The Role of Class Scale in Promotion of Students' Participation in Active Learning Process (Case Study: Male Students of a Secondary School in Shiraz)

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ABSTRACT: Perception and experience gained in the contemporary school could not help human beings' active learning. Totally, participation is the main element in active learning and thus, the active participation of students in the learning process is emphasized by education and learning in secondary schools. Given the importance of active learning, in this paper, the effective components in this type of learning has been identified. Among the three components involved in active learning, the component of participation in the learning process is selected and after a study of the model, two factors affecting the participation of children in the learning process are specified including social pattern and activation pattern of participation in the learning process. In this paper, the research uses a mixed method including a quantitative part and a qualitative part. The quantitative part uses a univariate T-test and the qualitative part uses a case-study method and content analysis to analyze the semi-structured interview. The study population in the quantitative part includes 279 male students of a secondary school in the city of Shiraz and the qualitative part includes 43 male students of the seventh grade of a secondary school in Shiraz. The results show that the majority of the respondents prefer a small class size. The findings emphasize the concept of participation in the learning process and introduce the factors of social interaction, individual and group activities, involvement and experience in the learning process for the indoor educational environment design and ultimately emphasize the factor of interaction as the most important criterion.

Keywords: Indoor educational environment design, Active learning, learning process, Environmental variables

INTRODUCTION

Among the different urban places, schools are one of the most important places where children spend many hours of their day. This environment is one of the most important areas for the formation of the children's character and ability. The educational environment for children is an environment that offers a range of knowledge and action required for the children's development. In this environment, children get acquainted with a variety of personal and social skills and consequently such an environment would affect the development of their personality. Most research conducted on this topic revolves around how the physical aspects of the learning environment affect children's learning. Most of the research which sought to create a pleasant learning environment for children emphasized various issues

such as participation in the learning process, development of technology, physical comfort, stress reduction, students' focus on work as well as trust and confidence (Chan, 1996). This is while the researchers nowadays mostly believe that the students' achievement at school increases when the school is considered as a social community. School is then considered as a learning environment in which the students do group work and have cooperation, trust and respect each other (Nasr Abadi & Norouzi, 2005, 169).

So far, several studies have focused on the impact of the environmental factors on learning and a willingness for participation in the world scale (Chen, 2008, 192). However, this issue has not been studied from the point of view of spatial proportions of the class and its impact on it. Accordingly,

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the present study evaluates the effect of class size on the willingness of students to learn the lessons to explore the factors influencing it. Thus, in the present study, the class size is considered as the independent variable on which the variable of the student's willingness to learn depends. Thus, the class size in this study contains classes bigger than 30 square meters or smaller. On the other hand, the willingness of students to learn was analyzed through the mediator variable of students' participation. The factors affecting the students' participation which are developed as the theoretical framework of the study are extracted from the literature related to the concept of active learning. The present study thus seeks to answer the following questions:

- What are the determinant factors in participation in indoor educational environments?
- What environmental features and capabilities facilitate the possibility of students' participation in the learning process?
- What impact does the class size have on improving students' participation?

Accordingly, the research hypotheses can be explained in the following way:

1. It seems that the class scale (class size) affects the students' participation in the curriculum and consequently their learning.
2. It seems that the students' willingness to learn the lessons is more in smaller-scale classes which is due to the increase of the students' interactions with each other and with the teachers, as well as their confidence and desire for group works.

Literature Review
Active and Passive Learning
Given that one of the main objectives of any educational environment is to improve learning for students, considering this issue and investigating the current approaches in this field seem necessary for planning, designing and constructing such environments. Due to the differences in the active and passive learning approaches, explanations are necessary to specify them. Passive learning returns to the first half of the twentieth century when the teachings of psychological and behavioral lessons reached their peak. At that time, the dominant paradigm in the field of learning was behaviorism. The foundations of this paradigm were founded by John Watson in 1913 (Aspadk, 2004).

Taylor (2009) in his book entitled "Architecture and Education" reviews a vast body of literature regarding the changes in the educational and learning approaches and their relation to the architecture of the educational environment and refers to important points as follows:

- Schools are in the transition from the Industrial Revolution Era with hard, memory-based, speech-driven and prognostic training to the Information Era with participatory training. Thus, the appropriate conditions for this transition must be provided in architecture.
- The linear and fixed configurations in the past architectural spaces should be substituted with flexible, movable and usable spaces for other activities.

- The hard and dry models of learning spaces should be substituted with models that develop the child's mind.
- The best learning experiences include active, project-based, environmental, structural, and experimental learning. Thus, the architecture must change the teacher-student relationships and the community and be substituted with diverse learning spaces with more access.
- Students are responsible for their own learning.
- Classes should be more like studios and workspaces.
- Schools should be designed and built more collectively and collaboratively.
- Schools should be designed with the consideration of technological needs (David & Weinstein, 1987, 132).

In the 18th and 19th centuries, teachers such as Parker and Dewey recognized the limitations of the educational systems and found that the traditional educational methods could not fulfill the individual students' needs which caused them to be passive in the process of learning. In contemporary, the educational experiences and philosophies have accepted that students should not be mere adopters of information but they should seek knowledge (Feliciano, 2011). Comparison between the traditional and modern classes (two classes with different teaching methods and class layout) shows that the quality of the traditional classroom environments is lower than the contemporary modern classes in which the focus is on group learning activities. The students in modern classes are active learners who use several techniques to learn such as cooperative learning, in which learning takes place in the groups (Ramirez, 2014). Inactive learning approach, the classroom environment is collaborative in which teaching and learning should be consistent with the whole students (Slavin, 1994). Table 1 compares with the features of active and passive learning from different researchers' perspective:

According to the studies conducted in the field of active learning and the distribution of concepts in the field, there are three major components with a high frequency which can be considered as the main components of active learning to be further studied: including participation in the learning process, exploration and curiosity: production of ideas, and activity. In the present study, the component of participation in the learning process is selected for discussion.

Active Learning and Participation
In the past, it was believed that only silent classes are real learning environments. At that time, the school administrators were walking in the corridors and waiting to hear the slightest sound to control their classes. However, today, many schools seek to take advantage of programs that invite the students to express their opinions and have participation. These programs which are called cooperative learning invite the students to discuss, negotiate and eventually teach each other. Research on the specific applications of cooperative learning in the classroom began from the early 1970s (Scardamalia & Bereiter, 2006). In the traditional classes of the 19th century, the teacher stood in

Table 1: Active learning features.

Researcher	Features of Active Learning
Bonwell &.Eison, 1991	- Involving in the learning process; - Engaging in meaningful learning activities; - Thinking about what's going on; - All the activities that are being done in class.
Masan, 1995	- Manipulation of objects; - Participation in the learning process; - Working together;
Prince, 2004	- The student's activity - Students' participation in the learning process
Oblinger, 2006	- Learning is obtained through partnership; - Learning is achieved in social groups; - Learning is acquired through physical activity (work and project);
Nisbet & et al., 2009	- The student enjoys learning more; - The student actively participates in the learning process rather than being a mere listener; - The student is responsible for their own learning and is motivated to discover facts;

front of the class and taught students. In fact, the students in the traditional classes could only hold 50% of what they saw and memorized. In 2006, Ebinger observed changes in the traditional classes and found that the classes have changed from lecture-centered to learning-centered classes. In fact, modern classes are designed to support active and cooperative learning. In general, participation in the learning environment affects the children's positive feeling in the learning environment and increases their interest to study and learn. Thus, participation is an important factor that directly and indirectly affects the students' learning in the class (Dotterer & Lowe, 2010). Participation in learning includes personal learning experience, attention to children, and expression of ideas and attitudes by the children (Shariatmadari, 1995).

The Ministry of Education of America suggests that the modern curriculum should be centered on the content-based learning models to facilitate learning. In the new models of learning, the concepts of students' participation in the learning process and the active learning process should be encouraged. In this type of learning, the concepts of critical thinking, activity, and problem-solving should be raised; these strategies need students' activity in diverse active groups (Taylor, 2009). Cooperation in learning is an active cooperative process in which the learner can: 1. Reach their goals; 2. Solve their problems, and 3. Reach a mutual understanding of issues. In this kind of learning, the learning feature includes cooperation in collective and individual activities and the use of different learning areas (physical, virtual or a combination of both spatial patterns) and various instruments (Seif, 2011,74). (Fig.1)

The architectural pattern of the class in the 1950s and 1970s, such as the cluster pattern and the open plan pattern created environments to improve learning and social experiences, such as individual training structure, cooperative learning, and learning from each other based on constant social interactions (Moore, & Lackney,1993,105). In general, today's education system and schools in America are experiencing student-centered educational models in small creative schools with their emphasis on continuous and permanent social interactions between teachers and students in a friendly social and physical environment. This suggests that the design of the school environment can have a significant influence on the participation of children.

One of the actions taken to strengthen the user's participation in the workplace is the design of Heinvara Elementary School in Helsinki, Finland. In this project, it is believed that learning depends on the social and economic background of the users. Today, in Finland, learning systems are defined as collaborative, project-oriented and learner-centered processes. The participants in this school determine the total characteristics of the school environment as follows: division space, social spaces, large and small spaces, seminar space, individual workplaces. This school was designed by Burak Celik for 190 students. The design and structure of the school are unique

since, in the school, a variety of learning spaces is provided for the learners, communal spaces are prepared for group activities, and open central spaces are provided to give the students an opportunity to present and display their activities and assignments in the school environment. Moreover, local materials are used to build the school environment. In general, it is believed in this project that the design and construction of school should consider collective needs (Colle, 2011, 27)

Based on a literature review, theorists have had different perspectives to explain the participation of children in the learning process. Some focused more on the objective aspects while some others emphasized the subjective aspects. In Fig. 2, the manner of participation in the learning process derived from the literature is provided. Generally, two different patterns can be provided for participation in the learning process: 1)

Social pattern, and 2) Activity pattern. The architecture of the educational environment should provide these patterns to improve active learning. The features of these patterns are classified as follows in terms of the present research:

- Social model: Social interactions, negotiations, opportunities to express ideas, good and pleasant communications, teacher-student interactions, mutual social dependence and positive interaction between the learning groups, thinking, talking and working with group mates, relations between people and environment.

- Activity pattern: games, group activities.

Studies in this area that are mostly psychological can specify the patterns of children's participation in the learning process. This section shows how children learn to participate, or which activities are necessary to engage children in the learning
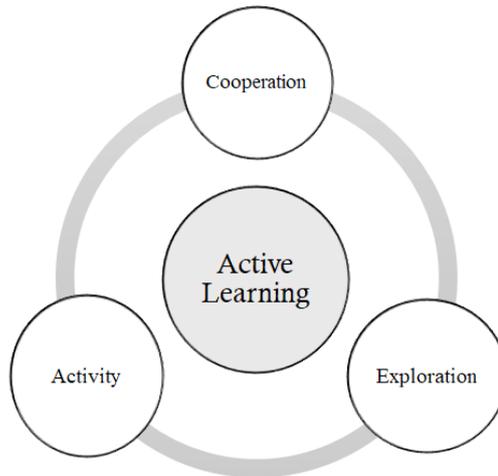
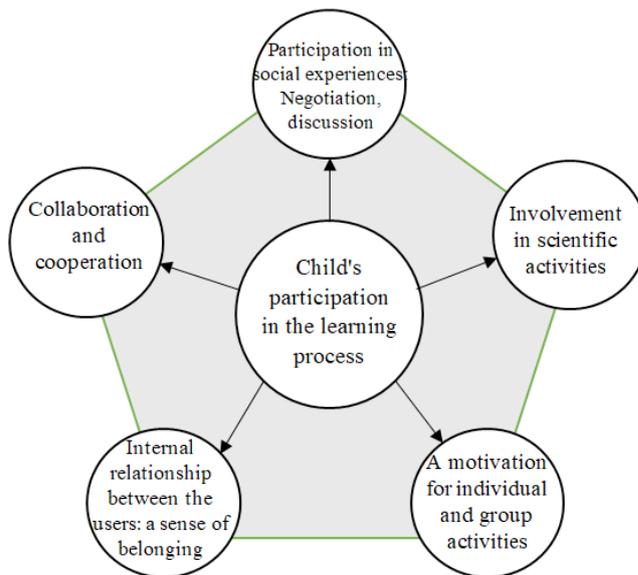

Fig. 1: Active learning features.

Fig.2: Child's cooperation manner in the learning process.

process from a psychological perspective. The activities and spaces can be organized as an influencing environment for the children's participation in active learning through classifying the views expressed in the section of participation in the learning process and adapting those concepts to the environmental-spatial factors. Due to the recurring concepts in Table 2, the following classification can be presented for participation in learning.

1. The motivation for individual-group activities;
2. Social interactions;
3. Involvement in learning;
4. Collaboration and cooperation;
5. The internal interconnection between users: a sense of belonging.

According to the above-mentioned comments, it can be understood that each of the views expressed can influence one or more factors in the promotion of participation. Therefore, on this basis, it can be stated that the 5 factors of motivation for individual-group activities, social interactions, involvement in learning, collaboration and cooperation, and internal interconnection between users: a sense of belonging are effective on the participation of students in the classroom. In this study, these 5 factors as moderating variables analyzed the mechanism of the effect of class size (as the independent variable) on the student participation (as the dependent variable). In this study, these 5 factors as moderating variables analyzed the mechanism of the effect of class size on the student participation which is presented in Fig. 3 is visible.

Table 2: Researchers' perspectives on features affecting participation in the learning process.

Researcher	Features of participation learning process
Keramati, 2007	- There are group works and team activities in children's class and they learn and understand more;
	- Social skills are required for learning;
	- Individual activities occur in the class;
	- Face interaction (thinking, speaking);
	- Interdependence and interconnectedness between the learning class members and classmates feel better about themselves and others.
Alexander, 1979	There is a relationship between people and space;
Wolf, 2002	- Relations exist between people;
	- Social life and teamwork are essential for participation in the learning process;
	- Learning is a type of defining and solving problems; at the same time, critical skills develop;
	- Improvement of communication and participation of the individual members in the learning process;
	- Collection, analysis, and use of information;
	- Application of technology and other tools to complete the objectives;
	- Enjoying the rights and accountability;
	Developing and expressing oneself;
	- Strengthening the collective sense of communication and participation in the learning process between
Bakhtiar Nasrabadi & Nowrouzi 2005	- Mutual and positive social interactions between individuals (see each other, social relations) Working together, discussing;
	- Group activities and cooperative learning;
	- Involvement in classroom activities and curriculum;
	- Individual and varied activities are common in the class;
	- The student's experience should be strengthened to encourage and stimulate;
	- The students observe their classmates in the class and there is a trust among the students which increases their self-esteem;
	- Mental health indicators such as personal identity, good social relations, creativity and sense of responsibility develop.

Continiue of Table 2: Researchers' perspectives on features affecting participation in the learning process.

| Researcher	Features of participation learning process
Tileston, 2000	- In this type of learning, effective communication exists between the students; actually, when we teach something to others, we learn it better; - Students work with any kind of human and learning is enhanced by the students themselves; - In this type of learning, teachers need an opportunity to work together as students also, in this type of learning, there is a relationship between teachers and students.
Reid et al., 2008	- Participation in group activities in the classroom; social experiences exist in the class; - Students participate in group discussions; - Small learning groups are common in the class ; - Participation in class activities.
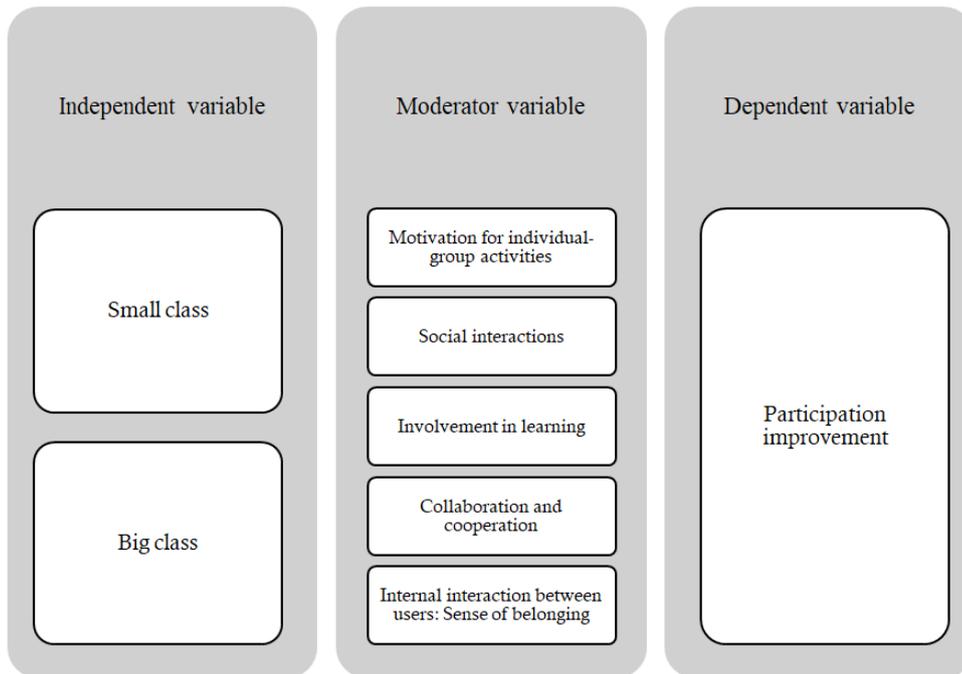
Fig. 3: The theoretical framework of the research.

MATERIALS AND METHODS

As previously mentioned, the main purpose of this study is to analyze the effect of the space scale (class size) on the students' learning in the secondary school. The class size in this study is, therefore, the independent variable and the students' willingness to learn is considered as the dependent variable. Class size as the independent variable is in two sizes: small-scale (less than 30 square meters) and big-scale (more than 30 square meters). Regarding the willingness to learn as the dependent variable, based on the framework of the study, five criteria were considered based on which, the students' participation

in the class increases or decreases and, consequently, their willingness to learn increases or decreases (Figure 2).

The study population was selected on two levels. On the first level, it included 279 male students of a secondary school in the city of Shiraz and on the second level, it included 43 male students of the seventh grade of a secondary school in Shiraz (seventh grade in the new educational system) were selected. The first community was used for the quantitative analysis while the second community was used for the qualitative analysis. The questionnaire used for the quantitative analysis consisted of 10 questions in which the moderator variables

related to the students' participation in the classroom were questioned with an emphasis on the class scale (Table 3). The second community including the male students of a secondary school in the city of Shiraz was divided into two groups, respectively 25 and 18 members at arrival (in coordination with school officials) in two classes with 35 and 22 square meters area. Among the various courses of this grade, three lessons including "Work and Technology", "Science" and "Social Studies" which require participation in education were selected and the students' participative behavior was observed during one year for these three lessons (in coordination with the relevant teachers). In this regard, to collect data, interviews were done with the teachers, the student's behaviors were observed by the authors and interviews were done with the students.

RESULTS AND DISCUSSION

As mentioned in the introduction, this study has two hypotheses; in the first hypothesis, the principle of effectiveness or lack of effectiveness of the class scale on the students' learning has been studied and in the second hypothesis, the students' learning in two classes with large and small scales has been compared. To examine the first hypothesis, a quantitative analysis was used. As mentioned before, a community of 279 male students of a secondary school in the city of Shiraz was selected through cluster random sampling and a questionnaire was distributed among them. Given the nature of the variables, a univariable T-test was used for the data analysis related to this hypothesis. The results are presented in Table 3. (Fig.4)

According to the test results (Table 3), it can be found that the significance of the whole factors affecting the students' participation is 0.001 which is lower than the constant value of 0.05 and therefore proves the hypothesis. This means that the class scale affects the students' willingness for the corporation and leads to a change in the willingness to learn. However,

the mean values obtained from the tests in relation to the two classes with different scales (small and large) show that the students in the smaller-scale classes had a greater sense of satisfaction in all five indicators of "motivation for individual and group activity", "social interaction and discussion", "involvement and experience in space", "belonging", as well as "collaboration and cooperation", compared to the students in the larger-scale classes.

After obtaining the above-mentioned results, the authors sought to find why the students in smaller classes had more willingness to participate compared to the students in the larger classes. Accordingly, the second part of the study was formed as a qualitative research study aiming to analyze the second hypothesis. As mentioned in the research method, a case study was done on the male students of a secondary school in Shiraz. The students were divided into two groups and placed in two classes of different sizes (35 and 22 square meters) and their behavior was analyzed during one academic year. During this time, their behavior was analyzed through authors' direct observation of the classes as well as interviews with the teachers involved (given that teachers in both classes in the courses selected were the same) and their willingness to participate in the class was examined. The following results were obtained after summing up the findings:

- In smaller classes, the students' willingness to answer the teacher's questions and participate in the class discussions was too much great.

- In smaller classes, the students' willingness to communicate with the other students was analyzed to be more and it was also found that the students in such classes had deeper friendships with their classmates.

- In smaller classes, the students were found to have more willingness to ask questions, express their personal opinions, discuss issues raised in the class and do scientific activities.

- In smaller classes, due to the small number of students, the

Table 3: T-test results in relation to the analysis of the moderator variables and their effects on the students' participation in the learning process.

|	Factors affecting participation	Class size	Average	Standard deviation	T	Significance
Class Scale	The motivation for individual and group activities	Small size	13.25	1.2	3.5	.0010
		Large size	7.1	2.15		
	Collaboration and cooperation	Small size	8.15	1.53	4.04	0.001
		Large size	7.02	2.2		
	Interactions	Small size	16.3	2.73	4.6	0.001
		Large size	10.01	3.34		
	Sense of belonging	Small size	10.11	1.54	5.53	0.001
		Large size	7.01	2.19		
	Involvement in learning	Small size	15.3	1.61	1.45	0.001
		Large size	7.1	1.72		
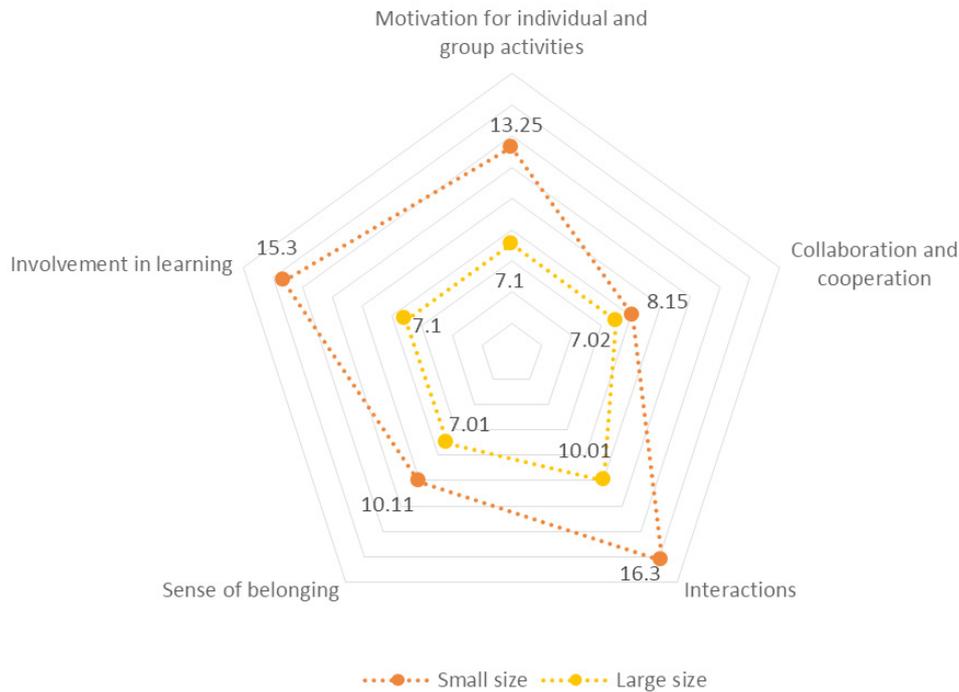
Fig. 4: Polygon chart of participation promotion

students were found to have more self-esteem and a better spirit in the classroom.

- In smaller classes, the students' interactions with the teacher significantly increased.

- In smaller classes, the students' motivation for doing individual and group activities was more in the environment.

- In smaller classes, due to the small number of students in the class, the teacher's attention the students increased and helped to improve their motivation for presence in the class, as well as doing group activities and individual studies.

Based on these findings, it seems that in smaller classes, the students are more able to see each other in the class which leads to the increased interaction between them and confidence. This also leads to an increased communication between the students and teachers which eventually results in an increased desire for students to participate in group discussions in the class that is referred to as "participation" in this study.

On the other hand, according to the teachers' reports in relation to the students' scores in the selected courses, a big difference was observed in the average of the final scores of the students in the three lessons. The average score of the three lessons for the students in the smaller class was obtained 18.42. However, this value was 18.03 for the students in the larger class. This difference confirms the validity of the tests and the mentioned issues. This means that compared to the students in the larger

classes, the students in the smaller classes are far better in cases such as focusing on topics provided by the teacher, understanding the materials, interaction, motivation for involvement in the individual and group works, involvement and experience in learning, cooperation, as well as sense of belonging. They have also greater participation in learning which increases their willingness to learn in such classes

CONCLUSION

Participation solutions in schools can help to identify the status quo, as well as the strengths, shortcomings, and deficiencies of the social condition with the aim of improving the quality of social participation in learning environments. In this context, one of the best assessment models is the views and experiences of people who are in direct contact with these spaces. Based on the concepts mentioned earlier, the most important features of governing participation in the learning process in the learning environment include social interaction, involvement and experience, and the opportunity to conduct individual and group activities. In fact, the spaces and activities can be organized through analyzing and grouping the categories so that the environment can affect the individual and collective activities, social interactions, as well as involvement and experience in the learning process to prepare the necessary context for

promoting the students' participation in the learning process. After analyzing the relationship between the environment and the participation of children in the learning process, the following most important factors affecting the participation in the learning process can be noted. However, considering the results obtained in this study, it can be generally noted that the students in different physical environments show different amount of participation. As it was mentioned before, the effect of the class size on the students' participation in the learning process was influenced by 5 factors. For example, it was found that students in the smaller classes showed the greatest participation in class discussions. The factors of involvement, the motivation for doing individual and group activities as well as interaction were greater in the smaller classes compared to the larger classes and were selected as the final criteria for the following principles and practical solutions. Finally, the interaction was chosen as the most important criterion of spatial participation in the design of indoor educational environments.

- Finally, interesting ideas and new details should be used in architecture to prepare an environment for the students to involve and have creativity. In fact, it should be so beautiful and increase the students' involvement and learning experience, and inspire and stimulate them. Moreover, since displaying the children's work increases their involvement and creativity, adequate surfaces and desks should exist for the display of the children's work.

- Moreover, putting the equipment in front of the people causes them to stimulate, search and involve in the space. Putting the bookshelves in the classroom and libraries make the environment exciting and increase motivation for reading books and doing activities.

- The use of various warm colors and fine details should make an exciting environment for activities to increase the quality of children's work.

- Combination of the class environment with the outdoor class causes people to get motivated for works and activities and this relationship becomes extraordinary popular among the children. Moreover, the students can use a platform in the classroom on to conduct various individual and group educational activities and work on them as horizontal surfaces.

- The layout of the furniture should be close to each other in such a way that allows the students to be there together to strengthen social interactions and ultimately participation.

- The class organization should be free in such a way that to carry out various activities, it should have the ability to change and be flexible. In this regard, a circular organization is suggested for group work, drama, debate and discussion in which reciprocity in dialogue increases or sometimes every student does activities in cooperation with another student. Such an organization is combined with multiple groups rather than individuals.

As it can be seen, in general, it is important to note that all the indicators that effectively promoted the students' participation, and the effect of small class scale was significantly greater than the large class scale, except for the variable of sense of cooperation and collaboration in which the small class had a small effect. Furthermore, the class size had the greatest impact on social interaction, involvement and experience in learning and individual and group activities had the highest average. The authors also attempt to suggest patterns to design such spaces for future research to thereby provide a basis for achieving a participatory environment.

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