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Research Article

Evaluating the Effects of Architectural Aspects on Student Sociability

(Case Study: Tehran University)

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ABSTRACT: The sociability and quality of behavior settings, according to general psychology data, are the most significant environmental values, measuring which helps to assess the success of environmental and architectural aspects. The present study was aimed at investigating the efficient environmental characteristics for the achievement of sociability in educational space. This issue has been addressed by examining the type and manner of interactions of students at the University of Tehran as well as qualified environmental factors facilitating, or restricting these interactions. In this study, data were collected as a combination of three methods of interview, observation, and questionnaire; with a population of students at the University of Tehran. With regards to statistical investigations, the sample size was 386 taken with a simple random sampling, and the data were analyzed using SPSS22 software. The one-sample t-test was also used for data analysis in order to find a logical relationship between variables. The results have shown that all environmental indicators are of significant importance for students in the formation of social interactions between students.

Keywords: *Social Interaction, Architectural Aspects, Environmental Affordance, Tehran University, Student Sociability*

INTRODUCTION

John Lang believes that patterns of social interaction and affordances of the built educational space are of particular importance in urban public realms. The main reason for this is that there is a close relationship between social interaction and people's attachment to social and constructed environments (Daneshgarmoghaddam et al., 2011). With the increase of individualism in the contemporary era, the physical condition, as a carrier of neighboring human beings, has been more concerned in order to bring humanity closer to each other and compensate for some of the lost social interactions in the past architectural and urban contexts (Salehinia, 2009). Educational spaces are a measure of the city or, in other words, a model of the city, the fact which doubles the importance of sociability in educational spaces. From this point of view, everything that happens in universities will occur on a larger scale in cities in the future. Therefore, making spaces in universities is more sociable, and the ability of environmental architects and designers to do, which will lead to finding the best sociability patterns that may have a significant contribution to the sociability of cities on another scale.

To identify environmental factors affecting the sociability of the place and explaining its pattern in the spaces of the University of Tehran. This study has been conducted in the form of development-applied research, considering the beneficial role of the operator. All information was collected through library documents and resources, interviews with experts in the field of architecture and behavioral sciences, which has been performed in two phases of qualitative and quantitative study. The data obtained from the students' point of view as users of the study space were analyzed and evaluated by adjusting the questionnaire and field observations using the SPSS22 software.

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Literature Review

Sharifian and Shirin Jani (2015) have performed a study on "the meaning of the balance concept in how people perceive the environment by the need for promoting social interactions in populist urban spaces". They recognized urban space as a concept that finds its true meaning in the urban scale and a thought depending not on the size of space but the mental belief of citizens as it is formed in their minds. What is important in identifying the characteristics of urban space is that the urban space is popular. Using the balance concept, which is a perceptual and emotional matter being related to the concept of movement in the city and urban space, this research was sought to analyze the definition and meaning of this principle, which is also the basic and governing principle in Iranian urban architecture. Taking advantage of instances and use of the principle of induction as the effect, the optimal use of urban space was addressed in order to improve the level of social interactions, with emphasis on its proper use in modern Iranian urban architecture with the aim that can facilitate the formation of cohesion and recover the identity of architecture and urban planning following the culture of having an Iranian urban space in future.

Ghavami and Pourzargar (2016) have investigated the components of human realms in the collective body from Edward Hall's point of view, pointing out that human beings have privacy in any space. Desirable space for human beings in individual spaces has been considered as the necessity of this research, which might be provided by improving the environment to create safe spaces and a sense of privacy while the body is collective. This descriptive-analytical research has specially investigated theoretical context and Edward Hall's theory in the field of human realms, so it deals with how to promote security and social relations in public spaces. As a result of the obtained analyzes, the mental concepts showed that access, proper distribution of space in terms of privacy, as well as the optimal physical design for the security feature, can make collective spaces desirable. Some relationships were addressed between spatial qualities and social concepts, including sociability in architecture and urban design and their use in the design of cultural buildings. The components of sociability were evaluated through the interview, and observation and results were analyzed by spatial behavior maps of users in the Farshchian Cultural Center of Isfahan as the case sample. The results of this study indicated a direct relationship between the degree of sociability and the physical and activity components of the formed environment. These components, sometimes alone and sometimes in combination with each other, can affect the quantity and quality of sociability in public buildings (Mohammadi & Ayatollahi, 2015). Streets that invite neighborhood residents to spend leisure time or meet their daily needs, and over time, a range of routes becomes a meeting place for them. Therefore, the components affecting the presence in urban space, especially the street, with inter-neighborhood performance, were first examined and identified. The relationship between urban space and social interactions and the effect that space's function and body imposes on the extent of pause and the formation of people's interactions was specified afterward. Finally, a guide for the urban design of a local boulevard was proposed using the analytical method based on prominent indicators, in order to attract neighborhood residents to promote social interactions (Ghalambor Dezfuly & Naghizadeh, 2014). That social sustainability in the general sense is synonymous with improving the quality of life of present and future generations taking his talents and capacities and satisfying the needs of all classes, involving indicators such as increasing the level of education, social justice, and popular participation, and so on (Bazrafkan & Gachkoob, 2016).

Asadpour and Moslemi Haghighi (2017) performed social interactions in poetry centers and, find effective architectural factors in designing poets' spaces to increase social interactions. In the first stage, information was collected by the library method to achieve the theoretical foundations of the research. Then, a questionnaire was prepared quantitatively about the important architectural factors in the design of poetry centers using factors affecting social interactions. The sample was selected from 203 members of a poetry center in Shiraz, Iran. The results showed that physical and social factors have the most direct effect is on the social interactions of young people and, poet designers have also been suggested to pay more attention to physical factors. The architecture should seek to increase social interaction and solidarity of people. The main goal of this study was to search for structural and semantic criteria of tourism complexes in order to create a sense of security and social sustainability due to the creation of a center for urban activities (Masoumi et al., 2015).

Lansdale et al. (2011) have studied the social interactions of civil engineering and building engineering researchers at Loughborough University and showed that the use of an open and group-based plan that is not demarcated, did not increase researchers' interactions compared to the room spaces allocated to each person, contrary to expectations. Even in an open-plan room, lack of privacy and increased noise distraction caused users dissatisfaction. This represents that providing privacy is as important as social interactions in an educational and research space. Russell and Snodgrass (1987) In their view, the emotional quality of the environment is the main factor in determining the mood and memories associated with a situation that can affect a person's health and well-being. Evans (2003) investigated the direct and indirect effects of environmental factors on mental health. He believes those features of the environment that directly affect mental health are congestion, noise pollution, air quality, and the amount of light. In addition to the direct effects, changes in psychosocial-social processes, which have known psychological consequences, can also

indirectly affect human mental health. Lang (2002) specified a point that divides the public sphere into two elements, the body as an objective element of space that can be seen, and the public or social sphere, which is certainly the first element that will provide the second one.

Theoretical Framework

The Feature of Environmental Affordance

The environment is an organized set of capabilities and affordances, the concept which is presented by the American psychologist James Gibson (Gibson, 1977; 1979). In this regard, these concepts can sometimes be used in the form of the word "supply". The affordance of material objects is one of those physical properties that can be used specifically by humans. In other words, different levels of the environment, provide different behaviors for humans. For example, if a surface has four characteristics of being horizontal, flat, expandable, and hard, and it is raised from the ground to the height of a human knee, one's perception is that one can sit on this surface. Put differently, the surface has the affordance to sit on. Therefore, one calls this level by the term platform, and this level has a meaning. An object has properties that provide its function according to human needs. The physical condition is composed of a set of levels, and it is a human who builds buildings by changing these levels, and as a result, changes the meanings of these levels or the built environment. Human beings transform levels of the physical condition so that they can adapt the environmental affordances to their needs. Thus, an environment may have special affordances for certain people, but at the same time for another person, these affordances might be meaningless (mostly due to the knowledge of their existence), and that environment does not reveal them to him. An environment tailored to human needs has specific affordances that provide human behaviors (Nasrollahzadeh et al., 2016, 8). Accordingly, urban architects and designers are paying special attention to the psychological understanding of human behaviors. Because such behaviors are closely related to the physical condition, and what distinguishes general psychology from other branches of psychology is the study of the relationship between behaviors that rely on the human psyche and the physical condition. However, human perception of the environment is one of the most central categories in general psychology, the process by which human beings select the necessary data from their environment based on their needs (Motalebi, 1998).

Social Interactions

Social interactions are closely related to people's attachment to social and constructed environments (Lang, 2002, 179) and also to social solidarity (Peters et al., 2010) because it provides the primary interactions for interconnectedness amongst people (Potapchuk et al., 1997). Therefore, the existence of these interactions in space gives it a meaning beyond space and promotes it as a place for social life (Alitajer & Zareihajiabadi, 2016). Hence, the spaces that become the ground for social interactions can be mentioned as places for interaction. In this regard, one of the first and most complete definitions of the place is provided by Canter. According to the Canter's model, the place is a part of natural or artificial space that has a definite range conceptually or materially which results from the interaction of behavioral factors, concepts that can be received by humans, and physical characteristics of the environment (Lang, 2002, 15). In general, the social relationship between individuals increases with three variables; 1) opportunity for effective social contact; 2) proximity to others; and 3) appropriate space for interaction (Skjaeveland & Garling,1997). What activates these spaces socially are primarily physical factors that can underlie entering and then stopping people in space factors such as accesses, visual attractions, and natural factors (Ghalambor Dezfuly & Naghizadeh, 2014).

Therefore, according to Humphry Osmond's definition, the use of words sociable space or societal-friendly space, collective spaces, and divisive spaces indicates spatial qualities that bring people together or separate them (Hamzenejad & Ghelichy, 2019). Table 1 summarizes the views of theorists in this field.

The Effect of Architectural Aspects on Social Behavior

The literature on human studies shows that the review of physical space requires consideration of activities in it. Barker has emphasized the collective-behavioral nature of activity spaces and has highlighted collective interactions in activity spaces as an affordance for space (Barker, 1968). Although most research has focused on the sociability of cooperative environments, how to establish collective interactions in all areas of the educational space, including private, semi-public, and public spaces, has been emphasized. In this respect, many recent studies have centralized the relationship between characteristics of physical space and social interactions. The focus of this research is that in any conditions, physical space acts as a spatial system, having featured the effect of the social interactions of users (Pasalar, 2003). The relationship between social organization and structure of the environment is examined in these studies. Accordingly, Moleski and Lang (1986) have stated that a physical place ideally supports behaviors and ethological events in space through three manners. First, the physical place provides physical elements and characteristics necessary for the continuity and reliability of people's comfort in the environment. Light, for example, is an important feature in the physical condition that physical location determines it would be. Second, the physical condition provides spatial facilities and organization that consolidates particular systems and patterns of activity in space and diminishes other activities. In other words, it facilitates the relaxation of public relations and provides a desirable level of privacy in the activity space.

Table 1: Summary of different points of views on the factors affecting the sociability of the architectural aspect

No	Experts Ideas	Viewpoints
1	Osmond (1957)	Suggesting the terms sociable space and socialization, proving the violation of semi-fixed elements of space (furniture) in the sociability of architectural space
2	Whyte (1980)	The presence of women, the presence of couples, the presence of the elderly and their stopping, the activity of peddlers, the existence of different choices for individuals, the proper definition of space, the possibility of walking, sitting and eating, meeting in space, mixing land uses and activities, facilities, and arrangements, the density of use, the density of use of seating space
3	Carr et al.,(1992)	He considers public spaces as a place of comfort for people, which provides leisure to get rid of the anxieties of daily life. For social interactions and a place for active and social participation with others
4	Lang (2002)	A human-scale, context of various behaviors and activities, ability to afford the desired behaviors of citizens
5	Hall (1966)	The atmosphere of social exclusion in one culture may be in another. A social exclusion environment is not necessarily a bad one, as a sociable environment is not good at all.
6	PPS (2019)	People are accessible; people are engaged in activities there; the space is comfortable and has a good image; and finally, it is a sociable place: one where people meet each other and take people.
7	Gehl (1987).	Inviting space, the occurrence of collective participatory and group activities in space and non-participatory activities
8	Lennard & Lennard (1993)	Urban space design and architecture based on facilitating and increasing social life

Among these, operational variables at this level include dimensions, space geometry, and spatial relationships and communications in activity spaces. Ultimately, the man-made environment produces and guarantees symbolic and aesthetic feelings, experiences, and perceptions that, as qualities in the environment, affect users' perceptions. These three levels always control the relationship between social interactions and behavioral systems in space in an interactively and variably. Therefore, physical space is determinant for the sociability of space in this regard causes the formation of activity and desire centers in certain parts of space based on spatial characteristics (Nasrollahzadeh et al., 2016, 10).

The psychology has developed a variety of theories related to the impact of the environment on humans and how the physical condition interacts with experience to be able to conduct empirical research under those theories. Therefore, general psychology is aimed at creating practical theories that are a result of observations of human behaviors in the everyday condition, which can be used by designers. One of the most important issues in environmental theories is the role of the space in shaping human behavior or so-called environmental determinism. Architectural determinism, or in a more extensive sense, physical determinism is simply defined so that human behavior can be transformed, especially at the level of social behaviors, by making changes in the architectural elements of the environment and its affordances. There are usually three perspectives on how the physical condition affects human behavior (Rapoport, 1982). In the first view, so-called environmental determinism, the arrangement of a physical condition determines how humans behave algebraically. In the second view, known as environmental feasibility, affordances of the physical condition provide facilities and restrictions in which the user will be able to choose from provided affordances. These choices are often made based on users' cultural inclinations, value systems, and beliefs and attitudes. The third view is probabilism, in which, although the physical condition provides the necessary facilities for the occurrence of behavior based on a person's choice, studies show that users are more likely to choose several phenomena in the physical condition or a behavioral setting than others (Nasrollahzadeh et al., 2016, 11).

Educational Space and Social Interaction

Universities are places for teaching, learning, and research that simultaneously create a sense of sociality and social interactions in their entirety and components. But today, the rapid growth of universities and their physical development, without considering other dimensions, has caused various problems such as student absenteeism and declining environmental quality. While the university and its spaces are a platform for the occurrence of the diverse individual or collective activities that host various scientific activities, this activity of students in educational space causes the emergence of communication and social interactions and creates a sense of place among them (Edwards, 2014). In this respect, if the university is assumed as a living being, this creature needs social interactions in order to survive. Therefore, the main role of educational space, as a place for students with different ages and gender diversity, which creates a variety of activities among students, is the basis for creating a sense of vitality in its context. As a result, social interactions are examined based on two micro and macro scales. At the micro-level, this concept means the diversity of

activities in the public sphere and its adaptation to space within the framework of behavioral settings. Therefore, using activity classification, any environment can be called sociable in which voluntary and social activities take place over a wide range of time. In this case, some indicators to identify sociability are the density of pedestrians in the area, the number, variety, and nature of existing behavioral settings, the existence of seasonal activities, various users, variety of forms and colors, and so on. At the macro level, social interactions can be considered as a feature of the environment, which allows for a better quality of life in the place with a combination of physical and non-physical qualities.

Furthermore, one of the issues that should be considered in designing interactive space for students is the qualities of the environment that affect their spatial preference or, in other words, encourages them to use that space (Alitajer & Zareihajiabadi, 2016). In the following, the spatial qualities affecting the spatial preference of students in three physical, functional, and semantic dimensions of space in both micro and macro dimensions are presented separately in Figure 1.

MATERIALS AND METHODS

Dimensions, Components, Criteria, and Sub-Criteria of the Research

In order to formulate a conceptual model of the research, the definitions and concepts were examined, and the opinions of theorists and researchers and global experiences were evaluated regarding the sociability of public space to adopt criteria and sub-criteria. These factors were matched with each other, and subscriptions were selected as criteria and sub-criteria of this research.

The sociability dimensions of public space were divided into three physical, social, and activity dimensions in this study. Each of these dimensions has had criteria, and each criterion may have one to several sub-criteria. The relationship between dimensions, components, criteria, and sub-criteria is hierarchical, as all listed in Table 2.

Research Methods

The one-sample t-test was used in order to analyze the data and also to find a logical relationship between the variables. The main purpose of this study was to identify and evaluate the environmental criteria affecting social interactions in universities in order to provide solutions that can improve the process of creating social interactions. Based on the research, the first important and effective indicators on the evaluation of a desirable library were extracted from reliable sources, and then a questionnaire was prepared for students of the University of Tehran. SPSS22 software has also been used in data analysis for the measurement of this research. The study population is students of the University of Tehran. According to statistical methods, the sample size was 386 using the simple random

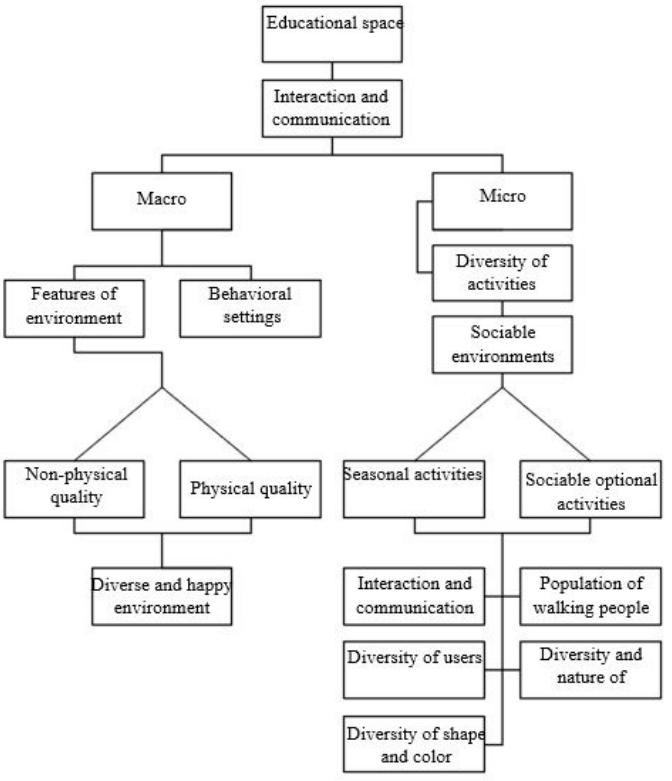

Fig.1: Study and identification of effective indicators in creating communication and social interactions in the educational space

sampling method. The main scale of the criteria studied in this research has been qualitative, so the Likert ranking scale has been used in compiling most of the questions. Thus, the answers to the questions were very high, high, medium, low, and very low. The duration of completing the questionnaires has been from December 2019 to January 2020 for 1 month. In addition, considering that the university space is generally used by both groups of men and women, so the gender assumption was not considered in the research.

RESULTS AND DISCUSSION

The Case Sample

With regards to the surveys conducted at the University of Tehran and the collection of information from the students, suitable places of the University Daily Interactions and communications were obtained with percentage values as described in fig.2.

According to the above diagram, it is more possible to create relationships with others and social interactions for students in

Table 2: Introduction of criteria and sub-criteria of research in terms of physical, spatial and activity characteristics

Criteria	Sub-criteria	Indicators
Spatial features of the place	Leisure	Existence of library and research center
		Existence of restaurant and teahouse/buffet
		Existence of campus, yards, and green space
		Existence of lobby, corridor, and public spaces for waiting and talking with friends
	Talking	Existence of closed space inside the faculty building and in the lobby and crowded public waiting areas
		(Existence of closed space inside the faculty (cozy and secluded places and low traffic
		(Existence of semi-open space in front of the entrance of the faculty building (such as
		Existence of yard or open space and public green space in the faculty
	Stopping	Possibility of waiting in a place to see friends
		Possibility of meeting and talking with friends on the place
		Possibility of enjoying and meeting the crowd and ongoing activities in the place
		Possibility to obtain scientific news and current faculty information
		Possibility of spending free time between classes and waiting for the next class
		Existence of service facilities around the place
	Form and Physical	Existence of proper lighting
		Human-centered space and the existence of vitality
		Existence of appropriate confinement
		Existence of paint, type of texture of materials used effectively in walls, floors, and ceilings
		(Existence of sensory richness (pleasant smell
		Existence of special and beautiful shape of the roof
		There are horizontal and elongated openings in the walls
		Existence of vertical and vertical windows in the walls
		Existence of skylights on the roof
		(.Correct placement of service-administrative functions (such as education, office, etc
		Existence of a small number of columns in the space and creating a private space for viewing
		No sound reflection
		Climatic comfort (proportion of temperature (heat and cold) in different seasons of the year-appropriate to (human
Spatial features of the place	Form and Physical	Possibility of short-term sitting
		The circular shape of the space
		The square shape of the space
		The rectangular shape of the space
		Existence of special signs, symbols, and signs to encourage staying in university
		Placing a suitable space for social interaction in a special and strategic place

Continue of Table 2: Introduction of criteria and sub-criteria of research in terms of physical, spatial and activity characteristics

Criteria	Sub-criteria	Indicators
Activities	Relationships and social occasions	Existence of benches, platforms, edges, and other seating equipment
		Possibility of gatherings and student and union ceremonies
		Ability to talk and exchange views in the faculty on scientific, academic, political, cultural and social issues, management issues of professors and events
		Ability to communicate with senior students
		Ability to interact with non-friendly (strange) students
		Possibility of sudden social interaction of students
		Existence of friendly and favorable behavior with classmates
		Existence of common facilities and pre-heating devices, cupboards, etc. in the environment
		Possibility to observe and monitor others
		Existence of scientific and non-scientific activities in public spaces
		Possibility of social presence of students
		(Possibility of human-environment interaction (movement in the environment
		Possibility to set up a photography and posters exhibition, and group working
		Existence of live music
		Possibility of watching
		Possibility of walking
		Possibility of student activities
		Possibility of instant meeting for various scientific and research activities
		Existence of university group activities (such as maintaining and cleaning the university environment and various meetings)

restaurants, buffets, and teahouses. The yard and campus, and then the corridor and lobby are suitable for communications.

Data Analysis

The K-S normality hypothesis test was performed on the collected data, considering that Asymp. Sig was 0.096, higher than 0.05, which is the measurement criterion between the significant test and the non-significant test, the data distribution has been normal and parametric tests such as the T-test can be employed (fig.3).

To test the hypothesis, data analysis related to research indicators was performed in a one-sample T-test statistical model (Table 3). In this regard, the amount of statistics (0.000-0.005) includes the positive views of the statistical community

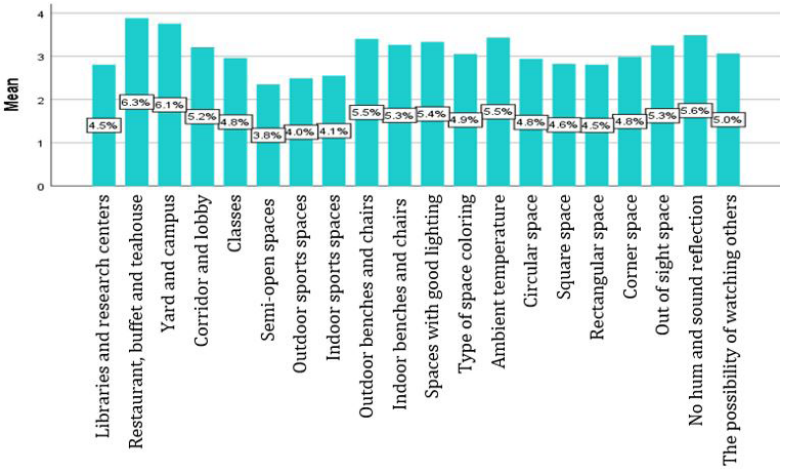

Fig.2: Priority places for social interaction to others students

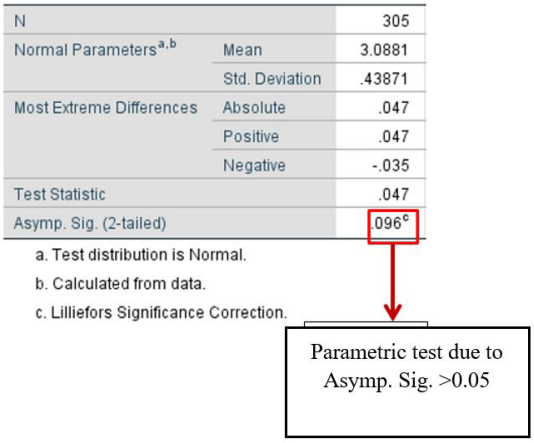

Fig. 3: One Sample Kolmogorov-Smirnov Test

Table 3: One-Sample Test

	Test Value = 0					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Libraries and research centers	43.474	298	.000	2.796	2.67	2.92
Restaurant, buffet and teahouse	63.277	304	.000	3.823	3.70	3.94
Yard and campus	61.425	301	.000	3.705	3.59	3.82
Corridor and lobby	49.243	304	.000	3.187	3.06	3.31
Classes	45.187	302	.000	2.983	2.85	3.11
Semi-open spaces (such as university entrance space)	41.819	302	.000	2.350	2.24	2.46
Outdoor sports spaces (such as volleyball and tennis)	35.333	301	.000	2.490	2.35	2.63
Indoor sports spaces (such as ping pong, etc.)	35.642	303	.000	2.549	2.41	2.69
Outdoor benches and chairs	52.608	297	.000	3.386	3.26	3.51
Benches and chairs in building spaces such as corridors and lobbies	51.842	302	.000	3.238	3.11	3.36
Spaces with good lighting	57.917	304	.000	3.341	3.23	3.45
Type of space coloring	49.429	289	.000	3.038	2.92	3.16
Ambient temperature (cold and warmth)	57.027	298	.000	3.408	3.29	3.53
Circular space	48.089	298	.000	2.983	2.86	3.11
Square space	58.133	301	.000	2.861	2.76	2.96
Rectangular space	51.923	297	.000	2.795	2.69	2.90
Corner space	45.283	301	.000	2.977	2.85	3.11
Out of sight space	47.781	298	.000	3.227	3.09	3.36
No hum and sound reflection	53.079	299	.000	3.477	3.35	3.61
The possibility of watching others	48.531	301	.000	3.132	3.01	3.26

towards the required index and (0.015, for example) indicates the negative effects and negative opinion of the statistical population towards the desired index concerning the social interaction index.

As the questionnaire data and t-test results indicate in the table, the test results represent that students consider all indicators significantly important in the formation of social interactions between students.

CONCLUSION

Considering the importance of cultural and educational centers of universities in the contemporary period and their important role in promoting social interactions, in this study, we tried to have an analytical look at the role of spatial arrangement in these centers to promote social interaction. In this view, the spatial organization and arrangement of spaces next to each other have a direct impact on how space users use the space, and this indicates a significant social relationship.

This study aimed to identify environmental factors affecting sociability in educational spaces. According to environmental assessments and questionnaires, although different environmental factors affect sociability, all environmental indicators are significant from the perspective of students indicating that all these factors should be considered in designing educational spaces. However, in this assessment, places where students are more active, such as libraries and buffets, and places where students feel more relaxed and comfortable, including open spaces and campuses, and places where better communication is possible apart from academic affairs, that is spaces where it is possible to talk for a long time and have less noise, such as corner spaces and spaces where it is possible to sit, have a higher percentage of frequency than other spaces. Therefore, for future research, it is recommended that researchers focus on creating space in public spaces of the university, such as buffets and restaurants and open spaces, to study the architectural form of this type of space that leads to greater sociability.

The quality and quantity of socialization increase with the coordination and compatibility between the physical of space and the behaviors of users. The effect of physics of space on the degree of socialization occurs in two cases. One with "direct capability" that allows the physical occurrence of interactive interpersonal behaviors in space and the other with "indirect" capability that as a perceptual and semantic factor, by creating images to define and facilitate social relationships between users or Increases and changes. Also, the physical characteristics of the public space of architecture are effective in the amount and type of interpersonal and transpersonal social interactions that occur in space. The magnitude of these effects, as they increase the number of interactions that occur, indicates the high sociability of that space. Physical characteristics include fixed elements (geometry, shape, and form), semi-fixed (furniture), and non-fixed or dynamic space (light, smell, temperature, etc.). The presence of semi-fixed elements of space, especially sitting furniture (benches and platforms) in public spaces leads to more users stopping in space and thus increases the likelihood of interpersonal and interpersonal relationships. Consequently, with the formation of more interactions between the two, the sociability of the space also increases.

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