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Research Paper

Determining the Role of Physical Components of Educational Environment in Motivation Towards Learning among Sixth-Grade Students in Tehran City*

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ABSTRACT

The educational environment is one of the effective factors in the academic performance of students. This study aims to investigate the role of physical components of educational learning in motivation toward learning among sixth-grade students in Tehran City. This is a descriptive study with a correlation type. The statistical society comprises all sixth-grade students who were studying during the academic year 2021-2022 in Tehran. Sampling was done through a systematic random technique, and 37 students who provided inclusion criteria were selected. The research tools included the physical aspects of the classroom environment (PACE) scale and students' motivation toward science learning (AMTSL) questionnaire. Data analysis was done through SMART PLS Software, Pearson correlation test, and Structural Equation Modeling (SEM). The results showed a positive and significant relationship between physical aspects of the environment (academic self-efficacy, furniture, equipment and amenities, space, light, indoor air quality of building, and color) and motivation towards learning. Moreover, SEM analysis showed that the t-value of all variables is greater than 1.96 and the load factor is greater than 0.4, so the selected questions have an appropriate factor structure. The path coefficient equals 0.340, and the absolute value of the t-value equals 5.197, which is greater than 1.96. A positive significant relationship exists between the physical components of the educational environment, motivation towards learning, and academic self-efficacy of students. Therefore, programming for developing the structure of physical components of the schools should be a priority in the creation of an underlying evolution in the promotion process of students, which improves their academic and motivational achievement.

Keywords: Physical Components, Educational Environment, Motivation Towards Learning, Students.

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1. INTRODUCTION

The modern education system tries to pave the way for self-actualization and the development of students' talents since the low academic grades (Akhoundi et al. 2020). Hence, students should have the right to ask questions, think and criticize freely, doubt right, and dare to show creativity and innovation; therefore, education structure goes beyond the curriculums and teaching techniques. In this case, schools are the most important social institutes that are responsible for students' education and pedagogy (Samadppor Shahrak and Tahbaz 2015). Educational environment, especially school is a crucial component that influences learning conditions within various educational and pedagogical dimensions (Turel and Gur 2019). Therefore, an educational environment that provides the field for the progress and learning of students during childhood would increase the psychological health of children, and foster their talents (Oreyzi et al. 2015). Accordingly, educational systems, teaching techniques, and education next to physical environmental components are substantial variables that can improve learning motivation.

The education and training system aims to grow and develop elementary students within its excellence trajectory. It is seen that developments in elementary school are multidimensional, and cognitive development is one of these dimensions experiencing a change in its deepest layer during elementary school age (Conesa et al. 2022). Therefore, emphasis on the operationalization of the learning process not only contributes to skill and knowledge transfer, but also leads to growth and excellence of values, promotion of attitude, and emotional, cognitive, and behavioral traits in students. All mentioned factors increase the motivation towards learning among students (Parsipour and Mohammadi Ahmadabadi 2022).

Motivation towards learning means an extensive and lasting willingness to acquire science and knowledge with mastery over learning-related skills. The lasting part is indeed substantial because motivation will remain in all school grades, workplaces, and social life situations. Although motivation toward learning may be different in classes, positive motivation is beyond and more holistic than a specific classroom topic (Li et al. 2021).

Motivation towards learning is an important variable in predicting the educational career of students, which is correlated with many factors. There are some factors related to students' motivation towards learning, including relationships with others, particularly peers (Allameh et al. 2017), adaptability in the educational environment (Miri Rostami 2020), teacher-student relationship, intelligence and happiness (Sadati et al. 2022), and healthy and dynamic educational environment. However, the role of physical environmental components has not been investigated in a specific case.

Unfortunately, few theories have paid attention to the environment and spatial components used in it, especially in the evolution of motivation toward learning. Most theories may have considered the method, structure, and functionality of teachers and teaching to teach skills and create a cognitive change in students. Although everybody is aware of the role of an efficient teacher in educational motivation and motivation towards learning (Morris et al. 2017), appropriate educational space and tools can play a vital role in increasing motivation towards learning. On the contrary, a high number of students in the limited area of the classroom, lack of suitable chairs and benches, insufficient light, improper ventilation system and environment temperature, street-facing windows, and subsequent noise are among environmental components that have negative effects on the motivation towards learning. The educational and pedagogical spaces must be designed based on an accurate and profound knowledge of the existing conditions and basic psychological needs of the individual for whom the architectural space is designed. It seems that age conditions with the concepts and sciences used in the designed space of teaching or the type of colors used in the educational environment have a direct and significant effect on the quality of pedagogy. The geographic area of the school, the socioeconomic status of students, and the gender of students have a considerable impact on the design of educational spaces (Jandric et al. 2021).

The physical space of a school is one of the important living and dynamic factors in the quality of education and creating motivation in students. Space creation has been always one of the goals of architecture. In this lieu, architecture tends to design modern educational spaces (Zarneshani Asl 2022). Space is considered as the main component in architectural design. Architectural space would bring the sense of being protected, sheltered, and closed. Walls, floor, and ceiling distinguished the interior space area from the adjacent interior spaces and exterior space. Form, shape, and quality of space components, design of windows, walls and their combinations, and outdoor space would determine the quality of physical components. Physical components affect the students within the environmental, functional, perceptual (cognitive, emotional, interpretive, and assessment), time, space, and semantic (performance, culture, and building location) dimensions (Konopko et al. 2019). As mentioned before, environment and architecture can play an important role by affecting various dimensions of mental health and landscape beauty. However, the body of the educational environment can affect academic achievement. Also, physical components of the educational environment in schools can effectively improve the quality of education and learning, and few studies have directly investigated the role of schools' physical factors in

motivation toward learning. Therefore, this study aims to examine whether physical components of the educational environment can be effective in creating motivation toward better learning considering various dimensions, particularly the academic self-efficacy of students.

2. BACKGROUND

A review of studies on current schools in Iran indicates that the relationship between educational spaces and learner's needs has been less investigated so the problem in these schools is very low spatial quality in their architecture and substitution of other elements compared to traditional schools (Alaghmand 2017). However, students and their needs are the most important factors in education that determine the design of educational spaces. By developing proper locations matched with psych and personality, this approach, not only improves a child's growth but also encourages them during other education phases. They do this exploration through their five senses, and all details used in the shapes, colors, motifs, volumes, sounds, and odors are effective for them to create an integrated space. Hence, the organization of educational spaces is an essential case (Sarchashmi et al. 2017).

Education and educational environments play an important role in mentality and civilization in all communities. Large schools were designed architecturally based on the learning model for two centuries. In these schools, peer groups of students had to gather in a single space called a classroom and pass a process to acquire various knowledge types. They had to take the exam based on the predetermined criteria at the end of the academic year to ensure they had learned during the academic year, and then they were permitted to pass the higher grade (Garcia et al. 2020). Many theorists, including teachers and architects, criticized this traditional education model. These criticisms on the common educational system of schools and type of schools' designs led to the more creative designs of schools, smaller classrooms, and manageable schools, schools with open plans, consideration of all dimensions of a child's personality, substitution of disciplined and quiet classrooms with group discussions, and changing the interior environment of school making it a safe place with warm atmosphere. Previous studies have shown that those children who have studied in schools with better spatial quality showed higher educational motivation rather than those studied in schools with dark classrooms that had broken windows and improper atmosphere (Miranda et al. 2021).

The learning process is a constant and stable trajectory that relies on two internal and external factors. Learning is always the outcome of interaction between individual and environmental factors, but it is not possible to separate these personality and environmental factors that influence on learning process. The reason is that personality is shaped by the environment, and environmental factors, in turn, affect the personality variables and are also influenced by them. Conducted studies showed that the living environment and its inevitable changes are the most important determinants for psychological-emotional sanitation and learning motivation in individuals (Williams et al. 2021).

3. METHOD

The research method is descriptive with a correlational type. The statistical society of participants comprises all sixth-grade students in 19 districts of Tehran during the academic year 2021-2022. Moreover, these students had dynamic and continuous participation in the class presence or online without any absence since the beginning of the academic year. Two districts 1 and 3 were chosen for sampling through a random systematic method. Only two schools had inclusion criteria and were eligible to enter the study. Therefore, two schools were chosen from District 1 of Tehran. The sample size was measured using the Cochran formula, which equaled 376 members regarding the statistical society.

The most important inclusion criteria of the study were as follows: education in grade six, being a boy, dynamic and active participation since the beginning of the academic year (maximum three absences), attending in-person classes (at least twice a week in November), moderate socioeconomic status, lack of any serious psychiatric disorder, lesson plan based on constructivism, available modern and efficient equipment and tools. The most important exclusion criteria were more than two absences over a month lack of complete and accurate answers given to the items of the questionnaires, losing inclusion criteria, and finally withdrawal from the process in any phase of research. Moreover, participants signed content letters to observe ethical considerations and be aware of the research's objectives. In addition, another ethical consideration was an emphasis on the confidentiality and anonymity of participants to encourage them to participate in the study and trust in the authors. Finally, 378 complete questionnaires were collected out of 420 questionnaires after deleting the incomplete ones. The questionnaires were imported to SMAR PLS Software, and data analysis was done through SEM and Pearson correlation methods.

4. ASSESSMENT INSTRUMENTS

Physical Aspects of Classroom Environment (PACE) Scale: This questionnaire was designed by Ahmad et al. (2015). This instrument includes 66 items and monitors and measures six constructs: furniture, facilities, space, lighting, indoor air quality, and

color. PACE scale is scored based on the five-point Likert scale, including strongly disagree (1), disagree (2), no idea (3), agree (4), and strongly agree (5). All constructs are scored positively. The highest and lowest scores equal 330 and 66, respectively. The higher the scores, the more suitable the physical environment will be. This instrument examines the arrangement and layout of bench and chairs, blackboard, and screen (smart board) in the classroom. This instrument has assessed the learning space in the classroom, movability, and activity of students and teachers regarding the arrangement type and matched number of students in the space classroom. The color, number, efficiency, and function of lights have been assessed to examine the light, number, and location of fans and windows, and temperature of the classroom. Moreover, conditions and architecture of walls and ceilings affecting the color perception of students is the last subscale measured in this scale. Subscales include furniture and arrangement of chairs, benches, and blackboard (14 items), facilities (6 items), space proportionality (6 items), lighting (6 items), indoor air quality (12 items), and color (12 items). This instrument has internal consistency (alpha coefficient), so Cronbach's alpha values of furniture and arrangement, facilities, space, lighting, color, and indoor air quality equal 0.881, 0.979, 0.951, 0.827, 0.94, and 0.919, respectively.

Motivation towards Learning Questionnaire: The SMTSL questionnaire is designed by Tuan et al. (2005). This scale includes 35 items and six psychological subscales: performance goal, self-efficacy, active learning strategy, science learning value, learning environment stimulation, and achievement goal. This scale has been designed to measure the learning motivation rate. This scale has been constructed based on a five-point Likert scale (strongly disagree, disagree, neutral, agree, strongly agree). Items 1-7 are designed for self-efficacy subscale, items 8-15 are about learning strategy, items 16-20 examine science learning value, items 21-24 examine performance goal, items 25-29 are related to achievement goal, and items 30-35 assess the learning environment stimulation. Items 2, 4-7, and 21-24 are scored reversely. Zare and Bakhshesh (2013) normalized this questionnaire, and their results showed that Cronbach's alpha and Gottman's reliability of this instrument equaled 0.838 and 0.875, respectively. Also, the correlation coefficient of the questionnaire equaled 0.667 two weeks after the retest of the instrument (Zare and Bakhshesh 2014).

5. FINDINGS

According to the demographic features of participants, the average age of them was 12, and 67% of participants were the first children of the family. The weight of respondents varied between 28 and 76kg, and an average weight equaled 51kg. The height of respondents varied between 142 and 170cm, with an average height of 158cm. According to demographic results, most respondents' fathers (89.8%) were self-employed, and their mothers (48.9%) were housewives.

Table 1. Descriptive Statistics of Variables

Variables	Min	Max	Mean	SD
Furniture	39	70	51.114	7.316
Equipment and Facilities	8	30	22.318	5.965
Space	17	80	52.727	14.864
Light	12	30	22.284	5.669
Indoor Air Quality of the Building	12	58	32.716	12.152
Color	20	60	40.136	10.466
Self-Efficacy	12	35	18.943	5.637
Active Learning Strategies	23	40	33.614	5.340
Science Learning Value	9	25	21.182	3.666
Performance Goal	6	20	11.841	3.751
Goal Achievement	15	25	21.398	3.324
Incentive Learning Environment	16	30	22.023	4.521

Table 1 reports the minimum, maximum, mean, and standard deviation (SD) values of environmental bodies and motivation toward learning. According to this table, participants gave the mean values of 51.11, 22.31, 52.72, 22.28, 32.1, and 40.13 to physical components of the educational environment, including furniture, equipment and facilities, space, light, indoor air quality of building, and color,

respectively. Moreover, the standard deviation values of these variables equaled 7.31, 5.96, 14.86, 5.66, 12.15, and 10.46, respectively. The highest mean and SD value was related to space, and the lowest score was given to light. In the motivation towards learning scale, active learning strategies obtained the maximum mean value (33.614), and self-efficacy obtained the maximum SD (5.637).

Table 2. Correlation between Variables

Variables	Academic Self-Efficacy	Furniture	Equipment and Facilities	Space	Light	Indoor Air Quality of the Building	Color
Academic Self-Efficacy	1						
Furniture	0.419 P=0.003	1					
Equipment and Facilities	0.800 P=0.000	0.389 P=0.000	1				
Space	0.514 P=0.000	0.558 P=0.000	0.414 P=0.000	1			
Light	0.660 P=0.000	0.256 P=0.016	0.488 P=0.000	0.368 P=0.000	1		
Indoor Air Quality of the Building	0.602 P=0.000	0.528 P=0.000	0.223 P=0.037	0.622 P=0.000	0.315 P=0.003	1	
Color	0.544 P=0.000	0.558 P=0.000	0.332 P=0.002	0.564 P=0.000	0.272 P=0.010	0.437 P=0.000	1

Table 2 reports the correlation between research variables. All components of the physical environment had a positive and significant relationship with motivation towards learning. According to the reported results, the highest correlation is seen between facilities and motivation towards educational learning (0.80). Moreover, there is a high correlation (0.6) between light, indoor air quality, and academic self-efficacy, which shows a strong relationship between variables.

Table 3. Final Results of Testing Hypotheses

Hypothesis	Path Coefficient	Test Value	Result
First sub-hypothesis: a significant relationship exists between furniture and its arrangement with motivation towards learning among sixth-grade students based on the constructivism approach in Tehran.	0.340	5.197	Confirmed
Second sub-hypothesis: a significant relationship exists between equipment and facilities with the learning level of sixth-grade students based on the constructivism approach in Tehran.	0.604	14.263	Confirmed
Third sub-hypothesis: a significant relationship exists between space and area with the learning level of sixth-grade students based on the constructivism approach in Tehran.	0.453	9.714	Confirmed
Fourth sub-hypothesis: a significant relationship exists between light and the learning level of sixth-grade students based on the constructivism approach in Tehran.	0.521	13.503	Confirmed
Fifth sub-hypothesis: a significant relationship exists between indoor air quality and the learning level of sixth-grade students based on the constructivism approach in Tehran.	0.509	12.425	Confirmed
Sixth sub-hypothesis: a significant relationship exists between color and the learning level of sixth-grade students based on the constructivism approach in Tehran.	0.445	8.038	Confirmed

According to Table 3, all hypotheses of the study are confirmed. Therefore, the educational environment's bodies have a significant effect on the motivation towards learning.

6. DISCUSSION

This study was conducted to examine the relationship between physical components of environment and

motivation towards learning among sixth-grade students in Tehran. The results indicated a positive and significant correlation between the physical components of the environment and the motivation toward the learning of students. The results of this study were in line with studies conducted by Vaziri and Rahbari Manesh (2021) who examined the effect of physical and architectural space on the educational motivation in high schools of Qazvin City. Their results showed a positive and significant relationship between components of the educational environment (including physical, architectural, and symbolic components) and components of educational motivation of students, including cognitive, emotional, and behavioral motivation. The highest value was related to the effect of architectural and behavioral components, while the lowest rate was seen in the relationship between symbolic and emotional components. Therefore, improved quality of environmental components in schools would increase academic participation among students (Vaziri and Rahbari Manesh 2022).

The results of the present study were matched with results obtained by Foroud et al. (2021) who studied the effect of environment design on learning in elementary schools of Rasht City. Their results implied a direct and significant relationship between architectural system factors (including flexibility, quality of light, and nature) and factors of learning systems (including underlying, behavioral, and motivational needs). The highest correlation was related to the effect of nature that can increase motivation and happiness, which are the most important variables affecting learning promotion (Foroud et al. 2021).

Some foreign studies also achieved similar results indicating that environmental bodies can play an important role in learning rate and increasing motivation towards learning among students. According to the results of the study conducted by Dargue et al. (2021), when environment and environmental bodies are designed based on standard conditions, autistic children will have a higher willingness and motivation for learning. This result was consistent with the results of the present study.

These findings can be explained by the effect of space flexibility (performance flexibility and arrangement variability), light (quality of natural light), and environment nature, quality of benches and chairs, use of bright colors suitable for children's age on the learning rate of children, which comprises underlying factors (attention, precision, memory, and intelligence), behavioral factors (activity and participation of learner), and motivational factors (motivation and goal) (Garcia et al. 2019). Moreover, a dynamic educational environment with proper ventilation can improve brain function because an inappropriate oxygen rate may lead to fatigue and headaches. Temperature is another important factor for comfort and maximum efficacy during learning (Hitches et al. 2022). On the other hand, attention to the beauty of the environment is another factor that can affect learning, so a beautiful school would facilitate learning bringing happiness and pleasure to children when learning in an educational environment (Saponto et al. 2021).

This study also faced some limitations. This study is correlational, so it is not possible to find causal relationships between variables. In addition to the physical components of the educational environment, many other variables may affect the results: demographic components, such as the education level of parents, socioeconomic status of a family, number of books available in the house, and having a computer in the house. On the other hand, this study has been done in district 1 of Tehran. Therefore, caution must be taken when generalizing the results to other populations with different cultures and religions. Moreover, this study has been done only on sixth-grade male students, so different results may be achieved in other educational and age groups. It is recommended to do this study in other cities of Iran that have different fabrics, languages, and religions to overcome the limitations. Moreover, further studies can be done on other age groups, especially female adolescents studying in high school and university. It is suggested to control the education and income level of the family to achieve more accurate results and prevent false findings in further studies.

7. CONCLUSION

The results of this study indicate the positive and significant correlation between physical components of the environment and motivation towards learning. Therefore, great attention must be paid to the environment and architecture (light, color, chairs, benches, and windows) of classrooms to improve the motivation and learning achievement of students. Therefore, the academic achievement, motivation, and self-efficacy of students will increase in a dynamic educational environment that is based on modern standards.

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CONFLICT OF INTEREST

The authors have no conflicts of interest to declare.

MORAL APPROVAL

The authors commit to observe all the ethical principles of the publication of the scientific work based on the ethical principles of COPE. In case of any violation of the ethical principles, even after the publication of the article, they give the journal the right to delete the article and follow up on the matter.

PARTICIPATION PERCENTAGE

The authors state that they have directly participated in the stages of conducting research and writing the article.

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