Ontology Space International Journal
ISSN: 2345-6450
OISSN: 2423-7299
Autumn 2021, Vol. 10, Issue 4, No. 39, Pages: 1- 18
Journal homepage: soij.qiau.ac.ir

The Role of Sense of Belonging to the Architectural Symbolic Elements on Promoting Social Participation in Students within Educational Settings

Reza Askarizad [a,*], Sindokht Rezaei Liapee [b], Mohammad Mohajer [c]

[a] *The Center for Modern Chinese City Studies, Institute of Urban Development, East China Normal University, 200062, China.*
[b] *Department of Architecture, Academic Center for Education, Culture and Research (ACECR), Rasht, Iran.*
[c] *Department of Architecture, Rasht Branch, Islamic Azad University, Rasht, Iran.*

Received: 09 May 2021- Accepted: 10 October 2021
Doi: 10.22094/SOIJ.2021.1930154.1419

Abstract

Nowadays, due to the ever-growing number of universities and institutions for higher education in recent years, the social requirements of students have not been adequately addressed. In many cases, residential buildings have been converted into higher education institutions regardless of the social demands of students. Therefore, as one of the fundamental principles of solidarity and social interactions, social participation has largely been neglected, which will have negative consequences such as decreased efficiency and learning among students. This study attempts to investigate the role of a sense of belonging to the symbolic architectural elements in promoting the social participation of architecture students within educational settings. Accordingly, it was intended to utilize a combination of syntactical analysis, the empirical observation of student activities on campus, and semi-structured interviews to estimate the role of intervening variables such as sense of belonging to the symbolic architectural elements in promoting students' social participation. The findings of this study indicate that in most of the studied cases, the students' sociability level for social participation is in accordance with the integration value of their spatial configuration. However, the conducted field observations revealed that some spaces, despite having a low degree of integration due to specific symbolic architectural elements, encouraged the formation of attractive crowded student communities. Also, such symbolic architectural elements can indirectly influence the students' social participation within the campus by stimulating their sense of belonging. The implication of this study highlights the importance of on-campus teaching systems.

Keywords: Educational setting; Place attachment; Sense of belonging; Social interactions; Social participation; Space Syntax; Spatial configuration

1. Introduction

In recent years, social participation significantly increased among members of the young generation and policymakers (Martin, Rice, & Lodhia, 2014). Studies indicate that for students who actively participate in the learning process, the learning level will proliferate (Weaver & Qi, 2005). Regarding student participation in academic activities, they often interact with their learning environment, which directly affects the learning process (Quinn, Barrett Cox, & Steinbugler, 2020). Research shows that the physical and social factors of the environment have a significant impact on learning and the behavior of individuals in educational settings (Gilavand & Jamshidnezhad, 2016). The low level of social participation in educational spaces is often due to the weakness of environmental factors, particularly symbolic, semantic and physical ones (Caspi, Chajut, Saporta, & Beyth-Marom, 2006).

In the meantime, universities are social environments that depict students' attitudes, perceptions, and behavioral styles to provide better interaction between the students, the faculty, and the community (Beyraghi & Balilan Asl, 2018). Research has indicated that the complex process of establishing a sense of belonging during the initial transition into the first year of study is conspicuous (Curtin, Stewart, & Ostrive, 2013). Because the establishment of social interaction requires the existence of a setting that improves the sense of belonging and place attachment among students (Holton, 2015). Place attachment is defined as a link between the individuals and the semantic symbols of the environment (Rioux, Scrima, & Werner, 2017). Meanwhile, public spaces in universities provide semantic signs that answer students' fundamental requirements, including a sense of belonging, social interactions, social participation, and a wide variety of activities (Beyraghi & Balilan Asl, 2018).

The sense of belonging to place toward educational settings reflects the emotional relationship of students with the university environment, which is rooted in the experiences and characteristics of individuals. These places should be responsive toward the requirements and expectations of students and have the idea capacity to do

* Corresponding Author Email Address: Reza.Askarizad@gmail.com

so (Moghisi, Mokhtari, & Heidari, 2015). Research has shown that having a sense of belonging to the place has a significant correlation with the social and political participation of individuals and those who have a sense of belonging to the place are more likely to interact, collaborate, and protect their physical and social characteristics (Anton & Lawrence, 2014). The sense of belonging to a place is based on the cognitive, emotional, and functional interactions between individuals and social groups (Scannell & Gifford, 2010).

Nowadays, due to the ever-growing number of universities and institutions for higher education in recent years, the social requirements of students have not been adequately addressed. In many cases, residential buildings have been converted into higher education institutions regardless of the social needs of students. Therefore, as one of the basic principles of solidarity and social interactions, social participation has largely been neglected, ultimately bringing about negative consequences such as decreased efficiency and learning among students. On the other hand, due to the ongoing pandemic, discussions related to students' experiences regarding online and on-campus learning systems are deemed an indispensable topic. By conducting this research, the significance of on-campus learning systems will be further highlighted. Additionally, it is important from a pedagogical perspective to understand how a certain learning environment impacts the students' learning ability and their learning experience.

In this research, attempts have been made to investigate the role of the symbolic elements of architecture on enhancing the social participation of architecture students in educational settings. In this regard, the Tabriz Art University – which is on the list of the cultural heritage monuments – as an example of a residential house of which its function has been changed and been turned into a university is assessed in order to answer the following questions:

- What is the role of a sense of belonging to the symbolic architectural elements in promoting the social participation of students within an educational setting?
- What can architectural components of educational settings effectively enhance the amount of the students' social participation within communal spaces of the campus?
- How do symbolic and semantic architectural elements promote social participation?

There seems to be a direct correlation between a sense of belonging to the symbolic architectural elements and augmentation of social participation within an educational setting. It is also assumed that addressing the indirect capabilities of the built environment in promoting social participation can be effective and social participation in communal spaces such as educational settings is influenced by semantic components. Also, the archetype and identity components lead to increased social participation among architecture students by stimulating a sense of belonging. This research contributes to architects, environmental psychologists, and policymakers by demonstrating the effective factors of social participation to promote the level of the students' efficiency in educational settings.

Many valuable studies have been conducted around the world that have scrutinized the impact of environmental factors on social participation in educational settings. According to precedent studies, studies on the role of students' sense of community (Cicognani et al., 2008), sense of place (Kudryavtsev, Stedman, & Krasny, 2012), place attachment (Moghisi et al., 2015), as well as phenomenology of place (Xuan & Zheng, 2013) have been conducted so far in order to evaluate the relation between space and place within educational settings. Other studies reveal the relation between the time spent on the campus and the degree of attachment to the setting felt by students (Rioux et al., 2017). In addition, the influence of some factors such as campus characteristics (Abu-Ghazzeh, 1999; Samura, 2018), behavioral patterns (Beyraghi & Balilan Asl, 2018), and semantic factors (Mohammadian, Ghanbaran, & Sharghi, 2016) on the students' sense of belonging have been examined. Also, from the viewpoint of the physical characteristics of educational centers, a set of original publications have been provided in terms of the perceptibility and legibility of educational building typologies (Mustafa & Rafeeq, 2019), the impact of geometry on vitality (Safari & FakouriMoridani, 2020), and wayfinding (Rezaei Liapaee, Askarizad, & Alborzi, 2020) within educational spaces. However, the role of a *sense of belonging* to symbolic architectural elements on students' social participation has not been addressed sufficiently. This matter sheds light on the existing scientific gap that the present study aims to compensate.

2. Social Participation and its Role on the Students' Learning Process

The concept of social participation has a crucial role in disciplines such as political sciences, social sciences, and social psychology, with a particular concentration on conceptualization and theoretical discussions (Cicognani et al., 2008). The concept of social participation has been used with some specific concepts, including social capital (Lindstrom, 2005). Social capital is a process in which individuals participate in the decision-making processes for the institutions, programs, and environments that affect them (Wandersman & Florin, 2000). Studies have indicated that the integration of social capital and sense of belonging eventuate to social participation (Zhu & Fu, 2016). Social participation occurs within the community space, where people engage in social activities in the form of many formal and informal social networks (Quinn et al., 2020). The forms of participation are determined by issues arising within a community, including various types of participation in political, voluntary, social, cultural, sports, and recreational fields (Cicognani et al., 2008).

Students' participation in academic activities is often dependent on their interactive behavior, directly related to their learning process (Caspi et al., 2006). Studies show that learning participation in theoretical and practical

discussions leads to success and facilitates the students' learning process (Kerr, Zigmond, Schaeffer, & Brown, 1986). Research on students has revealed that investing time and energy in targeted learning activities can positively impact their learning performance (Astin, 1993). Meanwhile, to prove the social dimension of the mind, Vygotsky presented a theory in the 1920s based on high-efficiency learning (Hogan & Tudge, 1999). He believed that the source of the best sort of learning should be sought in the social relationships of individuals within their surroundings (Lectorsky, 1999).

Therefore, students' mental activities should be engaged in issues that exceed their current level of competence and challenge them. Although learning takes place within the students' minds, it is also mediated by activities, communication, interaction, collaboration, and participation with others (Hogan & Tudge, 1999). Vygotsky's historical-cultural theory holds that the paramount processes of the human mind are mediated functional activities. This intermediate structure is formed by using signs and symbols that act as intermediaries of different effects (Kozulin, 1999). As a result, tongue, and language play the central role as subjectivity and objectivity. Tongue equips the mind with a system of signs, which is the achievement of mediating properties. Nevertheless, the language in social action is covered by symbolism (Rocher, 1974).

3. The Role of the Built Environment on Social Participation

Investigating the role of the built environment on the social and behavioral interactions of the people emphasizes the importance of "place" as a space that expresses the semantic characteristics of the environment through the individual, group, or cultural processes (Kaltenborn & Bjerke, 2002). This relationship is achieved by the theoretical foundations of a sense of place concerned with discovering the meanings, values, and beliefs of different individuals and groups (Davenport & Anderson, 2005). The sense of place is a theoretical structure studied by numerous scholars. The high popularity of this concept demonstrates the understanding of its importance regarding human relations and its correlation with the social participation of individuals in public places (Thompson & Prokopy, 2016).

Having a sense of belonging toward a place is a multidimensional attitude that seeks to communicate emotionally with a physical place that encompasses the semantic and cultural values & symbols (Nazer Safavi & Khastou, 2018). This sense, influenced by an intrinsic and personal experience, considers places as an attitude object. It is based on the distinction between the cognitive, emotional, and spiritual aspects, leading to a sense of identity and attachment to place (McCunn & Gifford, 2018). Nonetheless, the term 'sense of place' encompasses both objective and subjective facets, which correspond to the range of people's satisfaction from space as their fundamental requirements (Gokce & Chen, 2017). One of the most important strategies that lead to human psychological interactions with the environment is establishing a sense of attachment toward the place, which is affected by interactive and behavioral components in humans (Tan, Tan, Kok, & Choon, 2018).

Therefore, social interaction can be deemed as one of the most fundamental and pre-requisite factors for improving contribution and participation among community members (Mamas, Daly, Cohen, & Jones, 2021), and it can be defined as establishing communication between two or more people that leads to their reaction (Askarizad, 2020; Hong, Kubik, & Stein, 2004; Mcclurg, 2003). Accordingly, cognitive, interactional, and emotional factors have been identified as effective factors in forming a sense of belonging toward a place. Scholars believe that the cognitive aspect is affected by spatial perception derived from factors such as spatial configuration (Penn & Turner, 2002). The interactional aspect refers to the relationship between space and activities, whereas the emotional aspect relates to their semantic signs and symbols, which depends on the individuals' experiences, motivations, intellectual backgrounds, and physical properties (Waskita Hutama, 2016). The semantic aspect of the symbolic architectural elements is often manifested as physical components rooted in identity symbols, principles that have been implicated in many beliefs as archetypal associations of patterns (Knapp, 1986) (Figure 1).

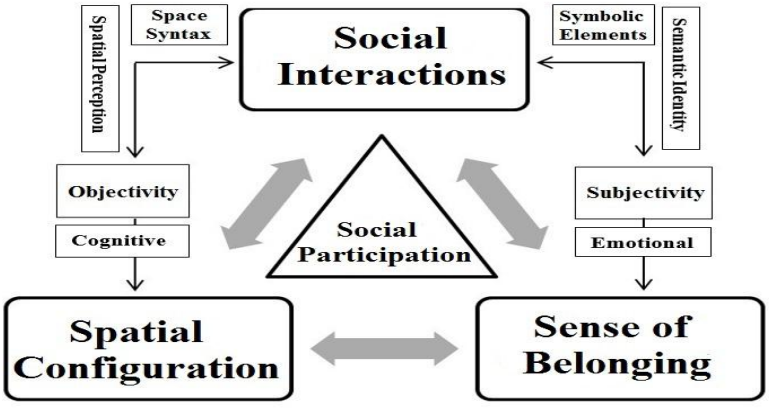


Fig. 1. Conceptual framework of the research

4. Material and Methods

The research method has been applied quantitatively and qualitatively. According to the conceptual framework derived from the research, environmental factors that influence social participation are divided into three main categories: spatial configuration, social interaction, and the sense of belonging. Therefore, it was intended to adopt an appropriate procedure to evaluate each of these variables. In this regard, a combination of empirical axial line and visibility graph analysis using the space syntax technique has been adopted to measure the role of spatial configuration on the constitution of social participation within the studied educational settings. Also, empirical observation of student activities on the campus has been captured to evaluate their behavioral patterns and the possible establishment of social interactions using snapshot methods.

In this process, it was incumbent to identify the symbolic architectural elements within the educational buildings and their location on the plans to reconcile their possible correlations with where observed activities take place. Therefore, the mapping of the symbolic architectural elements in the studied cases has been specified. In the next phase, gathering qualitative data was accomplished by conducting a semi-structured interview with the participants to explain the results efficiently. Thus, the students involved in activities in the snapshot observation methods were randomly selected as the participants in this procedure to ensure the efficient analysis process of the research (Figure 2). In the following, each of these segments was categorized and described thoroughly to explain the implementation procedure of each mentioned method and their utilized instruments.

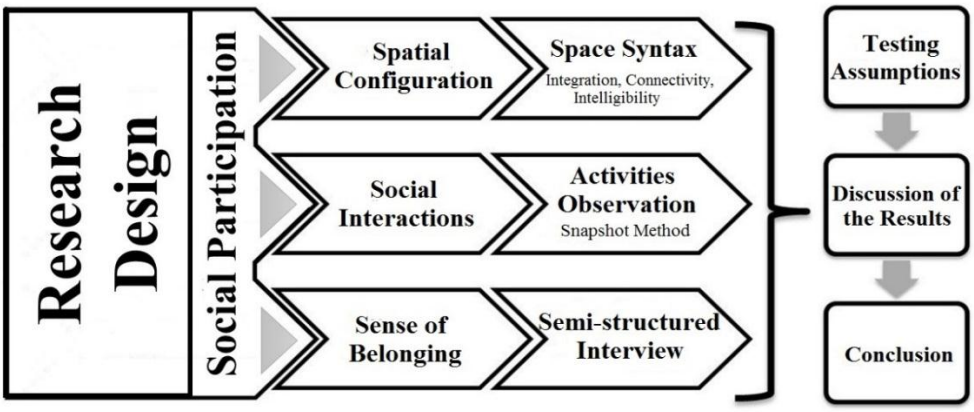


Fig. 2. Functional procedure of the research

4.1. Empirical analysis using space syntax

Space Syntax analysis quantifies the relationships between social life and the built environment based on the spatial configuration approach to explore the relationships between the social, behavioral patterns of the people and the physical structure of the space (Hillier, 1993). The main parameter of this theoretical framework is to scrutinize the influence of spatial layout on social integrations (Vaughan, 2007); specifically, Space Syntax proposes a relationship between built environments and social structures (Safari, Nazidizaji, & FakouriMoridani, 2018; Hillier & Hanson, 1984). According to the fundamental theoretical concept of Space Syntax, space is shaped in ways that reflect the direct interaction between space and people, and through this, the space we create or the built environment is humanized (Karimi, 2012). Numerous studies on architectural and urban designs have validated this method (Agirbas, 2020; Askarizad et al., 2021; Can & Heath, 2016; Hillier, Penn, Hanson, Grajewski, & Xu, 1993; Omer & Kaplan, 2017; Penn, 2003; Rollings & Evans, 2019; Waskita Hutama, 2016; Zerouati & Bellal, 2020).

This research implemented syntactical analysis based on the axial line map and the visibility graph analysis. Accordingly, in its initial stage, the architectural plans of the studied cases have been drawn using AutoCAD 2010 software. Afterward, by transferring them into the Depthmap 10 Software, the required analysis was executed to figure out the role of spatial configuration on the potential social forces of the educational buildings. UCL Depthmap is a specified software package developed by Alasdair Turner to measure morphological analysis of the built environment to prognosticate the social logic of space and their potential for forming behavioral patterns through simulation. In this regard, integration and connectivity were identified as two fundamental variables that influence the syntactical analysis (Al_Sayed, Turner, Hillier, Lida, & Penn, 2014). Accordingly, the higher degree of integration, the more that space is used; also, the higher range of connectivity can indicate better accessibility within that space (Hillier & Hanson, 1984; Hillier, 2007).

Numerous studies have indicated that the correlation between integration and connectivity results in spatial intelligibility; so that the higher degree of correlation, the higher spatial legibility (Hillier, Hanson, Burdett, Peponis, & Penn, 1987; Kuliga et al., 2019; Peponis, Hajinikoloaou, Livieratos, & Fatouros, 1989; Hillier, 1996; Long & Baran, 2012). Spatial syntax concentrates specifically on people's movement patterns in the built environment, and this pattern in a physical setting has a significant correlation with the degree of integration obtained from spatial configuration analysis (Hillier et al., 1993). On the other hand, visibility graph analysis represents a connection visibility platform to identify possible movement and behavioral forecasting within the

Space Syntax literature (Turner, 2001; Turner & Penn, 1999). In this process, integration, connectivity, and intelligibility are identified as a basis of configurational analysis of this research to recognize the potential places that students may likely be gathered within it.

4.2. Field observations using static snapshot

In general, static snapshots are conducted to record the use pattern of spaces within public spaces in a behavioral setting. The combined quantitative and qualitative method is useful for comparing static and dynamic activities by tracking and mapping these kinds of behaviors. In time, it is possible to outline the patterns of space use in an area and spot the locations where more potential interaction occurs naturally. Thus, it can be considered a potential procedure to capture students' social interactions within studied educational settings. In this regard, using a large-scale plan to note categories and different kinds of activities such as sitting, standing, moving, and interacting for five minutes over regular intervals during pre-defined circumstances (Al_Sayed, Turner, Hillier, Lida, & Penn, 2014) to record activities and behavioral patterns on the campus.

Accordingly, a specific weekday was selected for recording these activities, and based on the inquiries regarding the curriculum of the architecture students, Monday, December 9th, 2019, was identified as a relatively overcrowded day in the faculty. It should be noted that the weather conditions on this day in the city of Tabriz were temperate and partly cloudy. Also, a definite time between 10:30 AM to 11:30 AM was considered for the simultaneous data gathering carried out by two researchers in the studied cases. Based on the recommendation of this method developed by Al_Sayed et al. (2014), the most common sorts of behaviors comprising moving, sitting, standing, and interacting have been considered for this empirical observation data collection (Askarizad, Jinliao & Jafari, 2021). In the case of the simultaneous observation of the two behaviors, both are recorded on the printed plans using predefined shapes.

Accordingly, sitting was categorized by a red square, walking or moving categorized by a blue circle, talking or interacting categorized by a green rectangle, and finally, standing behaviors were categorized by an orange triangle. Ultimately, to better comprehend the correlation between activities and configurational analysis, mapping of the observations was implemented on the axial line map graphs of the case studies to compare their possible relationships with each other. Also, these correlations were compared with the locations of the symbolic architectural elements to figure out if there is a relationship between the participation and interaction of the students and the placement of these symbolic elements. By applying this method, it would be possible to measure the social interactions opportunities as one of the fundamental factors shaping social participation among students.

4.3. Qualitative semi-structured interview

On most occasions, qualitative methods can be utilized as a dataset that helps explain the quantitative findings, and they are considered one of the most rampant methods in social and behavioral science studies (Creswell, Plano Clark, Gutmann, & Hanson, 2003). In this process, gathering data in qualitative methods can be implemented employing having interviews with the participants who could effectively describe the findings (Schmidt, 2004). This research intended to use semi-structured interviews (SSIs) due to their resilient nature. This creates a comfortable environment for the people to express their ideas and possibly concerning the subject matter (Krueger, 2002). A semi-structured interview is a verbal exchange where the interviewer endeavors to elicit the required data from the participants via asking several predetermined questions. The advantage of SSI is that it provides an opportunity to delve into the issues that people find significant (Longhurst, 2010).

Numerous studies have validated that the focus group of this method comprises between 6-12 participants who meet in an informal setting to talk about a particular topic (Brown, 1996; Longhurst, 2010). Therefore, 12 individuals whose activities were obtained in field observations were randomly interviewed as participants in this study using on-site recruiting methods because it seems necessary to keep in touch with the students who can comprehend the nature of the questions, in addition to simultaneously having the experience of being in that particular space. In this regard, and based on the theoretical framework of this study, seven predetermined questions were formulated to grasp the relationship between a sense of belonging to symbolic architectural elements and promoting the social participation of students within educational settings.

The proceedings of the semi-structured interviews were audio-recorded in order for the interviewer to be able to concentrate solely on the interactions instead of on taking notes. Also, it was attempted to transcribe the interviews as soon as possible when the content of interactions was still fresh in the researcher's mind to make the procedure much easier. In addition, the transcription of the interviews provides a suitable platform for analysis and concentrating on tasks that are valuable for the research findings. Data analysis in such qualitative methods is most often summarized into short phrases. This method is considered an effective approach to elicit identified codes in the analysis process (Keys, 2000). Thus, after fully transcribing the data, they were converted into clause-length segments, and subsequently, the frequency of the words used in the interviews by the participants was analyzed as the desired codes for each question. It should be noted that ethical issues, including the participants' confidentiality and anonymity, have been considered in this study. It was also intended to provide the participants with a summary of the research results once the project was concluded.

4.4. Case study

Tabriz Art University, which is on the list of national cultural heritage monuments, has a total area of 10,382 square meters and is located in the heart of Tabriz City and has 250 architecture students. Currently, it consists of 5 historical buildings named ***Behnam***, ***Ghadaki***, ***Ganjeizadeh,*** and ***Goharion***. These buildings have been completely renovated and are functional & in use, and the fifth building is the ***Sadaghiani House*** which will join the complex shortly after its restoration process is over. Due to the site's location in the center of Tabriz, air pollution and noise pollution are two of the main problems, but as a result of the introspection in the anatomic parts and the lack of visual communication with the surrounding space, a very comfortable and cozy place has been created at the very heart of the city. The success of the floor plan is largely based on the physical environment of the complex, which provides students with many facilities for reaction and certain behaviors.

The university environment consists of humanitarian, social and non-human, and physical aspects as a place for displaying behavior. Students interact and collaborate. The occupants' needs and the daily use of the spaces between the classes should be considered in the formation of behavioral settings so that opportunities for confrontation, exchange of opinions, and interdisciplinary communications can be enhanced & enriched. The green space and yards within the complex play an important role in motivating outdoor activities and informal social gatherings among students. The open space of the middle yard, which is located along the main entrance of the courtyard, provides an aesthetic view of the historic buildings that include the immediate observation of activities, interactions, participation, and social processes within the campus (Beyraghi & Balilan Asl, 2018).

5. Results and Discussion

This section presents the data obtained from the axial map and the visibility graph analysis of the Tabriz Islamic Arts University using the Depthmap software and utilizing the Space Syntax method. Afterward, the field observation findings acquired by the static snapshot method were evaluated to properly capture the symbolic elements of architecture and its influence on enhancing students' social participation within the campus. Additionally, the data obtained from the semi-structured interviews were codified in this stage, and subsequently, further analysis was made regarding the findings above. Ultimately, a general comparison was made to compare the simulated model using the software and the practical activities obtained from field observations to figure out the possible correlation between variables in this study. Further discussions were also made on the data obtained from the findings.

5.1. The Spatial configuration analysis using space syntax

Space Syntax is defined as a graph-based theory used by architects and urban designers in order to examine how the spatial layout of buildings or cities influences the social and environmental outcomes of human movement and social interaction. This section includes the axial line map, agent-based analysis, and visibility graph analysis. The analysis is translated visually into a chromatic scale. Integrated spaces are presented in red, whereas segregated spaces are presented in blue.

The findings of the Behnam House analysis by Space Syntax demonstrate that spaces in zones 2 and 4, with an integration level of 14.70, have the highest degree of spatial integration in terms of axial line map. Also, these spaces have the best connectivity, with a connection rate of 432. The syntactic intelligibility of an area is defined as the degree of correlation between each line's connectivity and integration values (Peponis, Hajinikoloaou, Livieratos, & Fatouros, 1989). Therefore, the results of the correlation test, based on the correlation between integration and connectivity in the Behnam House, illustrate that this house has proper legibility, with an intelligibility level of 0.78. Also, the visual connectivity test findings to estimate users' movement and behavioral patterns indicate that the central courtyard of the house that features visual connectivity of 3123 is recognized as the best place to create movement and behavioral patterns.

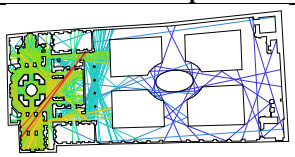
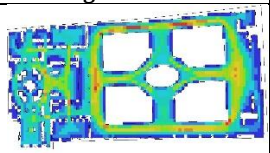
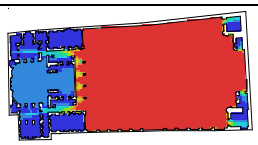
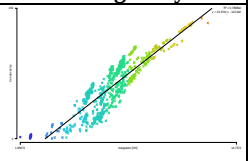
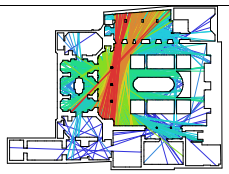
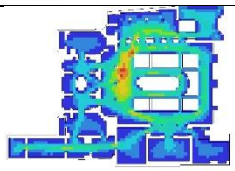
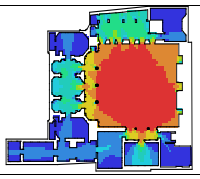
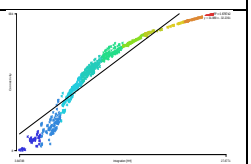
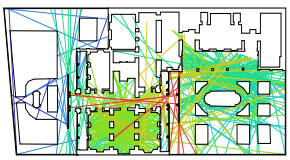
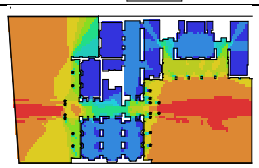
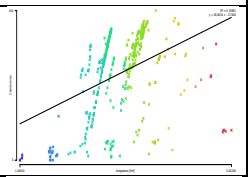
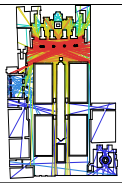
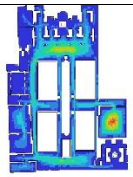
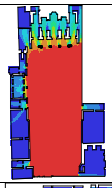
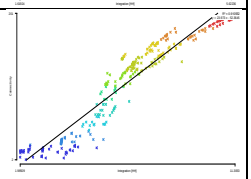
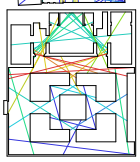
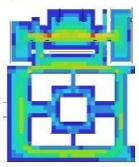
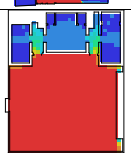
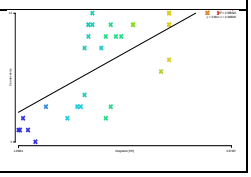
The results of the analysis for the Ghadaki House using the Space Syntax method indicate that the semi-open space in front of the pool with an integration level of 27.87 has the highest sociability capability in terms of spatial configuration. It also has the best accessibility, with a connectivity level of 684 in terms of configurational analysis. Findings from the correlation between integration and connectivity in the Ghadaki House indicate that this house has high legibility, with an intelligibility level of 0.87. Also, findings from the visibility graph analysis indicate that the central courtyard of the Ghadaki House, with visual connectivity of 2060, is considered the best place to form movement and behavioral patterns. The analysis results for the Ganjeizadeh House, which, unlike the other houses, has an extraverted organization, represent that the semi-open entrance space with an integration level of 5.62 has the highest amount of spatial integration. Also, the atelier space, featuring a connectivity level of 154, has the best accessibility based on morphological structure. Analysis based on the correlation between integration and connectivity indicates that the Ganjeizadeh House, with an intelligibility level of 0.15, has a negligible level of legibility. Also, the visual connectivity test results indicate that the entrance axis to the corridor space, with a visual connectivity level of 2575, has the most visual capability within the Ganjeizadeh House.

The results obtained from the analysis of the Sadaghiani House using the Space Syntax method demonstrate that the semi-open and colonnade space in front of the pool house, featuring an integration level of 11.30, has the highest amount of spatial integration. This means that this area has the most amount of sociability potential based on its spatial configuration. Also, with a connectivity level of 201, this space provides the best accessibility based on a configurational perspective. The findings of the correlation test between integration and connectivity indicate that the Sadaghiani House, with an intelligibility level of 0.91, has excellent legibility. The results of the

visibility graph analysis also indicate that the central courtyard space, with a visual connectivity level of 5993, has the best potential for the creation of movement patterns. The results of the analysis for the Goharian House using the Space Syntax method indicate that the front entrance space of the house, with an integration level of 3.87, has the highest level of spatial integration. This means that this area has the most sociability potential based on its spatial configuration. Also, with a connectivity level of 14, this space has the best accessibility based on its configurational facets. The findings of the correlation test between integration and connectivity indicate that the Goharian House, with an R^2 level of 0.55, does NOT have good legibility. Also, the visibility graph analysis results reveal that the courtyard space has the best potential for the creation of movement and behavioral patterns according to its spatial configuration structure. The table below comprises the studied cases and their illustrations, axial line map graphs, agent-based graphs, VGA graphs, and the correlation between integration and connectivity as an indicator of spatial intelligibility. The scattering chart of spatial intelligibility reveals that the closer the distribution of points to the line, the higher the legibility (Table 1).

The Most Integrated Space **The Most Segregated Space**

Table 1
Tabriz Art University Houses Analysis by Space Syntax Method

House	Axial Map	Agent-Based	VGA	Intelligibility
Behnam				
Ghadaki				
Ganjeizadeh				
Sadaghiani				
Goharion				

5.2. Analysis of the behavioral pattern of students' activities

This section evaluates students' behavioral patterns, including interacting, walking, sitting & standing, using field observations and static snapshots. Accordingly, these four types of activities were categorized, and each of them was determined with a specific geometrical shape – interacting by a green rectangle, walking by a blue circle, sitting by a red square, and standing by an orange triangle. It should be noted that to interpret the findings better, each house was categorized into different zones. This categorization is identified based on symbolic architectural elements, configurational characteristics, and their affiliated functionality. According to the theoretical framework of this research, social interactions are considered to establish communication among two or more people that leads to a reaction among them that is

meaningful for the audiences (Askarizad & Safari, 2020a). Thus, based on this definition, it was attempted to capture appropriate interactions as one of the fundamental factors on social participation among students.

The findings from the field observations and investigating the behavioral patterns and activities being carried out by the students in the Behnam House indicate that the students less use the spaces less due to the administrative function of this house and the existence of the presidency and some of the faculty members' rooms. Therefore, due to the specific function of this house, it is not considered an ideal place for the behavioral setting of students despite its endogenous configurational potential. In the pool house, for instance, despite the high potential for student participation in spatial configuration analysis, vitality in that space has virtually been disabled due to closing and locking the doors and using it as an inn. Hence, based on data obtained from the interview, many students were not even cognizant of such a space in that area.

However, in some spaces, such as the west wall of the house, the placement of appropriate furniture and benches and wall shading have made this space desirable and suitable for student social interactions and participation. The figure below represents the mapping of the data obtained from static snapshot observation in the foreground of spatial integration derived from the axial line map of space syntax. Also, in its associated diagram, spatial integration value and the observed behavioral activities were represented in that, horizontal axis reveals zone categorizations, and the vertical axis reveals the quantitative value of the obtained data. Although quantification of the data is not on the same scale, the chart illustrates that spatial integration and behavioral activities are well-correlated (Figure 3) that indicates the validation of syntactical literature (Hillier & Hanson, 1984).

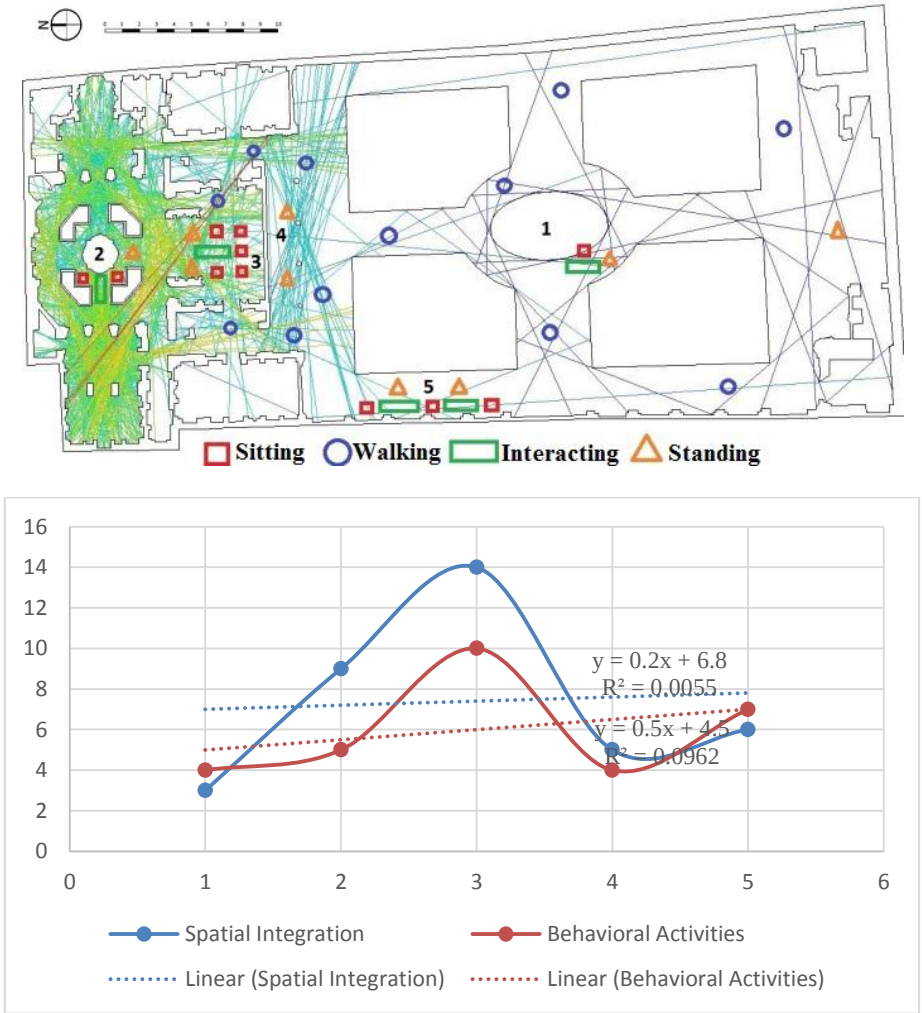


Fig. 3. Analysis of activities in behnam house and its correlation with spatial integration

The results of the field observations aimed at investigating the activities of students in the Ghadaki House indicate that the semi-open and colonnaded space of the house has been attributed to the most crowded communities; despite the lack of benches and appropriate furniture. Students preferred to sit on the edge of the niche rather than gathering in many other spaces. Furthermore, the pool area within the central courtyard attracts the largest community of students, and students have shown a particular desire to sit and interact around the edge of this

pool. Also, regarding the pool house space, it can be said that students had a certain propensity to use this space, and students' aggregations were often formed between the pool and the single stair in front of the pool to enhance the level of interactions among them. Further accuracy on the practical activities revealed that colonnaded semi-open spaces (e. g., zone 3) have an undeniable role in students' sociability, consistent with the results of previous studies (Askarizad & Safari, 2020b). There is also a notable correspondence between syntactic analysis and behavioral activities in this house (Figure 4).

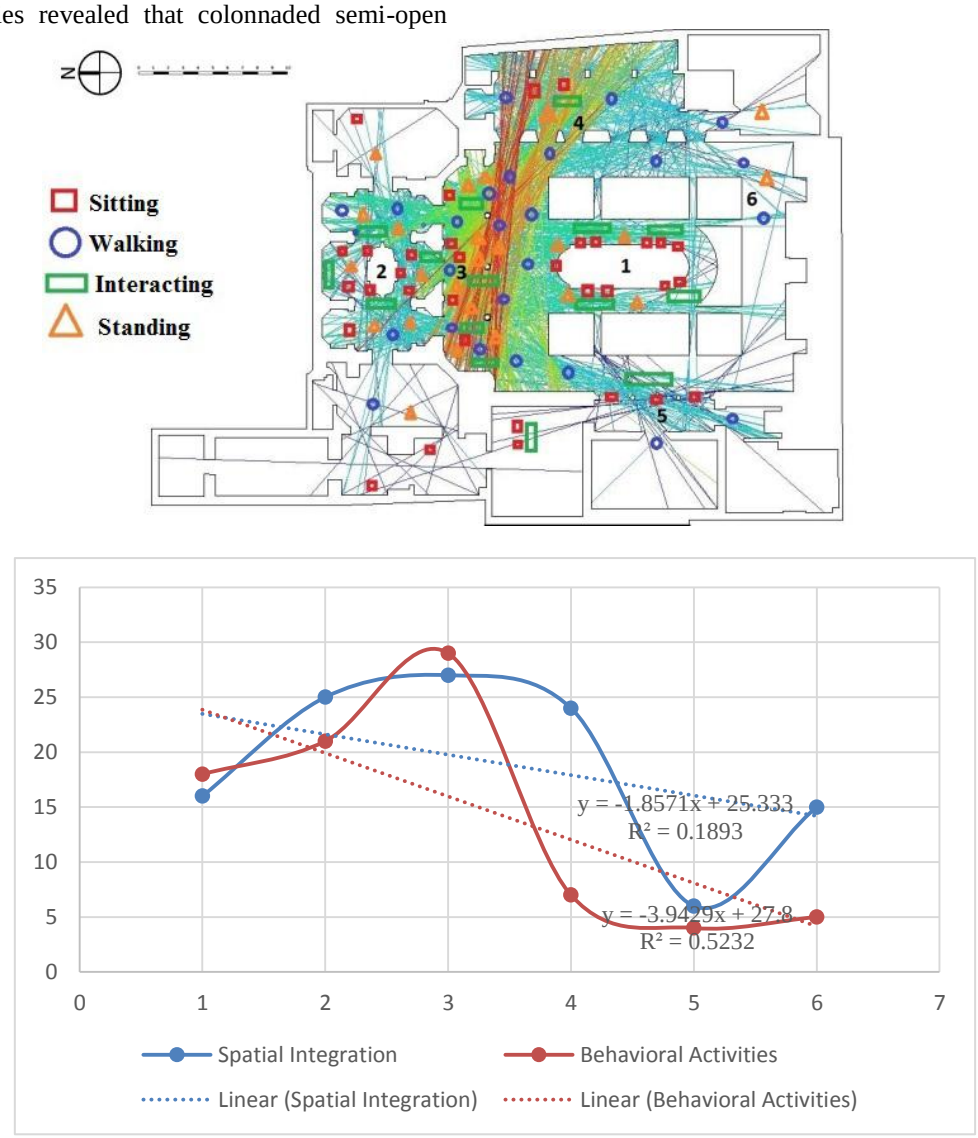


Fig. 4. Analysis of Activities in Ghadaki House and its Correlation with Spatial Integration

The analysis results for the Ganjeizadeh House show that the semi-open entrance space has the most potential for housing social interaction among students; according to the Space Syntax analysis, it had the highest level of integration in the spatial configuration of the house. Apart from that, the pool in the courtyard was considered an ideal space for students, despite its low levels of spatial integration. Also, the semi-open and colonnaded space in the northern part of the pool has special potential for student social participation and behavioral patterns. Also, the Avini Atelier space (zone 4) is a good place for student hangouts and features a relatively good view of the courtyard. Based on the syntactic analysis, this house, due to its extroverted and purely functional nature, lacks a suitable space for forming social patterns and has very poor legibility.

For this reason, to establish social interactions, students attempt to choose the outdoor space for their social communications as much as possible. Alternatively, in some cases, students prefer to use the studio space as a space for participatory activities, which, of course, due to its functional nature, cannot be considered a permanent place for social activities. Thus, they will have to use other spaces (e. g., colonnaded spaces, edges of the pool, or gardens) as alternatives (Figure 5).

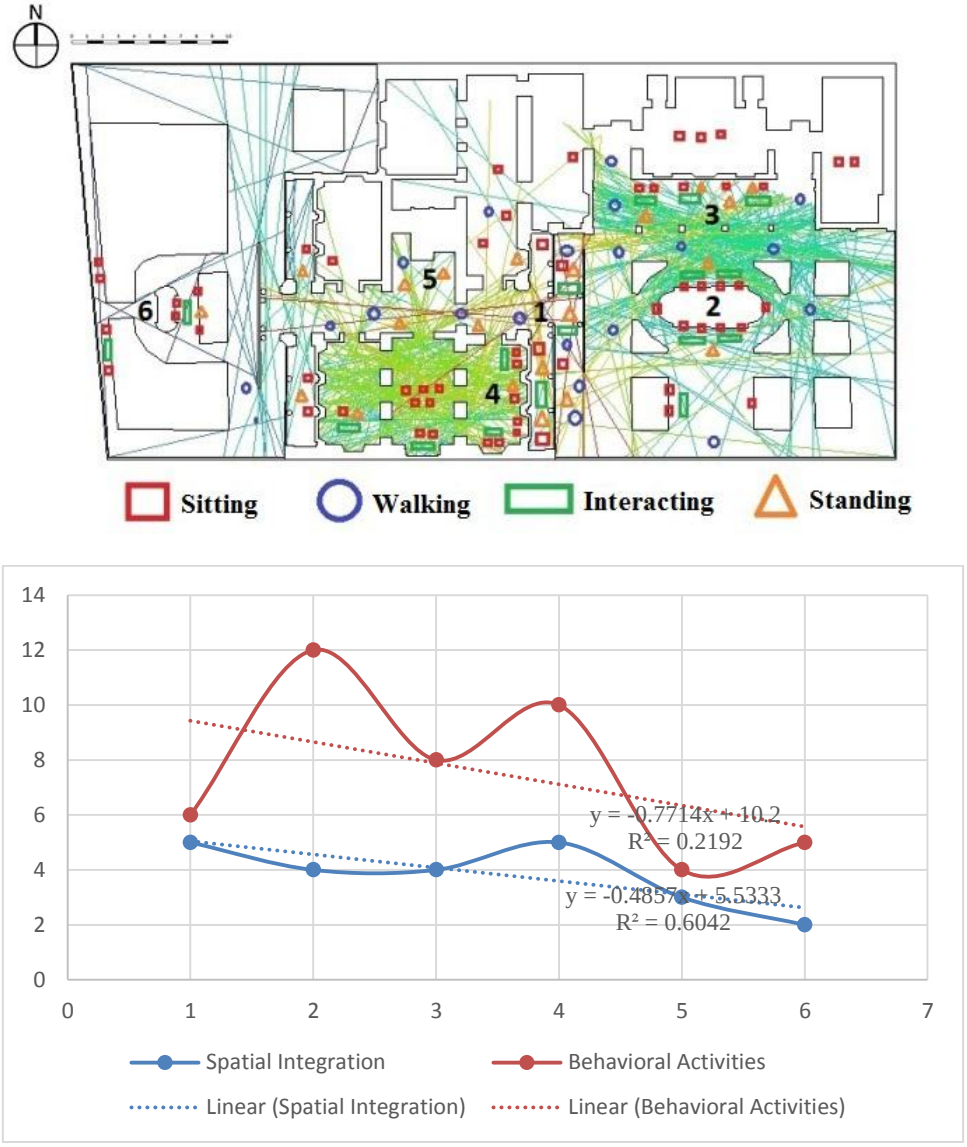


Fig. 5. Analysis of activities in ganjeizadeh house and its correlation with spatial integration

The results obtained from the analysis of the Sadaghiani House indicate that it is still undergoing renovation, despite its potential for spatial legibility & symbolic architectural elements. It has not yet reached the operational stage intended for student use and opportunities for social participation. Also, the field investigations from the Goharian House indicate that this house is only meant for Ph.D. students. As a result, the number of people visiting the building has reduced dramatically. However, the obtained analysis illustrates that the most crowded communities are formed in front of the main facade of the building. Afterward, the space around the pool in the courtyard has the most potential for sociability and social participation among students (Figure 6). One of the most crucial points that all the studied cases have in common is that these houses are not designated for the educational function; the lack of appropriate response to the social requirements of the students is quite conspicuous. Thus, architecture students subconsciously refer to semi-open and open spaces to establish social interactions and participation. On the other hand, all the studied houses encompass a characteristic which benefits from symbolic architectural elements. Field investigations indicate that students most often refer to the places where these symbolic elements in Persian architecture existed.

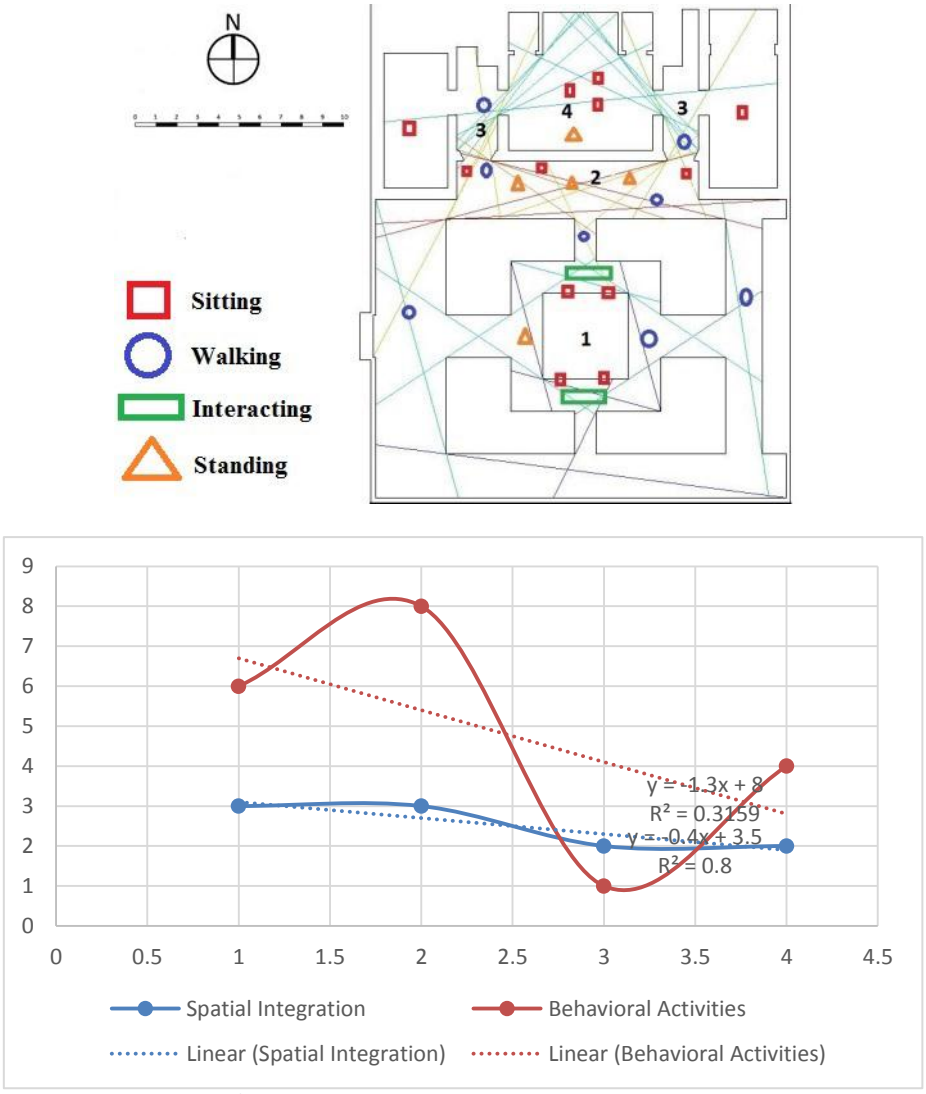


Fig. 6. Analysis of activities in goharion house and its correlation with spatial integration

5.3. Qualitative data obtained from semi-structured interviews

All the findings obtained from the interviews were recorded using a voice recorder (smartphone) and later transcribed in order for them to be organized and codified in the most structured manner possible. According to the theoretical framework of the research, the data obtained from these interviews were re-corroborated, and a general coding framework was established in this procedure. Data analyses of the interviews were completed within 60 days, and all the transcribed data were coded for better comprehension. Every single word, sentence, and the phrase was coded based on the coding system. All the participants in the interviews were students of architecture; five were natives of Tabriz, and seven were students from other cities in Iran who had come to study at this university. Also, gender equity was considered regarding the sample population, meaning that half of them were male, and the other half were female.

There are two main approaches to qualitative analysis, namely inductive and deductive. Furthermore, there are two types of inductive qualitative analyses called thematic content analysis and narrative analysis, which call for an unstructured approach to research. Among the qualitative analysis methods, thematic content analysis is perhaps the most common and effective. It can also be considered one of the most trustworthy, meaning that it increases the traceability and verification of an analysis (Creswell et al., 2003). The adopted approach in the present study is based on thematic content analysis. According to the theoretical framework of this study, seven fixed themes were formulated for the coding scheme. These themes encompass social interaction skills, sense of belonging, socio-cultural background, gender segregation, configurational form and function of the campus, semantic and identity values, and symbolic architectural elements. The data were further investigated in order to capture the positive and negative attitudes of the participants. Accordingly, the common patterns across the datasets were identified. After coding, the most utilized themes were a sense of belonging, social interaction skills, configurational form and function, and symbolic

architectural elements (Table 2). Further clarifications regarding the findings of the research are discussed in the next section.

Table 2
Participants' attitudes regarding the most influential factors affecting social participation using the coding scheme.

No.	*Themes*	*Sub-Themes*	*Positive Attitude*	*Negative Attitude*	*Frequency (Total)*	*Percentage (Total)*
1	Social Interaction Skills	May have a passive role in a high range of control and supervision.	6	3	9	75
2	Sense of Belonging	Reminiscent of lost architectural identity and its role in the curriculum.	9	2	11	92
3	Socio-Cultural Background	Different beliefs and traditions, and cultural differences.	2	3	5	42
4	Gender Segregation	May diminish the sense of confidence and reliance among students and induce panic in establishing social communications even regarding academic participation.	1	6	7	58
5	Configurational Form and Function	Inconsistency of the functional requirements of a university with the current setting.	6	2	8	67
6	Semantic and Identity Values	The valuable outcome for architectural students, practical vision towards architectural history courses.	3	1	4	33
7	Symbolic Architectural Elements	Sense of place attachment, indirect influence on social participation among students.	4	2	6	50

5.4. The role of the symbolic architectural elements on students' social participation

The findings obtained from the Space Syntax analysis, semi-structured interviews, and field observations indicate that the Behnam House has failed to fully utilize its potential due to the house's adopted policies and administrative use. Therefore, the routes leading to the symbolic elements of architecture in this house were out of reach for students for various reasons, and they were not allowed to attend, interact and participate within those areas. The symbolic elements of architecture and the social structure of spatial configuration have been deactivated due to the policies adopted in this house. The interesting point in the field observation of this house is that in the western wall of the house, even though it has a low level of spatial integration and there were no particular symbolic elements of architecture present in that area, several students gathered there to discuss and interact due to the existence of a bench as well as the wall shading. In some cases, the arrangement of facilities such as furniture can be more influential in making pleasant places. In this regard, the role of the symbolic elements of architecture in the Behnam House was ineffective due to its administrative use.

The findings from the Space Syntax analysis and the field observations of the Ghadaki House indicate that the students' social participation is well correlated with the placement of the symbolic architectural elements. So that, based on the Space Syntax analysis, the best place for crowded communities was under the semi-open space portico, where the symbolic elements of architecture were also placed. In addition, the area around the pool of the central courtyard and the pool house, despite being less socially structured, has been welcomed by students to engage in social interactions and participation. As a focal point known as the origin of life in Persian architecture, the pool of the central courtyard space has attracted the attention of architecture students for social interaction and participation. Also, the pool house space, which features Karbandi[1] decorations and the pool at its focal point, is also well known to architecture students for social participation and it may be considered a kind of student hangout area. The findings indicate that the symbolic elements of architecture in the Ghadaki House have a significant correlation with the social participation of architecture students.

The analysis of the Ganjeizadeh House by Space Syntax and the empirical observations indicate that most crowded student communities are formed in the entrance staircase area and the semi-open space, which has the highest degree of integration. Subsequently, the space around the pool in the main courtyard has attracted students to this focal area, despite its lower level of integration compared to many other spaces. Also, the northern semi-open and colonnaded spaces have been a good hangout for students' participation and interaction, despite their low level of integration. Meanwhile, the atelier space is always welcomed by students because of its convenient access and an ideal window view of the courtyard beyond. It should be noted that, due to the lack of visibility and high vegetative coverage, the backyard pool, and garden, which have the highest level of mean spatial depth in the Space Syntax analysis, has turned into a welcoming place for some students who need a cozy and private space for

[1] **Karbandi** is an arched covering pattern in Persian architecture which provides the interior of a structure with a particular geometric elegance and integrates architecture and structure by means of creating meaningful spaces and it has been an element of identity in Persian architecture (AmjadMohammadi, Asefi, & NejadEbrahimi, 2018).

social participation that validates the findings of studies concerning the privacy in a university building (Bentinck, van Oel, & van Dorst, 2020).

The Space syntax analysis for the Sadaghiani House indicates that although students have not yet exploited this space because of the restoration purposes, it has great potential to attract students due to its high spatial legibility and numerous symbolic architectural elements. The findings indicate that the colonnaded semi-open space and its surrounding area have the greatest potential for attracting crowded student communities. In addition, despite its lower level of integration, the pool house space can be considered a good place to attract students and establish social participation. In the southwest part of the house, a space with a high level of mean spatial depth and an appropriate seating area provides a suitable space for students' social participation and meets the requirements of students' territory of privacy.

Also, the findings obtained from the analysis of the Goharian House by Space Syntax and observations indicate that the front-facing space, which according to the syntactical analysis had the highest degree of integration, occupied most students' communities. Also, investigating the role of the symbolic elements of architecture elucidates that in this space, the color and texture of the bricks and the plaster decorations stimulate the students' sense of belonging because of the Orsi glass. In addition, the pool space is considered a focal point for Ph.D. students' gathering and enhances their sense of participation, despite its low level of integration (Figure 7).

Fig. 7. symbolic architectural elements that are influential on social participation in the studied cases.

Concerning the general comparison among the syntactical characteristics of the studied cases, a set of line charts was conducted to delineate the main variables used in this research (Figure 8). The results indicated that *Ghadaki House* features the highest level of integration (27.87) and connectivity (684) values among the studied cases. Next, *Behnam House* features the most potential integration (14.70) and connectivity (432) values. However, *Goharion House* characterizes the lowest level of integration (3.87) and connectivity (14) spatial configuration. Then, *Ganjeizadeh House*, with the integration level of (5.62) and connectivity level of (154), has the lowest value in its syntactical analysis. In the meantime, *Sadaghiani House* features the highest level of intelligibility (0.91) and visual connectivity (5993), among other cases. This means that a higher quantitative value of integration and connectivity does NOT necessarily indicate higher intelligibility (Figure 8).

The results obtained from the static snapshot technique reveal that in the general case, the obtained quantitative value of the spatial integration derived from the syntactical analysis has a significant correlation with the students' activities within the campus. Nonetheless, the findings indicated that in the case of providing spaces for the sake of sitting, the range of social interactions and participation would be augmented within that particular space. The results of empirical studies elucidate that considering providing appropriate benches and furniture, and creating spaces that provide thermal comfort through the shade, facilitates social interactions within educational settings, which supports previous findings (Beyraghi & Balilan Asl, 2018). Furthermore, evidence indicates that the existence of symbolic architectural elements such as semi-open and colonnaded spaces, edges of the niches, edges of the pool, corners of the garden, and pool houses led to an increase in the establishment of social interactions in those spaces (Figures 3-6). This fact reveals the novelty of the present study.

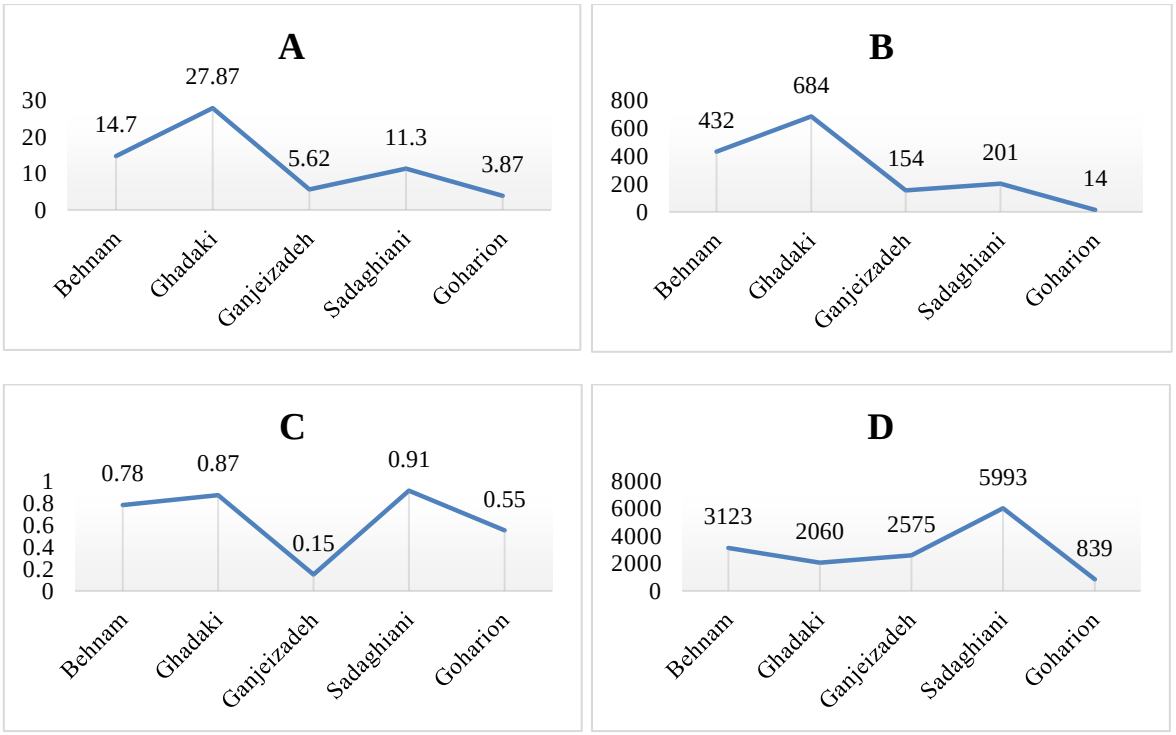


Fig. 8. (A): The Integration Value of the Educational Settings within the Studied Cases; (B): The Connectivity Value of the Educational Settings within the Studied Cases; (C): The Intelligibility Value of the Educational Settings within the Studied Cases; (D): The Visual Connectivity Value of the Educational Settings within the Studied Cases

Regarding the relationship between symbolic architectural patterns, and student gathering spaces obtained based on the semi-structured interviews, the findings indicated that due to their visual attraction, symbolic architectural elements indirectly influence the students' hangout and sense of belonging towards such spaces. On the other hand, synchronizing the learning process in courses such as *The History of Architecture* and *Islamic Architecture* in a theoretical manner subconsciously shifted the students' minds toward the traditional elements of Persian architecture to simultaneously become acquainted with these archetypes in practice. Also, the inconsistency of the functional requirements of a university with the current setting has led to the students' confusion in terms of participating in activities. Furthermore, one of the most influential factors that have an adverse impact on the social participation of the students within the *Islamic Art University of Tabriz* campus was identified as the gender segregation of students. Participants argued that due to the adoption of certain policies, students have always faced various forms of restrictions that have negative mental consequences that negatively affect establishing ideal social relationships. Thus, under the pressure of upholding some specific internal values, the level of interaction is significantly diminished due to the existing management scheme, which subsequently affects the social participation of students.

One of the main objectives of adopting qualitative methods in the research process is obtaining their consistencies and integrities with quantitative ones. Accordingly, it seems to be necessary to make a comparison between the qualitative and quantitative findings of the study. The obtained results revealed that the qualitative findings are in line with the quantitative outcomes, a feat that validates the consistency of the present research. Meanwhile, the contribution of the adopted procedures provides valuable outcomes in terms of the precision of the data accuracy for measuring the required aspects as meticulously as possible. Although the results of the spatial configuration and social interactions within the campus are well-correlated, the qualitative semi-structured interviews reveal that as they stimulate the students' sense of belonging, symbolic architectural elements can indirectly influence their social participation within the campus.

Concerning other studies on the social participation of students in educational settings, it can be stated that having a sense of community has a significant correlation with social participation among students in educational environments (Cicognani et al., 2008). Research has also shown that identity, a sense of place attachment, and a high degree of integration in space configuration are three factors that promote social participation in behavioral settings (Waskita Hutama, 2016). Also, there is a direct relationship between the social integration of people with the degree of participation in the society (Algarín, Vázquez-Fernández, & Fernández, 2020). Recent studies have suggested that the current configuration of educational settings should be redesigned according to students' participation, communication, and motivation (Saghafi & Mirzaei, 2020). Also, studies have revealed that a sense of place and aesthetic concepts can be considered indispensable indicators within campuses (Feli, Habib, & Shahcheraghi, 2020). Another study

indicates that factors such as semantic features and social components of space were identified as the most important factors affecting the formation of behavioral settings. Also, physical factors such as the presence of spaces for relaxation and social interaction on the campus can influence the behavioral patterns of students (Beyraghi & Balilan Asl, 2018). Consistent with the above studies that advocate the factors affecting milieu-behavior, the present study investigates the role of a sense of belonging to the symbolic architectural elements on promoting students' social participation in educational settings.

6. Conclusion

The main objective of this research was to investigate the role of a sense of belonging to the symbolic elements of architecture in promoting the social participation of architecture students in educational settings. Due to the ever-growing number of universities and higher education institutions in recent years, the social requirements of students have not been adequately addressed. In most cases, residential houses, regardless of the social needs of students, have been converted into higher education institutions. Therefore, as one of the basic principles of solidarity and social interactions, social participation has largely been neglected, which will have negative consequences such as decreased student efficiency and learning. The findings of this study indicate that in most of the cases studied, the students' sociability level for social participation is in accordance with the social integration of their spatial configuration. However, field observations revealed that some spaces, despite their low degree of integration due to specific architectural symbolic elements, led to the formation of attracting crowded student communities. For instance, spaces such as the pool edges in the central courtyard of houses, pool houses, semi-open colonnaded spaces, plaster decorations, and brick arrays have been identified as influential factors affecting the students' social participation.

Generally, it can be concluded that because of the establishment of a sense of belonging to the place, the symbolic elements of architecture can influence social participation among architecture students. Therefore, it can be stated that symbolic and semantic components influence social participation in the communal spaces of educational centers, and there is a significant correlation between these two variables. In addition, the effective components of communal spaces in educational settings that promulgate social participation, which may be pointed out, include the influential role of spatial configuration in the formation of social behaviors, appropriate furniture, and spatial layout, focal points such as pools, providing semi-private spaces to meet users' privacy demands, archetypal patterns and architectural identities. Regarding the suggestion & necessity of further research, this case can be tested in other samples that feature symbolic elements of architecture and concerning students from other majors, and the obtained results can be compared with the findings of the present study. Additionally, further studies can be conducted concerning the students' experiences regarding online and on-campus learning systems, and subsequently, the impact of the COVID-19 pandemic on students' participatory activities.

References

1) Abu-Ghazzeh, T. M. (1999). Communicating Behavioral Research to Campus Design: Factors Affecting the Perception and Use of Outdoor Spaces at the University of Jordan. *Environment and Behavior*, 31(6), 764–804. doi:https://doi.org/10.1177/00139169921972344
2) Agirbas, A. (2020). Characteristics of social formations and space syntax application to quantify spatial configurations of urban regeneration in Levent, Istanbul. *Journal of Housing and the Built Environment*, *35*, 171–189. doi:https://doi.org/10.1007/s10901-019-09671-1
3) Al_Sayed, K., Turner, A., Hillier, B., Lida, S., & Penn, A. (2014). *Space Syntax Methodology*. London: Bartlett School of Architecture, UCL.
4) Algarín, E., Vázquez-Fernández, M., & Fernández, A. (2020). Analysis of the Sociability of Older People in Urban Environments. In *Qualitative and Quantitative Models in Socio Economic Systems and Social Work* (Vol. 208, pp. 305-313). Cham: Springer.
5) AmjadMohammadi, A., Asefi, M., & NejadEbrahimi, A. (2018). The Geometrical Regularization for Covering Irregular Bases with Karbandi. *Nexus Network Journal*, *20* (2), 331-352. doi:https://doi.org/10.1007/s00004-018-0373-0
6) Anton, C., & Lawrence, C. (2014). Home is where the heart is: The effect of place of residence on place attachment and community participation. *Journal of Environmental Psychology*, *40*, 541-461. doi:https://doi.org/10.1016/j.jenvp.2014.10.007
7) Askarizad, R. (2020). Evaluation of the Effective Factors on Social Interactions in the Design of Public Libraries. *Tehnički glasnik*, 14(4), 403-410. doi:https://doi.org/10.31803/tg-20190525220939
8) Askarizad, R., & Safari, H. (2020a). The influence of social interactions on the behavioral patterns of the people in urban spaces (case study: The pedestrian zone of Rasht Municipality Square, Iran). *Cities*, 101, 102687. doi:https://doi.org/10.1016/j.cities.2020.102687
9) Askarizad, R., & Safari, H. (2020b). Investigating the role of semi-open spaces on the sociability of public libraries using space syntax (Case Studies: Sunrise Mountain and Desert Broom Libraries, Arizona, USA). *Ain Shams Engineering Journal*, *11*(1), 253-264. doi:https://doi.org/10.1016/j.asej.2019.09.007
10) Askarizad, R., Dadashpour, A., Faghirnavaz, J., Jinliao, H. & Safari, H. (2021). Organizing worn-out neighborhoods with the new-urbanism approach using mixed methods in Rudsar, northern Iran. *Smart and Sustainable Built Environment*, 1-28. doi:https://doi.org/10.1108/SASBE-03-2021-0055

11) Askarizad, R., Jinliao, H., & Jafari, S. (2021). The influence of COVID-19 on the societal mobility of urban spaces. *Cities*, 103388. doi:https://doi.org/10.1016/j.cities.2021.103388
12) Astin, A. (1993). *What matters in college? Four critical years revisited*. San Francisco: Jossey-Bass.
13) Badiee, B. (2018). *A Traditional Narrative on the Origin, Design and Climatic Imperative of Coloured Glass Lattice Panels and Orsi Windows in Persia.* (Doctor of Philosophy (PhD)). University of Kent, Kent.
14) Bentinck, S., van Oel, C., & van Dorst, M. (2020). Perception of privacy in a university building: The transparency paradox. *Frontiers of Architectural Research, 9*(3), 579-587. doi:https://doi.org/10.1016/j.foar.2020.03.004
15) Beyraghi, S., & Balilan Asl, L. (2018). Semiotics of behavioral settings in educational spaces, emphasizing the social value of spaces Case study of Islamic Art faculty and architecture and Art faculty of Azad university of Tabriz. *International Journal of Architecture & Urban Planning, 28* (2), 117-133. doi:10.22068/ijaup.28.2.117
16) Brown, J. D. (1996). *Testing in language programs*. Upper Saddle River, NJ: Prentice Hall.
17) Can, I., & Heath, T. (2016). In-between spaces and social interaction: a morphological analysis of Izmir using space syntax. *Journal of Housing and the Built Environment, 31*, 31–49. doi:https://doi.org/10.1007/s10901-015-9442-9
18) Caspi, A., Chajut, E., Saporta, K., & Beyth-Marom, R. (2006). The influence of personality on social participation in learning environments. *Learning and Individual Differences, 16*, 129-144. doi:https://doi.org/10.1016/j.lindif.2005.07.003
19) Cicognani, E., Pirini, C., Keyes, C., Joshanloo, M., Rostami, R., & Nosratabadi, M. (2008). Social Participation, Sense of Community and Social Well Being: A Study on American, Italian and Iranian University Students. *Social Indicators Research, 89*, 97-112. doi:https://doi.org/10.1007/s11205-007-9222-3
20) Creswell, J. W., Plano Clark, V. L., Gutmann, M. L., & Hanson, W. E. (2003). Advanced mixed methods research designs. In A. Tashakkori & C. Teddlie (Eds.), *Handbook of mixed methods in social and behavioral research* (pp. 209–240). Thousand Oaks, CA: Sage.
21) Curtin, N., Stewart, A., & Ostrive, J. (2013). Fostering Academic Self-Concept: Advisor Support and Sense of Belonging Among International and Domestic Graduate Students. *American Educational Research Journal, 50*(1), 108-137. doi:https://doi.org/10.3102%2F0002831212446662
22) Davenport, M., & Anderson, D. (2005). Getting from sense of place to place-based management: An Interpretive Investigation of Place Meanings and Perceptions of Landscape Change. *Society and Natural Resources, 18*, 625-641. doi:https://doi.org/10.1080/08941920590959613
23) Feli, S., Habib, F., Shahcheraghi, A. (2020). Identification of Components Affecting Synomorphy and Utilization of it in Planning Educational Spaces (Case: Faculties of Art and Architecture of Tehran). *Space Ontology International Journal*, 9(4), 43-56.
24) Hong, H., Kubik, J., Stein, J. (2004). Social Interaction and Stock-Market Participation. *The Journal of Finance*, 59(1), 137-163. https://doi.org/10.1111/j.1540-6261.2004.00629.x
25) Gilavand, A., & Jamshidnezhad, A. (2016). The Effect of Noise in Educational Institutions on Learning and Academic Achievement of Elementary Students in Ahvaz, South-West of Iran. *International Journal of Pediatrics, 4*(3), 1453-1463. doi:http://dx.doi.org/10.22038/ijp.2016.6500
26) Gokce, D., & Chen, F. (2017). Sense of place in the changing process of house form: Case studies from Ankara, Turkey. *Environment and Planning B: Urban Analytics and City Science, 45*(4), 772-796. doi:https://doi.org/10.1177%2F0265813516686970
27) Hillier, B. (1993). Specifically architectural theory: a partial account of the ascent from building as cultural transmission to architecture as theoretical concretion. *The Harvard Architectural Review, 9*, 9-27. Retrieved from http://discovery.ucl.ac.uk/1027/
28) Hillier, B., & Hanson, J. (1984). *The Social Logic of Space*. Cambridge: Cambridge University Press.
29) Hillier, B., Hanson, J., Burdett, R., Peponis, J., Penn, A. (1987). Creating life: Or, does architecture determine anything?. *Architecture et Comportement/Architecture and Behaviour*, 3(3), 233-250.
30) Hillier, B., Penn, A., Hanson, J., Grajewski, T., & Xu, J. (1993). Natural Movement: Or, Configuration and Attraction in Urban Pedestrian Movement. *Environment and Planning B: Urban Analytics and City Science, 20*(1), 29-66. doi:https://doi.org/10.1068%2Fb200029
31) Hillier, B. (1996). *Space is the machine: a configurational theory of architecture.* London: Create Space Independent Publishing Platform.
32) Hillier, B. (2007). Space and spatiality: What the built environment needs from social theory, *Building Research & Information*, 36 (3), 216-230. https://doi.org/10.1080/09613210801928073
33) Hogan, D., & Tudge, J. (1999). Implications of Vygotsky's theory for peer learning. In *The Rutgers Invitational Symposium On Education Series. Cognitive perspectives on peer learning* (pp. 39-65): Lawrence Erlbaum Associates Publishers.
34) Holton, M. (2015). Adapting relationships with place: Investigating the evolving place attachment and 'sense of place' of UK higher education students during a period of intense transition. *Geoforum, 59*, 21-29. doi:https://doi.org/10.1016/j.geoforum.2014.11.017
35) Kaltenborn, B., & Bjerke, T. (2002). Association between landscape preferences and place attachment: A study in Roros, southern Norway. *Landscape*

Research, 27(4), 381-396. doi:https://doi.org/10.1080/0142639022000023943
36) Karimi, K. (2012). A configurational approach to analytical urban design: 'Space syntax' methodology. *Urban Design International, 17*(4), 297–318. doi:https://doi.org/10.1057/udi.2012.19
37) Kerr, M., Zigmond, N., Schaeffer, A., & Brown, G. (1986). An observational follow-up study of successful and unsuccessful high school students. *High School Journal, 70*, 20-24. Retrieved from https://www.jstor.org/stable/40364967
38) Keys, D. (2000). *Catastrophe: an investigation into the origins of the modern world*. Ballantine Books.
39) Knapp, B. (1986). *Archetype, architecture, and the writer*. Indiana Indiana University Press.
40) Kozulin, A. (1999). *Vygotsky's Psychology: A Biography of Ideas*. Massachusetts: Harvard University Press.
41) Krueger, R. A. (2002). *Designing and conducting focus group interviews*. University of Minnesota: Minnesota.
42) Kudryavtsev, A., Stedman, R. C., & Krasny, M, E. (2012). Sense of place in environmental education. *Environmental Education Research*, 18(2), 229-250. doi:https://doi.org/10.1080/13504622.2011.609615
43) Kuliga, S. F., Nelligan, B., Dalton, R. C., Marchette, S., Shelton, A. L., Carlson, L., & Hölscher, C. (2019). Exploring Individual Differences and Building Complexity in Wayfinding: The Case of the Seattle Central Library. *Environment and Behavior*, 51(5), 622–665. doi:https://doi.org/10.1177/0013916519836149
44) Lectorsky, V. (1999). *The activity theory in a new era. Perspectives on Activity Theory*. Cambridge Cambridge University Press.
45) Lindstrom, M. (2005). Ethnic differences in social participation and social capital in Malmo, Sweden: a population-based study. *Social Science & Medicine, 60*, 1527-1546. doi:https://doi.org/10.1016/j.socscimed.2004.08.015
46) Long, Y., & Baran, P. K. (2012). Does Intelligibility Affect Place Legibility? Understanding the Relationship Between Objective and Subjective Evaluations of the Urban Environment. *Environment and Behavior*, 44(5), 616–640. doi:https://doi.org/10.1177/0013916511402059
47) Longhurst, R. (2010). Semi-structured Interviews and Focus Groups. In Clifford, N., Cope, M., Gillespie, T., French, S. *Key Methods in Geography* (pp. 143–156). Third Edition. Sage: Los Angeles.
48) Mamas, C., Daly, A., Cohen, S., & Jones, G. (2021). Social participation of students with autism spectrum disorder in general education settings. *Learning, Culture and Social Interaction*, 28, 100467. doi:https://doi.org/10.1016/j.lcsi.2020.100467
49) Martin, N., Rice, J., & Lodhia, S. (2014). Sustainable Development Planning: A Case of Public Participation using Online Forums. *Sustainable Development, 22*(4), 265-275. doi:https://doi.org/10.1002/sd.1541
50) Mcclurg, S. D. (2003). Social Networks and Political Participation: The Role of Social Interaction in Explaining Political Participation. *Political Research Quarterly*, 56(4), 449–464. doi:https://doi.org/10.1177/106591290305600407
51) McCunn, L., & Gifford, R. (2018). Spatial Navigation and Place Imageability in Sense of Place. *Cities, 74*, 208-218. doi:https://doi.org/10.1016/j.cities.2017.12.006
52) Moghisi, R., Mokhtari, S., & Heidari, A. (2015). Place Attachment in University Students. Case study: Shiraz University. *Procedia - Social and Behavioral Sciences*, Asian Conference on Environment Behavior Studies Chung-Ang University, Seoul, S. Korea. doi:https://doi.org/10.1016/j.sbspro.2015.01.028
53) Mohammadian, B., Ghanbaran, A., & Sharghi, A. (2016). Semantic Factors: Students' Sense of Belonging to Outdoor School Spaces. *International Journal of Architecture and Urban Development*, 6(4), 43-50.
54) Mustafa, F. A., & Rafeeq, D. A. (2019). Assessment of elementary school buildings in Erbil city using space syntax analysis and school teachers′ feedback. *Alexandria Engineering Journal*, 58(3), 1039-1052. doi:https://doi.org/10.1016/j.aej.2019.09.007
55) Nazer Safavi, F., Khastou, M. (2018). Investigating the Effective Factors on the Sense of Place in Relation to Urban Migrations (Case Study: City of Qazvin). *Space Ontology International Journal*, 7(2), 55-67.
56) Omer, I., & Kaplan, N. (2017). Using space syntax and agent-based approaches for modeling pedestrian volume at the urban scale. *Computers, Environment and Urban Systems, 64*, 57-67. doi:https://doi.org/10.1016/j.compenvurbsys.2017.01.007
57) Penn, A. (2003). Space Syntax And Spatial Cognition: Or Why the Axial Line? *Environment and Behavior, 35*(1), 30-65. doi:https://doi.org/10.1177/0013916502238864
58) Penn, A., & Turner, A. (2002). Space Syntax Based Agent Simulation. In M. a. S. In: Schreckenberg, Som Deo, (eds.) (Ed.), *Pedestrian and Evacuation Dynamics* (pp. 99-114). Berlin, Germany: Springer-Verlag.
59) Peponis, J., Hajinikoloaou, E., Livieratos, C., & Fatouros, D. (1989). The Spatial Core of Urban Culture. *Ekistics, 56*(334), 43-55. Retrieved from https://www.jstor.org/stable/43622102seq=1#page_scan_tab_contents
60) Quinn, R., Barrett Cox, A., & Steinbugler, A. (2020). Social Position or School Participation? Access and Mobilization of Social Capital in a School-Based Network. *Educational Researcher, 49*(1), 44-55. doi:https://doi.org/10.3102%2F0013189X19898700
61) Rezaei Liapaee, S., Askarizad, R., Alborzi, F. (2020). Investigation of Physical Factors Affecting the Wayfinding of Educational Spaces Children aged 7-12 years old in Rasht, North of Iran. *International*

Journal of Pediatrics, 8(1), 10689-10704. doi:https://dx.doi.org/10.22038/ijp.2019.14063

62) Rioux, L., Scrima, F., & Werner, C. (2017). Space appropriation and place attachment: University students create places. *Journal of Environmental Psychology*, *50*, 60-68. doi:https://doi.org/10.1016/j.jenvp.2017.02.003
63) Rocher, G. (1974). *Talcott Parsons and American Sociology*. New York: Nelson.
64) Rollings, K., & Evans, G. (2019). Design Moderators of Perceived Residential Crowding and Chronic Physiological Stress Among Children. *Environment and Behavior*, *51*(5), 590–621. doi:https://doi.org/10.1177/0013916518824631
65) Safari, H. & FakouriMoridani, F. (2020). Influence of geometry on the vitality of space; A case study: Lahijan's institute for the intellectual development of children and young adults. *Proceedings of the 12th Space Syntax Symposium, Beijing, China*, 468.
66) Safari, H., Nazidizaji, S., & FakouriMoridani, F. (2018). Social Logic of Cities and Urban Tourism Accessibility; Space Syntax Analysis of Kuala Lumpur City Centre. *Space Ontology International Journal*, 7(3), 35-46.
67) Saghafi, M., & Mirzaei, B. (2020). The spatial configuration analysis of a high school through a participatory approach. *Architectural Engineering and Design Management*, 17(1-2), 17-35. doi:https://doi.org/10.1080/17452007.2020.1744420
68) Samura, M. (2018). Understanding Campus Spaces to Improve Student Belonging. *About Campus*, 23(2), 19–23. doi:https://doi.org/10.1177/1086482218785887
69) Scannell, L., & Gifford, R. (2010). Defining place attachment: A tripartite organizing framework. *Journal of Environmental Psychology*, *30*(1), 1-10. doi:https://doi.org/10.1016/j.jenvp.2009.09.006
70) Schmidt, C. (2004). The analysis of semi-structured interviews. In U. Flick, E. von Kardoff, & Ines Steinke (Eds.). *A companion to qualitative research* (pp. 253–258). London: SAGE.
71) Tan, K., Tan, H., Kok, Y., & Choon, S. (2018). Sense of place and sustainability of intangible cultural heritage – The case of George Town and Melaka. *Tourism Management*, *67*(8), 376-387. doi:https://doi.org/10.1016/j.tourman.2018.02.012
72) Thompson, A., & Prokopy, L. (2016). The Role of Sense of Place in Collaborative Planning. *Journal of Sustainability Education*, *11*(2), 1-19.
73) Turner, A., & Penn, A. (1999). Making isovists syntatic: Isovist integration analysis. *2nd International Symposium on Space Syntax Proceedings*, Universidad de Brasil, Brasilia, Brazil.
74) Turner, A. (2001). Depthmap: a program to perform visibility graph analysis. *3rd International Symposium on Space Syntax Proceedings*, Atlanta, US.
75) Vaughan, L. (2007). The spatial syntax of urban segregation. *Progress in Planning*, *67*(3), 205-294. doi:https://doi.org/10.1016/j.progress.2007.03.001
76) Wandersman, A., & Florin, P. (2000). Citizen participation and community organizations. In I. J. R. E. Seidman (Ed.), *Handbook of community psychology*. Boston: Springer.
77) Waskita Hutama, I. (2016). *Exploring the Sense of Place of an Urban Through the Daily Activities, Configuration of Space and Dweller's Perception: Case Study of Kampung Code, Yogyakarta.* (Master Degree). University of Twente, Netherlands.
78) Weaver, R., & Qi, J. (2005). Classroom Organization and Participation: College Students' Perceptions. *The Journal of Higher Education*, *76*(5), 570-601. doi:http://dx.doi.org/10.1080/00221546.2005.11772299
79) Xuan, Z., & Zheng, L. (2013). The Interpretation of Place Phenomenology Based on Space Syntax Theory. *Advanced Materials Research*, 664, 422-428. doi:https://doi.org/10.4028/www.scientific.net/AMR.664.422
80) Zerouati, W., & Bellal, T. (2020). Evaluating the impact of mass housings' in-between spaces' spatial configuration on users' social interaction. *Frontiers of Architectural Research*, *9*(1), 34-53. doi:https://doi.org/10.1016/j.foar.2019.05.005
81) Zhu, Y., & Fu, Q. (2016). Deciphering the Civic Virtue of Communal Space: Neighborhood Attachment, Social Capital, and Neighborhood Participation in Urban China. *Environment and Behavior*, *49*(2), 161-191. doi:https://doi.org/10.1177%2F0013916515627308