	Total		Count	12	5	29	21	60	127
			% of Total	9.4	3.9	22.8	16.5	47.2	100.0
Male	Natural environment	No	Count	5	2	11	8	9	35
			% of Total	4.0	1.6	8.9	6.5	7.3	28.2
		Yes	Count	12	2	14	18	43	89
			% of Total	9.7	1.6	11.3	14.5	34.7	71.8
	Total		Count	17	4	25	26	52	124
			% of Total	13.7	3.2	20.2	21.0	41.9	100.0

Table 7. *Output of the Descriptive Statistics of the Conceptual and Symbolic Themes Variable by Age and Gender*

gender			year					Total	
			3.0	4.0	5.0	6.0	7.0		
Female	Conceptual and symbolic themes	No	Count	11	5	24	17	59	116
			% of Total	8.7	3.9	18.9	13.4	46.5	91.3
		Yes	Count	1	0	5	4	1	11
			% of Total	0.8	0.0	3.9	3.1	0.8	8.7
	Total	Count	12	5	29	21	60	127	
		% of Total	9.4	3.9	22.8	16.5	47.2	100.0	
Male	Conceptual and symbolic themes	No	Count	16	3	22	15	38	94
			% of Total	12.9	2.4	17.7	12.1	30.6	75.8
		Yes	Count	1	1	3	11	14	30
			% of Total	0.8	0.8	2.4	8.9	11.3	24.2
	Total	Count	17	4	25	26	52	124	
		% of Total	13.7	3.2	20.2	21.0	41.9	100.0	

conceptual and symbolic themes. Next, given the rankings of built environment, natural environment, landscaping and conceptual and symbolic themes, it is possible to test different hypotheses consisting of two correlated parts that are related to these categories.

Table 8. *Friedman Test Results for Categories*

Test Statistics ^a	
N	251
Chi-Square	306.721
Df	3
Asymp. Sig.	.000

a. Friedman Test

Ranks	
	Mean Rank
Built environment	3.05
Natural environment	2.92
Landscaping	2.36
Conceptual and symbolic themes	1.67

After evaluating these relationships, only one hypotheses was accepted and is as follows: using the natural environment in the design of the kindergarten, through landscaping while having a positive effect on the built environment of the institution, creates a child-friendly environment in the design of the kindergarten.

To test the first part of this hypothesis, based on the relationship between the natural environment and landscaping, correlation relationships were extracted. According to the results obtained from the correlation table, it can be said that the natural environment variable has a significant and direct (positive) relationship with landscaping. This means that as the natural environment increases, landscaping also increases slightly ($R = 0.367$, $p\text{-value} = 0.000$) (Table 9). Therefore, the first part of the first hypothesis is confirmed. Also, to test the second part of this hypothesis, based on the relationship between landscaping and the built environment, correlation relationships were extracted. According to the results of the correlation table, it can be said that the landscaping variable has a significant and direct (positive) relationship with the built environment. This means that as landscaping increases, the built environment also increases slightly ($R = 0.353$, $p\text{-value} = 0.000$) (Table 10). The second part of the first hypothesis is also confirmed. Thus, the natural environment is effective in creating a child-friendly environment for children through landscaping with a positive influence on the built environment.

The first hypothesis, which was confirmed, is used to continue the analysis process. The most effective subcategories of natural environment, landscaping and built environments should now be sought to get closer to design solutions according to the obtained formula. Friedman test was used to rank the different subcategories of natural environment, landscaping and built environment. As Table 11 shows, among the subcategories of natural

Table 9. *Correlation Between Natural Environment Variable and Landscaping Variable*

		Natural environment Landscaping	
Spearman's rho	Natural environment	Correlation Coefficient	1.000
		Sig. (2-tailed)	.367**
		N	.000
			251
	Landscaping	Correlation Coefficient	.367**
		Sig. (2-tailed)	1.000
		N	.000
			251

** . Correlation is significant at the 0.01 level (2-tailed).

Table 10. *Correlation Between Landscaping Variable and Built Environment Variable*

		Landscaping	Built environment
Spearman's rho	Correlation Coefficient	1.000	.353**
	Landscaping		
	Sig. (2-tailed)	.	.000
	N	251	251
	Correlation Coefficient	.353**	1.000
	Built environment		
	Sig. (2-tailed)	.000	.
	N	251	251

** . Correlation is significant at the 0.01 level (2-tailed).

environment, the abiotic elements and plants categories ranked highest. According to Table 12, among the landscaping subcategories, the yard or outdoor area category was ranked highest. Also, according to Table 13, among the subcategories of built environment, form, elements and ceiling were ranked the highest, respectively. Therefore, it can be concluded that the subcategories of abiotic elements and plants each have a significant and direct (positive) relationship with the yard or outdoor area, and the yard or outdoor area has a significant and direct (positive) relationship with each of the form, elements and ceiling subcategories; in conclusion, it can be said that children can enjoy a child-friendly environment by making use of the subcategories of abiotic elements and plants through

Table 11. *Friedman Test Results for Natural Environment Subcategories*

Test Statistics ^a	
N	251
Chi-Square	79.988
df	2
Asymp. Sig.	.000

a. Friedman Test

Ranks	
	Mean Rank
Plants	1.98
Animals	1.73
Abiotic elements	2.29

Table 12. *Friedman Test Results for Landscaping Subcategories*

Test Statistics ^a	
N	251
Chi-Square	225.057
df	3
Asymp. Sig.	.000

a. Friedman Test

Ranks	
	Mean Rank
Space furniture	2.47
Access	2.24
Yard or outdoor area	3.09
Parking	2.20

Table 13. *Friedman Test Results for Built Environment Subcategories*

Test Statistics ^a	
N	251
Chi-Square	824.493
df	6
Asymp. Sig.	.000

a. Friedman Test

Ranks	
	Mean Rank
Floors	4.84
Form	5.03
Sub spaces	2.52
Roof	4.95
Elements	5.01
Lighting	2.84
Color	2.80

creating a yard or outdoor area while having a positive influence on the form, elements and ceiling subcategories.

To identify and compare children's tendency towards each category of built environment, landscaping, natural environment, and conceptual and symbolic themes in two groups of

boys and girls, the Mann-Whitney U test was used. The results of tables 14 and 15 show that the mean rank of the built environment variable is 129.68 for girls and 122.23 for boys. But given the Z value of -1.323 at a significant level of 0.186 which is greater than 0.05, it can be argued that the inclination towards built environment does not differ between the two groups of girls and boys.

Table 14. *Population of the Two Groups of Girls and Boys and the Mean Rank of Each of the Built Environment, Landscaping, Natural Environment and Conceptual and Symbolic Themes Variables*

	gender	N	Mean Rank	Sum of Ranks
Built environment	Female	127	129.68	16469.00
	Male	124	122.23	15157.00
	Total	251		
Landscaping	Female	127	135.63	17224.50
	Male	124	116.14	14401.50
	Total	251		
Natural environment	Female	127	134.71	17108.50
	Male	124	117.08	14517.50
	Total	251		
Conceptual and symbolic themes	Female	127	116.37	14779.00
	Male	124	135.86	16847.00
	Total	251		

Table 15. *Results of the Mann-Whitney U Test for the Categories*

	Built environment	Landscaping	Natural environment	Conceptual and symbolic themes
Mann Whitney U	7407.000	6651.500	6767.500	6651.000
Wilcoxon W	15157.000	14401.500	14517.500	14779.000
Z	-1.323	-2.455	-2.722	-3.321
Asymp. Sig. (2-tailed)	.186	.014	.006	.001

a. Grouping Variable: gender

The mean rank of the landscaping variable was 135.63 for girls and 116.14 for boys. Given the Z value of -0.455 at a significance level of 0.014 which is less than 0.05, it can be argued that there is a significant difference in the tendency for landscaping between the

two groups of girls and boys. The mean rank of the natural environment variable in the girls group was 134.71 and 117.08 in boys; given the Z value of -2.722 at a significance level of 0.006 which is less than 0.05, it can be argued that the tendency towards natural environment is significantly different between the two groups of girls and boys. The mean rank of the conceptual and symbolic themes variable was 116.37 for girls and 135.86 for boys. Considering the Z value of -3.321 at a significance level of 0.001 which is less than 0.05, it can be argued that the tendency for conceptual and symbolic themes is significantly different between the two groups of girls and boys.

Table 16. *the Number of Children at Different Ages and the Mean Rating of each of the Built Environment, Landscaping, Natural Environment and Conceptual and Symbolic Themes Variables*

	year	N	Mean Rank
Built environment	3.0	29	66.60
	4.0	9	102.67
	5.0	54	128.23
	6.0	47	133.82
	7.0	112	138.90
	Total	251	
Landscaping	3.0	29	66.83
	4.0	9	62.50
	5.0	54	102.01
	6.0	47	137.27
	7.0	112	153.26
	Total	251	
Natural environment	3.0	29	117.88
	4.0	9	96.72
	5.0	54	110.67
	6.0	47	123.13
	7.0	112	139.05
	Total	251	
Conceptual and symbolic themes	3.0	29	114.16
	4.0	9	119.44
	5.0	54	124.09
	6.0	47	145.55
	7.0	112	122.31
	Total	251	

Table 17. *Kruskal-Wallis Test Results for the Categories*

	Test Statistics ^{a,b}			
	Built environment	Landscaping	Natural environment	Conceptual and symbolic themes
Chi-Square	64.900	65.302	15.868	11.174
df	4	4	4	4
Asymp. Sig.	.000	.000	.003	.025

a. Kruskal Wallis Test

b. Grouping Variable: year

The Kruskal-Wallis test was used to identify and compare children's tendency towards any of the built environment, landscaping, natural environment and conceptual and symbolic themes categories in the age groups of 3 to 7 years. According to tables 16 and 17, given the Chi-Square value for each of the variables and the significance level of each being less than 0.05, it can be argued that the tendency towards all four built environment, landscaping, natural environment, and conceptual and symbolic themes variables is significantly different at different ages; so that for the three variables of built environment, landscaping and natural environment, the mean rank of 7 year olds is higher than other ages, while the mean rank of 6 year olds is higher for conceptual and symbolic themes.

Discussion

According to the obtained statistics, it can be concluded that the children under study paid more attention to the built and natural environment aspects, which indicates the importance of the close relationship between architecture and nature in children's mental imagery. On the subject of built environment, they preferred right-angled forms with gable roofs more. Also, concerning the types of roofs, curved roofs had the least frequency and among architectural elements, windows, especially colored windows, were the most frequent. These results may be due to the bold role of the natural landscape of the city of Gorgan as well as the traditional and native architecture of the city. Regarding landscaping, the children showed the most interest in the yard or the outdoor area and the least in parking lots. As mentioned earlier, children are less likely to play and have leisure activities

outdoors due to the lack of outdoor spaces in residential areas, especially apartments; to compensate, this should be particularly emphasized when designing, especially for the children in the studied town whom have a natural bedding provided for them.

Among the subcategories of natural environment, abiotic elements, especially the sun and clouds, and later plants, were the most popular concepts for children. A study by Günindi in Aksaray, Turkey, also yielded similar results, such that the environment in the study, from the point of view of children aged 5 to 6 years, mostly includes people, plants, animals, mountains and especially elements such as the sun and clouds (Günindi, 2012). Of course, Greek children aged 9 to 12, in the study of Stokas et al., out of the of sustainable urban development indicators, that include the environment, economy and society, also had the most interest in the environment, with once again the sun, plants, sky and animals being the most abundant; However Gorgani children refer to animals less frequently than the other subcategories of natural environment (Stokas et al., 2017). Essential and lasting parts of child development occur with animals. Animals raise the child's level of self-cognition and respond deeply to human actions and are therefore very likely to be taken care of by humans. This natural care for animals can lead to the care for the whole of nature or habitat. So animals are a bridge to caring for the whole of nature and can be used, especially birds, which are more abundant than other types of animals in the drawings studied, to further link children to nature (Arcari et al., 2020). Paying attention to this issue can be effective in teaching children sustainable urban development, as Stokas et al. believe that sustainable urban development education should start from childhood so that children can shape a sustainable future for themselves (Stokas et al., 2017).

Conceptual and symbolic themes were less frequent than other categories in the children's drawings and interviews, although one cannot make a precise conclusion because the way children interact with their surroundings before 7 years of age is through conceptual and symbolic themes, and some of the concepts in children's drawings, especially with 3 and 4 years old children, were so intangible and unclear, even for their instructors, that they could not be coded and analyzed. However, children, using symbols such as the Iranian flag, emphasized the subcategory of identity more than other conceptual and symbolic subcategories. It can be said that children like a place that is known to them so they can have a sense of closeness to it. As noted earlier, symbols are an effective factor

in promoting sense of place. Sense of place, by linking one's understanding and feelings with the semantic context of the environment, makes one feel comfortable in the environment and helps individuals, including children, in gaining their identity. So it is very important for children to create symbols that consider their moods and mentality in the design.

Regarding the confirmed hypothesis that "Using the natural environment in the design of the kindergarten, through landscaping while having a positive effect on the built environment of the institution, creates a child-friendly environment in the design of the kindergarten", it was concluded that to connect nature to architecture in regards to these children, landscaping must be used. In fact, the children referred to the category of landscaping in order to connect with nature, and the design of the institution should also take into account that nature should be brought inside from the outside. So designing can start from the outside towards the inside and finally eliminate the boundary between the inside and the outside. According to statistics obtained from children's drawings and interviews, the most effective natural environment categories to use in landscaping are abiotic elements and plants. Also, the most effective landscaping issues that can affect the built environment is the yard or the outdoor area, and lastly, the most effective built environment subcategories that result in landscaping, realizing the child-friendly space of the institution, are form, elements and then the ceiling.

Comparing the differences between boys and girls, the results showed that there is no significant difference in the inclination of children towards built environment between boys and girls, but in terms of landscaping, natural environment and conceptual and symbolic themes, there is a significant difference between them. Girls were more interested than boys in landscaping and natural environment, while boys were more interested in conceptual and symbolic themes which is due to psychological differences between boys and girls. Girls naturally have a sense of aesthetics and panache. They are also communication-oriented and tend to interact with their surroundings. For this reason, landscaping and natural environments satisfy the aesthetic sense of girls and enhance their emotional connection with the environment around them; while boys are goal-oriented, and convey their goals through conceptual and symbolic themes.

While comparing the age differences of children, it can be said that there is a significant

difference in their tendency towards all four categories of built environment, landscaping, natural environment and conceptual and symbolic themes at different ages. Seven-year-olds referred to the three categories of built environment, landscaping, and natural environment more than others, because according to Crain and McAndrew, as a child ages, her/his thinking becomes more systematic and more intangible about objects and actions (McAndrew, 1993; Crain, 2015). Also, 6-year-olds, more than any other age group, even 7-year-olds, were interested in conceptual and symbolic themes, which relates to the way children interact with their kindergarten world. The relationship of a 6-year-old child with the world around her/his is conceptual and symbolic, but at school age as her/his social relationships increase, so does his verbal communication. Of course, a series of concepts in the drawings of children under 6 years, especially 3 and 4 years old, were difficult to understand for the first author and even the child instructors, as they were intangible and symbolic doodles. These series of concepts were not coded and analyzed, and this was one of the limitations of this study.

Conclusions

According to the statistics obtained from the children's drawings and interviews and their analysis, it can be concluded that by linking the natural environment, landscaping and the built environment, a child-friendly kindergarten can be created and that the importance of the connection between architecture and nature is well represented in the mental images of Gorgani children through landscaping. The relationship between the three categories of natural environment, landscaping and built environment should be such that abiotic elements and plants used in an outdoor setting eventually influence the right angle form, gable roof and elements such as windows with colored glass and doors which are the favorite of the Gorgani children – as previously analyzed- and lead to child-friendly architecture. Also, since girls and boys have different interests in some aspects, as well as the ways in which children communicate at different ages, their spaces should be for themselves and tailored to their characteristics. Therefore, it can be inferred from such researches that children can express their environmental needs, even those that adults are not aware of. Collaborative design with children often results in increased environmental

quality. Also, with the participation of children, cultural and environmental differences in each region are identified, and subsequently child-friendly environmental indicators can be localized for each area. Also, it seems that the role of climate and natural environment as well as the native architecture of the city can be considered effective in children's mental images and paintings, but to clarify this issue, other research is needed.

The present study can be used by various individuals and groups to explain the priorities that children Consider on the kindergarten environment. This research can examine the views of academic and research communities and even Education organizations on the needs of children and make them realize that characteristics cannot be generalized to children in different genders and ages. A local perspective is also needed. Researchers need to realize that the only appropriate research tools about children are those that give children the opportunity to express themselves directly.

Another application of this research relates to the field of Architecture. Architects need to realize that not only do they need to pay attention to the needs of children when designing for them, but instead of using only a set of specific instructions for designing, they need to use what the same group of children like. There is no more valuable source of information than children themselves, provided that architectural consultants use methods that do not limit children while expressing their feelings and opinions about the design project. Kindergarten principals and educators can also involve children in different macro to micro scales in their decision makings for the kindergarten environment, given the value of participatory design. The solutions proposed in this article will not be very generalizable per children with similar conditions and need to be evaluated and reviewed by future research.

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