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The Effect of Kindergarten on Academic Achievement

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Abstract: This aim of this study is to identify and reflect the impact of kindergarten architecture on children. Kindergarten is the first educational and social place that children experience. It makes children more creative thus influencing their behaviours. Therefore, this physical learning environment should be more inspirational, challenging, thought provoking and uplifting. The places that are relevant for children's learning should include an appropriate environment to improve their physical, mental and social growth. This is possible by utilising suitable architectural elements and designing a place that children use to learn. Architectural forms originate from special and specific elements. Thus, the best place for children must be colourful, absorbing, systematic and mirthful, besides being comfortable and safe.

Key words: Children, learning environment, academic outcome, architecture, multiple intelligence, Iran

INTRODUCTION

There is nothing new about the idea that learning is affected by architecture and is more directly related to formal curriculum. Research indicates that students who attend schools that are well maintained, meet safety standards, and are kept clean, are also more likely to demonstrate higher levels of academic performance than those students in schools with leaking roofs, broken windows, missing toilet stalls, and dark classrooms (Boss, 2001; Kolleeny, 2003; Peters, 2003). For decades, engineers, architects, psychologists, and educators have also examined the role that lighting and colour, for instance, play in generating environments conducive to learning and to prosaically behaviours (Dudek, 2001; Hathaway, 1995; Muir, 2001; Rittner-Heir, 2002; Sherman, 2001; Tanner and Andersen, 2002). Some researchers and planners have demonstrated that the use of daylight in the context of a larger energy-efficient design is not only associated with higher levels of student performance, but can also be cost effective (Plympton *et al*., 2000; Reicher, 2000). Studies have also focused on the detrimental effects of too much noise in the learning environment (Boss, 2001; Tanner and Langford, 2003); the importance of appropriate furniture (Bullock and Foster-Harrison, 1997) and the need for inviting outdoor spaces including green areas and play areas (Tanner and Andersen, 2002).

LITERATURE REVIEW

There is sensitivity to how the architecture shapes and the design of the classrooms influence the children in early childhood schooling. Nowadays, what school environments teach children becomes the main concern of both parents and teachers. The first five years of a child's life are a time of enormous growth in linguistic, cognitive, social, emotional, and motor competence. Because children learn continuously from birth, childcare and education cannot be thought of separately. Early education promotes the overall development of a healthy child, but it is also critical because children who have had the right kinds of educational experiences before kindergarten do better in school (West *et al*., 2000).

Herrington (2003) emphasized the exterior learning spaces for the kindergartens. Dudek (2001) also believed that texture, sound, light and colour will challenge and inspire children, and that exciting outdoor spaces allow for freedom of movement and physical daring. He emphasized the equal importance of indoor and outdoor play for learning. Upitis (2007) observed that challenging playgrounds create a mini-world where children can explore the diversity of the natural world using all of their senses and natural capabilities; explorations that can serve to reinforce the formal curriculum. According to Sanders (2002) although we all have experienced childhood and may assume to understand children well, children have unique characteristics of their own and the design approach from the adults' standpoint based on the users' explicit and observable needs will differ from the approach of the children's stand point . This research aims to identify and reflect the impact of kindergarten architecture on children. According to studies on child development, a child's limited short-term memory span, language skills and insufficient knowledge affect his or her perception of kindergarten and environment (Yoo, 2000) thus his or her knowledge will also construct in a way different from that of adults. The questions are then

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how it is unique, and how can the uniqueness be elicited and reflected in the design process.

Architecture impact and Kindergarten in Iran: Iranian architecture displays great variety, both structural and aesthetic, developing gradually and coherently out of prior traditions and experience. Without sudden innovations, and despite the repeated trauma of invasions and cultural shocks, it has achieved "individuality distinct from that of other Muslim countries". Iran is in the midst of its biggest building boom post-modern architecture.

Iran's educational system comprises many schools and universities scattered throughout the country. Kindergarten in Iran, which is also mandatory, begins at the age of 6 for 1-year duration. The first kindergarten was established in Iran in 1924 and the Supreme council for Culture adopted the first statute for kindergartens in 1933. In 1955 an independent bureau was established within the Ministry of Culture for kindergartens. In 1961, the government, taking into account the different dialects prevalent in the country as well as the fact of taking care of the children of employed women in various organizations, authorized the private sector to the quantitative development of pre-school education (UNESCO, 2006). During the fifth construction plan in 1973-77, both the qualitative and quantitative development of the kindergartens were given prominence to and kindergartens were built in bilingual regions enjoying local dialects, such that the number of like centres increased from 53 to 2,481 in the governmental sector in 2000. Since 1999, kindergartens were also set up in different ministries. Some two years later, all ministries and governmental organizations allocated a budget to the establishment of kindergartens. The women's organization was authorized to set up and to supervise them. Kindergartens take care of and educate children between the ages of 4 months and 6 years. Today, different institutions provide pre-school education services. These include the Ministry of Education, State Welfare Organization, Municipalities, NGOs, the Ministry of Labour and Social Affairs, as well as different governmental, non-governmental, private, and charity organisations. The main objectives of pre-primary education are as follows (UNESCO, 2006):

- To contribute to the physical, mental, emotional and social growth of young children, based on religious and ethical principles
- To develop the abilities and talents of children in order to prepare them for future studies
- To prepare children to easily comprehend scientific concepts
- To promote the Persian language, particularly in the provinces where different languages are spoken
- To prepare children to adapt themselves to Islamic principles in their personal and social life; creating in them the sense of cooperation and partnership in social activities and imbibing in them a respect for laws and regulations and to be responsive
- To help low-income families by creating a safe educational atmosphere to train their young children

Therefore, there are many factors which are involved in kindergarten and they are not only the curriculum but also the architecture and environment that are very important to make the kindergarten a comfortable and friendly second home for children. Unfortunately, only a small number of studies have demonstrated the impact of architecture and interior design in kindergartens and their learning environments. Iran enjoys four seasons and two of them (autumn and winter) are considered as cold weather. The academic year runs for 10 months (200 active days) from September to June. There are three terms: September–December, January-March and April-June. Winter (January - March) can be very cold in Iran and schools will be closed by the government due to heavy snow. During school season, students spend most of their time in the school and inside the buildings especially during the cold season. Therefore the building's interior design, light, colour and the other design elements of the building can directly affect student's learning process and performance in this learning environment. This study aims to explore the effect of interior design on the children's learning behaviour in the kindergarten.

METHODOLOGY

Two types of surveys were conducted in this study. First, a modified version of the Multiple Intelligence theory (MI) was used to design the children's questionnaire. Based on this model, the kind of a more preferred and demanded architecture by Iranian children would be explored. Secondly, the kindergarten teachers were interviewed to find out their perceptions towards a suitable learning environment. Besides the children, their teachers would also have bright and cooperative ideas in order to improve kindergarten architecture in Iran. Their close interaction with children and also their experiences through the years make this research more accurate.

Multiple Intelligence theory (MI): This theory states there are at least seven ways (intelligences) that children understand and perceive the world. These intelligences may not be exhaustive. Linguistic is the ability to use spoken or written words; logical-Mathematical is an inductive and deductive thinking and reasoning abilities, logic, as well as the use of numbers and abstract pattern recognition; visual-Spatial is the ability to mentally visualize objects and spatial dimensions; body-Kinaesthetic is the wisdom of the body and the ability to control physical motion; musical-rhythmic is the ability to

master music as well as rhythms, tones and beats; interpersonal is the ability to communicate effectively with other people and to be able to develop relationships; lastly intrapersonal is the ability to understand one's own emotions, motivations, inner states of being, and self-reflection.

Since this research concentrates on interior design of the kindergarten building, the Iranian children were interviewed by showing the seven elements of the MI theory in the form of pictures. Thus, the most selected picture will demonstrate the most preferred environments by kids. The teachers were also interviewed via a structured questionnaire to gauge their opinions of how architectural factors can influence their students' achievement (children 5-6 year old) at the kindergarten in Iran. They were asked to rank the most effective architectural factor to the least. Meanwhile, their opinions were revealed by asking some questions about space, area, environment and the safety of the Iranian kindergartens.

Sampling frame: The study was targeted to children from private kindergartens in Tehran, 2009. Iran is divided into 5 major cities and a huge number of private kindergartens are allocated in the major city which is called Tehran. Therefore, the main focus of this study was on those private kindergartens in the Tehran metropolitan. From the list of kindergartens, 20 of them were randomly chosen and a number of 10 students and 10 teachers were targeted to be interviewed randomly at each kindergarten. Hence, the sample for this study was made up of 200 educators aged 5 to 6 years old and 200 kindergarten teachers.

Research hypothesis: Previous studies show that kindergarten architecture is influenced by lighting, colour, indoor space, outdoor space, suitable material, safety and circulation (Dudek, 2001; Hathaway, 1995; Muir, 2001; Rittner-Heir, 2002; Sherman, 2001; Tanner, 2000). Possibly, in the case of Iran, a kindergarten with better facilities will have a higher impact on the student's academic achievement. On the contrary, the lower facilities have the worse impact and therefore the student could be less motivated to attend to school or pay attention to the teacher. Hence the following hypotheses are set forth:

H1(*kindergarten teachers*). There is no (versus yes) significant difference between kindergarten facilities (lighting, colour, indoor space, outdoor space, suitable material, safety and circulation) and academic achievements. In other words, a kindergarten with a lower (versus more) concerned facilities (lighting, colour, indoor space, outdoor space, suitable material, safety and circulation)willinfluence students'academic achievements.

H2 (*kindergarten students*). There is no (versus yes) significant difference between the MI theory elements (music instruments, dance and sport, charts and numbers, drawing walls, team work, colourful area, playground and handcraft) and children's interests in their kindergarten. In other words, a kindergarten with a lower (versus more) attention on the MI theory dimensions (lighting, colour, indoor space, outdoor space, suitable material, safety and circulation) will more likely not favour students.

The hypotheses will be tested for both sets of questionnaires to determine the relationship between the kindergarten facilities and academic achievements and also which MI theory dimension is more related to the students' interests in their learning space.

Method of analysis: In order to accomplish the objectives of this study, a descriptive analysis was performed. Further, the analysis included chi-square test of independence to examine the extent to which selected kindergarten environment facilities influenced students' academic achievements.

RESULTS AND DISCUSSION

Socio-economic/demographic information: Descriptive analysis was used to discuss the results of the socio-economic profile of the teachers and children. Since all of the surveyed children were 5-6 year old and they also completely depended on their parents, their gender was the only asked item. Teachers were asked the entire demographic factors related to this study such as gender, age, education level and marital status. Table 1 shows the characteristics of the sample with regard to their demographic background. The majority of adult respondents were female 81.5%. More than half of the interviewed children 55.5% (111) were female and the

Table 1: Demographic profile of respondents

Characteristics	Number	%
Gender (Teachers)		
Male	37	18.5
Female	163	81.5
Gender (Students)		
Female	111	55.5
Male	89	44.5
Marital status		
Single	173	86.5
Married	22	11.0
Widowed	2	1.0
Separated	3	1.5
Age		
18-25	39	19.5
26-35	99	49.5
36-45	50	25.0
46-5	58	4.0
Above46	4	2.0
Education Level		
Primary	4	2.0
Secondary	13	6.5
Diploma	60	30.0
Undergrad degree	83	41.5
Postgraduate degree	40	20.0

rest (44.5%) were male. In this survey, 86.5% (173) of those surveyed were single, 11% (22) were married and the rest were widowed and separated. The majority of the respondents interviewed were between 26-35 years of age (49.5%) and most of them (41.5%) had a Bachelor degree. In Iran, like many other countries, dealing with young children is traditionally viewed as women's work and therefore the same pattern could also be observed in this survey.

Ranking of effective architectural components on learning space: The rank is a statement describing the "level of importance" of different architectural components in the kindergarten environment. The overall purpose of ranking was to find out the most important perceived components (physical and architectural) by the kindergarten teachers. In order to measure the level of importance, the respondents were to rank the factors from scale 1 (most important) to 6 (least important). The degree of importance in accepting or rejecting the items was measured by computing the average scores for each item. Table 2 gives a visual quick view of the ranked items and safety concern of the learning space which show the highest importance among the rest. The kindergarten is an important start to lifetime learning and academic achievements; therefore, it is vital to have a safe environment in order to build a personal foundation for the children.

Chi-square analysis: Next, the possible differential predictive value of the architectural components depending on the academic achievements based on the teachers' concerns was examined. The results of the chi-square test of independence showed that there was a significant relationship between class furniture, safety, Kindergarten lighting, indoor space, suitable material and academic achievement. The respondents' responses to determine the important level of each component were classified into two categories using median split (low, high). The results showed that most of the teachers believed that the better quality of furniture like desk, table, chair, board (white/ black), TV, computer and etc., had a higher impact on the students academic achievements ($\chi^2 = 8.996$, $p<0.01$) (Table 3). In teacher's point, addition, the teacher's lighting in the classrooms also affected student's learning behaviour positively

Table 2: Ranking of Effective Components on Learning Space

Factor ranking from the most important to the least important	Number	%
Safety	71	35.5
Aesthetic	57	28.5
Comfort	30	15.0
Light	20	10.0
Colour	18	9.0
Acoustic	4	2.0

Table 3: Chi-square values and Kindergarten teachers' responses

Architectural Components of Kindergarten	Learning Spacecan affect Academic Achievement Yes (%)	No (%)	χ^2	p-value
Class furniture [0 = Less important 1 = more Important]	64.5	35.5	8.996	0.003
Lighting [0 = Less important 1 = more Important]	63.0	37.0	18.251	0.000
Colour [0 = Less important 1 = more Important]	59.5	40.5	0.516	0.473
Indoor area [0 = Less important 1=more Important]	58.5	41.5	5.198	0.023
Outdoor area [0 = Less important 1 = more Important]	51.5	48.5	0.237	0.626
Safety [0 = Less important 1 = more Important]	54.5	44.5	3.606	0.058
Suitable Material [0 = Less important 1=more Important]	62.0	38.0	3.824	0.051
Circulation [0 = Less important 1 = more Important]	48.5	51.5	1.101	0.294

Table 4: Chi-square values and children's responses

The elements of MI theory	If the children like their kindergarten Yes (%)	No (%)	χ^2	p-value
Music in the class [0=Less agree 1=more agree]	60.5	39.5	4.712	0.030
Dance and Sport [0=Less agree 1=more agree]	52.5	47.5	3.654	0.056
Numbers and Charts [0=Less agree 1=more agree]	52.0	48.0	0.604	0.437
Drawing on the walls [0=Less agree 1=more agree]	56.5	43.5	4.731	0.064
Team work [0=Less agree 1=more agree]	79.5	20.5	0.066	0.797
Playgroun [0=Less agree 1=more agree]	62.0	38.0	3.606	0.064
Colourful furniture [0=Less agree 1=more agree]	61.0	39.0	3.182	0.074
Handcrafts [0=Less agree 1=more agree]	57.5	42.5	5.030	0.025

($\chi^2 = 18.9251$, $p<0.01$). In the point, indoor space was also related to the student's academic achievements ($\chi^2 = 5.198$, $p<0.05$). A relationship existed between the safety of the kindergarten environment and academic achievements ($\chi^2 = 3.606$, $p<0.10$). Moreover, suitable material (e.g., books, movies, music, CDs and etc.) in the

kindergarten had a better impact on the children's academic achievements (χ^2 = 3.824, p<0.10). The information presented in Table 3 showed that the teachers were more concerned about the quality of the furniture, lighting, indoor space, safety issues and suitable materials in relation to academic achievements. To them, outdoor space and colour did not play any critical role in the academic achievement of the students. This indicated that the teachers emphasized more on the components, which were directly related to the learning behaviour like comfortable benches, suitable lighting system, facilitated classrooms and advanced learning materials.

Table 4 shows the results of the chi-square test for the children. The purpose of this test was to find which dimension of MI theory made the students more interested in their kindergarten. The children were divided into 2 groups based on how agreeable they were with the MI theory dimension (less agree and more agree). The results showed that there was a relationship between playing music in the class and the students' interests in the kindergarten (χ^2 = 4.712, p<0.05). Dance and sports also had a relationship with the children's interest in their kindergarten. The more entertainment there were, the more the students were in favour of their learning area (χ^2 = 4.712, p<0.05). Existing drawings on the walls was also related to the students' interests in their kindergarten. As a child, the more drawings (especially comics and cartoon drawings) around, the more attractive it would be to the child (χ^2 = 4.731, p<0.10). There is no doubt that a well equipped playground will bring more attraction to the kindergarten as the students would want to spend more time there (χ^2 = 3.606, p<0.10). There was also a relationship between the colourful furniture, wall and students' interests in their kindergarten (χ^2 = 3.182, p<0.10). Creating handcrafts was also related to the students' attention to their kindergarten (χ^2 = 5.030, p<0.05). As mentioned earlier, students are in favour of entertainment and activities and the results also confirmed this matter. Team work and walls covered with numbers and charts did not show any relationship to the children's interest.

CONCLUSION

The study provided an important exploratory analysis of the relationship between architectural components and young students' academic achievements. The results of the ranked components showed that safety was the most important concern for the teachers in relation to learning space. This finding was similar to that of Smith's study in 2002. He found that the safety issue was the most influential factor on the learning environment among the middle school students. In this study, safety was followed by aesthetics, that could be related to the old Iranian culture, art, history and literature. Comfort, light, colour and acoustic were in the lower level of importance. The results of this study indicated the relationship between the architectural components of learning space and academic achievements. The teachers were more concerned about class furniture, lighting system, safety, suitable material for study and indoor space in relation to students' academic achievements. No significant difference was found between outdoor design and achievements. This could have been due to the fact that Iran schooling term began in the autumn season and ended at the end or middle of spring. During this period (especially autumn and winter) the weather is not warm enough for the students to have outdoor activities. Therefore, they spend most of their time inside the classrooms or in indoor sport clubs. Thus, the teachers emphasized more on indoor architecture and designs. In contrary with Tanner and Andersen (2002), no relationship was found between colour and academic performance. This result indicated that the concept of using colour as one of the main architectural elements was quite new in Iran. Although the kindergartens in Iran were partially furnished with colourful equipment's, the concept of colour in design and building architecture was not very common. The findings of the children's opinions about their kindergarten indicated that the MI elements played a key role in academic performance of kindergarten students. The attraction caused by these elements motivated and encouraged the students to learn. The results showed that playing with number and chart and team work were not related to the students' interests in their kindergartens. The descriptive analysis showed that most of the surveyed children were girls and females are less logical-mathematically compared to the males (Kaur and Chhikara, 2008). Based on the research by Qui *et al*. (2009), children did not like teamwork by nature and this was one of the main reasons of their addiction to computer games. Thus, playing in group or team work was selected by children as an influential item in this study. From the present study it can be concluded that greater attention towards the architecture and interior designs of kindergarten is required. MI elements play a role in the development of the children's personality and also their academic performance. The teachers are not the only responsible people in the children's academic achievements. There is a need of collaboration of teachers, architects, children psychologists and policy makers (from the government and private sectors) to identify a strategy plan for maximum utilization of kindergartens and pre-learning spaces in relation to students' academic achievements. Meanwhile, the parents should be careful in choosing a suitable kindergarten for their children in order to motivate and encourage their children's talents.

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REFERENCES

Boss, S., 2001. Breaking Out of the Box. Northwest Education Magazine 6(4), Summer, Retrieved from: http://www.nwrel.org/nwedu/summer01/ (accessed 2006, Nov 25).

Bullock, A.A. and E.S. Foster-Harrison, 1997. Making the best decisions: Designing for excellence. Schools Middle, 7(2): 37-39.

Dudek, M., 2001. Kindergarten Architecture: Space for the Imagination. 2nd Edn., Independence, Spon Press, KY.

Hathaway, W., 1995. Effects of school lighting on physical development and school performance. J. Educ. Res., 88(4): 228.

Herrington, S., 2003. Kindergarten: Garden pedagogy from romanticism to reform. Landscape J., 20(1): 30-47.

Kaur, G. and S. Chhikara, 2008. Assessment of multiple intelligence among young adolescents (12-14 Years). J. Hum. Ecol., 23(1): 7-11

Kolleeny, J. 2003. "K–12 Schools: As Good As It Gets." Architectural Record 191 (3): 131.

Muir, M., 2001. A Model Program In A Remodeled Building. Northwest Education Magazine 6(4), Sumer, Retrieved from: http://www.nwrel.org/nwedu/summer01/, (Accessed on: November 25, 2006).

Peters, P., 2003. Here for the children. Texas Architect, 53(1): 22-25.

Plympton, P., S. Conway and K. Epstein. 2000. Daylighting in schools: improving student performance and health at a price schools can afford. Paper Presented at the American Solar Energy Society Conference, Madison, Wisconsin, June 16.

Qui, L., W. Tay and J. Wu, 2009. The impact of virtual teamwork on real-world collaboration. Proceedings of the International Conference on Advances in Computer Entertainment Technology, pp: 44-51.

Reicher, D., 2000. Nature's Design Rules: Leading The Way Toward Energy-Efficient Schools. Learning ByDesign. Retrieved from: http://www.asbj.com/lbd/2000/00inprint/00reicher.html, (Accessed on: November 25, 2004).

Rittner-Heir, R.M., 2002. Color and light in learning. School Plann. Manage., 41(2): 60-61.

Sanders, E.B.N., 2002. Post Design and Participatory Cultur, Retrieved from: http://www.sonierim,com/red/us/commune/papers/Finlandpaper99.pdf2, (Accessed on: November 11, 2008).

Sherman, L., 2001. Lighting the Way to Learning. Northwest Education Magazine, 6(4), Summer, Retrieved from: http://www.nwrel.org/nwedu/summer01/lighting_way.html, (Accessed on: November 25, 2006).

Tanner, C.K., 2000. The Influence of School Architecture on Academic Achievement. J. Educ. Admin., 38(4): 309-330.

Tanner, C.K. and S. Andersen, 2002. Toward A Pattern language theory of middle school design. Educ. Plann.,13(3): 3-20.

Tanner, C.K. and S. Langford, 2003. The importance of interior design elements as they relate to student outcomes. Carpet and Rug Institute, ERIC Document Reproduction Service, ED 478177, Dalton, GA.

UNESCO, International Bureau of Education (IBE), 2006. Iran: Early Childhood Care and Education (ECCE) programme. Geneva, Switzerland.

Upitis, R., 2007. Spheres of influence: The interplay between music research, technology, heritage, and music education. Int. J. Music Educ., 37(1): 44-58.

West, J., K. Denton and K. Germino-Hausken, 2000. America's kindergartener (NCES 2000070). US. Government Printing Office, Washington, DC.

Yoo, H.S., 2000. Child Development, Changjisa, pp: 151-202.