THE EFFECT OF BUILT ENVIRONMENT ON STUDENTS` INTERACTIONS IN INFORMAL SPACES OF MEDICINE SCHOOLS

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Abstract- Social life of students in all formal and informal spaces of the faculty can greatly influence learning process. These interactions are more regarded through training designing as a social art which is involved to others from the very beginning such as understanding the problem to final steps and implementation. An issue which is important before interactions through educational structure of medical schools is a proper environment for these interactions which are mostly disregarded for designing educational spaces. Since environmental qualities can make potentials or limits for social interactions and be effective on attracting groups and gatherings, studying these effective factors is important in order to qualify medical educational spaces. In the research in hand, in addition to gathering researchers` queries about the role of built space toward social interactions, type and way of medical students' interactions and effective environmental factors for facilitating or limiting these interactions are studied by qualitative research on medicine faculty of Bu-Ali Sina university and Tehran campus as to case-studies. In the research in hand ,data are gathered through using interview, observation and questionnaire. First , effective place factors are offered using interview, observation and previous studies based on Canter model. These factors extracted from interviews and observations were presented as a questionnaire to a larger sample in order to each factor's effect for place preference measured. Data were analyzed using Freidman test and SPSS. The results suggest that students prefer some formal places of the faculty for gathering which have some specific qualities; these specifications are different for educational and friendly gatherings.

Keyword- About four key words or phrases in alphabetical order, separated by commas.

I. INTRODUCTION

Social interaction is not only important for cognitive processes for learning, but is equally important for socio-emotional processes such as affiliation and impression formation, the development of social relationships and the creation of a sense of cohesiveness and community. These qualities determine the existence of a sound social space which is essential for reinforcing social interaction. We define a social space to be the network of social relationships amongst the group members embedded in group structures of norms and values, rules and roles, beliefs and ideals. We designate a social space to be sound if it is characterized by affective work relationships, strong group cohesiveness, trust, respect and belonging, satisfaction, and a strong sense of community. A sound social space determines, reinforces and sustains the social interaction that is taking place amongst the group members and enables open critical dialogues that neither harm nor offend group members because they know and trust each other.

These feelings of community can increase the flow of information between all learners while encouraging support, commitment to group goals, cooperation among members, and satisfaction with group efforts. In other words, a sound social space promotes positive feelings between group members such that learners benefit by experiencing a greater sense of well-being and having a larger set of willing individuals to call on for support. Finally, a sound social space contributes to a positive social climate/online-atmosphere within the group.

According to Pellegrino (2003), spaces are significant because involve social, cultural, physical, personal, emotionalmeanings and all these meanings are the result, as Mc-Kie have reported (2000), not only of what the technology provokes for the individuals because its structure, possibilities, limitations or features, but also the memory of what traditional known environments represent, compared with the virtual ones. Based on this approach, the study aimed to discover how these "provocations" and "evocations" are perceived by the subjects in the virtual learning environments.

Higher education is a kind of new socialization for students which means being a member of academic-cultural community with certain relations and norms. Understanding faculty as a social- cultural environment makes it a social structure, an interaction context and a set of relations between its members (students and professors). Quality of interactions (formal and informal) through university campus can increase the feeling of belonging to the place which makes more satisfaction for users (Lang, 1987) and encourages them to spend more time in the place (Carmona, 2010)

The mentioned issue is especially important about medicine faculties. According to the type of theoretical and practical training of medicine and type of abilities, the students must gain such creative and critical thinking and group thinking and also due to its irrefrangible relation to society and humans, there is a

necessity for social interactions between the students. Achieving social skills is not necessarily available for students at anatomy hall and formal spaces of faculty. In contrast, communal and informal spaces are more proper for meeting and interacting to upper level students, students of other fields, doing group works, reviewing and judging projects, etc .

Shaping and mobility of social interactions between students depend on many individual and environmental elements and according to its strong connection to culture and also interactions of built space and behaviors which is studied by researchers. Generalization of a unique related hypothesis about these spaces is not enough. Regardingly, the article in hand has described interactions between medicine students and its relation to the built environment through medicine faculty in Bu-Ali Sina University and Tehran campus.

According to importance of to social interactions of students in medicine schools, the mentioned faculties have been studied in order to answer the forthcoming questions:

1. What kind of social interactions between students happen out of formal time and space of faculty? Do these interactions and discussions relate to activities of medicine or are only based on friendship?
2. What spaces of faculty do students prefer for their gatherings? Is the kind of their interactions (friendly or study-oriented activities) effective on their space preference? What specifications of built environment of the faculty are effective on space preference of students for gathering?

In the studies about subject background through the research in hand, the space specifications that are effective on social interactions are extracted from previous studies and is offered as a framework for this article based on space model of Canter.

Generally, the social relationship between people increase by three variables:

- Chance of social impressible contact.
- Closeness to others, and
- Proper space for interaction (Oddvar. S &Tommy.G. 1997).

Therefore, one of the regarded issues for qualifying social interactions of students in educational spaces is to find a proper space for gatherings, discussions and group works which happen out of formal educational spaces and often unorganized, unforeseen and informal. Space quality of such environments can be effective on motivation of social behaviors of their users.

Social interactions have a close relation with people's interest in social built spaces (Lang, 1987) and also with social solidarity, due to their provision of these basic interactions for connecting between people (Potapcukh, 1997). Thus, these interactions through the environment give it a meaning beyond the space and improve it to a place for social life. Place is not a subjective and abstract concept, rather it is a place for direct relation to the world and the place for human life. So, it is full of meaning, physical reality and human experiences (Relph, 2007). Therefore, the spaces which become a context for social interactions can be mentioned as spaces for interaction. One of the primary and complete definitions of place is offered by Canter. According to Canter's model, place is a part of natural or human made environment which has a material or conceptual certain range and is a result of interaction between behavior elements, understandable concepts for human and physical specifications of the environment (Canter, 1977). Thus, a place has physical, activity and meaning aspects, each can be effective through shaping social interactions in each place. However, since each place needs different physical specifications according to its usage, there are different activities going on through it and shaping different meanings toward the mind, while the rate of effectiveness for each element on social interactions is different through various environments. There are several opinions about potentials of built spaces for social interactions and specifications of a proper interaction place, some of which are results of designers' studies on urban spaces as public places and could be generalized to communal spaces through buildings of a university campus.

A. Physical aspects

Accessibility to a communal place is one of the effective and preventing factors in in order to increase utility and social interactions through it (Peters et al 2010), because potential high access increases social contacts through the space (Fisher, 2009). Toward such place, suitable furniture will end to attracting people and participating in social gatherings (Gehl, 1987; Carr 1992) and ordering of the furniture though the place affects the formation of the relationships (Sailer& Ian, 2012). For instance , back to back benches are a kind of centrifugal community organization which may cause social interaction to lag(Lang, 1987.(Through an interaction place, there should be enough space for attracting people which can increase social communications (Gehl, 1987). Size of space is an important element for defining type of interactions which may happen through the space. Yet, space area should be large enough to host population but very large area can have some negative effects ,too. For instance, in some studies about two public places "Tim Park" and "Goffert Park", it is observed that in Tim park there is a more friendly atmosphere despite its smaller size not because there are more interactions but due to the large size there are not many random interactions happening (Peter et al, 2010). When the area is larger , space shape is important. Long and narrow corridors provide different kinds of interactions rather than a large rectangular space (Hall,

1966). Road and center are two main elements of space organization. Of these two ,one is movement defined in association with time and the other is relax defined contacting with others (Grutter, 1987). A space which is inducing pause and sitting attracts more groups (Lang, 1987.(

One of the most important elements of changing an environment to an interactional place is its location through the route of activities people accomplish daily (Lang, 1987). In fact, contiguities are effective on the amount of social interactions of users of a place. Studies about scientists and engineers in a research organization suggest that when people work in contiguous offices, they have more interactions with each other (Kraunt et al, 2002). Toker and Gray also suggest through their studies about interactions in a research center that those whose work station is seeable from the group part of the place, are more open to non-targeted visits rather than those who work in isolation and indeed the researchers who are more sociable prefer their work place to be more accessible (Toker& Gray, 2011.(

Being attractive makes a place more receptive for population and increases the probability of social interactions toward it. This attraction can be created by spatial variation (Bently et al, 1985), beauty (Lokaitou& Banerjee, 1988; Bisadi et al, 2012), proper light (Lang, 1987; Wang &Boubekri, 2009), and noise (Holland et al, 2007). The results of a study about researchers of center for medicine and urban researches suggest that spatial variation and flexibility of communal space, increase researchers' motivation for presence at that place and place's beauty first increases users' relax and then raises their motivation for longer stay and so increases the probability of interactions between them (Bisadi et al, 2012). Light as a structure maker element through a place can helps us understand the place which includes space understanding, adverse selection, navigation and social interaction (Wang &Boubekri, 2009.(

Lansdale et al study (2011) on social interactions of researchers in civil engineering building at Loughborough University represents that using open group-plan territory categorized ,contrary to researchers` prediction, has not effect on increasing interactions rather than room spaces allocated to each person and even in the room with open plan lack of privacy and increase of distraction caused by noises has dissatisfied users (Lansdale et al, 2011). This shows that in an educational and research environment providing privacy matters as much as social interactions .

Kasali and Dogan (2010) have surveyed pupils using space and their preference of using it at times out of the class. Items used for evaluating quality of educational space are as forthcoming: accessibility, proportion and understandability, space delimitation, circulation, physical specifications and furniture. In this research which was concentrated on spatial variation and size of indoor and outdoor spaces, results confirmed that both mentioned elements are important for place preference of pupils. Size of space is important because when pupils overcrowded somewhere, they avoid it and spatial variation is important because people with different genders and ages need different sub- spaces with different capacities. In addition, they found out that space indexes such as spatial arrangement, natural and artificial lighting, acoustic and visibility are effecting on pupils' preference (Kasali&Dogan, 2010)

B. Activity aspects

A place for social interaction should not only contain appearance and function factors, but also include social activities and social recognition and understanding (Carmona, 2010). In fact ,toward public places it's the activities itself each of which acts as an important support for other activities while people go to these places to experience other people (Bently et al, 1985). Activities like looking, listening and experiencing the others and active or passive participation in the place cause its vitality (Gehl, 1987). Each successful communal place provides possibility of participation active and passive: In fact, people like to sit somewhere, stand or pause for a talk where other people are present (Lenard & Lenard, 1993.)

C. Semantic aspects

The understood social context of a place is a set of functional, motivational and assessment means which is transferred to current and future users of the place (Oddvar and Tommy, 1997). Attributed meanings to a certain place are often a reflection of physical specifications and social interactions happening through it (Eisenhauer et al, 2000). Rapaport (1977) expresses that people act to the objects according to the meanings they have for them and these meanings are inherent but are interpreted in process of social interaction. Having a common place with others makes a sense of belonging to a group and means having a common identity (Norberg- schulz, 1988). Contrarily, places that are clearly public or private have less control on social communications and decrease social interactions (Lang, 1987(

According to the previous studies and researchers' comments, place elements effective on social interactions are presented in Fig. (1) as the primary framework of the article in hand regarding Canter's definition of place.

II. METHODS

In the study in hand, social behaviors of students at informal places of two faculty are analyzed based on previous studies using observing behaviors, interviewing students and polls by questionnaires. In

this research, two medicine faculties in Iran are chosen which follow nearly same education program and both are operating under the ministry of science; however ,they are different according to the amount of student and spatial composition.

The sample population is only undergraduate medicine students of two faculties the number of which is 130 for the first sample (Bu-Ali medicine faculty) and 392 (Tehran campus) through which some are chosen randomly for reviewing. Since the goal of these interviews was merely discovering environmental factors effective on social interactions, benchmark of participants is data saturation. Therefore, these participants are 9 from first sample and 14 from the second. Sometimes, the interviewee was positioned through his friends group and his talks were confirmed or rejected by the others, all recorded in the interview. The questions are so designed that first the rate of students' desire for participating in activities and group discussions out of class and atelier is assessed and second the spaces of faculty which are more selected for such activities are recognized including their strengths and weaknesses from their point of view. Even students' suggestions for improving the faculty according to social interactions are recorded. There are 5 main questions in the questionnaires and in each interview, some further questions were asked in order to have transparency. Then, interviews were coded and codes were categorized based on Canter's place model so that the results are categorized and compared to previous studies according to fig (1). Although coding according to this model was concerned by the researcher but it is tried that students do not feel any kind of special orientation and are not dictated by some certain specification. This kind of questioning aimed to discover the specifications of the place which are more regarded by the students. In addition, the amount of people's awareness of their environment's specifications and their effect on preference of a place for gathering is cleared.

Table 1: interview questions:

1. Do you like to stay at faculty in non-official hours of class? Why?
2. Do you have academic and group activities out of class and atelier in the faculty besides your friendly relations with your colleagues ?
3. If yes, what places do you choose for it? Why?
4. Which places of faculty do you choose for friendly chats in leisure? Why?
5. How much do you communicate with higher level students and other -field students? Where does it happen? Why?

But people are not often able to explain their behavior and activities precisely. So, it is necessary to observe them directly in their real environments so that a general Figure of their social interactions is gained. Therefore, informal spaces in two faculties which are prepared for interactions and group activities out of class were architecturally analyzed and students' behaviors through them were observed. In fact, these observations and interviews are complementary tools for the author in order to describe limitations and potentials of faculty for students' interactions. However, the population was inevitably expanded to whole students of faculties.

Observations were accomplished in spring and autumn in three different time ranges of day (10-11 am, 12-13 pm, 4-5 pm). Times were the leisure between class hours and behaviors were recorded in three groups of moving, gathering and privacies. Privacy is the kind of control on social interactions (Rapaport, 1977), comparing placed that are chosen for privacy or interactions and commuter routes which provide accessibility and social contacts can be useful for clarifying interactional potentials of a place. In addition, it was tried during the observations that users' behavior is regarded according to several aspects of the place which are effective on social interactions based on researchers' opinion.

Regardingly, effective elements on students' interactions were achieved. In the next step, these elements were represented to 87 undergraduate students as a questionnaire which aimed to examine research's results on a larger sample and amount of effect and importance of each element is determined.

III. CASE STUDIES

In the research in hand, medicine faculty of Bu-Ali Sina and that of campus of Tehran are selected. The reason for selection of these two is easiness of their accessibility for research and difference of composition of informal public places. Medicine faculty of Bu-Ali Sina is a separated building from the main campus of the university at the center of the city. The building is formed introverted and central; connection of main spaces is available from both open and closed spaces. The building of medicine faculty of Bu-Ali Sina which was designed as public high school ,at the first ,contains parts around a central yard and green space and is limited from three directions by city streets. Building of ateliers, gyms, libraries, dorm, restaurant and building of professors are the four main buildings each are connected to others by corridors and lobbies. Connection spaces between buildings –corridors and central yard- are the informal spaces of the faculty which can be a potential for students interactions. Contrarily, Tehran faculty at the main campus of the university is formed extroverted through which different buildings with different uses

are connected by open and colonnade spaces. This building is made up of separated buildings which are connected as chain by faculty's colonnade. Central spaces of the buildings designed as an open space and with colonnade are the most main informal spaces in the campus which can be counted as a potential for informal interactions of students.

IV. STUDENTS' INTERACTIONS THROUGH INFORMAL SPACES OF THE FACULTY

According to the nature of medicine course, many projects during the semester are done by groups. Students have also mentioned this point in the interviews and most of them said that they spend significant time out of class time or ateliers for group works or discussions about designing. Students choose different spaces at faculty for interactions and gathering;these choices are affected by potentials and limitations of the environment and may be not always informed. These gatherings include informal interactions such as friendly chats and also more formal contacts like group works and discussions about designing. Both of these gatherings are directly (by information exchange) and indirectly (by improving tacit knowledge) effective on designers' learning and their personality (McKenna, 2000), but this can happen in environments with different conditions. Regardingly, these two kinds of interactions are considered separately through questionnaires and different answers were received. In addition, considering the importance of active relation and participation of students of different levels emphasized by teachers, relation with higher level students was separately questioned. Almost all students learn from more experienced students and this stream of learning goes on through both friendly chats and questioning of lessons.

- ''It is good if one can enjoy experience of those who have recently passed these steps; sometimes students guide better than professors, I mean they get me better.''
- "We are related to upper students only as saying hello unless we want to take some prepared projects from them."
- These two kinds of informal interactions of students –friendly and study-based, happen in different spaces of faculty which are presented at Table 1 and Table 2according to students' answers.

Table 2:

	total	Fourth year	Third year	Second year	First year	boys	girls
Bu-alisina	29	5	14	5	5	12	17
Tehran campus	33 %	17.2 %	43.4 %	17.2 %	17. %2	41. %4	58. %6
total	58	20	6	10	22	22	36

Table 3:

1. Bu-Ali sina	2. Tehran campus	sample
		Aerial picture

Contrarily, Tehran campus is formed extroverted and its several spaces are linked by open spaces and due to separate ateliers for different classes; students spend their most times in ateliers and use open and informal spaces for friendly chats. Moreover, the faculty's educational program is so adjusted that two students of two consecutive classes work in the same Anatomy Hall. So, they have much relationship with upper students at ateliers or routes. At Tehran campus the busiest routes are shaped at colonnades and central yard and most gatherings happen at these two and also BezGarden , the difference is interactions through colonnade and yard are more short and sandal and interactions at Bez garden are more planned.

Moreover, at Tehran campus anatomy Halls are separately for classes and rarely other lessons are held there so students do not need to leave anatomy hall after class (in contrary with Bu-Ali medicine faculty). Thus, they use other spaces for designing discussion less than Bu-Ali medicine students .

- Since on Wednesdays and Thursdays faculty classes are allocated for other courses we have no place at faculty and have to go out often to cafes.
- At ateliers or at the company we work.
- If it is possible, we go to ateliers and then to buffet due to its suitable furniture.

Factors affecting students' preference for gathering place

Built space of faculty is a place that that gatherings are held in, a space which can facilitate interactions or make them limitations. Knowing these specifications can be a help for designing interaction spaces for students. Informal spaces in both samples are sometimes suitable for students' interactions and sometimes they make some problems for them. Accordingly extracted codes from students` interviews about quality of different spaces of faculty are categorized in three groups (based on Canter model) and 14 grades (Table 3)

Extracted codes of interviews are different with

offered model at research background in some cases. Instances like access to academic facilities, connection to outdoors, and feeling for work and activity are added to this model and for exchange instances like visibility, light and dimensions are omitted. However since behaviors are completely describable and sometimes happen unintentionally, authors' observations were used in order to supplement space factors that effect on students' preference for gathering. Results of the observations are briefly mentioned below:

• About space proportions, the observations have shown some unexpected results. Although pause space provides a better possibility for interaction –like faculty's central yard-, considerable interactions happen in corridors leading to ateliers despite their route-sorted shape. However pause space in front of library is not well quite appreciated (Fig.1)



Fig.1: morning gathering

• It seems that the more closeness of space gets, the more suitable it is for individuals and groups privacy. In open spaces the corners and covered parts or parts with more closeness by trees, are more used for private activities such as talking on phone, reading book or group privacies (Fig.2 and Fig.3)



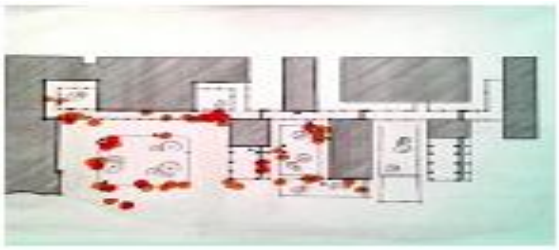
Fig.2



Fig.3

About space lightening especially natural, although students have not regarded to light during the interviews neither mentioned it, toward recorded observations it seems that there is more attempt for brighter places and near window through closed spaces (Fig.1).

- The most random interactions happen where routes of different users meet (Fig.1&Fig.4-



- Fig.6)

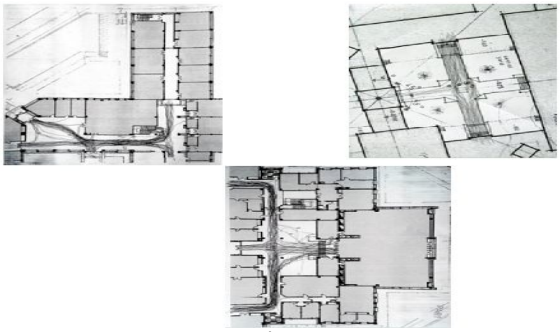


Fig.4

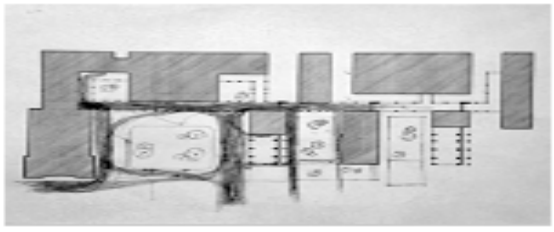


Fig.5

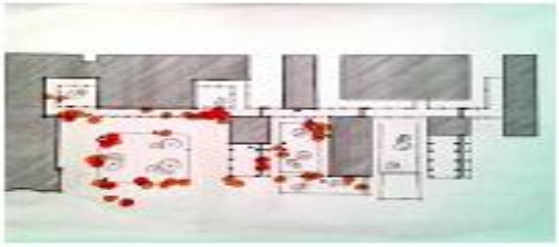


Fig.6:

Eventually effective factors on place preference of students for gathering is achieved as a model of extracted factors from interviews and observations including the model derived from previous studies –except visibility. However since there was no proper pattern for proving it through observations and it was possible that students disregard its effects toward the interviews, visibility was also questioned in the questionnaire.

V. RANKING EFFECTIVE FACTORS

To prepare the questionnaire, there was a general question to be asked: "what specifications do you prefer for the place you choose for gathering?" then, each of these effective place factors was given to students according to its effect on interactions, in order to be ranked between 1 (low) to 3 (high). For measuring the effect of each factors, data was ranked using Friedman test, the result of which are presented at table 5. Reasons of using this non-parameter test, is Non-normally distribution of data and sequence data. This test was applied separately for both types of gatherings (educational and friendly) and has had different results. In all cases of applying Friedman test, statistical significance level of k2 was 0.000, therefore according to Inequality $\alpha = 0.05 \leq 0.000$, it is concluded that there is significant difference between mentioned factors and the ranking derived from the test can be trusted. About friendly gathering, having sense of ownership to the place, friendly atmosphere, closeness and beauty are factors ranked as first five by students. Contrarily, feel of pause space and distance from pother, access to academic information, light, silence and furniture were more regarded for educational gatherings by them.

	rank	Mean Rank	rank	Mean Rank		rank	Mean Rank	rank	Mean Rank
1	2.27	5	10.57			9	9.18	furniture
		9	8.41			5	10.58	beauty
		3	10.93			13	7.69	lighting
		4	10.76			16	6.55	Silence and peace
		16	7.49			10	8.32	Lack of visibility
		12	8.01			3	10.80	Access to the edible
		2	11.11			15	7.07	Access to information
		6	10.07			14	7.45	Surrounding performance
		10	8.29			6	10.48	Relation with open space
		13	7.97			7	10.26	Spatial diversity
		14	7.71			4	10.65	enclosure
		1	11.76			8	9.59	Pause space
		8	8.53			11	8.25	size

Generally, semantic features for friendly interactions and physical feature for educational interactions were more regarded by students of these two faculties.

Difference of students' place preference through educational and friendly interactions

Although, Freidman test somehow clarifies the difference between students' place preference of friendly interactions and that of educational ones, factors of both gatherings were measured one by one using the test and also the test was applied separately for both faculties. The results suggested that in some cases there is significant difference of place preference between friendly and educational interactions. In Tehran campus there is significant difference for effect of factors on place preference except for enlargement of the space. However, in medicine faculty of Bu-Ali Sina University these factors are only beauty, silence, access to food and information, adjacent functions, closeness, pause space and sense of ownership. Out of this difference in is to be concluded that friendly and educational interactions happen more medley at medicine faculty of Bu-Ali Sina University.

The results indicate some points about type of interactions of medicine students and role of built space on facilitating or limiting them and suggest that formal and informal interactions which have been a focus for psychologists of learning in all fields should be regarded by designers of medicine and designing faculties. The conclusions are generally mentioned according to the results:

- Presence and working with others in an interactional and friendly space is a key point for training designing which has an effective role on ideas and choosing proper solution for designing from the students' point of view. In addition it is the most principal reason for students to spent time at faculty which follows vitality of learning environment.
- Students choose difference places with different facilities for gathering according to subject and type of interactions (friendly or related to designing)
- Physical features of faculty's built space have significant effect on shaping the interactions. Anatomy act as the heart of an medicine school and their adjacent spaces can be a proper place for gathering with other students specially upper students and students of other fields. Suitable locating of spaces with difference functions unto proper light, conditioning, view and furniture and accessibility to academic and other facilities can make suitable interaction places for students.
- Group works though informal spaces of the faculty such as holding exhibition of students' works increase socializing of these places.
- Extra physical and work aspects of the space, its semantic aspects can also be effective on gatherings, as well as naming a place effect on making sense of

belonging to a group.

Furthermore, there are some additional points to be mentioned, each needs further study. Interactions out of class are not limited to medicine students. Type of fields and specialties gather in a faculty and way students of different fields contacting to each other and also informal relations with professors can be effective on forming their approach and their professional personality, and each can be a subject for other researches in order to improve designing. In general, 'Meeting place' space should be relatively simple to create. Small outdoor table groupings, reminiscent of café-type settings, and multi-level terrace spaces provide natural locations for informal small-group discussion or socializing. This is by far the most heavily trafficked area, meaning there are plenty of opportunities for people-watching and incidental meet-ups.

The students in the health sciences are very clear about the kinds of spaces where they learn best: Well-lit rooms with plenty of table space; comfortable, moveable furniture, and convenient power sources. And more often than not, they want their classmates there. Surveys reveal that students value study spaces highly, and that they would like smaller, isolated spaces to study alone or in a small group. Ideally, they want fully half of the informal learning space to be study space of some kind, with another 30 percent as breakout space and 20 percent designated as social space.

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