The Impact of Campus Sustainable Outdoor Spaces Quality on Students' Social Needs, Behaviour, and Satisfaction

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ABSTRACT

Universities have an important role in shaping the student's future and character. This influence extends to the social, academic, and cultural aspects of student life, by providing them with the information, capabilities, and experiences necessary to engage in practical life and positively impact their communities. The study reviewed many previous studies and concluded a set of quality indicators to evaluate (students' outdoor spaces). These indicators were applied in three different Egyptian universities campuses (Cairo University, Ain Shams University, and the British University in Egypt), to evaluate students' satisfaction with (campus outdoor spaces), and to identify the strengths and weaknesses that led to satisfaction or dissatisfaction. The study uses three different methods to evaluate (students' outdoor spaces) characteristics and their impact on student behaviors and satisfaction; 1- Behavioral observation and monitoring the effects. 2- Conducting interviews with groups of students. 3- conducting an online questionnaire to estimate student satisfaction and their opinions to determine the strengths and weaknesses of the outdoor spaces design. The study concluded that the quality of space design and furniture affected student behaviour positively and negatively. The study recommends using the previous methods that the British University gained the highest student satisfaction rate, which enhances students' social interactions.

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1. Introduction

Campus quality has recently been discussed in many studies according to the vital role of the university in building an individual's life and the future of society, and its impact on students' performance and satisfaction during the study period. Most of these studies focused on the academic attributes of the university in general or the quality of the design of academic buildings. Therefore, this study focuses on the quality of (students' outdoor spaces) and the extent of their impact on students' behavior and satisfaction on campus, and students' social interactions.

On the other hand, (connecting communities and individuals) is the 8th goal of the global trends that call for the sustainability of resources and the preservation of the environment. According to "World Green Building Council" [1]. Therefore, this study supports one of the goals of sustainability.

2. Research Objective and Methodology

The research aims study presents the research objective as a main objective and the research methodology as follows:

2.1 Research Objectives

The research aims to study the impact of campus outdoor sustainable spaces quality on student social behaviour and satisfaction by achieving the following secondary objectives: 1- identifying outdoor design strategies and social connections. 2-studying the design considerations for outdoor spaces. 3- identifying the social and physical distance/space. 4- illustrate the social walkway and rest area design considerations. 5- observing student behavior and applying the proposed quality indicators to the selected case studies to illustrate the best actions using the research findings for enhancing the student's outdoor social spaces on campus.

2.2 Research Methodology

The research follows a theoretical, comparative analysis, and application approach, through a comparative study between three Egyptian universities with different cultural and social backgrounds; Ain Shams University, Cairo University, and The British University in Egypt (BUE), as a case studies, through discussing students' requirements and design attributes to deduce a set of design guidelines, and compare between the three case studies through three steps Observing Student Behavior/ Interview, Actions and Illustrate Behavior Map, and Questionnaires, to come up with a set of findings and recommendations that supports the designers in case retrofitting the campus.

3. Outdoor Design Strategies and Social Connections

Generally, many previous studies discussed (outdoor space quality) and different design strategies to enhance social connections in the built environment, (William H. Whyte 1980) discussed the importance of creating seating spaces, which refers to outdoor spaces must contain an appropriate number of comfortable seatings as one of the essential components of built environments, and be comfortable and offer a variety of options [1], whether in the sun, in the shade, in groups, or solitary [2]. According to (P.S. Waite 2003) universities are like small cities or communities that enhance the social connection for most of the population and help society to reach a prosperous future [1].

4. Design Considerations for Outdoor Spaces

Many previous researchers and designers have also discussed several design considerations for outdoor spaces, (Evyapan & Tokol, 2000) and identified five basic criteria for selecting and placing furniture in the outdoor spaces of the university campus [2]: 1- **Function:** according to its importance related to space's function and how it can serve user's (students) needs. 2- **Siting and layout:** identifying furniture location, orientation, and distribution. 3- **Form and appearance:** these furniture items should be linked with each other [3]. 4- **Durability:** the furniture meets the expected usage. 5- **Cost:** furniture cost suitable for the predetermined budget [4].

(Dober, R. P. 2000) mentioned some design considerations for seats that create visual order, provide space definition, delineate functional areas, and provide an orientation that controls students' social activities and behavior in different types of campus outdoor spaces as follows: 1- Seats are preferred to be located at the edges of the plaza so as not to disturb pedestrians at the entrance. 2- On the main plazas, seats should be located at the edge of the plaza to allow gatherings and holding important events there, these seats should be well-shaded according to their use. 3- Backyard spaces, few seats can be set, and it's preferred to be movable. 4- Areas close to sources of food or snacks where students often read and eat at the same time [5]. 5- The seat and shades design should match with students' activity; it is supposed to be a part of accessory on campus that should not greatly grab attention but act in harmony with the surroundings [6].

The following Figure 1 illustrates different seats arrangement according to student's social activities with different group size.
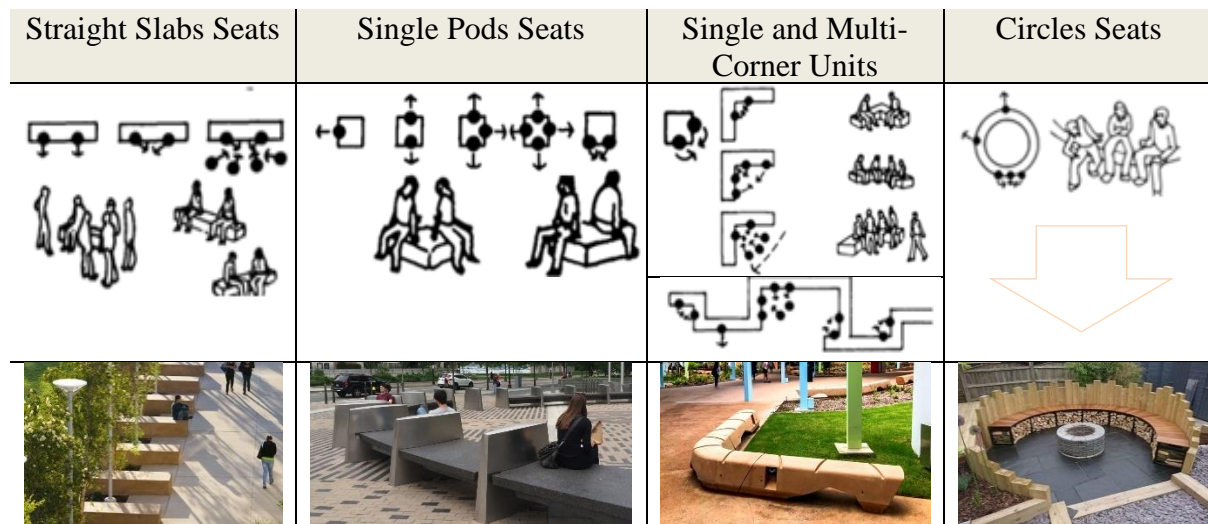
Straight Slabs Seats	Single Pods Seats	Single and Multi-Corner Units	Circles Seats

Figure 1. Different types of student seats on campus, Authors based on Carmona, M. (2021)

5. Social and Physical Distance/Space

Edward Hall came up with a study of how people unconsciously construct and shape the space around them, which varies depending on each culture. Hall (1966) noted that social distance can be related to physical distance. He classified distances, each of which is used by people only for a specific type of communication: intimate, personal, social, and public [1], as illustrated in the following Figure 2.
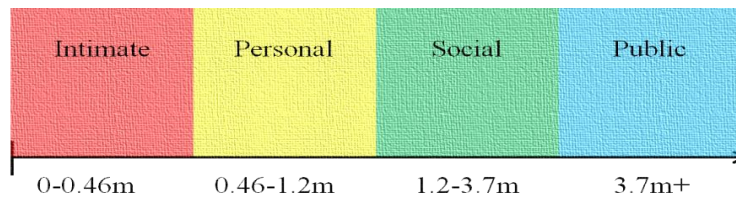
Figure 2. The difference between four types of communication (social/physical) distances, Hall (1966)

By applying Edward Hall's theory on university campuses some types disappeared, and others were dominant depending on the nature of the relationship between the students these interaction levels categorized social spaces into four levels: intimate spaces, personal spaces, social spaces, and public spaces as follows:

- **Intimate distance/space:** This ranges from physical contact to 0.46cm, this distance does not exist on campus, it is intended for family, children, or very close friends. Intimate space is that area immediately surrounding an individual, which is the most private and includes physical and emotional interaction [1].
- **Personal distance/space:** which ranges from 0.46 to 1.2 meters between two persons, on campus as illustrated in Figure 3. in which the student allows only specific friends or classmates. This type of space is like a study and activity space for small groups. According to COVID-19 guidelines for indoor and outdoor gatherings in 2021, the distance range allowed in outdoor spaces for students on campus is 2:4 meters [2].

Spaces for small groups of students (Charleston Southern University) USA	The space is well-furnished to allow students to sit alone and concentrate in the outdoor space

Figure 3. Examples of personal distance/spaces on the university campus, https://www.charlestonsouthern.edu/

- **Social distance/space:** This distance/space is considered from 1.2 m to 3.7 m, which is the range in which most general interactions are observed. This distance/space is suitable for clear speech and expressions, effective communication, and making social contacts, Figure 4. [3]
- **Public distance/space:** (+3.7 m) These distance/spaces were designed to help students make friends, or join any student club, often, such activities provide the students with opportunities to develop leadership, social responsibility, citizenship, volunteerism, and employment experience, these clubs differ according to their types such as academic, cultural, sports, political, and public service clubs, Figure 5. [3]

Figure 4. Spaces for students' gatherings and making friends

Figure 5. Spaces for students' clubs, https://www.auccaravan.com

6. Social Walkway and Rest Area Design Considerations

Deasy, C et. Al provided many considerations in designing the walkways and rest areas to enhance social interaction and group formation: [1]

- Make activity areas visible from different points along the open space. By creating intersections between walkways and activity areas, occupants may become spectators to enhance social interaction.

- Availability of spaces to accommodate presentation activities. This may be in central squares or main walkways where students can present their work, advertise their events, or even organize exhibitions that may interest passers-by from students.

- Providing flexible and arranged seating at entrances and near to all students' activities to allow student gatherings and interaction. These seats should be placed away from the flow of pedestrians or vehicles.

7. Applying The Proposed Quality Indicators to The Selected Case Studies:

The study chose three Egyptian universities with different cultural and social backgrounds; Ain Shams University, Cairo University, and The British University in Egypt (BUE), through applying three methods as follows:

6.1 First Method: Observing Student Behavior/ Interview:

- **Observing Student Behavior**: The observation was conducted on three average university days with normal occupancy, neither high as exam days nor low like vacation days, in the middle of the day between 12: 00 p.m. to 2:00 p.m. in break time (peak times). The observer assumed the role of a participant observer by behaving like one of the students, observing students' behavior estimating their satisfaction, and opinions about the space, and identifying design strengths and weakness points.

The objective of this observation is to identify the impact of space design on students' activities, and how that influences student behaviour. by applying the design strategies and indicators deduced from the theoretical study, illustrated in the following Table 1.

- **Interviews:** The study aimed to conduct a face-to-face meeting that allowed discussing the questions at length and allowed students to speak freely to express their satisfaction and impressions about the space through the following questions:
    1. Does space help you to feel comfortable?
    2. Do you usually sit with your friends? Can you gather easily here?

Table 1. Design strategies and guidelines for achieving social quality

	Design Strategies	Design/Observing Guidelines
1	Adequacy of outdoor social space furniture on campus that facilitates social interactions	-Providing an adequate number of seats in the space. -Providing well-arranged seats according to students' activity types. -Providing well-maintained seats.
2	Providing spaces for different sizes for students' group	-The availability of spaces for personal use. -The availability of spaces for group gatherings at different levels.

6.2 Second Method: Actions and Illustrate Behavior Map:

Observers took notes, and pictures, and drew sketches of what can be seen, heard, or felt, the study aims to analyze the relationship between space characteristics and the students' activities and behavior within the selected space and illustrates the students' observed grouping based on the level of social interactions in behavioral maps as illustrated in Table. 4. through classifying students' activities into three categories; solitary where a student was reading, looking at their phones, etc., or gathering in two types of groups from 2-5 students talking, eating, or taking photos or from 5-10 students talking or playing. Etc.

6.3 Third Method: Questionnaires:
the study conducted an online questionnaire for 50 students as illustrated in Table. 5. and aimed to assess their satisfaction with the design of the open spaces, the questionnaire consists of a set of questions about students' satisfaction with space in each dimension by using (5 Point-Likert scale) questions. **How satisfied are you with the following indicators?)**

1	Extremely dissatisfied
2	Not satisfied
3	Neutral
4	Satisfied
5	Very satisfied

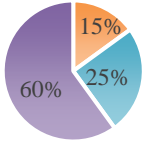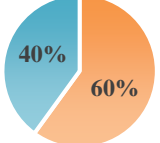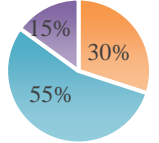The result of each method will be discussed in the following Tables 2,3,4,5

Table 2. Design/Observing Guidelines according Design strategies for social quality, Authors
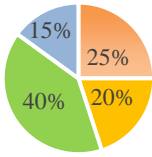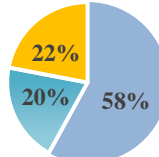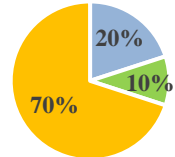
First Method: Observing Student Behavior / Interview				
	Design Strategies	**Design/Observing Guidelines**		
		Ain Shams University	**Cairo University**	**The British University**
Design Strategies	Adequacy of outdoor social space furniture on campus that facilitates social interactions	• Seats distributed along the path facilitate gatherings and enhance social connections between students. • Some ineffective spaces are irregularly furnished (seats very close to each other or unshaded seats or pergolas without seats) and their location is inappropriate which makes some of students prefer to sit on the grass.	• Some ineffective spaces are irregularly furnished, and their location is inappropriate (spaces that are completely adjacent to buildings) which affects student behavior, where some students were noticed set in uncomfortable ways to gather with their friends. • The presence of some useless pergolas led to some students sitting on the sides of the buildings and the flower boxes.	• Seats were distributed along the campus to encourage students to gather easily (single bench or group of seats for gatherings), some seats are movable to allow students to gather easily. • All the available seats are clean, well-arranged, and well-maintained.

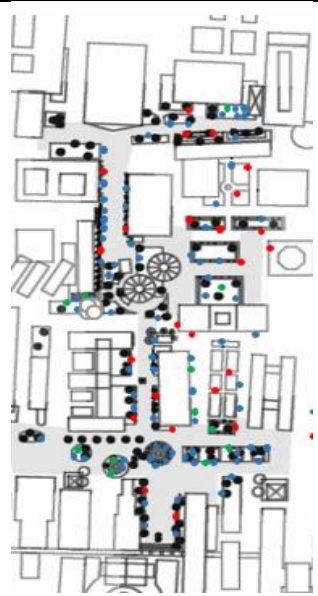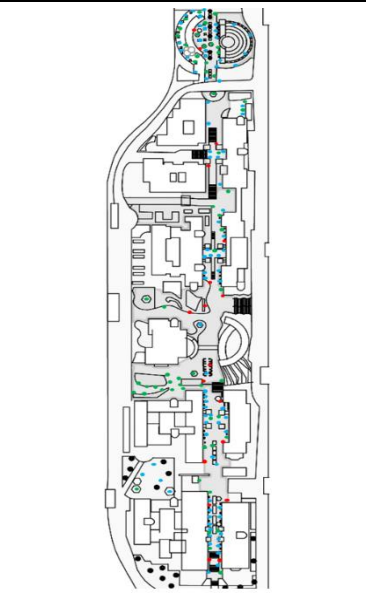|	Providing spaces for different sizes for students' group	• Space design encourages students to gather in groups due to the wide green spaces near the shaded seats. • A very small percentage of solitary students were noticed reading or studying.	• Social interaction level grades according to space function, area, density, and location. • A percentage of solitary students were noticed in calm spaces.	• Social connection levels differ according to space location, furniture, and quietness level, some solitary students were noticed set comfortably for reading or relaxing.
		 Students gather in large groups Students gather in small groups Solitary student	 Solitary students Small groups 2-5 students Large groups 5-10 students	 Students gather in large groups under the pergola Students gather in small groups Solitary students
		Different levels of social interactions	Different levels of social interactions	Different levels of social interactions

Table 3. The result and indicators based on interview with students about needs social quality, Authors

	Questions	Ain Shams University	Cairo University	The British University
Interview	Where do you sit alone comfortably?	Solitary students mentioned that they can't feel comfortable sitting alone for reading studying or resting, the crowds and noises distract them and don't help them to concentrate, also15% of the students resorted to sitting in the shade of buildings, and 25 % under trees to take shelter from the sun	When asking solitarily students in the plaza, 80% can feel comfortable sitting alone for reading or studying in a quiet, empty, far from gatherings and crowded spaces	When asking solitarily students in the plaza, they mentioned that they can't feel comfortable sitting alone for reading or studying in the space near the academic buildings and in the food court, the crowds and noises distract them and don't help them to concentrate.
		 ■ Under building shades ■ Under trees	 ■ In quiet space near buildings ■ no I cannot	 ■ Behind the academic buildings ■ beside the pedestrian path
	Can you gather easily with your friends?	40% of them liked to stay in the plaza 25% referred to the crowds and noises that they needed to take a break in a quiet place, and 20% referred to the quality of arranging the seats that some of them could set and others had to stand to hear the conversation, the arrangement of the seats didn't maintain the degree	35% of students asserted that they can gather with their friends easily, 23% referred to the lack of available maintained seats that made them sit on the grass, and 22% preferred to sit away from the crowded spaces on buildings' stairs or inside the buildings.	35% of them liked to stay near their faculty whereas the food court is too far, others said that they gather easily with their friends from the same faculty or other faculty, whereas some referred to the design of the campus and the location of the academic buildings helped them to make new friends and the availability

		of privacy between groups therefor some students preferred to stay on the grass to be more comfortable.		of seats helped them to gather easily.
		15% 25% 40% 20% ■ Yes we like to stay here ■ No we prefer to set on the grass	22% 20% 58% ■ yes, we can gather easily ■ we prefere sit on the grass	20% 10% 70% ■ agreable ■ boring ■ very good
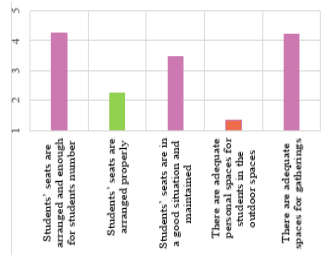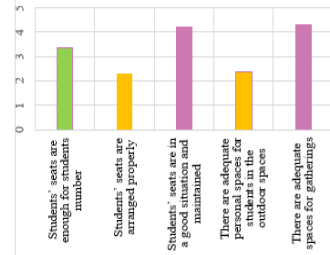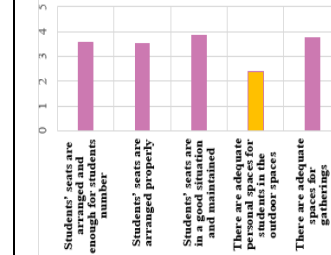
Table 4. Students Behavior Map, Authors

Second Method: Actions and Illustrate Behavior Map:						
The Behavioral Map		●	Solitary Students	●	Small group from (2-5)	● Large group from (5-10)

Ain Shams University	**Cairo University**	**The British University**
most student gather along the plaza where green spaces and shaded seats, small student groups from 2-5 are spread out in the whole plaza, otherwise, solitary students usually stay far from student gatherings, most of the activities inside the plaza are social activities that depend on students' conversations, playing games, a very small percentage were noticed reading or studying or engaging in any activity that requires concentration and quietness.	large groups (5-10 students) of students appear in spaces that are capable of accommodating large gatherings that have pergolas, food kiosks, or are centered between the whole faculties, and groups (2-5 students) are distributed along the open spaces, but solitary students usually exist in the quiet and relatively empty space such as the open spaces between the academic building, the pedestrian path in front of the central library, the back yard of faculty of commerce.	solitarily students usually sit away from the crowded space in front of the academic buildings' entrances to have some quietness, groups of 2-5 students are distributed along the main spine and mostly in the front yards of the academic buildings and the food courts, large groups of students (5-10 students) mostly gather at the end of the front yards were some seats are arranged in groups, and the open space specified for events, under pergolas, and in the food court.

Table 5. Questionnaire Results, Authors

Third Method: Questionnaires:															
Questionnaires	(1) Extremely dissatisfied		(2) Not satisfied		(3) Neutral	(4) Satisfied				(5) Very satisfied					
Quality indicators	Ain Shams University					Cairo University					The British University				
	(1)	(2)	(3)	(4)	(5)	(1)	(2)	(3)	(4)	(5)	(1)	(2)	(3)	(4)	(5)
Students' seat numbers are enough for student's number	6	0	0	12	29	11	4	8	12	15	13	10	6	9	2
Students' seats are arranged properly	18	15	5	12	0	2	2	8	13	25	10	14	3	13	
Students' seats are in a good situation and maintained	6	0	9	20	12	14	12	8	11	5	15	16	2	5	
There are adequate personal spaces for students in the outdoor spaces	25	3	9	10		1	3	8	16	22	4	6	3	16	11
There are adequate spaces for gatherings	9	3	1	12	22	16	10	11	7	6	10	16	8	6	
Indicator Graph															
Notes	the differences in students' satisfaction ratios showed that they are satisfied with the seat number and maintenance in the space, and they are not satisfied with the seat arrangement in the space, and they are extremely dissatisfied with the absence of personal space to study or concentrate. which express the efficiency of seat arrangement and number in the space, and the importance of respecting social interaction hierarchy between students and providing spaces for individual use.					The differences showed that students are satisfied with the seat maintenance, and the presence of spaces for gatherings and they are not satisfied with seat arrangement in the space, and the absence of personal space to study or concentrate and they are neutral with seat number in the space. These ratios express the importance of respecting social interaction hierarchy between students and providing spaces for individual use and indicate that the campus needs to increase seats in the space.					The differences showed that Students are a little satisfied with the seat availability, distribution and arrangement which help in students' gatherings and creating groups, also, they are satisfied with seat quality and maintenance, and spaces for events and gathers are quite agreeable. But they weren't satisfied with the absence of spaces for personal use; quiet, furnished, help to concentrate, or relax.				

The previous observation analysis and questionnaire concluded to strength and weakness points in each selected campus (Ain Shams University, Cairo University, and The British University in Egypt (BUE) as illustrated in the following Table 6.

Table 6. Campuses analysis strength/weakness points, Authors

	A- Design Strength Points:	B- Design Weakness points:
Ain Shams University	- The provision of outdoor spaces adequate for students' gatherings in large groups that enhance social connections between students and can be used as spaces for special events.	- Shaded seats need to be increased for comfortable use of the space, - Increasing artificial and natural shades (trees) whereas palm trees don't provide comfortable shade. - Disorganization of seats affected student behavior and made some of them prefer to sit on the grass. - lack of any space for personal use
Cairo University	- The width of the pedestrian path is suitable, - Good location of the surrounding seats interfering with the pedestrian flow, - Some spaces are specified for pedestrian movements only in which students move freely and easily.	- Inefficient space furniture in terms of number and arrangement affects student behavior, - Some students were noticed set in uncomfortable ways to gather with their friends, - Inadequacy of natural shades (trees) and artificial shades (pergolas) in terms of distribution.
The British University in Egypt (BUE)	- The outdoor spaces are well-furnished; with movable wooden seats, some are arranged for groups, and others are distributed along the path, - There are many spaces for different types of activities and gatherings on campus.	- The need to spaces were designed for personal use for studying, reading, or having a break. - Some spaces need more seats such as the spaces between the academic buildings need more seats away from the building entrance that could help in reducing the crowds near the entrance.

8. Conclusion and Recommendations:

- The study reviewed some literature and design considerations that affect sustainability in the theoretical part to deduce design strategies and guidelines to enhance the quality of social interactions between students in the outdoor spaces on the university campus.
- The study uses a comparative method between three Egyptian case studies; Ain Shams University, Cairo University, and The British University in Egypt, to assess the quality of students' outdoor spaces on these universities' campuses, through three different methods; behavioral observation, interviews, and online questionnaire. To observe student behavior in these spaces and assess student satisfaction.
- The study suggests an Improvement recommendation to the three case studies:

Ain Shams University	- Seat arrangements need to be enhanced to allow different numbers of student groups to gather easily and comfortably. - Furniture needs to be redistributed and rearranged to distribute students' gatherings whether in large or small groups or solitary along the campus to reduce large groups to disturb small groups or solitary students.
Cairo University	- Seats need to be rearranged to allow different numbers of student groups to gather easily and comfortably, - Some outdoor spaces need to be well-furnished with adequate furniture, - Quiet spaces can be used for solitary activities that need concentration and quietness, these spaces need to be well-furnished and shaded.
The British University in Egypt (BUE)	- Providing more shaded seats in the wide spaces between the academic buildings to encourage students to gather easily in large groups. - increase furnished spaces between the academic buildings.

- Some personal factors may affect students' preferences, such as general mood, taste, social personality, and socioeconomic status. These factors may affect students' judgments, preferences, or evaluation of the quality of space and affect their satisfaction. It is noted from their answers that they expected more quality, luxury, and comfort and were dissatisfied or demanding more. In some elements, although students are satisfied with the same things at other universities.

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