



Principles of Open School Design Based on Emotional Intelligence Model and Enhancing Learning

Hosna Shams Dolatabadi*

Ph.D. Student of Architecture, Isfahan Art University, Isfahan, Iran

Nilufar Malek, Ph.D.

Department of Architecture, University of Art, Isfahan, Iran

Farhang Mozafar, Ph.D.

Department of Architecture, Iran University of Science & Technology, Tehran, Iran

Bahram Saleh Sedghpour, Ph.D.

Department of Educational Sciences, Shahid Rajaee Teacher Training University, Tehran, Iran

Abstract

Considering the effects of open school spaces on students, the aim of the study was to provide guidelines for designing school open spaces to enhance the level of emotional intelligence and learning in primary school children. This can be done through increasing the level of motivation and providing the appropriate space to play. In this research a quantitative-qualitative research method is applied. Also, the Delphi system of gathering data is used to produce content-table and questionnaires. According to Kline, the sample size is calculated around 326. Teachers and school designers were questioned using randomized cluster sampling. The data was evaluated in SPSS software program version 22 using R factor analysis to produce analytical model in Amos. The results of the research indicated that physical aspects of space including: natural and diverse elements, spaces with cultural functions, semi-private (with supervision) and flexible environments, spatial diversity, space for different types of play and diverse connections between open and close spaces affect the changes of emotional intelligence in schoolyard. Thus, it was concluded that school open spaces are physical sites as well as social sets. Students' behavior, abilities and space applications can be affected by spatial characteristics in school yard and lead to acquiring emotional abilities.

Keywords: Environmental motives, Outdoor learning, Schoolyards educational approaches.

Introduction

The current curriculum of our schools focuses on the cognitive dimension of learning and acquiring excellence in fields such as mathematics and empirical sciences. Paying too much attention to such a learning which mainly happens in close area of classroom, is a factor in diminishing intrinsic desire to learn. This situation makes learning a tedious and vague activity in school. In this way, learning basic abilities for social

life is also neglected (Baccarat, Sheltie, & Shams pour, 2006).

It is therefore fair to consider "how" to learn more important than "what" to learn. Any individual capabilities are built through interaction of environment with learning process. Through this process, experience can be gained (Fenoughty, 2002) and experiences provide unique elements to change cognitive structure of child's mind (Szczepanski, 2011).

Learning is a multi-dimensional phenomenon, so personal activity and experiences are dimensions of learning through which an individual is trained by social and environmental experience. Any combination of thought, action and experience creates different forms of learning. In his view, learning simultaneously

* Corresponding Author

Email: hosna_shd@yahoo.com

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contains; cognitive, emotional, and social dimensions (Jarvi, 2006; as cited in Fägerstam, 2012).

In confirming the accompaniment of various aspects of learning, today in the modern systems of education, the emphasis is on learning through emotions and there is no deep and desirable learning without it. Additionally, students remember emotional behaviors better than non-emotional ones (Golman, 1995).

Emotion is a determinant and meaningful factor in creating and sustaining motivation (Mayer, Caruso, & Salovey, 1999; as cited in Ciaruchi, Forgas, & Mayer, 2006). By understanding emotional experiences and motivational characteristics, it is possible to understand changes that occur during lifetime of an individual. This transformation is identified as the origin of emotional intelligence (Strongman, 2003; as cited in Khodapanahi, 2014).

With motivation for learning, an individual gets familiar with environment through incentives and at the same time environment provides for his needs. This experience helps him to coordinate with environment, master it or take advantage of it (Szczepanski, 2002). Acquiring experiences that occurs through continuous interaction with environment forms the foundation for learning. And it is an important factor in promoting and learning emotional abilities (Fägerstam, 2012).

Therefore, learning proper emotions through experience of social, participatory and environmental processes is not only for acquiring emotional intelligence skills but also is an effective factor in enhancing cognitive science and memory (Gölman, 1995; Marís, Elias, Hunter Jeffrey, & Kers, 2006; Zins et al., 2007). It improves learning process through; increasing positive social behaviors, individual and work discipline, individual motivation, better outcomes in evaluations, facilitating thinking process, concentration of students and lower level of anxiety and stress (Costa & Faria, 2015).

Interaction with environment creates new experiences. Learning depends on the first-hand experience that relates individual to people, issues and the real environment. However, the classroom environment does not fit the reality that children feel in their bodies. That is, it keeps them away from the reality, they feel (movement and change) inside. It also keeps them away from real life and communication with surrounding. While the essence of the open and natural environment in school contain change and movement with the help of observation and experience. When the "physical environment, stimulates excitement, emotion and experience, child finds it easier

to learn ". In addition, a child develops "his social and individual skills which form the emotional intelligent ability" (Szczepanski, 2011, p. 8).

Empirical social or cognitive learning can be explained using Kolb cycle. A person is able to create new experiences that he did not previously have by promoting intellectuals. Based on Kolbe's experiential learning philosophy, learning takes place in a learning cycle for educational design (Bell & Dymont, 2008; as cited in Medeiros, 2011). Therefore, it seems quite important to design school open spaces, in a way that enhance children learning and emotional abilities.

Schools with new educational approaches

With the beginning of the twentieth century, schools with strict physical and environmental conditions faced serious criticism (Samii-Azar, 1379). Problems like; passive role of students in learning and maintaining their health in the school environment became one of the major challenges of school designers (Elmore, 2004). The issues created by such schools were the key factor in formation of Future School plans and the Schools without Walls (corridor) in the 1970s (Kamelniya, 2007).

Schools with open design patterns aim to coordinate with children's learning at different functional levels. These patterns are concerned with factors related to place concepts, social, physical, climatic and psychological factors (Kamelnia, 2007). The main goal of these schools was converting children to citizens of future. However, this goal was not achieved due to the lack of cooperation between traditional training and new design perspectives (Gifford, 2007; as cited in Mirrmoradi, 1391).

During this period, a device-based design becomes pervasive. That is, designers created relatively large spaces which were surrounded by variety of devices for physical and environmental activities. Gradually extensive research on the development of child and his needs began in the 1970s. This decade witnessed changes in the educational system based on child's requirements in line with the open design theories (Noddings, 2005; as cited in Silberman, 1973). It's when the open space design was accompanied by careful attention to aesthetic and physical issues to provide children with experiences (Feyzi et al., 1389). Though researches such as Sanoff (1994) and Taylor and Vlastos (1975) condemned the idea of open design due to problems it created such as lack of territory and mixing of activities. It was in this period that projects

such as "Loose parts" applied recycled items and created a more innovative environment for children to think more and get creative in outdoor spaces. Also, the movement of adventurous playgrounds was relied on principles of flexibility and no pre-designed structure was used in its construction. It means that, children created their own play with their mental imagination in natural hills covered with grass, water, and other tools (Feyzi et al., 2010).

In the 90s, together with the rising of emotional intelligence concept, is the culmination of programs to advance social and emotional learning. At this time, the school and children's spaces are integrated with urban institutions, and the school's yard is counted as a place to learn. Gölmen and Rockefeller Growald developed emotional and social learning as part of education and continued their programs in many countries (Elias et al., 2006). Within this time frame, creative play areas were formed the main idea behind designing open places for children which consist of experiences involving physical activity and natural environment for a variety of formal and informal learning (Feyzi et al., 2010)

Seattle's social development project and the School's transition environment are among the successful projects that have encouraged active participation in education and learning with peers. Other programs also introduce child as part of community-based activities. These programs introduce school as a part of community, trying to increase the emotional growth of children (Hawkins et al., 1992).

Social behaviors of children are affected by school's yard (Rickinson et al., 2004). According to Davies and Hamilton (2016), "School open spaces have the potential to promote communication, children's emotional and social developments"(p. 1; as cited in Knight, 2009, as well as Eloquin & Hutchinson 2011). As a result, the school yard seems to require a collaborative way of design (Rickinson et al., 2004, Kemp et al., 2005). In this way, it is not only a means of cognitive learning but also a place for acquiring self-

esteem, group interactions, student relationships, experiences of various emotions, a motive for learning and feeling of belongingness to school (Khamis, 2009; as cited in Mirrahimi, Long, & Abdullah, 2011). Therefore, by motivating children to attend school yard, their emotional intelligence can improve. Considering that, the main research question of this study is:

*What are the principles of school yard design based on emotional intelligence and its impact on the learning process?

And also the core aim of the study was to:

Achieve outdoor design principles to empower emotional intelligence and learning.

Theoretical Framework

The study was based on the quantitative-qualitative research methodology. The qualitative section included Delphi method, containing interviews with 17 professionals in the fields of architecture and psychology (emotional intelligence). Snowball technique was considered for sampling to reach a theoretical saturation. Then, the interviews were analyzed using open and axial coding. Also, a questionnaire was designed based on content-table which is the product of coding step. Resultant data is then analyzed through Q factor analysis with the help of SPSS software. Six factors were recognized accordingly. Next, with the help of the drawn information, the second questionnaire was designed. In this round, teachers and practitioners (professionals in school renovation organization) were questioned. The data was then evaluated using R factor analysis. It means that the analysis was done on data, in contrast with the Q factor analysis which was done on the professionals. Results show that 8 factor are related to the design of school's outdoor spaces to increase emotional intelligence and learning. Further, a model was developed to show the relationship between the variables.

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Table 1.
Theoretical Framework

Primary step	
Explaining the scope of research	Statement of the problem and aims
Identification of research variables	
Step one	
Collecting and arranging the literature review	
Applying library documents	
Internet search	
Step two	
Identifying related factors and concepts to clarify the subject's scope	
Delphi first round	Open interview with professionals
Delphi second round	Closed questionnaire from professionals
	Closed questionnaire from teachers and practitioner
Emotional Intelligence Concepts and Learning as an outstanding phenomena in School outdoor area	
Step Three	
The design principles corresponding to emotional intelligence and learning	
Finding a model to explain the relationship between emotional intelligence and learning with the corresponding design principles	
Creating Research Tool	
Closed Questionnaire with Likert scale (4 multiple choice)	
Open and axial coding	Face validity
Content Table	Content validity
Reliability of the questionnaire	Coordination within questions
Validity of questionnaire	
Step Four	
Identification of Design Components (Factor Analysis)	
Eight significant factors	
Step Five	
Classification of expert view (Q factor analysis)	
Identifying six classes of thought	
Step Six	
Modeling the of the relationship between components of emotional intelligence and learning Path analysis	

Method

In the second step, Schools in Tehran's fourth district were selected because of the diverse economic and social conditions (as a small socio-economic example of Tehran). Using cluster sampling, schools were divided into two groups of girls and boys. Then schools were chosen from each group and about 10 teachers were questioned in each group. At the same time, questionnaires were also distributed randomly between practitioners in "Organization of renovation and

equipment of schools" in design, coding and renovation departments.

Participants

Kline (2005) proposes 5 volunteers to determine the sample size for each question in the questionnaire. Since the questions within research questionnaire are 65, the sample size is calculated 326.

Instruments

To gather and analyze information from teachers and practitioners in the field of school design, a closed-questionnaire, content-table, SPSS software and R-factor analysis are applied.

Validity and Reliability of the Tests

Validity of the questionnaire was checked through face validity by open and axial coding. The content validity was also investigated using content-table. At the same time, the factor analysis accounted for Construct validity.

The reliability of the tests was also analyzed through measuring coordination of questions (using difficulty Index, discrimination index and loop method) and the Cronbach's alpha. This amount should be higher than 0.7 to achieve reliability. The result of analysis confirmed the reliability to be 0.96 according to Table 2.

Table 3.

KMO and Bartlett's test for factor analysis and sample size adequacy

Kaiser-Meyer-Olkin Measure of Sampling Adequacy	.889
Bartlett's Test of Sphericity	16014.724
Approx. Chi-Square df	2278
Sig	.000

Identifying Meaningful Factors

From data analysis on teachers and school designers, eight factors were identified. About 72.4% of the respondents, realized an understandable reality and the

Table 2.

Cronbach's Alpha for Reliability Statistics

Cronbach's Alpha	No. of Items
.968	68

Findings

Through KMO and Bartlett's Test, the sample size can be determined. Results of Cronbach's Alpha over 0.6 indicate the sufficiency of sample size. To verify the correlation, it is necessary to confirm the outcomes of the Bartlett's test. If this value is less than 0.05, then it is possible to create a model. Since the "Sig" of the test is zero, the factor analysis can be applied (Table 3).

remaining 27.6% showed individual views toward the matter. This means that the eight identified factors are recognized significant by 72% of the respondents (Table 4).

Table 4.

Data variance after rotation of factor analysis

Comp.	Rotation Sums of Squared Loadings		Comp.	Rotation Sums of Squared Loadings	
	% of Variance	Cumulative %		% of Variance	Cumulative %
1	9.369	9.369	8	4.073	53.024
2	7.790	17.159	9	3.588	56.612
3	7.620	24.779	10	3.518	60.130
4	7.073	31.852	11	3.503	63.632
5	6.150	38.002	12	3.002	66.634
6	5.709	43.711	13	2.937	69.571
7	5.240	48.951	14	2.898	72.469

The research sought to explain the relationship between factors affecting learning and emotional intelligence and architectural features by; natural elements, space for cultural behaviors, play space, semi-private and flexible space, diverse connection between open and close space and the diversity of activities and functions.

To measure the significance of each relationship, the measure of P was used. The value of P indicates that the modeling relationships are at 95 Percentage of confidence. The value smaller than 0.05 represents

0.95% of confidence, and if this amount reaches 0.01, the confidence becomes 99%. The proposed model of these relationships shows that emotional intelligence is the dependent variable and diversity of space and diversity of activities and functions are independent variables which with the help of mediating factors such as; natural elements, space for cultural behaviors, play space, semi-private and flexible space, diverse connection between open and close space and the diversity of activities and functions effect each other.

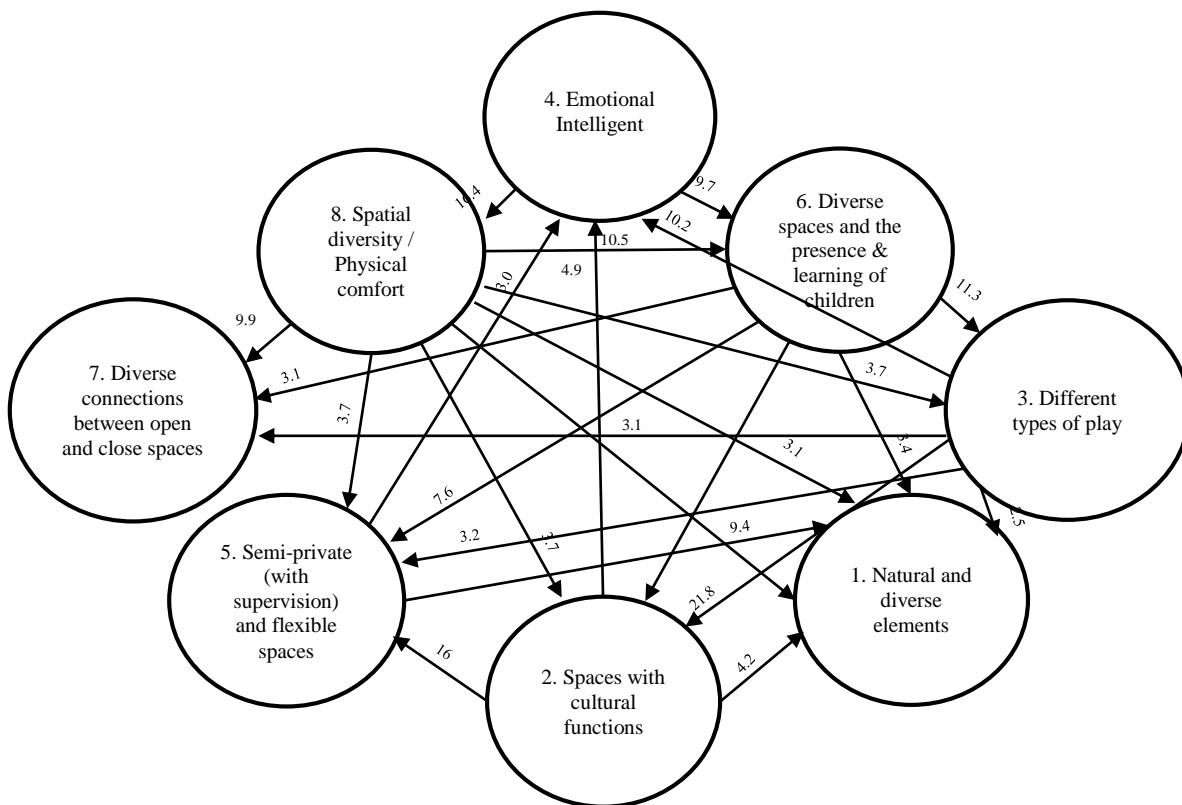


Figure 1.
Final model with path coefficient¹

1. Effects of natural and diverse elements on the presence of children in schoolyard and self-actualization
2. The Relationship spaces with cultural functions and learning & self-actualization
3. Learning and acquiring experience from natural environment for different types of play in different age groups
5. Semi-private (with supervision) and flexible spaces as a factor in self-actualization
6. The relationship between diverse spaces with the presence and learning of children
7. Gaining experience from natural spaces through diverse connections between open & close spaces

Table 5.
Direct, indirect, and total standard effects

The relationship between two variables			Estimate	Standard Error	Standardized Total Effects	Standardized indirect relation*	Standardized Regression
Spatial diversity / Physical comfort	→	Connection between open & close spaces	.371	.057	.548	4.07**	.316
Spatial diversity / Physical comfort	→	Natural elements	.637	.136	.461	2.08*	.178
Diversity of spaces and the presence & learning of children	→	Connection between open & close spaces	.125	.036	.380	1.61	.178
Diversity of spaces and the presence & learning of children	→	Natural elements	.398	.089	.516	0.36	.187
Semi-private (with supervision) and flexible spaces	→	Natural elements	.826	.104	.368	0.57	.308
The natural environment for playing	→	Connection between open & close spaces	.306	.044	.521	3.81**	.353
Spaces with cultural functions	→	Natural elements	.453	.096	.431	0.23	.207
The natural environment for playing	→	Natural elements	.425	.111	.535	0.33	.161
Emotional Intelligence	→	Spatial diversity / Physical comfort	.224	.033	.481	2.27*	.406
Emotional intelligence	→	Diversity of spaces and the presence & learning of children	.288	.057	.526	3.75**	.312
Spatial diversity / Physical comfort	→	Semi-private (with supervision) and flexible spaces	-.258	.076	.137	4.35**	-.194
Spatial diversity / Physical comfort	→	The natural environment for playing	.261	.084	.355	1.92	.193
Spatial diversity / Physical comfort	→	Spaces with cultural functions	.316	.085	.418	2.64**	.193
Diversity of spaces and the presence & learning of children	→	Semi-private (with supervision) and flexible spaces	.220	.047	.492	4.59**	.277
Diversity of spaces and the presence & learning of children	→	The natural environment for playing	.270	.050	.400	1.32	.334
Diversity of spaces and the presence & learning of children	→	Spaces with cultural functions	.110	.055	.329	3.94**	.112
The natural environment for playing	→	Emotional intelligence	.444	.074	.291	0.34	.331
Spaces with cultural functions	→	Emotional intelligence	.246	.065	.345	1.90	.222
Semi-private (with supervision) and flexible spaces	→	Emotional intelligence	.237	.072	.206	0.44	.174
The natural environment for playing	→	Spaces with cultural functions	.543	.063	.583	0.21	.448
Spaces with cultural functions	→	Semi-private (with supervision) and flexible space	.325	.049	.460	1.24	.400
Spatial diversity / Physical comfort	→	Diversity of spaces and the presence & learning of children	.544	.087	.428	1.19	.325
Spaces with cultural functions	→	Semi-private (with supervision) and flexible spaces	.176	.059	.461	4.77**	.179

This section covers the relationship between factors in the model structure.

Cycle of child presence and learning in schoolyard

Spatial diversity through; diverse spatial functions, transitional spaces (between open and closed spaces), diversity in terms of public spaces at different levels, diverse natural spaces for individual or group activities influence the design and flexibility of individual and semi-private spaces. This way, by increasing the presence of child in school's yard, he achieves emotional intelligence. And again, through providing physical comfort, it delivers spatial diversity. In fact, by creating environment for individual activities, children achieve self-awareness. In other words, by using spaces which are natural and semi-private, as well as using flexible and movable barriers, services for individual activities are provided. Thus, the cycle of relationship between diversity and presence and learning of children is formed with the help of spatial diversity, individual and semi-private spaces and emotional intelligence.

Cycle of cultural learning

Spatial diversity with utilizing; natural green areas, vast multi-functional spaces, semi-open areas and spaces for variety of activities can provide a context for cultural spaces. In other words, cultural spaces such as auditorium, spaces with a variety of functions that can increase interactions and areas inspired by native and local concepts impress child's social and cultural learning. Ultimately emotional intelligence and self-actualization changed.

In this way, the cultural learning cycle is formed through spatial diversity and emotional intelligence.

Cycle of play

Spatial diversity influences emotional intelligence through learning and experiencing various plays in natural environment, and by changing emotional intelligence, the diversity of the space is affected as well.

Spatial diversity incorporates; natural green spaces, spacious multi-functional spaces, semi-open spaces which influence learning and experiencing from natural environment. The relationship between "diverse spaces with the presence and learning" of children changes through; accompanying playing spaces with class area, transitional spaces, public and semi-public spaces (with supervision) at different levels for group work, green natural environment and Safe spaces. it means that spaces for various kinds of play, especially multi-

sensory plays (with the help of several natural elements like; water, soil, animals, light and shadow) are capable of indirect and experimental learning and regulating emotions, which ultimately contributes to the quality of life, self-actualization and intelligence of the child.

Cycle of natural environment

"diverse spaces for the presence and learning of children" with the help of; safe spaces, accompanying class area with playing spaces, transitional spaces, public and semi-public area (with supervision) at different levels for group work encourage children to be present in the natural environment. The natural environment also get affected from; colors, natural shapes and free lines (curve lines), shallow ponds (with safety considerations), diverse hard and soft materials like; plants, flowers and blossoms, the composition and the interactions between open and close spaces (for the greater presence of nature in close space), the increase of transparent and flexible walls between open and close spaces and diverse connection between the constituent spaces can lead to cultural activities.

Cultural spaces in the natural environment, like theater and play area, spaces with variety of functions to enhance interactions, designed spaces inspired by national and local stories, can affect the child's social and cultural learning, ultimately it influence emotional intelligence and self-actualization. Hence, the natural space cycle is influenced by the intermediation of diverse spaces and emotional intelligence impress spaces with cultural performance and presence of children in the natural environment.

Discussion and Conclusion

The main purpose of the research was to determine the principles of open school design to enhance learning and emotional intelligence.

According to the results of the study, social, physical and psychological space characteristics of the environment in school open spaces can facilitate the conditions for increasing emotional intelligence and learning. Spatial attribute in school open space facilitates the process of belonging to school which increase presence of children in school yard and enhance social, emotional and cognitive learnings of children. Similarly, increased motivation for play and group activities leads to an improvement in the level of emotional intelligence among children. The review of this research reflects the fact that human behavior,

abilities and space characteristics can be affected by space and spatial connections which ultimately lead to acquiring emotional abilities. In the case of school open spaces, it should also be noted that they are physical sites as much as social sets.

It should be noted that schools are considered social as well as physical places for different kinds of learning. That is, the way school building and grounds are placed and located influence school's main function of learning. In the meantime, the open space of the school is of great importance to social, emotional, cultural and cognitive learning, since it contains special potential due to its specific characteristics. Ultimately, the intellectual space and the mental domain where learning occurs should interact with social space and also cultural environment.

The research is done in the limited area of Tehran city, as the time and financial aspect of research could not cover a country wide research. Also the socio-cultural features of the study are limited to this city.

Further research can be conducted in higher levels of education in high school's open spaces. And other aspects of school activities can be measured along with emotional intelligence like social interactions.

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