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The Impact of Environmental and Architectural Design on Users' Affective Experience[1]

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Abstract: *This study examines the impact of environmental design on user experiences in the educational spaces of Tabriz Islamic Art University in Iran. In the research area, the affective assessment of four different spaces, which have been changed their function, was made. The research hypothesis is that users' affective experience is influenced by environmental and architectural design. The method applied is the interpretation of the data obtained by the scores of the pleasure-arousal diagram of the affective and perceptional experience of 100 students in 16 educational spaces belonging to Tabriz Islamic Art University in Iran. As a result of the research, it has been verified that space design style has an active role in the affective experience of students, and there is a meaningful relationship between user's spatial experience and the design style. In this context, it has been revealed that the spatial experiences of students in traditional spaces are positive and satisfactory in terms of interest, pleasuret and security, and that for the other three groups, many changes are required in the architectural design and spatial organization to provide positive motivation and emotional suitability.*

Keywords: *Affective experience, Pleasure-Arousal Diagram, Design style, Environmental Design, Tabriz İslamic Art University.*

1. INTRODUCTION

The impact of architecture, urban space and landscape on people's mentality has been accepted in environmental psychologists' studies, but there is no enough evidence in terms of design style and quality impact on experience, perception, and affection [1, 2, 3]. We should have an understanding of the effect of environment on their affection in order to have an experience of interaction and communication with the place. Such an interaction is realized through the process of affection, perception, cognition and behavior [4]. In order to create an environment which is compatible with the needs of the individuals, it is necessary to understand both the relationship between users and the environment, in the sense of the impact of environmental elements on different levels of users' behaviour, affection and perception.

[1]This study is a version of the PhD thesis preapered by the first author.

According to Amos Rappoport [5], environmental quality is the focus of planning and design to ensure a better environment, in terms of safety, health, aesthetics, comfort and well-being of the society. In respect to Rappoport's thinking, due to the multi-dimensional nature of environment quality, it should be considered in both objective and subjective assessments.

Studies have shown the difference between the users' subjective assessment and the specialists' objective assessment [6, 7]. Lang believes that designers are impressed by visual aspects. According to him, designers consider architecture as a work of art rather than a place where people live. Hubbard also has the same idea and puts: "Design has created a special vision for specialists in the field, which focuses on measurable aspects of environment quality rather than aspects of personal perception. The difference between designers and non-designers is how they think about their environment…"[8]. It can't be expected from an environment that is considered to be a pleasant, beautiful and efficient by urban planner and architect, for other people in that community to have a similar interpretation. Because people rely on their past experiences and knowledge to interpret environmental information [9]. Therefore, the relationship between specialists' assessment and users' assessment, and the relationship between technical indicators (the quality of climate) and general indicators (the quality of neighborhood environment), together with the application of these indicators in evaluating these operations are important [1]. Different methods have been used for the recognition, analysis and evaluation of environmental quality. Different measurement techniques and models have been proposed which justified the difference between users' subjective assessment and specialists' objective assessment [6, 7].

In terms of users' affective assessment of the environment, two studies have been proposed: A) emotional quality of place and B) attachment to the place. The measurement of emotional quality of place focusing on architectural design style is the topic of this paper that is going to introduce a new method to measure environmental experience, and provides a platform for dialogue between people and design specialists. For this purpose, the impact of architectural quality of educational space on users' affection and emotions has been investigated as an example.

2. ARCHITECTURE AND USER'S ASSESSMENT

The design of contemporary buildings has been based on specialized criteria from the designers. However, since people understand the aspects and signs of buildings differently, they have different interpretations of them [10]. So, it seems that contemporary buildings that should represent several qualities such as new, clean and distinct, in the eyes of public they are plain, hard and impermeable.

While Linda Groat [11] was displaying modernist, traditional and post-modernist buildings to architects and non-architects, found that these two groups have different processes in attributing meaning to the buildings. Rezazadeh [12], an Iranian urban researcher, by focusing on some cases of Tehran's streets, has found that although users' preferences under the influence of cultural preferences are different, factors such as diversity, spatial organization and coherence shows similar results. On the other hand, Kevin Lynch [13] , known for assessing urban environment with the concept of cognitive maps, has introduced five components in his model; they are paths, nodes, edges, landmarks and districts. However, his model is not able to explore users' affective experience in the environment. Jack Nasar [14] argues that, with the improvement of Lynch's environmental cognition idea, we can consider the concept of environmental assessment by people based on five criteria such as naturalism, cleanliness and maintenance, spatial opening, historical significance and order.

Many researchers, such as Rappoport, Kaplan, Alexander and Ralph believe that the use of methods and procedures to identify individuals' affective assessment, beside the environment's technical assessment, can develop planning and space design theories [15]. Therefore, the understanding of the affective assessment of users is considered as a source of useful data collection in creating and developing public spaces. It can also reflect the designers' ideas of what made pleasant places. For instance, in David Canter's theory of place [16], the users' satisfaction in residential environment has been investigated, and the experience of pleasure has been analysed as an important criterion. Studies on place satisfaction include three psychological components of affection, cognition and behaviour [17]. In this study, the affective and cognitive dimensions are considered.

3. AFFECTIVE ASSESSMENT

Affective assessment depends on the understanding of the affective quality of objects and the affective quality of places by an individual. To this end, although objective factors arouse desirable or undesirable feelings, they are result of a mental and affective state. In the field of environmental psychology, pleasure and arousal are conceived as two basic dimensions of affective responses that indicate people's state of feeling. An often applied approach to assess and describe environmental experiences is the environmental psychology type method of Mehrabian and Russell [18]. They use three affective dimensions - pleasure, arousal and dominance - to describe human perception of physical environments (Diagram 1). In the last four decades, pleasure, arousal and to a lesser extent dominance have been used and are still used by numerous researchers in the field of environmental psychology [19, 20, 21, 22, 23]. Pleasure and arousal are also applied in other disciplines such as the neurological and neuropsychological sciences [24, 25], marketing research [26, 27] and computer systems [28].

Diagram 2 is results of 16 descriptive elements which have been obtained from 105 features proposed by Mehrabian and Russell [18]. Thist was modified by Russel and Barret [29], and represents the feelings of popular culture with different meanings. Horizontal axis of the diagram shows various adjectives to indicate the level of pleasure (desirable to undesirable attributes), and vertical axis shows various adjectives of arousal (from uniform to impressive attributes). Based on this analytical index, the affective quality of places can be explained.

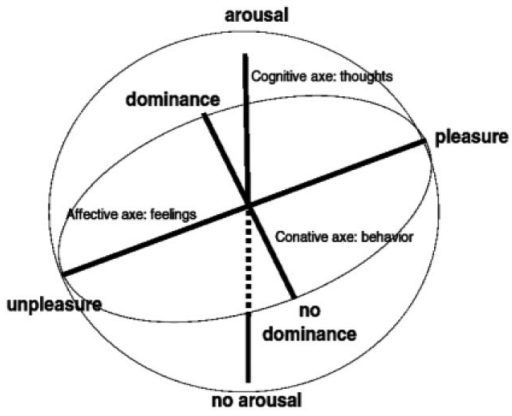


Diagram 1. Three dimensional model of pleasure, arousal and dominance as tripartite view of experience proposed by Mehrabian and Russell [30]

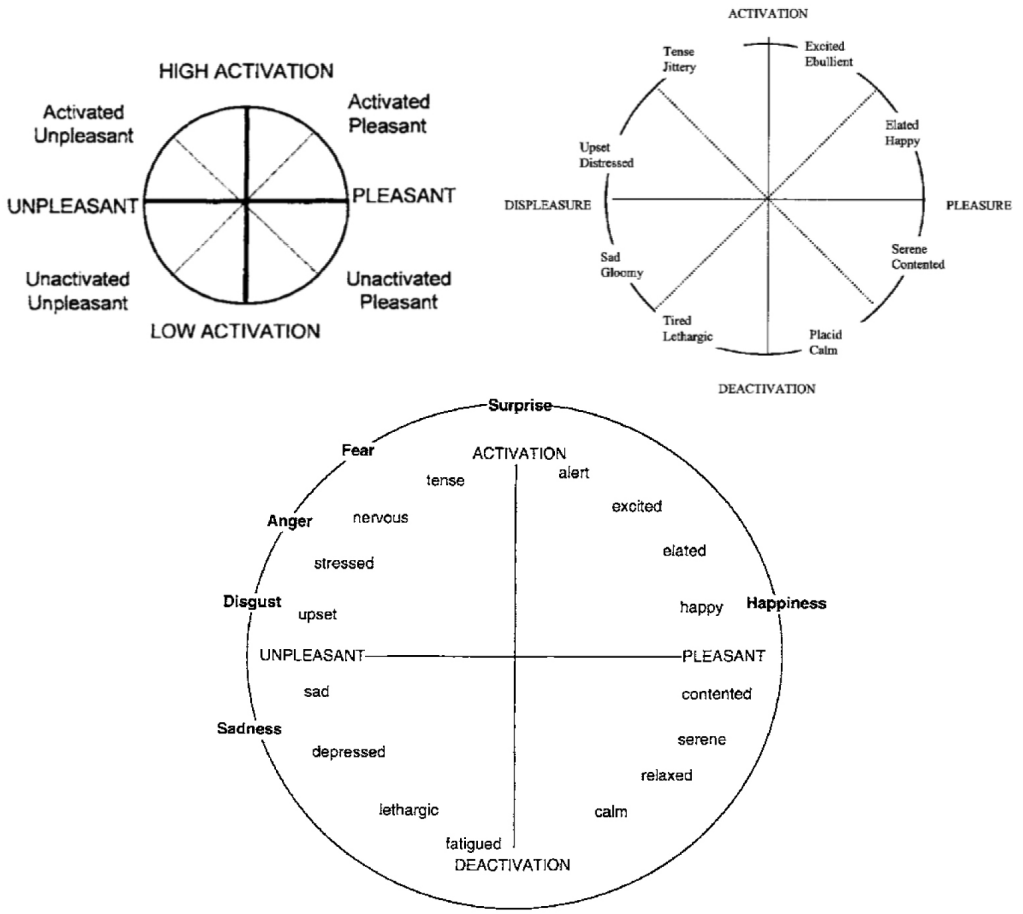


Diagram 2. Pleasure and arousal conceived as two basic dimensions of affective responses that indicate peoples' state of feeling proposed by Mehrabian and Russell, and modified from Russel and Barret (1998) [29].

Individuals' affective responses to the environment include a complex situation of behavioural and cognitive responses which have a continuous and implicit mode. People describe places based on combination of modes such as desirable, impressive, safe and control. These feelings are related in the model of Pleasure-Arousal [18].

Accordingly, if a place is both pleasant and impressive, we will be attracted to it. In assessing the pleasant (horizontal axis), visual factors play a role more than audio factors, but in terms of motivation (vertical axis), both visual and audio factors are important. Also, affective assessment, that correlates with individual's compatibility level [31], has shown that people's assessment depend on the amount of arousal. According to the compatibility theory [32], if extreme emotional assessment (very high or low arousal and pleasure) occurs in people exposed to the environment, such situation affects the assessment of the next or another place, and in this context, the level of compatibility is one of the reasons for differences in the affective assessment of a place.

Background research on emotional quality of the environment can be investigated in studies of two pioneers of environmental psychology, James Russell and Jack Nasar [3, 14, 18, 29, 31].

In addition, cognitive and behavioural experience of educational environments has been involved in Barker's place-behaviour theory [33], but little information has been published in terms of the emotional and cognitive effect of the space.

4. HYPOTHESIS AND RESEARCH METHODOLOGY

The purpose of the research are to find some improvement of the model for measuring and to document of how architecture is experienced by users. So, its results can assist architectural designers. Basic hypothesis of research is that the new and traditional buildings affect users' affective perception. It is expected that there are more pleasure and arousal in traditional spaces compared to new and industrial spaces. The research began with identifying and analysing of spaces' quality in order to achieve shared communication language between users and designers, and continued with references from users' comments. Users' affections in describing environment features, were recorded based on perceived environmental quality index and observed by using a survey.

Tabriz Islamic Art University students, aged 22 and over, were recruited for the field survey that was performed on 17 November 2016. Participants were art and architecture students with similar education backgrounds and experiences; thus, they were supposed to respond to the given spaces keenly and similarly. In this context, 16 photographs about the internal and external environment of four places in Tabriz Islamic Art University were prepared and presented to 100 students. 4 photographs belonged to the each place, namely 2 photographs related to the outdoor environment and 2 photographs related to the indoor environment, were selected. Then, students were asked to express their affective and perceptional experiences related to these places of the University. The time spent on each place ranged from 3–5 minutes. Although complex phenomena of environment can't be described by some simple attributes, this approach led to identify a list of users' favourite design factors[2].

In collecting data about affective experience of places, questions were asked, and pictures of spaces were shown in the survey. The answers were recorded in the format of a diagram which shows the percentage (%) of participants evaluating attributes such as displeasure, lethargic, and stressed, etc. or pleasure, calm, and excited, etc. Also, users were asked to indicate affective factors in their environmental experience. In total, 16 attributes and affective characteristics were measured related to the environment.

5. CASE STUDY: TABRIZ ISLAMIC ART UNIVERSITY BUILDINGS

After the restoration work in 2000, some of the historical - industrial leather factories in Tabriz were converted into Tabriz Islamic Art University as a centre of higher education in Iran. On the south side of the city of Tabriz, these buildings can be group into two. ***1) Old buildings:*** The buildings of this group are classified in two categories: old leather factory buildings and old residential buildings of Tabriz. The former buildings were used for industrial purposes, but they have been changed and nowdays are used as studios, lecture halls, dining hall, sports hall, amphitheater and library. The latter buildings were used as residential houses, and are currently being used by the Faculty of Architecture. In addition to that, these buildings were made in Iranian traditional house style, and located in the city centre of Tabriz.

[2] According to the researches, laboratory studies are more important than field studies in terms of economy, logic, time management and elimination of disruptive environmental barriers such as lack of preparation, lack of concentration and lack of sufficient opportunities. In addition to that, this research was conducted in the premises of the campus, and the questions and answers were made regarding the spaces in question. Leading researchers such as Kevin Lynch and Jack Nasar have proved the credibility and solidarity of this method compared to the objective and field evaluation of a space [14, 35].

These houses contain a dining hall, classrooms, a library, and academic staff's rooms.
2) New buildings: The buildings of this group are also classified into two categories, and have been built not too long ago. One of these buildings is used by the Faculty of Practical Arts. The other new building is used by the Faculty of Computer Arts.

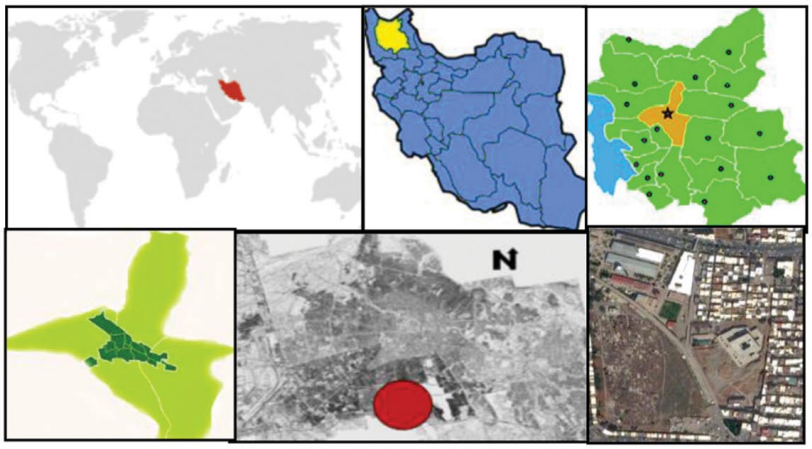


Figure 1. Location of the city of Tabriz and location of the Tabriz Islamic Art University [34]

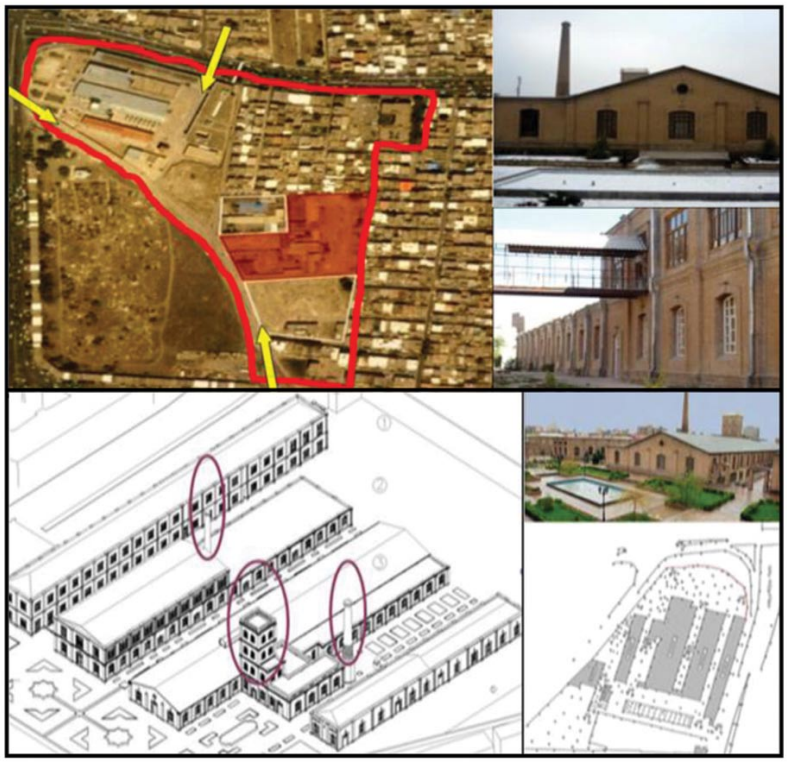


Figure 2. Tabriz's historical leather industry factory's collection (Tabriz Islamic Art University) [34]

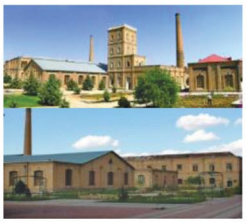
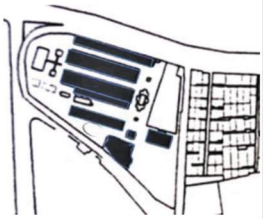
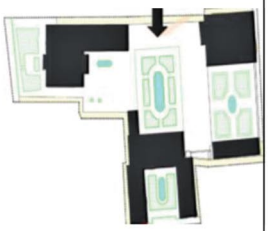
Place	*Outdoor Image*	*Plan*
Old Factory Buildings (Industrial Buildings)		
Faculty of Architecture (Tabriz Traditional Houses)		

Table 1. The Places of Tabriz İslamic Art University [Authors]

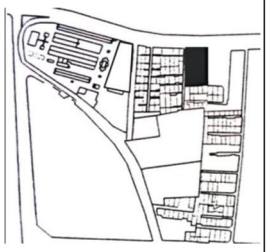
Place	*Outdoor Image*	*Plan*
Faculty of Practical Arts (New Building)		
Faculty of Computer Arts (New Building)		

Table 2 The Places of Tabriz İslamic Art University [Authors]

6. METHODS

Within the framework of examining the perceptions and affections of students regarding educational spaces, after investigating the basic concepts and psychology of perception and affection by using Mehrabian & Russell's[3] [18] theory of environmental arousal, the impact of design style on perception and affection of students was examined empirically. In order to test the hypothesis, students from A: Architecture faculty (Tabriz traditional houses), B: Computer arts faculty (New), C: Practical arts faculty (New) and D: Leather factory building (Industrial) were selected.

16 pictures from the four above mentioned places, including 2 pictures of interior spaces and 2 pictures of exterior spaces related to each place, were shown to 100 students. Then, students were asked to rate their perceptions of the pictures and their spatial experience on the Pleasure - Arousal model. Students individually, while viewing the pictures, pointed out their emotions and perceptions and marked them on the diagram (model) for each image.The aroused emotions were marked from 0 to 100 points. The qualitative data obtained were collected and combined. Then, analysing and matching results with other assumptions and findings were fulfilled. The respondents were selected mostly from undergraduate students (70%), preferably who passed the fourth and fifth semesters, and from graduate students (30%)[4]. 40% of the students were females and 60% were males, aged between 22 - 27, and the average time to answer the questions was 3-5 minutes. Questions were answered in the specific area of each faculty, and most of the students were asked during the middle hours of the day because they were present at the university at noon. Questions were answered in groups of 3 or 4 people, and interviewers did not make any statements about the results and the questions. The rest of the results can be observed in tables 3-7 and diagrams 3-4.

7. FINDINGS AND DISCUSSION

A comparative study of the Pleasure-Arousal model shows that affective attitude of students towards different style of design is quite meaningful. Table 3 and 4 show differences in comparative results of the Pleasure-Arousal model in both traditional and new educational places of Tabriz Islamic Art University. Accordingly, faculty of architecture's spaces have been assessed as pleasant, exciting, placid, harmonic and safe. In contrast, faculty of computer arts' spaces have been assessed as unpleasant, boring, irritating, frustrating, unsafe and upsetting.

[3] Mehrabian and Russell presented pleasure, arousal and dimensions of reaction as primary criteria in the field of environmental psychology to achieve people's emotional responses related to their environment.

[4] Since undergraduate students spent more time than graduate students at the university, they have deeper experiences and perceptions about their university places.

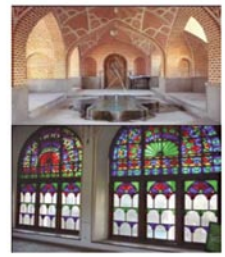
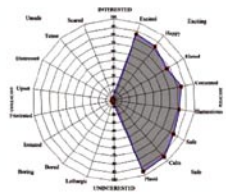
The Style of Design	Historical Houses as Educational Places (traditional) Revival of Landscaping and Architecture.	
Evaluated Images		
Average of The Places According to Pleasure-Arousal Diagram From The Users Point of View		

Table 3. The result of pleasure-arousal diagram of the Faculty of Architecture

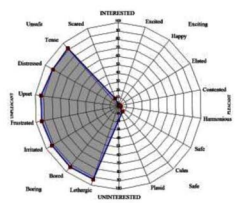
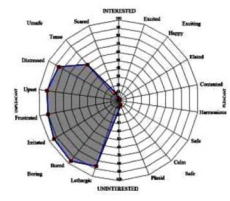
The Style of Design	New Architecture	New Indoor Desing
Evaluated Images		
Average of The Places According to Pleasure-Arousal Diagram From The Users Point of View		

Table 4. The result of pleasure-arousal diagram of the Faculty of Computer Arts

Spaces of the Practical Arts Faculty and leather factory building have also been assessed. Table 5 and 6 show differences and similarities in comparative results of the Pleasure-Arousal model in two new and industrial educational places of the same university. Accordingly, open

spaces of the Practical Arts Faculty designed with the concepts of Iranian gardens and elements such as grass, trees, fountains, variety flooring and spaces to sit, have been assessed as pleasant, lively and calm. However, open spaces between industrial buildings designed to be uniform and simple without any diversity, have been assessed as unpleasant, irritating and scary.

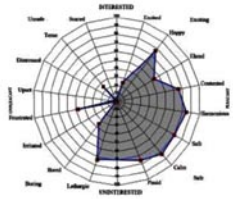
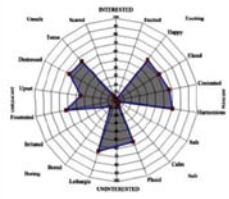
The Style of Design	*New Architecture*	*New Indoor Desing*
Evaluated Images		
Average of The Places According to Pleasure-Arousal Diagram From The Users Point of View		

Table 5. The result of pleasure-arousal diagram of the Faculty of Practical Arts

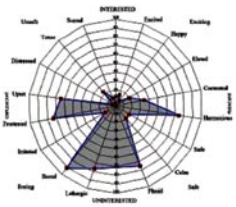
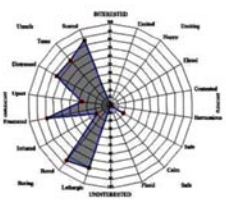
The Style of Design	*Industrial Leather Factory as an Education Place Revival of Landscaping and Architecture*	
Evaluated Images		
Average of The Places According to Pleasure-Arousal Diagram From The Users Point of View		

Table 6. The result of pleasure-arousal diagram of the industrial leather factory

Interior spaces of the Practical Arts Faculty, because of turbulence in their design approach, have been assessed in some cases as pleasant and in other cases as unpleasant. For interior spaces of industrial buildings, due to lack of compatibility with emotions and affection evoking the lack of pleasure, have been associated with anxiety and boredom.

The results of the interviews of participants are presented in the table 7.

The Name of Faculty			***Architecture***		***Practical Arts***		***Industrial Factory***		***Computer Arts***	
Criterion		**Mood**	**Int**	**Ext**	**Int**	**Ext**	**Int**	**Ext**	**Int**	**Ext**
Exciting	**Activated pleasant**	**Excited**	**87.3**	**75.3**	-	25	-	15	-	-
		Happy	82.7	70.3	63.7	**78.2**	-	5	-	-
		Elated	77.5	25	62.5	52.5	-	20	-	2
		Contented	84.3	70.4	**67.3**	75.6	-	35	-	4
Safe	**Unactivated pleasant**	**Harmony**	81	**91.2**	**70.1**	**83.9**	-	74	-	3
		Safe	85.4	75	4	80	20	20	-	-
		Calm	92.7	85.8	7	82.2	-	20	-	10
		Placid	**95.5**	85.9	56.4	77.1	-	75	5	10
Boring	**Unactivated unpleasant**	**Lethargic**	-	10	67.6	73.7	81.7	78.4	86.2	93.1
		Bored	-	2	10	35.5	**85.7**	**91**	93.7	92.7
		Irritated	-	-	-	-	20	15	**93.8**	92.4
		Frustrated	-	-	62.5	49.3	78.6	74.3	90.4	**93.2**
Unsafe	**Activated unpleasant**	**Upset**	-	-	45	-	37	**65**	**90**	**92.6**
		Distressed	-	-	67.5	-	75	5	86	90
		Tense	-	-	64	26.3	72.5	22	60	90.5
		Scared	-	-	5	-	**85.9**	10	10	10

Table 7. The results of the interviews of participants [Authors]

Based on the assumption that users experience emotions through an architectural space, this study investigated how users were emotionally stimulated by design styles. As shown in Table 7. for the Faculty of Architecture, the activated pleasant factor (exciting), is assessed as an exciting place (Interior, M=87.3 & Exterior, M=75.3), and of the unactivated pleasant factor (safe), is assessed as a placid and harmonic place (Interior, M=95.5 & Exterior, M=91.2). Faculty of Practical Arts of the activated pleasant factor (exciting), is assessed as a contented and happy place (Interior, M=67.3 & Exterior, M=78.2), and of the unactivated pleasant factor (safe), is assessed as an harmonic place (Interior, M=70.1 & Exterior, M=83.9). Also for industrial factory of the unactivated unpleasant factor (boring), is assessed as a boring place (Interior, M=85.7 & Exterior, M=91), and of the activated unpleasant factor (unsafe) is assessed as a scary and upsetting place (Interior, M=85.9 & Exterior, M=65). For the Faculty of Computer Arts, the unactivated unpleasant factor (boring) is assessed as an irritating and frustrating place (Interior, M=93.8 & Exterior, M=93.2), and the activated unpleasant factor (unsafe) is assessed as an upsetting place (Interior, M=90 & Exterior, M=92.6).

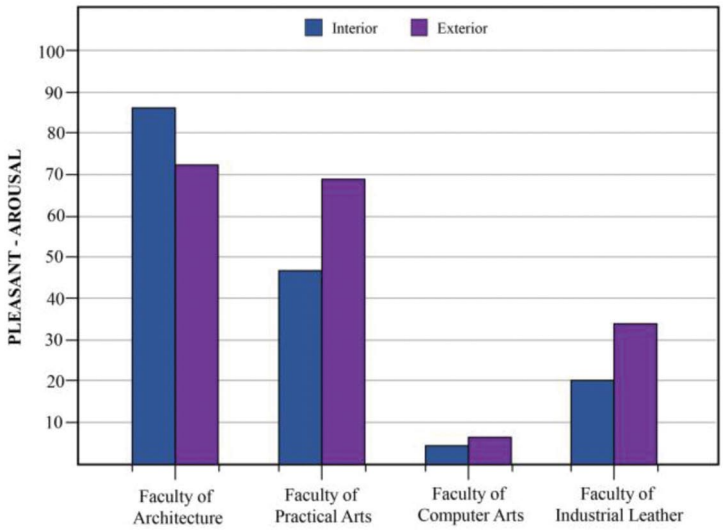


Diagram 3. The analysis of findings related to pleasant-arousal [Authors]

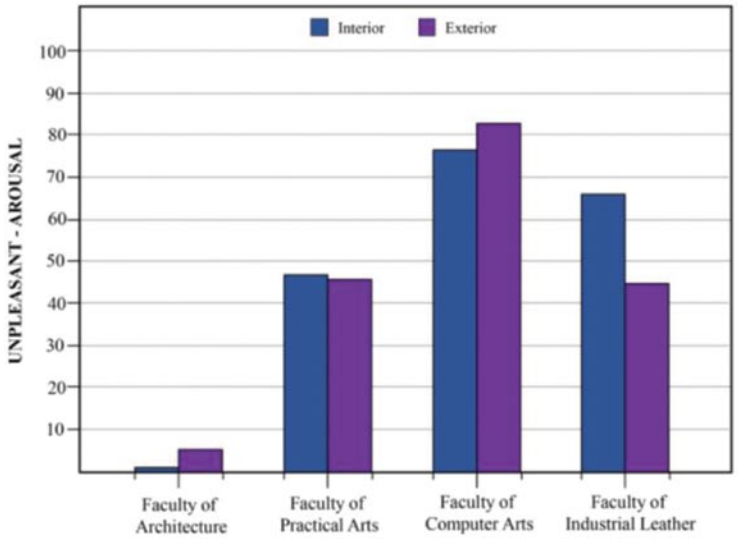


Diagram 4. The analysis of finding related to unpleasant-arousal [Authors]

According to the questionnaires' results and the analyses of responses to the open questions, respondents have considered interesting points which confirm the serious impact of design style on users' affection and spatial experience. Satisfaction with the questionnaires in terms of novelty, making students think, the comfort in educational space, and the complaint about the quality of sensation and perception of Computer Arts Faculty buildings, and even its comparison to a prison in responses were observed.

Satisfaction of central campus courtyard in terms of spatial quality and flora, complaints about library and its unpleasant, heavy, industrial and horror entrance are very considerable in the comments.

Although some spaces of central campus were boring and lifeless, it was significant to show pleasant remarks about its historical buildings and its compatibility with students' feeling. Satisfaction of atmosphere of the Architecture Faculty and negligible impact of tent awnings despite having interesting form, were other points considered.

8. CONCLUSION

According to Barker's place-behaviour theory, there is a specific relationship and harmony between physical dimensions and behavioural aspects of educational spaces and users' perception and affection.

– Socio-cultural features of people particularly their previous spatial experiences have an inevitable impact on their affective assessment. For example, graduate students, who have experienced other educational spaces, mainly do a subjective comparison with previous spatial experiences, as appeared in their response to open questions.

– Individuals, in order to satisfy their current needs, reconcile themselves with spatial situations in a short time, but the effects of this are not always identical. Sometimes this adaptation occurs in the form of indifference to the low quality of environment, but people try to establish the least emotional interaction with the environment. Moreover, people affected by impressive attractions, consider the environment more than expected and devote more time to environmental interactions. Special sensitivity of art students for campus beautification and environmental interactions in this context is significant.

– Quality of place and its aesthetic components play an important role in an individual's preferences and judgments. Physical features can improve the perceptional and affective quality of the environment, and led to psychological pleasure of positive affective assessment. The attention of designers to the physical and psychological dimensions of space is essential as a synomorph unit.

– People are sensitive in dealing with the environment with all of its aspects. In the communication process with the environment, their senses are active, and this issue must be considered by designers. In the design process, such an approach should be taken to stimulate all the senses of users at the "pleasure" level. Although an experimental study was conducted under controlled conditions and in the presence of specific individuals in the same age group, generalizability or accuracy of the results require further tests in a real environment to achieve a comprehensive judgement about the impact of design procedure on users' affection.

In this way, the results of the study showed meaningful correlation between design style and environmental pleasure experience. The revival of the historical houses as educational space is effective in creating affective pleasure. However, the design of new educational spaces based on uniform functionalism, and on the recycling of industrial buildings without modifying the spatial organization and environmental quality, has been unable to create an affective pleasure. Therefore, it is necessary to make modification in their spatial organization, architectural design and landscaping for arousal and pleasure aspects.

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