The Role of Open Spaces in the University Campus in the Egyptian context
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Abstract

During the last few decades, higher education has seen an evident increase in the call for establishing more higher education institutions (HEIs), particularly in developing countries. This has happened due to the appalling population growth and the limited capacities of existing educational institutions, along with the rising awareness and support offered to the youth to achieve higher degrees. Thus, with this double impact pressure, the private sector has allocated a relatively large budget to establish the required higher education institution sites, buildings and facilities to cover for the government deficit. Tens of HEIs have been established in the last two decades and some of which have proven successful, not only on the level of education but also on the level of design and planning.

In the process of planning these HE developments, physical requirements have always been the main driver of design. Assuming that the physical environment has only direct effects on behaviour, ignoring the active role of human choice and expectations, and neglecting active processes of creating and modifying environments have often been major weaknesses and limitations in its design and planning. For this reason, a lot of research work has been done concerning the effect of the immediate environment on users’ behaviour (and vice versa), which has been termed environmental psychology. This field defines the term environment broadly, encompassing natural environments, social settings, built environments, learning environments, and informational environments.

This research examines the effect of outdoor spaces associated with the learning environments and social settings in HEIs on students’ behaviour and wellbeing. It aims to discuss and analyse the role of outdoor spaces in universities in enhancing the overall experience of students. It highlights the magnitude of designing the open spaces as part of the broader aim of educational institutions in providing the facilities required by students. This includes designing cultural hubs, entertainment facilities and tranquil amenities to target most -if not all- students’ needs. The case study discussed and highlighted is a university established in a new urban community in 6th of October City near Cairo. This particular case study has been selected as the design has sought to incorporate users’ needs and behaviour in the preliminary design stages and until the complete implementation. The research methodology has also engaged the students’ opinions and attitudes in the critical assessment of the designed open spaces within the case study.

1. Introduction:

The last half of the twentieth century has witnessed a remarkable interest in the establishment of private universities in Egypt. Amid the increase of science and education supporters, the private sector had to participate in meeting these requirements and the provision of appropriate
buildings and services required. Most of the available studies and research focus on the study of educational buildings at specific and practical aspects; materials used, equipment, the design of the interior spaces, circulation, and lighting\(^1\). However, very little research has addressed the aspect of exterior spaces and its impact and importance on students’ behaviour and well-being. Thus, this research aims to analyze and study the effect of the exterior spaces in the Egyptian universities on students' behaviour and its importance in achieving the educational, cultural, and entertaining features, not only for the students but also the communities around them.

2. External spaces in university campuses

Designing external spaces in universities vary according to their location in relation to buildings, the designated activities for the space, and the activities of the surrounding spaces. Besides, climatic elements are considered one of the key determinants in the design of the urban spaces. As defined by Ashihara (1981) external space is ‘a space that is configured by a framework for identifying or removing part of the extended and infinite nature, which is a building without a roof, and is formed primarily by the correlation between man and the things he perceives.’\(^2\)

External spaces vary from broad to narrow, complex to simple, and from openness to closeness. Spaces vary in shapes and sizes, designed to accommodate infinite spatial functions and serve various users’ activities. There is no doubt that external spaces may be affected by the composition of the needs of students and this depends mainly on the individual qualities and characteristics of students, community customs and traditions, and university practices\(^3\).

External spaces on campus vary according to the functions, activities, uses and their location relevant to the whole site. The external spaces on campus can be classified into common turfs, academic spaces, spaces for sports activities, and spaces for roads, pathways and parking\(^4\). Common turfs include the university entrance space and main courtyard spaces. Academic spaces adjacent to specific buildings include the front entrance space, front yard, backyard, and secondary or service entrance. Spaces for sports activities include open courts and sports

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\(^3\) Ahmed Ismail, *The Standards for the Planning and Design for Egyptian Universities* (Cairo: Cairo University, Faculty of Engineering, 2002).

facilities provided on campus. Finally, spaces for roads, pathways and parking areas are major elements of external landscape and essential facilities.

3. Urban design standards for the external spaces in the university

There are some basic design standards defining the relationship between man and place at different levels. Some of these standards are permeability, variety, robustness, legibility, visual appropriateness, and personalisation\(^5\). Successful urban design is achieved through a balance between these standards and achieving a successful urban space that suits the purpose for which it is established, whilst meeting users’ needs. Thus, a responsive urban design of the environment and the human using this space is achieved. These standards are hereby discussed.

Permeability is the student’s ability to move easily in the place. This standard has been identified through designing a network of paths and walkways for the blocks and the university buildings. These circulation alternatives must be visible; thus ensuring visual permeability which is provided by the ease and clarity of the routes to and from all buildings on campus. Variety of the external spaces is the possibility of using the space for mixed functions, vehicle roads and pedestrian pathways. It may also be used for a diversity of activities within the space or on the borders of the space, such as recreational and relaxing activities\(^6\). This could be done by ensuring linking the functions together, and also the flexibility of changing uses at the same time. They need to be characterised by flexible design standards to suit any changes in the activities. This increases the flexibility, the robustness and the exploitation of these external spaces\(^7\).


\(^{6}\) Ahmed Ismail, *The Standards for the Planning and Design for Egyptian Universities* (Cairo: Cairo University, Faculty of Engineering, 2002).

Figure 1 (Left) The variety of heights surrounding the external space, besides the variety of finishing materials enhances the sense of plasticity and diversity of activities.

Legibility is essential for a person to visualise in his mind different places and how to reach them. Thus, legibility, permeability and variety in the design of the space help to easily navigate in different spaces. Whilst robustness is the flexibility of the design; in other words, the possibility of utilizing spaces in various ways and for various purposes. It is also the ability to have diversity in the use of spaces; that is to say that the space can be designed so that it can be used for multiple purposes, not just one, and can be used in a different way. As for visual appropriateness, it implies that the place expresses its character and function so that people can recognize the place and know its activities through the mental image they already have in their minds. This may differ from one person to another according to several factors, such as culture, experience and memory, as well as to achieve compatibility and harmony between the spatial configuration and the other spaces and the urban character of the surrounding blocks.

Participation and expression of opinions (user participation in the design of spaces) Personalization is what the user adds to the space to show his character through the participation with the designer to express his needs and his requirements. The motive behind that is the improvement and the development from the user's point of view, as well as the desire to identify and change the mental image of the place. So, the students have a great and key influence on the space. So, we can say that the student and his requirements are one of the important factors in the formation of the space, which is always overlooked by the designer in

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spite of its importance to meet the requirements of its users and also to protect the space from the behaviour that may arise because of this negligence.

4. **Analyzing the students’ requirements and behaviour in the external spaces of the university buildings**

Despite the diversity humanities topics and their relationship to the built environment, they were not directed directly to the concerns of architectural designers to benefit from them and use them properly. This may be attributed to the fact that most of these studies and theories focused on the study of the building and its impact on human behaviour from a theoretical and philosophical concept without paying attention to translate its findings and recommendations to "clear design considerations and criteria. That has minimized its benefit so much.

**First, students’ needs affecting the use of external spaces in universities**

An appreciation of human needs, as a principle of sustainable urban design, is part of the social dimension which raises important issues concerned with people’s values and choices of urban development interventions in a society\(^9\). However, designers and planners may face many challenges in trying to respond to the varying needs of different individuals in a community. While the aim of catering for users’ needs within a social context should be to create safe and accessible public spaces for all, the economic, social and ethical aspects could make this unachievable.

According to Maslow’s pyramid of human needs, physiological needs come first including food, warmth and survival; second comes safety and security needs, third, comes affiliation needs of belonging and acceptance, fourth, is the need for esteem by feeling valued by others through a person’s education, status or ownership, and finally self-actualisation needs through artistic expression and fulfilment. However, Jackson & Marks (1999) assert that “Individuals have been known to compromise even their most basic survival needs to the satisfaction of moral, psychological, or spiritual needs.”

Human factors are the social, cultural and ideological dimensions of the human being. They have a significant impact on the design of urban spaces since the way the human deals with the

spatial environmental elements and his reactions towards it is linked to his behaviour and his natural, psychological and sociological composition. The diverse needs of the space users range from physiological needs and need for safety, need for self esteem and the need for self-actualisation, according to Maslow’s pyramid of needs\textsuperscript{10}. Those needs should be catered for by designers and planners within the built environment, in order to ensure a built environment that fulfils users’ needs and aspirations.

**Second, students’ behaviour affected by the surrounding environment**

They are motivating factors stimulating students to form relationships within the external space. They can be classified into friendship formation, group membership, personal space, territoriality, communication, cue searching, and personal safety. The designer has a positive influence on students’ use of the space. He also provides an environment that encourages interaction which leads to friendship formation, and provides psychological comfort within the external spaces of the university buildings.

Although these catalysts mentioned above are diverse so that it may appear that each of them discusses an individual phenomenon or attribute in the nature of the space users; this gives a wrong impression because these factors are in fact linked and interrelated. It is difficult to find clear limits between one element and another as these factors interact in various ways at different times to form a phenomenon, which we call human nature.

Friendship formation depends on having common interests and cultural background. The more the interests or hobbies change, the more the student tends to make new friends. Studies conducted in university offices and cities have proved the importance of proximity (neighbourhood) to the start of social communication or contact. Students choose their friends from the groups that they know very well, especially those close to them. Consequently, designers bear a great responsibility in achieving social interaction. Designers cause creation of cases that determine the way of students’ passages and their presence in a central area where most of the students visit, as well as spaces for activities\textsuperscript{11}.

\textsuperscript{10} Christopher Tweed and Margaret Sutherland, 'Built cultural heritage and sustainable urban development', *Landscape and Urban Planning*, 83 (2007), 62-69.

Group membership is one of the ways that help students to identify themselves, and thus, it becomes an important issue for most of them. In addition, it represents an extension of the desire of people to form friendships and an attribute of the nature of human society. The tendency of joining a small group is a natural feature of many individuals. That is due to the ease of containing the general base of moderate behaviour and the accuracy of communication between them. A small group also offers each member an opportunity to participate in discussions, express their opinions and make decisions.

Besides, the climate, natural factors, site conditions, size of the university and the culture of the local community play an important role in the formation of external spaces, thus affecting users' behaviour of the space and the human relations of the students. In hot dry regions like Egypt, the climate dimension should be taken into account in the design of the external spaces in the university buildings to provide heat and comfort within internal and external spaces. This could be done by shading walkways and providing appropriately shaded spaces that encourage social interaction between students\(^\text{12}\).

Territoriality is another attribute of human behaviour. The territorial behaviour of humans is different and complicated, because it is not limited to border defence, but is integrated with a sense of personal emptiness. The territorial rights of the student are temporary but important; therefore, it should be born in mind that it's useful that the student has some sense of a temporary possession to the common shared spaces within the university, or possession of a comfortable seat in one of the spaces or gardens\(^\text{13}\).

Communication is also another strong desire that haunts every human being to know what is going on around him through the exchange of information and determine the trends of others. The designer can do much in designing places that encourage the process of communication, through providing the suitable environment, and providing accurate information about the nature of the building and what’s inside. However, a number of considerations should be taken such as the reduction or elimination of external noise that interferes with the talks, providing heat


comfort inside the external spaces and through the use of gazebos and appropriate vegetation for shading\textsuperscript{14}.

5. Research methodology

In this part, the research deals with the empirical study of the selected model from the Egyptian private universities, Misr University for Science and Technology (MUST). MUST was designed by Ahmed Abdin, Professor of environmental design at Cairo University. MUST has been nominated for the Aga Khan Award for Architecture in 2002 and has won the National Honourable Mention for Environmental Architecture in Egypt in 1998. The researcher has been involved in the preliminary design concepts right through the implementation of the buildings on site.

The research adopts a qualitative methodology that depicts the appropriateness of the previously mentioned design standards for external urban spaces and its relation to humanitarian needs of its users. This has been done by designing an analytical model to measure these criteria and determine the extent of its suitability to students’ diverse needs. This analytical model aims to extract lessons learnt from this recognised university campus design for future recommendations of the design and coordination of external spaces of campuses.

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{image1.png}
\caption{The main entrance plaza of MUST.}
\end{figure}

Firstly, the depiction of the external spaces of the university and the design strategy including analysis of the university site, the relationship with the surrounding environment, design

\textsuperscript{14} ibid
approach of the university, the functional relationships between the buildings of the university and movement paths. The description highlights the following elements of the external spaces on campus: main spaces, spaces adjacent to academic buildings, spaces for sports facilities, roads and parking spaces, pedestrian pathways, and spaces between buildings.

The analysis of the urban configuration of the external spaces constitutes the second phase of the research methodology. This is accomplished by; studying the extent of achieving urban standards (permeability - variety - legibility – personalization - visual appropriateness); studying the extent of achieving human relationships (making friends- membership of a group – the personal space - communication– cue searching - personal safety). A conclusion is finally drawn out to include the outcomes of the relationship between the design parameters and evaluating them within MUST external spaces.

Parameters for proper urban design of external spaces have been previously discussed in this study. In the analytical part of this study, measuring the level of applying those parameters within the external spaces in the case study is illustrated in table 2. This table is based on citation from previous research and theoretical studies, interviews with the university students by arranging several focus groups on campus. Besides, personal observations of students’ behaviour in different external spaces at the university have been recorded. Measurement standards have been classified into levels of good (given the value of 2), average (given the value of 1), and weak (given the value of 0); based on the extent of achieving the design parameter in the external spaces, as shown in Table 1.

Table 1 Levels of evaluation in the case study

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Value</th>
<th>The level of evaluation</th>
</tr>
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<tbody>
<tr>
<td>➫</td>
<td>Two (2)</td>
<td>Achieved a good level of measurement standards.</td>
</tr>
<tr>
<td>➯</td>
<td>One (1)</td>
<td>Achieved an average level of measurement standards.</td>
</tr>
<tr>
<td>◦</td>
<td>Zero (0)</td>
<td>Achieved a weak level of measurement standards</td>
</tr>
</tbody>
</table>
5.1 Description of external spaces

Buildings are designed to integrate with the surrounding environment and to give the relative importance of each by scale and size. Besides, the traditional elements represented in the overall composition have been embedded within the design. The design reflects the ancient Egyptian civilization and the culture of the Pharaonic period, which were reflected in the robust mass composition that merges with the site characteristics, where the building clusters tend to enclose the external spaces, as shown in Fig 3 (right).

Figure 3 (Left) Site analysis of MUST illustrating how climatic conditions reflected on the orientation of the buildings. (Right) Layout of MUST illustrating the internal courtyards, and the relationship between external spaces and the main plaza.

The campus is divided into two parts, front (towards the north) and it includes: conference halls, administrative buildings, research centre building, and the central library building, while the rear part includes the premises of all faculties. An integrated approach has been adopted in articulating the buildings composition within the site, so as to minimize the walking distance between any two points on campus. Besides, natural lighting and thermal comfort have been carefully considered in the design of multi courtyards within the academic buildings. Sound insulation in academic spaces has also been incorporated within the design.

5.2 Study and analysis of urban configuration

The project has been planned to be bounded by a main road, whilst cul-de-sacs have been planned at the entrances of faculty buildings. It has also been carefully considered to create a network of accessible routes for serving and catering all areas of the project. The movement of
pedestrians has been planned in the central axis of the project, and thus the convergence of the pedestrians and vehicle circulation take place at the subsidiary entrances of faculties which has allocated spaces for parking. The central pedestrian spine has been designed to achieve diversity of visual quality and uniqueness of each space. This has also been emphasised by using landmarks for guidance across the site.

Figure 4 Illustrates environmental design strategies embedded in the library design of MUST.

The hot and dry site determined the choice of vegetation with coordinated colours and smells to give spatial personality to each space and to the buildings. The layout has been planned to determine a unique character of the university, using palm trees and flowering and shading trees to define the ring road and in the internal courtyards. Also, each space has been individually characterised by using a colour and texture palette of materials. The activities of each space have been studied and a service building for students has been allocated at each site. Overall, environmental design strategies derived from the concepts of sustainable architecture have been incorporated in the use of wind catchers, backyards, and atria.

After performing several focus groups and interviews with 60 students at MUST, and by using table 1 in evaluating the different external spaces in MUST, the following table shows the outcome of what the majority of students have agreed upon.
The following issues have been raised in the focus groups and interviews:

- Concerning the main entrance plaza of the university, the human relations have been achieved at the same level of achieving the standards of urban design of the study spaces, due to the breadth of space and clarity and its peculiar landscape design. Besides, the diversity in the finishing of floors, and elevations added to the aesthetic quality of the space.
• The main plaza of the university, the existence of the conference hall on the main axis of the plaza space constitutes the most significant landmark of the space, which appears from a distance, and gives the space a special character and distinction from the rest of the spaces in the university. This has led to the success of the urban standards of the space at a greater level of legibility and permeability than responding to users’ needs.

• One of the weaknesses reported concerning the planning of the project, is that no dedicated areas have been planned for sports activities, however this was due to the client’s preference.

• Parking spaces are well planned in achieving the standards of appropriate numbers and locations. The careful separation between the circulations of cars and pedestrians is also acknowledged to provide personal safety. In addition, many of the parking spaces have been provided with shading elements.

• In-between spaces separating faculty buildings achieved the highest standards of evaluation with excellent rates, due to the relatively high levels of visual and thermal comfort within the spaces. These specific external spaces have been asserted to cater for most of the students’ needs from friendship formation to personal safety.

6. Conclusion and recommendations

A set of results have been reached associated with urban factors, and human dimensions related to spaces in universities, as well as human and psychological factors. These factors are represented in the special needs of users of the external spaces and social, cultural and personal influences. Therefore, it could be asserted that human relations in external spaces affect and are affected by the urban configuration of the university, and thus the components of the external spaces and its elements and characteristics.

A range of factors affect the planning and design of universities, and also affect the site of the university, some of those have been discussed in this paper. Careful and articulate consideration of these factors helps achieve functional efficiency and strong interaction between spaces and its users. Notably, these factors are affected by the university location in the city, the size and area of the university, the configuration of university buildings, the climate, educational system, and economic aspects. Those factors definitely determine the suitable
programme for each university by studying how factors affect one another and integrate together.

It is essential not to overlook the importance of planning external spaces in university campuses, due to their essential role in the process of education, and their direct effect on students’ experience and well being. Thus, the designer should study the factors that possess direct and indirect impact on designing such external spaces, such as the type of these spaces, composition and components and their physical and functional requirements, and its psychological significance for students and users of the space. Besides, taking into account the functional needs of the users dictates how each space is to be designed.

From the previous analysis, it has been highlighted how considering the in-between spaces separating between college buildings is important to students in fulfilling their psychosocial needs within those partially enclosed spaces. Besides, achieving permeability and legibility within a space at a sufficient level has proven as another essential aspect in external spaces. This has been incorporated in MUST, the case study, by designing distinctive landmarks, focal points, and establishing real and virtual limits of external spaces.

Following this research, it has been found that there is a vital need for research that communicates psychosocial needs of users and space design and planning. Preparation of programs for designing universities should be linked directly to the users’ needs and this requires the identification of activities and behaviours which are expected in these spaces. These activities should then be translated to spatial requirements of specific design, as well as the choice of the elements that create it. Design standards and considerations built on users’ needs and behaviour need to be incorporated in databases that could be used by designers of different typologies of projects.

Author Biography

Ihab Rached is currently an Associate Professor at Department of Architecture, El-Shorouk Academy in Cairo. He is also a part time lecturer for post graduate studies at Cairo University. He is director of a leading architectural consultancy in Cairo and has participated in many architectural projects and competitions and has won several prizes through the consultancy
Heba is currently in the final year of her PhD degree at the Department of Architecture and Built Environment, University of Nottingham. She holds a BSc and MSc in architectural engineering from Ain Shams University and Cairo University in Egypt. She is currently a part time lecturer at Nottingham Trent University. She has also been a part time teaching assistant at the University of Nottingham since 2009, tutoring design studio to undergraduates and architectural research methods to postgraduates. She has published several papers and posters at significant conferences in USA, Belgium, Netherlands and UK.

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