

A Study on the Visual and Structural Relationship between the Architecture of Modern Educational Spaces and the Academic Performance of Students

Abstract

An enhanced environment will lead to a more desirable education, thus, in parallel with the development of educational systems and programs, the environmental model of learning spaces must also evolve. The issue of education and the urgent need to improve the quality of education in recent years, has been studied from various dimensions. What is known today as the physical model of the school in Iran in some cases has not been able to attract and encourage people to attend continuously and usefully in that space, which has caused a decrease in positive student performance. The present study was conducted in two conducts: qualitative and quantitative. The qualitative part is done by content analysis method and the quantitative part is done by descriptive-experimental method. The statistical population of the present study included six schools in Toronto-Canada with different percentages of performance from weak to strong based on the national exam held by the education of that country in different neighborhoods. Using a cluster random sampling method, 100 grade ten students were selected. From the previous researches and the opinion of the professors of architecture and psychology, the main criteria and sub-criteria were extracted and used in a closed questionnaire containing 30 questions. In order to analyze the data and test the research hypotheses, inferential statistics and frequency distribution modeling were used. For this purpose, SPSS 22 software was used to check the descriptive statistics and Smart PLS software was used to check the research hypotheses. The results confirmed the model fit. The results of data analysis showed that the physical quality of modern educational environments has a direct and consistent effect on student performance and building form, internal and external communication and motor circulation were the most influential factors. The study of

all factors presented that proper design of the architecture of educational spaces is a solution to increase student productivity and improve their academic success.

Research aims:

١- To study the relationship between the architectural components of modern educational spaces and the academic performance of students in Canadian schools

٢- To reach a native pattern in the new educational space.

Research question:

١. What is the relationship between the efficiency of modern schools and the physical components of the educational space?

٢. What model can be provided to achieve an educational space that has the capacity for new teaching methods?

Keywords: Academic performance, Modern educational spaces, academic success, sense of place

Introduction

If the educational environment is designed to meet the needs of individuals and encounter their physical and mental needs, it helps students to grow well and be eager to be present in the environment, which will have a direct impact on their performance. It can be said that proper bedding and providing a dynamic environment is one of the factors, one of the factors, or to put it better, one of the strategies to solve the problem of quality of education. The greater the connection between the student and the school, the more positive effects it has on the audience. A bond that can affect a person's memories while studying at school as well as after graduation by leaving a pleasant memory of a sense of belonging and attachment to that environment. What this study emphasizes is an emphasis on nurturing the next generation, strengthening the sense of participation of individuals, motivated and enthusiastic presence in educational spaces and, consequently, increasing academic performance in students, with the aim of examining the relationship between the components. The architecture of modern educational spaces and the

academic performance of students in Canadian schools has been done and finally this study tries to reach a native pattern in modern educational spaces.

The school is a social institution and reflects the specific culture of different societies, which transmits certain worldviews, habits, customs, skills and knowledge to the mind of the child. When you first step into a new space, the set of factors in that place will have effects that will either make you want to come back to that place and look for new words for life, from different angles. You pay attention to it or, conversely, you volunteer to leave there faster. This issue is very important at the age of ۷-۱۲ due to lack of intellectual employment. Teaching is not just in the classroom; The classroom is a part of the educational space that, although it has a direct impact on the teaching method, it must be related to other spaces (whether open or closed) and to the user of the space, so that they cannot be separated. Previous and new studies, which are a combination of several studies in this field, show that inadequate facilities negatively affect students' progress and associate physical quality with student progress. (Clark, ۲۰۰۲; Dadak, ۲۰۰۰; Artman and Lemsters, ۱۹۹۶; Artman and Lemsters, ۱۹۹۸; McGuffie, ۱۹۸۲; Moore & Lacney, ۱۹۹۳).

Some studies show that if physical quality improves from poor to good, academic achievement improves from good to good. However, some claim that the relationship between academic achievement and physical quality of educational spaces is small (Artman, ۲۰۰۴; Stretchers, ۲۰۰۰). Storabi, Etesam and Majedi (۲۰۲۰) in examining the relationship between cultural and social identity and architectural design in Ekbatan town also showed that there is a significant relationship between socio-cultural factors and a sense of satisfaction and belonging. Mir Gholami and Aishm (۲۰۱۶) in an article entitled Conceptual model of evaluating the sense of place based on physical, perceptual, functional and social components, has studied the effect of body on the sense of place in the urban landscape. Jamaluddin Mehdinejad (۱۳۹۷) in an article has emphasized the criteria for designing educational spaces on environmental capabilities affecting the minds and behavior of students. In this research, the first importance: non-fixed or dynamic elements, respectively: green space, smell, temperature, light, sound. Second degree of importance: semi-fixed elements of space, respectively: decoration, patterns, colors, textures, materials, shapes, signs, and symbols. Third degree of importance: the position and size of the space in the spatial organization of the whole building is considered. Turkman et al. (۲۰۱۶) in a study examined the role of architecture and physical factors of the educational environment on facilitating children's

learning. The result indicates that the constructive factors of the educational environment are effective in facilitating children's learning. Together, these factors provide the conditions for students to be able to focus more easily on the lesson material, and on the other hand, create better conditions for the teacher so that he can also convey the lesson material to the students better. The path facilitates learning for students. Jafari (۲۰۱۷) in a study examining the index of flexibility in educational spaces, concluded that the design of educational space with the ability to change the elements and arrangement of spaces, strengthens students to adapt to the environment and the power of decomposition and composition in it Raises and also causes their group interactions with each other in the educational environment. Anjum Shoaab (۲۰۲۰) in an article examines the cultivation of creativity of architecture students and states that creativity is not limited to specific individuals, but by recognizing the mind and its abilities, provided conditions in a standard environment that enhances creativity and as a result of academic achievement in individuals. Pirtaj Hamedani (۲۰۱۷), Khan Mohammadi and Sharifnejad in a study to explain and study the indicators that cause sociability, attractiveness and quality of an educational space based on environmental psychology, and the expression and study of these indicators for a faculty attractiveness, sociable and responsive music has addressed the psychological, educational, welfare and activity needs of its audience from the perspective of students, professors and audiences in the field and has provided architectural suggestions based on them. Ghofrani (۲۰۱۶) states that physical design indicators help to create a sustainable educational environment. The effect of light and color in educational environments, classroom shape, classroom furniture, classroom interior architecture, layout of educational spaces, appearance characteristics of materials in interior design, orientation, natural ventilation of educational buildings, roof system, insulation, green roofs, landscape architecture of the site (open yard) of schools, suitable facilities for schools, etc. are among the important topics in this article. Mortazavi (۲۰۱۸) by examining educational spaces from the perspective of environmental psychology states that the new schools are significantly better than the old schools in terms of architecture, health, classroom equipment and the desired index, but in terms of land density and density outdoors have worse conditions. There is no significant difference between the new and old classrooms in terms of safety indicators, school equipment, school land density, classroom area and volume density, and building or infrastructure density. In this regard, the safety index is of special importance.

After collecting data from previous research and the opinion of professors of architecture and psychology, the main criteria were extracted (as a closed questionnaire containing 38 questions) to examine the physical component of the educational space.

All high schools are ranked based on the performance of 10th graders, according to the annual Toronto-Canada National Examination. In this study, 6 high schools with different efficiencies (from weak to strong) and from different neighborhoods were randomly determined and 30 students from each school (a total of 180 students in equal proportions of girls and boys) by cluster random sampling were selected. The initial questionnaire was given to a number of professors of architecture and psychology and after approval, the final designed questionnaire was distributed among the samples. In this study, descriptive statistics have been used to describe data such as central indicators. In order to analyze the data and test the research hypotheses, inferential statistics and frequency distribution modeling were used to analyze the data. For this purpose, in this study, SPSS 22 software was used to study descriptive statistics and Smart PLS software was used to examine the research hypotheses. Also, Cronbach's alpha coefficient of the whole questionnaire is 0.883, which indicates the high reliability of the questionnaire.

To check the convergent validity, the extracted mean variance index was calculated. Convergent validity exists when the combined reliability is greater than 0.5 and the extracted mean variance index is greater than 0.5. Also, the combined reliability must be greater than the mean variance index extracted. In this case, there will be a convergent validity condition. Due to the fulfillment of all 3 above conditions, the questionnaire has convergent validity. A single-sample Student's t-test was used to evaluate the status of the physical component and its criteria according to the results of Kolmogorov-Smirnov test and the normality of the data.

Conclusion

The purpose of this study is to investigate the relationship between the performance of 10th grade high school students in 6 schools in Toronto, Canada and its localization to improve the quality of education in the country. Since there are new teaching methods to be realized in addition to the need for management and trained teachers, a suitable container must be considered with it in order to be effective in order to increase the quality of education.

The education curriculum is now firmly linked to the current school architecture model, so that without a change in the existing school building foundation, no alteration in the school education system and method can be imagined. Over the past few decades, growth global awareness of the creative and constructive education environment has raised the issue of school design in a new and very thought-provoking status. Modern schools, designed on the basis of a deeper understanding, show well that the organization of educational environments based on different social needs has influenced the art of teaching and learning. Regarding the component of educational environment, it should be stated that educational environment includes a set of attitudes, feelings and behaviors that affect the innovation, satisfaction and efficiency of individuals, including students, teachers and administrators. The learning environment should provide the conditions for the personal growth and development of students to nurture creative and independent students. The traditional philosophy of education was that the child is an empty, passive, and disinterested foundation in learning that must be taught to the child, otherwise he will not take the lead in learning. If the facilities of the educational environment are adjusted based on the resident's passive and passive role, and in contrast, the teacher's physical mastery as a teaching agent is emphasized, the teaching will be one-way. However, in recent researches, the flow of education is considered as a reciprocal process between students and teachers, and in order to achieve this, its bed must be provided in space (Lotf Atta, ٢٠١٢). According to the analyzes, the criteria of communication between inside and outside the building, building design form and motor circulation had the highest frequency among respondents. By comparing the percentage of school performance with the percentage of satisfaction with the criteria of the physical component, an alignment relationship is observed. This finding is consistent with the results of Shahbazi (٢٠١٥) research which showed that proper design of educational space strengthens students to adapt to the environment and increases the power of decomposition and composition in them and also causes group interactions. They interact with each other in an educational environment that is directly related to increasing their productivity. A creative learning environment includes different parts of social, educational and physical environment that should be completely flexible and appropriate to different educational programs. The physical elements of a creative learning environment should meet the different needs of students at different levels. One of the parts of these physical elements in the environment is related to accesses and circulation spaces. In a New Zealand study examining barriers to educational spaces for students with special physical and mental disabilities, participants were asked to list ١٠

of the ۲۷ barriers prepared by experts as the ۱۰ most important barriers to this knowledge. Students choose. The results showed that ۱۹٪ of parents believed that the most important problem was due to improper design of educational spaces and ۱۶٪ considered the most important problem to be the physical spaces of schools (Kearney, ۲۰۰۹).

The results of the motor circulation criterion are consistent with Tanver (۲۰۰۰) research, which in a study to examine the facilities and quality and equipment of space, receiving movement paths is completely related to students' performance and named them as transparent spaces for sense of freedom and movement. Is. The results of this study are consistent with another study that showed that schools with crowded and cluttered physical environments have undesirable returns (Hullville and Velit, ۱۹۸۵). Movement and circulation in school spaces is one of the four most important design features to explain the productivity of students. Another notable criterion is the communication inside and outside the educational buildings, which includes the transparency of its entrance and readability, the possibility of light, air, etc. entering the building and the safety of students. This criterion is also important in educational-control discussions, which with proper design leads to easy control of the educational space without creating a negative feeling in students. The similarity and typology of school building forms in recent years has been associated with the discussion of boredom of space, which is one of the factors that leads people to want to leave the environment and does not meet the need to understand the visual appeal of students. . As can be seen from the results, schools with higher academic performance have performed stronger in this area. Based on the research findings, it is proposed to redefine the existing buildings and a new model for building construction by focusing on the three criteria of the form of educational buildings, the connection between inside and outside the building and the movement of movement in space. New methods should be explained so that the path of new educational methods can be realized in its proper container.

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