Contemporary Urban Affairs

2020, Volume 4, Number 2, pages 13– 26

Understanding Aesthetic Experiences of Architectural Students in Vertical and Horizontal Campuses: A Comprehensive Approach

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ARTICLE INFO:

Article history:
Received 20 May 2019
Accepted 10 June 2019
Available online 1 September 2019

Keywords:
Aesthetic Experience;
Sense of Place;
University Campus;
Photo-Projective Method;
Cognitive Mapping.

ABSTRACT

The typological features of university campus areas are shaped according to their locations in the city. Campuses in city centers carry great potentials for students' cultural, intellectual and artistic activities, especially for those from faculty of architecture and design, with close relations to the city. In big metropolitan cities, it is hard to reserve land for campuses therefore they emerge as vertical settlements. On the other hand, campuses built on the periphery mainly feature horizontal planning characteristics due to availability of land. The aim of this paper is to develop an approach for measuring architecture students' aesthetic experience of vertical and horizontal campuses in relation to sense of place theory. Recently, emerging technologies in cognitive science, such as brain imaging techniques, activity maps, sensory maps, cognitive mapping and photo-projective method etc., have enabled advanced measurement of aesthetic experience. In this exploratory research, using 'photo-projective method', students will be asked to interpret and draw 'cognitive maps' of the places that they are happy to be (defined place) or to see (landscape) on the campus. Based on students' impressions and experiences, it will be possible to compare aesthetic experience on vertical and horizontal campus. Thus, a comprehensive approach for improving campus design according to users' aesthetic experiences and sense of place rather than building technology, law, development and finance driven obligations will be introduced.

CONTEMPORARY URBAN AFFAIRS (2020), ***4***(2), 13-26.
https://doi.org/10.25034/ijcua.2020.v4n2-2

www.ijcua.com

1. Introduction

To become a part of global educational and research networks, Turkey has been investing huge sums on its educational and urban infrastructures. Cities with higher education institutions have been receiving thousands of native students as well as international students from all over the world, due to their advantageous location and appropriate cost than most countries. By 2018, population of students in higher education institutions of Turkey has exceeded 7.5 million according to statistics (Table 1).

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How to Cite this Article:
Bostancı, S.H. and Akdağ, S. G. (2020). Street Furniture Influence in Revitalizing the Bahraini Identity. *Journal of Contemporary Urban Affairs*, *4*(2), 13-26. https://doi.org/10.25034/ijcua.2020.v4n2-2

Several new campuses have been built on available plots. However, in dense cities, where land is scarce and rates are expensive, universities and their growing facilities have been packed into vertical buildings. According to their locations within the city, campus types are grouped as urban, suburban and rural. Similarly, Erçevik and Önal (2011) define three categories for universities in Istanbul as town university, in-town campus, and out-of-town campus. In their approach, town universities are scattered in various parts of the city whereas in-town campuses are formed as a result of urban transformation or re-functioning process of extensive areas.

Table 1. Number of Higher Education Institutions, 2017 – 2018 (https://istatistik.yok.gov.tr/)

	STATE UNIVERSITIES	FOUNDATION UNIVERSITIES	FOUNDATION VOCATIONAL TRAINING SCHOOLS	TOTAL
UNIVERSITY	112	69	5	186

According to Sargent (2016), vertical campus is the natural outcome of both new city development and urban regeneration. It is a new typology in the overgrown and denser city. In the form of progressive high-rise towers, it incorporates a variety of settings and amenities that support working, living and recreation. The demand for vertical campus has imposed new spatial attributes such as the need for 'vertical connectivity', 'convenient services for working', 'amenities for personal needs', 'multi-use conversion to changing functions' and 'connection to nature via green areas and elements'. Table 2 shows comparison of past and contemporary campus buildings and includes a categorization for spatial attributes of campus.

University campuses, which are located in city centres, have to fit in vertical structures due to pressure from the real estate sector (Groesbeck, et.al, 2012). When campuses are designed in vertical forms, they carry advantage of their positions in dense urban centres with easy access to public transportation. On the other hand, vertical campuses are found to be incompetent for creating balance between outer and inner spaces and providing living environments as in classic horizontal campuses. In order to overcome disconnection of vertical buildings in campus life, aesthetic studies based on environmental psychology, user experience, cognitive and behavioural sciences can contribute significantly to design of vertical campuses.

In addition to their high standard academic programs, universities are expected to provide high quality physical environments which ensure students' physical as well as social and psychological well-being. Therefore, physical environment of the campus should be integrated into an organic habitat or '*village*' which reflects and instils a tactile sense of place (Sturner, 1972). Basing on these facts, this paper deliberates aesthetic experience of campus in relation to the '*theory of sense of place'* (Figure 1). Sense of place components can be defined as activity, meaning and physical setting (Carmona et al., 2003). Tuan (1977) defined '*sense of place'*, as attachment and meanings to a setting held by an individual or a group. For studying the variation of sense of place between different types of places, descriptive place meanings and evaluative place attachment measures are considered as important tools (Masterson et. al., 2017).

'*Place meanings*' are evaluated by descriptive statements, and they are about what places are like, and their images (Manzo, 2005; Brehm et al., 2013). On campus, they are either defined by adjectives, descriptive/ symbolic/ interpretive comments or character definitions of places.

Table 2. Comparison of Spatial Attributes between Past and Contemporary Campus Typologies (This table is adapted from Sargent, 2016).

Building Attributes	*Campuses of the Past*	*Campuses Going Forward*
Occupancy / Zoning	• Corporate office	• Mixed use
Layering	• Limited to lobby atrium	• Visibility from entry, multiple levels
Stairwells	• Closed stairwells	• Interconnecting stairs
Grid	• Varied grid	• Regular planning grid
Core	• Centre core, opening to common space	• Offset core, minimal openings to usable space
Connections	• Horizontal, individual floors	• Vertical and horizontal, connecting atriums
Tenancy	• Space often wrapped core and had preferred zones	• Divisible with equal quality of space
Partitioning and elements	• Fixed and firm	• Flexible, demountable
Outdoor space	• Scaled buildings, limited to no access to	• Access to exterior, plazas, balconies

'*Place attachment*' on the other hand, is a positive emotional bond, between groups or individuals and their environment (Altman and Low, 1992). Students create personal bonds to campus through socializing (Chow and Healey, 2008). Through this stronger attachment they are believed to ensure higher levels of academic motivation (Bergin and Bergin, 2009; Osterman, 2000). Place attachment is comprised of *place dependence* and *place identity*. '*Place dependence*' is about connections that can be defined as instrumental between place and citizens (Stokols and Shumaker, 1981). Tidball and Stedman (2013) defined place dependence as the ability of a setting which can satisfy the important needs of people. In a survey by Jorgensen and Stedman (2001), place dependence is expressed with phrases such as, '*This is the best place to do the things I enjoy*'. In scope of recent works on sense of place, this research will be surveying Sargent (2016)'s spatial criteria of '*connectivity*', '*convenient services for working*', '*amenities for personal needs*', '*multi-use conversion to changing functions*' and '*connection to nature via green areas and elements*' on vertical and horizontal campuses.

There are some different definitions about place identity. For example, Proshansky (1978) defined '*place identity*' as the dimensions of self that define the individual's personal identity. Jorgensen and Stedman's (2001) survey includes an expression such as '*This place reflects the kind of person I am*'. Previous research exploring undergraduate students' *place bonding* levels to campus, has discovered that in different grades, at home or abroad, students showed relatively different extent of place bonding to campus. The extent of place identity was a comparatively weaker asset for place attachment, especially when limited years of study on campus was considered. Hence, it took more to incorporate the place as part of one's self (Northcote, 2008; Qingjiu and Maliki, 2013). Figure 1, shows the model of this study, based on theory of sense of place and employed for evaluating students' aesthetic experience on campus.

Vertical and horizontal campus typologies effect students' adaptation to urban life. For example, particularly for students from faculty of architecture and design, access to the city is critical for educational facilities and professional development. Due to these circumstances, newly established and developing universities have fitted in vertical campuses in central areas of the city. Briefly, vertical campus has become an alternative solution for integrating with the city, while horizontal campus, as the classical campus, has a greater potential for giving a sense of campus place.

This paper focuses on architecture students' perception and use of campus space. It aims to find the difference between vertical and horizontal campuses via descriptive statements about positive aesthetic experience, in scope of cognitive approach. As methodology, photo projective method (PPM) and cognitive mapping method in environmental psychology are employed. The aim of using both is to obtain comparative data about aesthetic evaluations and sense of place that architecture students have established within vertical and horizontal campuses.

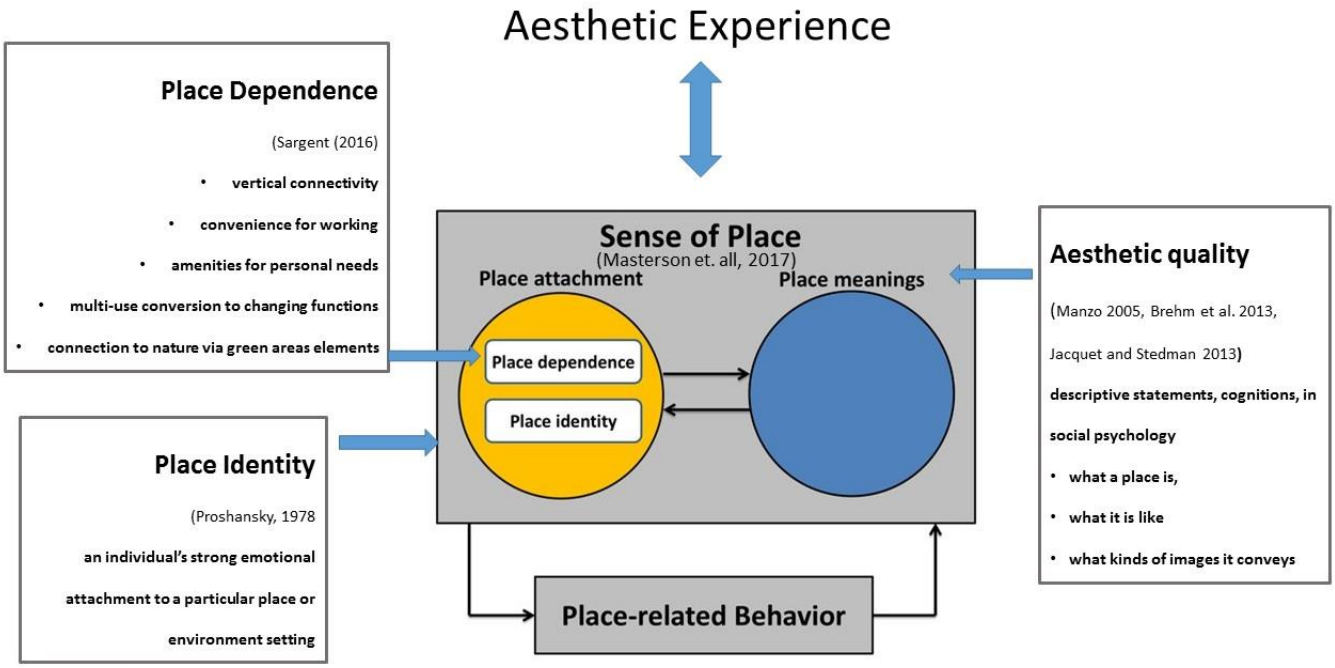

Figure 1. Aesthetic Experience of Campus (Developed by the authors)

2. Methodology

In environmental psychology research, objective measurement of aesthetic appreciation may implement multiple methodologies (Berlyne, 1974). Pringle and Guaralda's (2018) research on visual fields creating happiness in urban spaces, were carried out via analysis of data on photo sharing platforms such as Instagram. It involved use of urban photographs, which people took according to their preferences, as data. The common feature of such methods, including *participatory photo mapping, photo projective method, auto photography* and *photo survey research method* etc,. is their inclusion of photo-based analysis and evaluations via photographs and expressions without much intervention in user experience (Collier, 1967; Yamashita, 2002; Moore, et.al., 2008; van Riel and Salama, 2019; Garrod, 2008; Dennis, et.al, 2009;).

In former studies, for establishing spatial relations on photographs, participants were given a map of the environment and asked to show the locations where photos were taken. In this research, students are required to form their own cognitive maps of campuses for which they are supposed to have emotional, sensory and spatial ties, that might feel like a second home. Thus, the diversity of spatial attributes reflected to mental images in cognitive memory of students and how far they can relate their photos to their cognitive maps will be depicted. Employing both experimental aesthetic methods, PPM and cognitive mapping, will enable comparison of vertical and horizontal campuses according to students' aesthetic and physical experiences.

2.1 Photo Projective Method

Photo projective method (PPM) is used for aesthetic and behavioural evaluation in urban areas. It is a reflective method based on taking photographs and interpreting these photographs in urban areas (Bostancı, 2019). For urban aesthetics studies and research, urban photographs are the most common information materials. Using methods such as, adjective pairs and semantic differential etc, qualitative adjectives are derived from photographs (Kaplan, 1972; Bradley and Lang, 1994). PPM is used in various social science researches including anthropology, psychology and health, aesthetics and urban landscape studies etc. (Collier, 1967; Yamashita, 2002; Sugimoto, 2014; Wójcik and Tobiasz-Lis, 2013).

2.2 Cognitive Mapping

'Cognitive mapping technique' can be defined as the mind schemes developed by Tolman (1948), for analysing the ways in which individuals relate to their environments and to the society. Indeed, it is a way to understand how individuals gain pattern recognition. Such an approach owns features that can easily be adapted to urban issues such as; finding directions and memory association etc. Cognitive mapping was also included among methodologies used by Lynch (1960) in grouping urban image elements as paths, edges, landmarks, nodes and districts. These concepts showed how human mind formed the spatial relationships in cognitive maps of the places lived for long durations or visited for the first time. Cognitive maps of cities have more a dynamic structure than cartographic maps due to individuals' mobility and personal experience (Lloyd and Heivly, 1987). In the context of sense of place, cognitive maps can be considered as indicators to understand the importance given to a specific area by people who are constantly crossing it.

3. Case Study

Two different campuses, carrying vertical and horizontal planning characteristics, were selected from Istanbul and its surrounding district. A total of 40 architecture students, of whom 20 studying on horizontal campus and 20 on vertical campus, was required to document the visual characteristics of their campuses using PPM. Upon photos of 5 favoured and 5 unfavourable spaces, they were asked to make brief interpretations including qualitative adjectives.

For example, a student in vertical campus commented on a class photo among his favourable places using following terms '*The studio views are nice, especially during sunsets. The studios are positive in terms of socialization, group work, and overall division and layout. Easy to communicate with others and learn things during design days for example. The lighting is also good.*' In these categories, *positive adjectives* include '*nice view*', '*positive*' and '*suitable for socialization*' and '*good lighting*' etc. A week after this exercise, students were asked to draw the cognitive maps of their campuses and to mark the positions of the photographs they took. Generally, while taking pictures in a specific area with PPM, users are asked to mark the shooting areas on maps. In this study, instead of giving available maps, it was necessary to ask for cognitive maps. These mental maps helped to understand the extent to which students could keep campus spaces in their minds, and the extent to which mental maps could reflect the selection of favourable and unfavourable places. Hence, in such behaviour-based experimental studies, it is possible to obtain new findings that is not possible to envision.

Although a total of 40 students, were selected for the study, some did not participate in and some

could not contribute enough to the process. Finally, data could be obtained from 16 vertical and 15 horizontal campus students. Total 31 participants, with varying levels of ability to photograph and schematize maps, contributed to the study. An important issue here is that students from two different campuses provided data only for their own campus. Both campuses were established after 2000s. Thus, they own features proper to be expressed as new campuses with different campus typologies. Both campuses have several renovated parts and additions to their original designs. Information about the implementation of the field study was given on both campuses simultaneously on February 11, 2019. Students were given a week time to collect data. Cognitive map applications were conducted on 18 February 2019 during 1 hour of a course period. Participants were students, who were instructed by the researchers. In both cases, students were previously informed about the applications for half an hour. The participation of students was optional related to the fact that experimental studies based on volunteerism would create better results.

When demographic data of students was analysed, 31 participants were found to be last year students in faculty of architecture. 81% of them were in the 20-22 age range and 19% were over 22 years old. In both groups, students residing in Istanbul formed the majority.

On the vertical campus, 70% of 16 students participating in the study were female and 31% were male. 55% of participating students in vertical campus lived in Istanbul with their families. 25% came from various districts in the Marmara region, 19% from various regions of Turkey and 1% from abroad. 55% of these students were staying in their homes while 45% in dormitories or in rental homes with friends.

Among 15 horizontal campus students, 56% were female and 44% were male. 40% of these students came from Istanbul and 27% came from Marmara region. 33% were from the province where the campus was located. 25% of the students were living in the horizontal campus, 25% in surrounding dormitories, 50% in the campus dormitory. As previous research demonstrated (Northcote, 2008; Qingjiu and Maliki, 2013), staying in the campus dormitory was indeed an important factor for higher spatial place attachment levels to the campus.

3.1 Findings for Vertical Campus

The vertical campus in case study, was a corporate twin tower building re-functioned with an educational structure in 2010. It was located on the European side of Istanbul. It had an advantageous position due to its close location to Bosphorus and bridges with several public transportation options. The towers are 9 and 10 floors above ground with 4 additional basement floors. At entrance floor there is a café, a restaurant, a print centre and a wood atelier. At mezzanine floor a library and toilets are available. Typical upper floors from 2nd to 9th floor include design studios, office space for academicians, meeting rooms, storage rooms and toilets. Basement floors host a conference room, more management offices and parking lots. Corridors on all floors are furnished with seating, display and storage facilities.

In case study, 20 last year students from faculty of architecture were selected. 16 students provided data. Table 3, includes 3 selected photos from their most favourable and unfavourable spaces on the vertical campus. Generally, in PPM methodology according to changing themes, the ratio and simple statistics of spatial attributes are calculated. However, in this study, only descriptive expressions were used since number of samples was low and the research was an explanatory study. Among 16 students, 11 took 10 photos and 5 took 6 photographs. Thus, total number of photographs taken and interpreted on vertical campus was 140.

Table 3. Example photos taken by students from vertical campus using PPM approach.

In Table 3, first favourable images were café theme photos, representing general ambiance, seating with friends, interior details and food displays, at rate of 69%. One of the café photos was verbally described by a student as *'The hanging of various graffiti and paintings on the walls makes it a fun place'*. The second most favourable area was the entrance lobby with a rate of 62%. This area became as an area of interest for students, since their projects were exhibited there. The third most favourable place differed among students. Some chose photos of the studios, library and café in the outdoor area while others preferred the landscape, twin skyscraper view and interior resting spaces along corridors.

In this diversity, the landscape photo overlooking to the urban environment and the sea in Table 3 revealed the weak relation between students of vertical campus and the city. Only 2 out of 16 students submitted photos of Bosphorus. However, more sample groups could affect this result. In Table 3, elevators were photographed among the most unfavourable elements by 16 students. They used various negative expressions such as *'The elevators are not very useful at times. There is always at least one elevator that does not work, and that creates even more student traffic'*. Ranged in the second place with 75% among unfavourable areas was the fire staircase, where students used to smoke. Its importance laid on the fact that it had graffiti on its overall walls displaying the image of a rule-free student zone. Students made contradictory comments about this area: *'Despite being used very densely, it is lightless and enclosed. Graffiti makes the area even more stifling', 'The smell of paint is disturbing'* or *'I love it for its street ambiance'*. Probably smokers were those who made positive expressions. Nevertheless, they photographed this smoking area among unfavourable probably due to their expectance of better standards. In the third place of most unfavourable areas, were also stairs, lifts and model storage rooms. Key expressions extracted from such comments on photos can be found in Table 4.

Table 4. Evaluative categories and key expressions from scene descriptions of vertical campus.

Vertical Campus	
Positive Key Expression	**Negative Key Expression**
good, good shape, good layout, good lightning, good view, good idea, sense of place, belonging, more open, more options, less enclosed, well designed, well decorated, well organized, well lit, nice, nice view, nice idea, social, enjoyable, cosy, comfortable, comfortable for sitting, suitable, suitable for campus life, suitable for sleeping, new, fast, high, high quality, aesthetic, intimate, pleasant, similar to non-school places, out positive, large spacious, makes me happy, warm, warming, warm atmosphere, successful, appealing to the eye, visible, monumental, decorative, positive, very different, bright, proper fit, indirect, feels like outside school, calm, favourite, not crowded, multi-functional, big, reflects campus ambience, common space, ideal, comforting, silent, wide, spacious, so so, great, clean, useful, street ambience, same design language, appropriate ceiling height, spacious, supporter, conflicting, monumental, with mission, increased visuality, intensive green, light coloured, most functional, required, most preferred	narrow, enclosed, not good looking, not very warm, dull, dark, isolated, tiring, uncomfortable, un-designed, monotonous, not useful, time consuming, high traffic, expensive, crowded, limited, discomfort, hot, small, very small, too small, unsafe, messy, empty, unoccupied, unobtrusive, oblivious, boring, ignored, under construction, insufficient, low, anti-aesthetics, not wide enough, wrong location, incorrect positioning, unorganized, careless, left over, ugly, bad ventilated, mis-positioned, no adequate lightning, worst area, waste of space, no good advantages, no link, very dusty, unhealthy, very bad smelly, annoying view, useless, view blocked, suffocating, unlit and closed, untidy, very disturbing, so flat, not enough seating, distracting, no air circulation, only single function, the most outrageous, terrible, ironic, bad smell, no design, no order, no colour, blocking view, eliminating importance, hearth breaking, inadequate, unacceptable, correctable, changeable, not sustainable, varying, similar to hospital, not clean, not functional, chaotic, not enlightened, too much noise, not opening

Students' positive and negative interpretations via several adjectives, given in Table 4, have created an important data set. In urban and architectural design studies, design measurement criteria define the starting point for studies related to urban aesthetics. The acquisition of such information has created a need for extensive and deep-literature research (Nia and Altun, 2016). Key expressions obtained could be used as descriptive socio-psychological criteria for various design studies. Among vertical campus students with 75% rate, the most common expressions for positive feedback were '*good*', '*good view*', '*good idea*'. The second most commonly used phrase was '*comfortable*' with 62%. Between negative expressions, with 50% '*crowded*' (this expression is seen next to the pictures about the elevator) was the foremost and with 37% '*insufficient*' as the secondary.

Based on students' comments, campus spaces were categorized according to spatial attributes of vertical campus. Spaces of '*vertical connectivity*' were the elevators and stairs, spaces of '*functions connection to nature via green areas and elements*' were the studios, outdoor area, café, restaurant and outdoor area, spaces of '*convenient satellite services for working*' were the entrance lobby, café, corridors, spaces of '*amenities for personal needs*' were the studios, labs, tracing room, storage room, café, restaurant, parking lot and spaces of '*multi-use conversion to changing*' were the studios, entrance lobby, corridors, staircases, fire staircase (Table 5).

Table 5. Categories and key expressions of subjects for photography on vertical campus.

Vertical Campus	
Category	**Key Expression**
cafe	Restaurant, couch area, coffee shop area, common space
studios	design ateliers
labs	computer classes
wood atelier	laser cutting
storage room	
entrance lobby	exhibition area, empty space, natural lighting, glass roof,
corridors	edges of studios, empty spaces next to the studios, tracing room
staircases	circulation area
elevators	traffic
fire staircase	smoking area, under construction
outdoor area	outside sitting area, entrance stairs, common space, backyard
outdoor smoking area	hidden sitting area, lifesaver for winter times, hot area for smoking
parking lot	

Figure 2, shows cognitive maps of students from vertical campus. Among total 16 cognitive maps, 3 different techniques were unconsciously used by students. On 43% of cognitive maps, each photo was marked with several positions, instead of a unique position, since they were comprised of a number of partial sketches. In 30%, a related relational diagram was drawn indicating areas where each photograph was taken. 25% showed a combination of these two techniques. 88% of the students correctly positioned their photographs. However, it was obvious from the cognitive maps that they could not express the vertical campus in a holistic way.

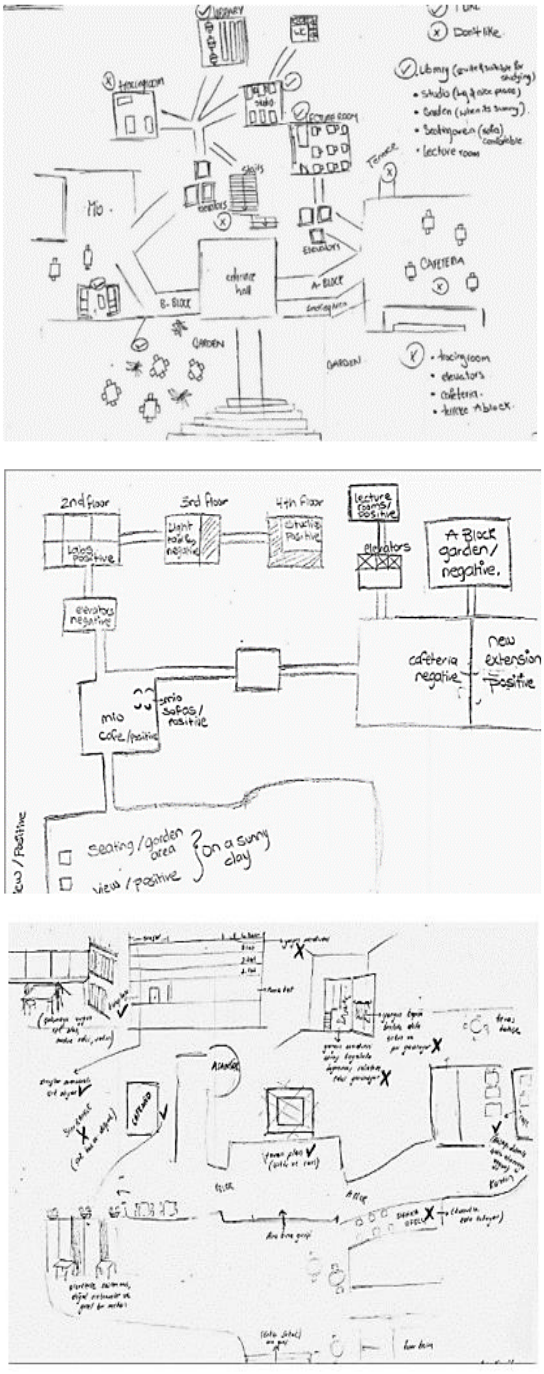

Figure 2. Cognitive map samples of students from their vertical campus experiences:
Relational schema (a,b) , Descriptive schema (c)

3.2 Findings for Horizontal Campus

The horizontal campus is a state university located in the Marmara Region, close to Istanbul. It was founded after 2000s and construction activities have been ongoing. Within campus boundaries, available are several faculties in different buildings, open / closed sports areas and green social areas. There is a ring service on the campus. An urban neighbourhood is within walking distance. The campus has a sea view. It owns classical horizontal campus features.

In the study, 20 last year students from the faculty of architecture were selected. 15 of them provided convenient data. Table 6 shows 3 selected photos from students' most favourable and unfavourable spaces on the horizontal campus. Table 6 contains the most favourable and unfavourable photos taken by students. Among 15 students, 9 took 10 photos and 6 took 6 photographs. Thus, number of photographs taken and interpreted on horizontal campus was 126.

Table 6. Example photos taken by students from horizontal campus using PPM approach.

1st favourable	2nd favourable	3rd favourable
		
1st unfavourable	**2nd unfavourable**	**3rd unfavourable**
		

In Table 6, first favourable images are café themed photographs by 60% of students. One of the café photos was defined by a student as '*An original space with paintings from the films, artistic lamp, bare concrete image, bare chimney pipes and simple, comfortable seatings'*. Green areas and pine woodland were chosen as the second most favourable areas with 53%. This field was described by a student as '*A place where we sit in our free time with friends and have a nice time'*. The pathway with trees, which had a partial view of the sea, was defined as the third most favourite area with %50. One comment was; '*On a sunny day, the sky and the tree branches are integrated into a beautiful path of pedestrian path. It is possible to see the sea view*'. The third most admired photo included the sea view. Based on this information, it was clear that students' attention was drawn to various details and comfort factors in the café area, where they spent most of their free time. The next two admirable areas were green space. The pine woodland and pathway

with trees caught attention since they were the places where students could integrate with nature on the horizontal campus.

In Table 6, corridors and undefined interior spaces between classrooms appeared as the most unfavourable by 73%. A student wrote: *'The skylights that cannot be entered in the floor gardens. Unspecified and meaningless corridors. Interior walls painted with bad colour. Gloomy ambiance'*. The second most unfavourable areas were the open ground with asphalt between the car park and the road. Photos similar to those were found to be 46%. One comment was: *'Very wide and empty space. There are no suitable add-ons for socialization and it creates a feeling of insecurity at night when it stands isolated'*. In the third rate of most unfavourable photographs, were left over spaces between the buildings and the landscape, similar to secondary photographs. Such images were 60%. One of the students defined it as *'A non-green bump, bare earth appearance does not create a feeling of spacious environment. No sense of vitality*'. Based on this information, it was conceived that students sought for architectural details that would create a warmer atmosphere in undefined areas such as the corridors on vertical campus. Urban spaces and undefined areas were also regarded as unsafe areas. Key expressions extracted from such comments on photos can be found in Table 7.

Table 7. Evaluative categories and key expressions from scene descriptions of horizontal campus

Horizontal Campus	
Positive Key Expression	**Negative Key Expression**
good time, natural, nature and panorama, relaxing, artistic, brutalist look, industrial look, bare concrete image, simple, comfortable, unique, spacious, peaceful, qualitative, qualitative time, nice time, accessible, panorama, sea view, harmony, aesthetic, clean air, shadow, comfortable, pedestrian, colourful, greenery, green, free, relaxing, social, essential, silent, student friendly, tree-lined, easy on the eye, different, good lighting, variety of the food and drinks, seasons beauties, feeling good, lovely, stress reducing, lovely, open	ugly, uncomfortable, like a hospital, un-functional, un-aesthetic, no panorama, dangerous, too wide, empty, no functions, unsecure, un-green, un-lively, un-spacious, no green, un-harmonious skyline, no shadow, no tree, slippery, un-thought, unable to sit, bad, useless, problematic working system, neglected, bad image, monotonous, incompatible, bulky, disturbing, old and worn, idle, unspecified, meaningless, bad view, tiring, gloomy ambiance, no-suitable, boring

Table 7 includes students' positive and negative descriptive attributes for horizontal campus. *Comfortable, nature, greenery, lovely* and *good* are among the most positive adjectives. At the same time, it can be assumed that original expressions such as *brutalist look, seasonal beauties and bare concrete image* etc. reflect their feelings as well as their thoughts. Among negative adjectives, *uncomfortable, bad view, unsecure* etc. are expressions of the majority. Especially on horizontal and large campuses, where dormitory buildings and secondary education facilities are available, security and feeling of safety become important issues for planning, design and management of campus space. Categories from these expressions are grouped in Table 8.

Table 8. Categories and key expressions of subjects for photography on horizontal campus.

Horizontal Campus	
Category	**Key Expression**
Café	social, brutalist look, qualitative time, good lighting, comfortable, variety of the food and drinks
Pedestrian path	accessible, panorama, harmony, sea view, tree-lined
Café in the pine area	clean air, shadow, comfortable, green
Library	silent, peaceful, student friendly
Green area	colourful, greenery, nature, stress reducing, good time
Unoccupied lot	dangerous, too wide, empty, bad view
Corridor between classes	bad, useless, unspecified, meaningless, gloomy
Entrance turnstiles	problematic working system, disturbing
Sitting group for the ring points	un-thought, unable to sit

From Table 8, it is seen that other than café, library and corridors between classes, students' most favourable and unfavourable areas are outdoor spaces. Students, who spend time outside and find these exterior areas healthy and green, emphasize the importance of creating organic habitats in campus life. The buildings are partially visible in the photographs. It reveals the fact that students' connections with these structures are weak however they do not find it negative. Horizontal campus life is oriented to exterior space. Unaesthetic seating groups in the waiting area of ring service, entrance turnstiles and isolated areas constitute the negative spatial features.

Even the findings obtained with a small number of samples could provide important clues about the design of campus space and its landscape. The results reveal the need of innovative design solutions for assuring horizontal connectivity in expanding campus areas. The fact that green spaces are considered among the most favourable features by students, shows the importance of landscape planning. Creation of social spaces and activity areas for elimination of urban gaps and development of creative solutions to those empty and undefined areas should be the major design issues for a happy and lively horizontal campus.

As described previously in the case study, students were asked to draw individual cognitive maps marking locations of their photos. The maps helped in evaluating their spatial awareness and partially understanding how they used the campus

space one week after taking those photographs. 3 samples were selected out of 16 cognitive maps (Figure 3).

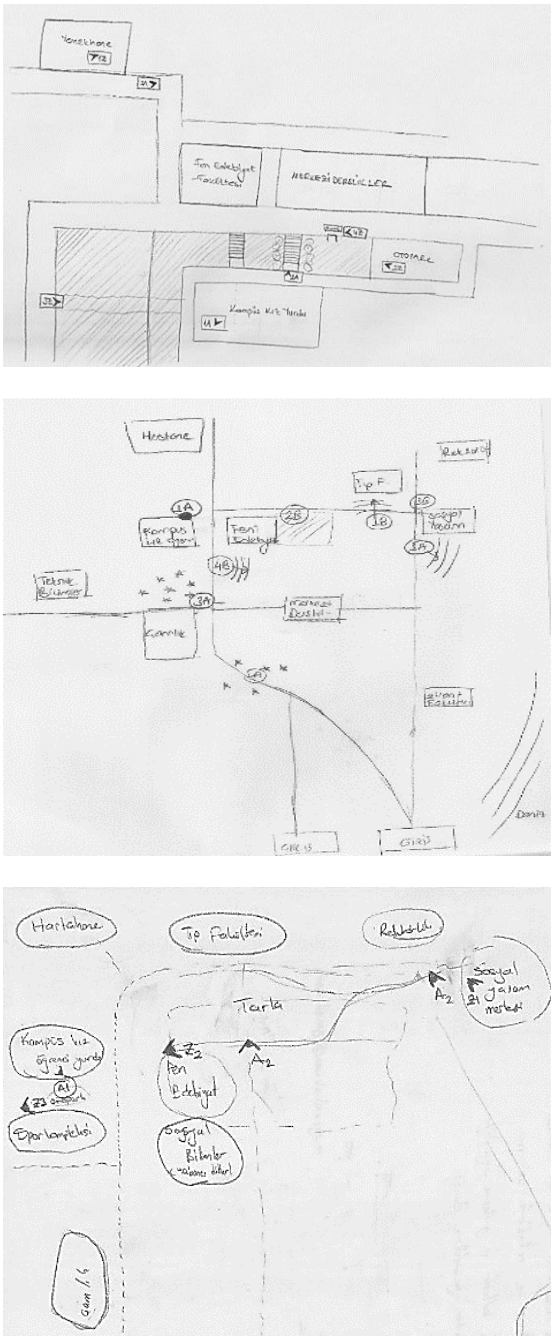

Figure 3. Cognitive map samples of the students from their horizontal campus experiences: *Drawing of near scale (a), Detailed connection drawings (b), Descriptive scheme (c)*

The cognitive maps in Figure 3 differ in expression techniques. In the first, surrounding environment is limited with near scale drawings by 30% of students. They might have preferred this drawing technique because they interact more with their close environment. The second one using detailed connection drawings, is a more efficient approach in establishing connections within the campus. 50% of students making detailed connection drawings means that they mostly conceive campus space as a result of spatial relations. The third category employing the descriptive scheme drawings, which selects the path of narration, is found to be drawn by 30% of students. In their cognitive maps, horizontal campus students were able to place the subjects correctly at 93%, slightly more accurate than vertical campus students.

3.3 Comparison of Findings for Vertical and Horizontal Campuses

The research of vertical and horizontal campuses was carried out in parallel sessions by two different researchers working on those campuses. A total of 31 samples from target 40 participants were obtained. Overall 266 photos were returned for PPM. While most participants were able to use three to four sentence comments in photo interpretation, those who made single sentence definitions were also included in the research. To facilitate the comparison, the findings are grouped into two: findings from PPM and findings from cognitive mapping.

Findings from PPM

PPM is a productive technique for acquisition of a large amount of data even with a small number of participants as well as for correct classification and interpretation of this data. Comparison of Table 3 and Table 6 reveals the most favourable images to be the cafés in both campuses and café photos taken from the interiors. In comparison of second favourable spaces, it is seen that the photos were taken from outdoor space on horizontal campus and interior space on vertical campus. The interiors on vertical campus offer more opportunities for activity and students are more likely to spend time indoors as studios located are on the upper floors. The third favourable photos of horizontal and vertical campuses feature a striking common detail. Both include landscape photographs with sea as the major element. Although verticality was seen as an important aesthetic advantage by the researchers at the beginning of the study, the expected interest was not detected. An interpretation of this could be students' priority of functional requirements and socialization opportunities before visual aesthetics of the campus. Thus, about discussions on aesthetics and function, it could be asserted that the latter comes first in the evaluation of living spaces, such as home, where most of the time is spent.

Unfavourable areas are found to be empty corridors and undefined exterior spaces on horizontal campus. Again, three photos of unfavourable spaces on vertical campus are lifts, their waiting halls and model storage rooms. Both groups of participants are unpleasant with the unfunctional spaces that have not been specifically designed for their needs. Therefore, it

can be asserted that design solutions are required for empty and undefined areas in both interior and exterior spaces on campus.

When key expressions in Table 4 and Table 7 are examined, the first remarkable outcome is the bigger number of positive and negative adjectives used by vertical campus students. Due to comparison of two different groups, this finding could be interpreted with the motivation and personal characteristics of students as well as the context of the study. In terms of positive key expressions, the most expressed on vertical campus were *good* and *comfortable*, while on horizontal campus were *comfortable, nature, greenery, lovely* and *good*. Positive expressions for nature were distinctive good features of horizontal campus. For comparison of spatial components between vertical and horizontal campus typologies, Table 9 was constituted, by referring to Table 5 and Table 8. From Table 9, it is evident that on the vertical campus interior features are accentuated by students whereas on horizontal campus the emphasis is on outdoor features.

Table 9: Comparison of Spatial Components between Vertical and Horizontal Campus.

Comparison of Spatial Components between Vertical and Horizontal Campus: Photographic finding	
Vertical Campus Indoor	**Horizontal Campus Indoor**
Cafe	Cafe
Studios	Library
Labs	Corridor between classes
Wood atelier	
Storage room	
Entrance lobby	
Corridors	
Staircases	
Elevators	
Fire staircase	
Vertical Campus Outdoor	**Horizontal Campus Outdoor**
Outdoor area	Pedestrian path
Outdoor smoking area	Cafe in the pine area
Parking lot	Green area
	Unoccupied lot
	Entrance turnstiles
	Sitting group for the ring points

Findings from Cognitive Mapping

Cognitive mapping in this study was used as a subsidiary method for establishing the relationships between photos and spatial relationships. The main purpose was to depict whether students were able to comprehend the spatial relationships correctly. According to maps drawn, vertical campus students accurately marked photos with 88% rate and horizontal campus students with 93%. However, when selected cognitive maps in Figure 2 and Figure 3 were compared, it was seen that drawing cognitive maps of vertical campus was more complex. It was relatively easier for students on horizontal campus to imagine and draw the gym, the faculty buildings, the tree-lined walkway and the social life centre. Despite several years spent in the campus, it came out to be difficult for students on vertical campus to make connections between floors since they mostly used elevators. It was hard for them to guess what functions took place on the floors, that they did not use. For this reason, cognitive map drawings of vertical campus students were mostly shaped as partial sketches of different floors. It is important to underline that this is a valid technique and an acceptable approach. Besides, on horizontal campus, there were students who only drew and interpreted the areas around the faculty on their cognitive maps. Overall cognitive maps of horizontal campus showed that students had access to more spaces than vertical campus students, whose campus life was limited to studios, cafe and restaurants and elevators. On vertical campus, few spaces such as, the entrance lobby hosting student projects exhibitions, was a favourable space with its aesthetic glass roof receiving natural lighting. It gave students a sense of dependence and identity together with aesthetic quality.

4. Recommendations for Further Studies

This study obtained data by photographic techniques and provided important findings on the dissimilarity of aesthetic experiences on vertical and horizontal campuses. According to total 31 students' photos and key expressions depicting the sense of place on the campus, place attachment (mainly generated by place dependence) was found to be the most important factor for positive aesthetic experience.

In future, comparative studies could be conducted on the same campuses with different sample groups: students from faculty of architecture and different faculties, male and female students, students from local and different countries etc. The pilot study was limited with the borders of selected campus areas. In future studies, it is possible to conduct research related to campus and city interaction. Within the immediate vicinity of the campus, students might be asked to take photos of their favourable and unfavourable areas. Social media platforms, where students share personal feedback through photo sharing and texting, could be employed for accessing

such spatial data. Thus, participatory workshops could be handled to create engaging campuses.

5. Conclusion

The originality of this study lays on use of two different methodologies based on environmental psychology and aesthetic experience for interpreting horizontal and vertical characteristics of campus typologies. Use of cognitive maps to measure aesthetic experience came out as an effective methodology since those drawn for horizontal and vertical campuses differentiated significantly. Although students correctly marked the positions on their maps of horizontal campus (93%) and vertical campus (88%), the perception of horizontal and vertical campus spaces were found to be distinct. Students on the horizontal campus could associate space relations with similar drawings and proper connections. Students on the vertical campus had difficulty in drawing cognitive maps, especially in connection points. On their cognitive maps, vertical campus was represented by disjoint sketches of spaces and its spatial relations were indicated with elevator and floor numbers. This finding proved higher levels of spatial interaction for students on the horizontal campus due to easier formation of internal and external connections.

In vertical campus, the difficulty of creating cognitive maps might be explained as an interruption in aesthetic experience. Due to the plan layout which is organized in several layers, students on the vertical campus never percept the space with its entire volume. Students only focus on spaces they use more hence miss most spatial features. When photographs are analysed, it is seen that students do not pay much attention to the city views, even on the vertical campus. In their photos of unfavourable spaces, they emphasize the empty spaces around vertical circulation elements and express their disgust with waiting for the lifts. As an interior design solution for vertical campuses, options of adding visual attractors such as; temporary and permanent photographs, paintings, images, texts, textures and colours should be considered. These attractors might help students to have a sense of aesthetics and comfort as if the campus was their habitat. Alternative activities could be designed indoors, such as activity and body performance workshops. Although it might seem difficult to create an organic habitat on vertical campuses, it may be possible to overcome this challenge with creative solutions.

Students described café and similar recreation areas as their most favourite in both campus buildings. The panoramic views of Bosphorus on vertical campus and the views of sea and nature on horizontal campus, were recalled only by few students as an aesthetic experience. In café areas, students usually took pictures of seating elements. A small number photographed the view toward outdoor areas. It revealed that students' attractions were mainly focused on the areas of comfort where they spent good time with friends. This shows that design elements that make students feel '*as if at home*' might strengthen place identity. Most importantly, other than aesthetic quality, place attachment criteria should be considered in priority for campus design at micro and macro scales.

In case study, while horizontal campus photographs revealed a balance of indoor and outdoor use, on the vertical campus outdoors photos were limited. Key expressions revealed that students felt safer on the vertical campus. Therefore, in the design process, use of alternative fencing elements such as vertical greenery systems could improve security. Although the case study was carried out in February, which was a cold season for being outdoors, photographs including exteriors and nature were still remarkable. Landscape was only photographed by horizontal campus students. Inclusion of green balconies and greenery could increase interaction with nature on vertical campus.

Limitation for this study was the acquisition of data from students only about their own universities. Students recorded their own aesthetic experiences on campuses hence the practice was consistent with itself. However, comparative interpretation of information obtained from two different student groups might be criticized. Use of simple random sampling method could also be criticized. Although a total of 40 were adequate for such experimental and behavioural studies, more universities and applications would be needed to test the methodology. Therefore, it is important to highlight that it was a pilot study.

Despite all limitations, results have shown that sense of place is important for a lively and happy campus life. Vertical campuses are a current design problem in overpopulating cities. This study has proved that using alternative measurement techniques for further analysis of spatial attributes could help improving aesthetic experience or sense of place on campus. Based on cognitive maps, photos and expressions of students, campus design could be improved to create alternative habitats for students.

Acknowledgement

This research did not receive any grant from any funding agency.

Conflict of interests

The authors declare no conflict of interest.

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How to Cite this Article:
Bostancı, S.H. and Akdağ, S. G. (2020). Street Furniture Influence in Revitalizing the Bahraini Identity. *Journal of Contemporary Urban Affairs*, *4*(2), 13-26. https://doi.org/10.25034/ijcua.2020.v4n1-2