Post occupancy evaluation of a transformed design studio

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Abstract
The decision-makers choices regarding the design and construction of educational spaces have a direct impact on the academic culture. With regard to the design studios, the physical conditions of the studio spaces specifically act as the main element that creates the studio culture. The present study aims at understanding the relationship between the spatial transformation and the expectations of the students. Following a post occupancy approach, we asked, "What can we learn from collection of individual evaluations of students' on transformed studio environment?" and "Where does this knowledge fit in the readily available literature on built environment and learning spaces?" Twenty-five students are asked to write texts on their expectations related to a transformed studio in which they were receiving education at the time of the study. The texts are first examined for the frequency of the words used via cloud analysis. Following that analysis, two independent evaluators identified the phenomena in the texts and conducted a content analysis. The student expectations are classified into two main groups: Learning Experiences and Spatial Experiences. Learning experience involves three subgroups namely variation in work practices, creativity and social interactions and spatial experience is made up of physical comfort and furniture subgroups. Although during the spatial transformation, some improvement have been made, they did not completely fulfill the students' expectations. The present study proposes that in such spatial transformations, it would be possible to attain user satisfaction when decision-makers follow participatory processes in which all groups that would be effected can participate.

1. Introduction

University campuses, the buildings that make up the campuses, the interior and exterior spaces of these buildings are all integral components that shape the academic culture that will warrant the university to fulfill its mission (Fugazzatto, 2009; 2010). While making decisions regarding these resources, beyond providing physical infrastructure that serves certain functions, the university administrators set the quality of life for the occupants of the campus spaces as well. Today, we cannot avoid facing the reality that the learning expectations of the new generation of students are different and responding to these in design of campus environments is more crucial than ever (Ruffo, 2008).

The present study seeks to understand the evaluations of the students regarding the spatial transformation carried out in the studios after the change in the studio pedagogy followed by the institutions. In order to frame the study we asked "What can we learn from collection of individual evaluations of students' about a transformed studio environment?" and "Where does this knowledge fit in the readily available literature on built environment and learning spaces?" The literature review of this study is threefold. First, the literature on built environment and learning spaces will be discussed, and second review of literature on the design studio will be presented. Finally, similar studies conducted by incorporating Post Occupancy Evaluation approach will be shared.

2. Built environment and learning space

Earlier research indicates the features of built environment impacts the eagerness and interest for learning and in turn the learning process, social participation and academic achievement (Duran-Narucki, 2008; Eartman, 2004; Kumar et al., 2008; Schneider, 2002; Yang et al., 2013; Devlin, 2010). Many design decisions that will have a direct impact on the education experience such as the perception of the education building, the functions that will take place in the spaces, the relations between interior and exterior spaces,

elements of exterior space, the form of the class and the configurations of the furniture, are decisions everybody can contribute to when -through suitable instruments- participation is warranted (Sanoff, 1994; 2000).

In the research they conducted at three US higher education institutions, Scott-Webber et al. (2013) concluded that in classes that support active learning, the rates of participation, co-working and in-class interaction (between academician-student and between students) are higher than it is in traditional classrooms.

3. Design studio

The studio spaces where students spend a great deal of their time form the heart of the design education.

Researchers describe the design studio through the learning experience at the studio, referring to it as the space where the uncertainty and uniqueness in design education is foregrounded, where the students focus on solving the problems that emerge, develop new ways of understanding and reflect what they sense into knowledge (Schön, 1983; Schön, 1985; Schön and Wiggins, 1992; Salama, 1995; 2015).

The learning experience at the design studio is among the design research topics that has attracted the attention of researchers in our country. The relationship between the students verbal and written expression skills and their performance at the studio (Ulusoy, 1999); the importance of the critiques in sharing design knowledge (Uluoğlu, 2000), and the connection between varied learning skills of design students and academic achievement (Demirkan and Demirbaş, 2008) are among the studies carried out in Turkey.

Due to the features mentioned above, studio education provide a source to be used for the learning experience in other disciplines (Brandt et al., 2013). Shaffer (2003) who observed the design studios at MIT, adopted the components of studio for mathematical education. Brant et al. (2013) created a theoretical framework for the application of studio-based learning in the human computer interaction field.

Since the design studios are used not only during class hours but also at other

times, it is very crucial for the students to embrace the space and enjoy spending time at the studio. Cuff (1991) argues that design studios are not just "work spaces" but a combination of home and workspace thus bear a similarity with a "home-office" approach.

Due to the nature of the communication tools used and the nature of learning experience, design studios are different from standard classrooms. This difference requires a specialization in the physical specifications of the studio space in accordance with the design education. Several research focused on the impact of the physical specifications of the studios on design and education and correlate spatial comfort components with student performance.

4. Post occupancy evaluation

Post Occupancy Evaluation approach can be defined as a process that is proposed for determining and solving problems which were not noticed during the design process, overlooked during construction but noticed at the time of occupancy; thus it is a process that is oriented towards increasing the performance of the environment (Preiser et al., 1988). According to Preiser et al. (1988), post occupancy evaluation is a systematic and practical method for the evaluation of buildings where the construction is completed and occupancy process started. Post occupancy evaluation approach focuses on occupants of the buildings and their needs through the results of the design decisions made in the past and thus shedding light on the resulting performance of the building (Preiser et al., 1988).

According to Dülgeroğlu et al. (1996) the method of evaluation during occupancy impacted the role of the architect in the design process. The architect's task no longer ends when the designed product is constructed; the cause and effect relationship between the design and the application becomes continuous through being combined with the evaluation of the occupancy process (Dülgeroğlu et al., 1996). According to Zimring (2003), post occupancy evaluation research provide a great opportunity for corporate learning. Dursun and Özsoy (2008) consider the post oc-

cupancy evaluation approach as a tool that is useful for designers to re-scrutinized the human being-built environment relation and learn from their own experience. Post occupancy evaluation approach, brings together research and design and provides a knowledge base for the future projects (Dursun and Özsoy, 2008).

The post occupancy evaluation research Sanoff (1999) carried out at the architecture school of six universities by using a walk through instrument, in which an evaluation of six components, namely context, massing, interface, wayfinding, social-spatial and comfort is studied, is one of the first such work in the field. The results of this work indicates that the wayfinding and comfort were the least successful components at all of the universities evaluated (Sanoff, 1999).

The results of another study evaluating sixteen architecture schools, thirteen of which are in the United States, indicates that the occupants complain about the physical conditions of the space that are poor acoustics, lighting, inequality in air-conditioning, insufficient ventilation (Nasar et al., 2007). The main reason for the observation of these common complaints at several different faculties is that the studios, which are essential for architecture education, are actually spaces constructed using large and hard, durable materials which render providing comfort quite tough. The existence of a small number of faculty buildings where the studio space is divided into smaller sections, with dedicated areas for critique and juries, and anti-glare sun-light control, adequate task lighting, sound absorbing materials and comfortable seating indicates there are in fact solutions to this problem (Nasar et al., 2007).

In our country, the studies carried out on the exterior spaces of university campuses which were conducted through collaboration of several different universities indicates a knowledge network is emerging in this area (Ünlü et al. 2009; Çubukçu and Işıtan, 2011). However, the post occupancy evaluation research in Turkey is mainly focused on urban spaces (Özsoy et al.,1996; Korkmaz and Türkoğlu, 2003; Yıldız and Şener, 2006) and the num-

Figure 1. *The spatial transformation that took in place in 2010. Note the second floor installed and wall divisions made for studios in right.*
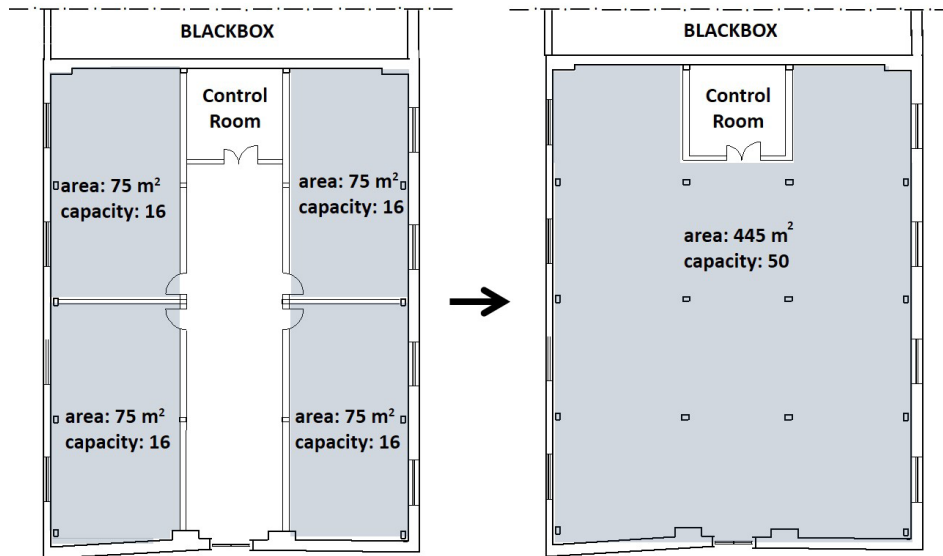

Figure 2. *The transformation of the studios from four small studios to one big one.*

ber of studies on interior spaces in this research area is quite limited. The studies on the personal space needs of the students in the studio (Demirbaş and Demirkan 2000) and on the relationship between the students' choices of location in the studio and their achievement (Edgü, 2015) are works on single components of interior space.

Karslı (2016) evaluated open and cell-type studios used for traditional architectural education through a post occupancy evaluation and after determining the strong and weak aspects of the existing studios, she suggested a combi-design which will fulfill the spatial requirements of new learning styles. Combi-design studio is defined as a single space where in-group presentations and critiques are allowed through flexible separators but where the social interaction and communication is also strong.

In her article on the design studios of İstanbul Technical University's Faculty of Architecture, Gür (2010) points out to the different spatial features of open and cell type design studios and dwells on the impact of these features on the student-to-student and the student-academician interactions.

Ultimately, findings of post occupancy evaluations provide a knowledge base for the future design activities with similar challenges to overcome some –if not all- future problems. However following a participatory design approach will not only ensure that the implemented design fulfills the expectations but it will also enable people to develop sense of belonging in early steps of implementation (Sanoff, 2000).

5. The scope and aim of the study

This study is about the students' post occupancy evaluations on the spatial changes that took place in some of the studios at the Cibali Campus of Kadir Has University. The building where the Kadir Has University's Cibali Campus is situated at was constructed in 1884 during the reign of Abdulhamid II as the Cibali Tobacco and Cigarette Factory. Located on a 10.385 m2 land

Figure 3. Photographs of the old studio where each studio instructor was given a separate room to conduct studios.

Figure 4. Panoramic photo of the new studio. Hall area where all studio doors were opened is now used for circulation.

with a 45.000 m2 interior space, it is among the significant buildings of our early industrial era cultural heritage (Alper, 2004). In 1995, the factory was evacuated and allotted to Kadir Has University to be used for educational purposes for 29 years (Alper, 2004). The project for converting the Cibali Tobacco and Cigarette Factory into Kadir Has University received the Europe Nostra award due to its elaborate and comprehensive restoration and its contribution to the improvement of the region it is located at (Alper, 2004).

The interior space that is the focus of the study was created in 2010 by dividing the space used as an indoor sports facility within the Faculty of Art and Design into two-stories. At its foundation, the university set up an aim for education focused on a small number of students. The spatial reflection of this aim was studios which were separated from each other with a wall, opening up to a common hallway and each of which served a maximum of 15 students (Figure 1).

As a part of this transformation, small-scale studios that were situated at the ground level of the university and that could accommodate a maximum of 15 students (a project group) were recreated at both of the newly acquired levels and a total of eight studios were attained. After the vertical educa-

tion model where students at different studio levels are taught by a single instructor was abandoned for a new educational model, these spaces, which were used actively between 2010 and 2014, failed to fulfill the coordination needs of different group coordinators and communication needs among students who were in different groups. It is observed that to solve this problem, all of the studio instructors initially taught classes by keeping the studio doors open and used the halls for notices and joint critiques, encouraging the students to visit other studios. Eventually, a decision to tear down the walls to transform this space, which was closed up by building walls four years ago, into a single body again is made (Figure 2).

The aim of the transformation is to create a single, large area that will replace four small studios serving 60 students with one big space that supports the group work of 50 students. Although by the removal of the walls, the visibility within the space increased, the project classes are hold with the same spatial organization using the same furniture and following the same organizational pattern. This transformation, that took place only four years after the initial intervention, does not involve any improvement suggestions other than the removal of the walls (Figure 3 and 4).

In the first project class that was held at the new studio, a post occupancy evaluation was carried out to understand which aspects of the student expectations are fulfilled by this new space. Another aim was to have this study act as a source in the form of a case study on the given studio topic that is focused on education spaces. With post occupancy evaluation of this studio, a research-focused approach is followed with a goal of making students question the use/occupancy of the buildings, which are assigned to them as the project topic, via different techniques. Within this framework, the students had the opportunity to experience the post occupancy evaluation approach initially as a participant and later as an implementer. An approach that considers research to be an integral part of undergraduate education as well as acknowledging research-focused education to be scientific are now widely accepted (Boyer, 1990; Boyer and Mitgang, 1996; Kepez, 2015). In this context, the design studio is not an environment that is merely designed upon debatable tastes and personal approaches, where the instructors are the "masters" and the students are the "apprentices". On the contrary, the studio is an environment of interaction and sharing where the provision of education is considered within the framework of "scholarship of teaching". This, in turn, makes the studio a research space which is nourished by knowledge from other disciplines, where accepted research findings are shared and where the students and instructors investigate their questions and several phenomena together. This definition also pertains to the studio where the present research is undertaken and the work discussed in the article is also among the studio components.

6. Methodology

Post occupancy evaluation is an approach that incorporates various action research methods (Zeisel, 2006). These methods may involve short visits by the experts of the field to the building that will be evaluated, and reports of a certain pre-determined format they prepare on the observations and views based on these visits (Zimring, 2003).

Manahasa and Özsoy (2016) who conducted a post occupancy evaluation of a campus building in Istanbul, sought to understand the impact of the new building on the student behavior and student satisfaction through the use of mixed techniques such as surveys, interviews, observations and behavior mapping.

Daily user satisfaction surveys, utilized for systematic data collection from various occupants impacted by the design decisions, may also be the main source for post occupancy evaluation. In addition to that, other post occupancy evaluation methods such as focus groups and new generation post occupancy evaluations that use mobile technologies for data collection are available. Ultimately, post occupancy evaluation techniques form a rich scale and they are field techniques that are designed in line with the goal, time and budget. When preliminary criteria are set for post occupancy evaluation, this in turn, leads to a reduction of the occupant feedback into only these preset criteria. When the pedagogical approach at the project studio is considered, it becomes obvious that evaluating complex phenomena with a reductionist method will not help students build awareness on the issue.

Based on this premise, no preset criteria were determined, instead students were asked to write texts accounting their experiences in this new studio. This way, rather than being given predetermined criteria, which may be leading, the students focused on their own experiences. In fact, each text has the characteristic of an open ended question they answered regarding their spatial experience. Through these texts, the students are expected to build the act of designing the studio space over their own learning practices, making use of their own experiences. With the texts the students are asked to write, the aim was to make them criticize the learning space, system and style and thus re-think on the studio space, face the problems and evaluate them.

For this research, 5000 words that are obtained from the texts produced independently by 25 students are evaluated through a methodology which utilized both quantitative and quali-

tative research methods, namely tag clouding analysis and content analysis.

7. Analysis

At the pre-evaluation stage, the words within the 5000 word text are listed according to their frequency and weight through tag clouding method which is a quantitative analysis method. While the cloud that lists the words according to their frequency is created, words that occur often in Turkish text hence have a high frequency (such as but, a, according to, and, or, this, that) yet should not be included in the analysis are eliminated. An open source online tag cloud software was used to conduct the analysis (Steinbock, n.d).

In the "tag cloud" illustration, the sizes and the shades of the words change in line with their degree of importance. As can be seen in the cloud, the words most often used by the students are "design", "student", "human being", "area", "space" and "education". Other words that stand out are "different", "free", "work" and "studio". Tag cloud is a preliminary analysis that is carried out in order to obtain the sub-headings to be used in the content

Figure 5. Tag Cloud analysis that included all written text about studios.

Figure 6. Emerging phenomena from the content analysis.

analysis, which is the following step (Figure 5).

The aim of content analysis is to study the data obtained from the texts and discover the main concepts and relations (Creswell, 2007; 2009). The texts collected from the students are examined by two independent researchers and grouped according to the observed phenomena. Later on, these phenomena are compared and each group is given a certain code (heading). Through a deeper analysis of the texts, which are categorized according to the common codes that are determined, the aim was to reveal concepts and relations which were not noticed earlier. According to the results of the content analysis, the student texts contain two main phenomena, namely the features regarding *the spatial experience* and the *learning experience*. When the collected 25 texts are examined, 13 sub-texts on the features of the spatial experience and 16 sub-texts on the features of learning experience are discovered (Figure 6).
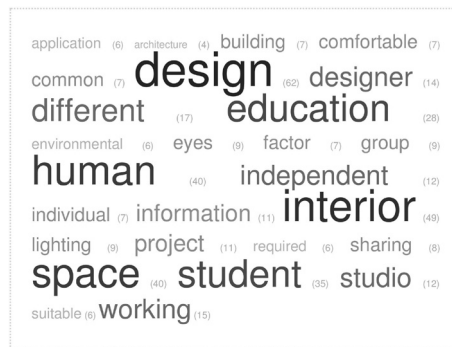
7.1. Features of the spatial experience

The content analysis results show that in the studio environment, fulfilling occupants' needs related to spatial experience is the initial step in increasing the productivity. This analysis indicates that the texts on the needs related to spatial experience involves two sub-headings; the components of physical environment comfort and components of furniture. An overview of the texts shows that 14 texts mention components of physical environment comfort and 8 texts mention components of furniture.

Physical environment comfort components can be considered as the first spatial comfort components that impact the productivity of the education process at the studio. The physical environment comfort components impact the learning process of the student by providing auditory, visual and thermal comfort of the space. Krüger and Zannin (2004) suggest that all physical environment parameters are related to each other and the comfort of the occupant is based on the perception of all these factors as a whole.

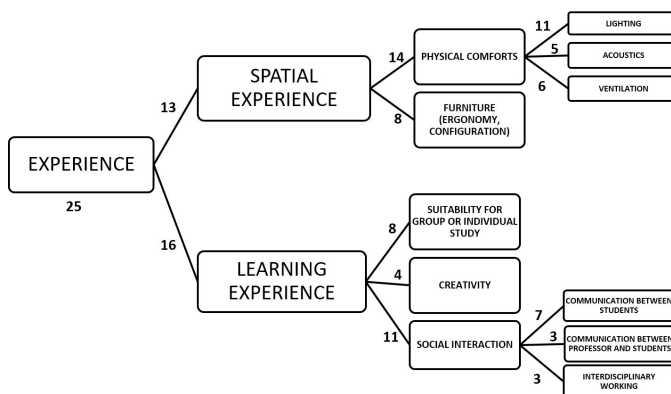Students frequently mention that physical environment factors impact

the quality of life of the occupants and need to be considered at the design phase. An overview of the 14 texts in which physical environment comfort component are mentioned, we see that 11 texts comment on visual comfort elements, 5 text comment on acoustic comfort components and 6 text comment on thermal comfort components.

In the sections where they make a remark on the visual comfort in their texts on the design of the studio, the students mentioned the importance of daylight, the quality and quantity of the artificial lighting that is used and the control of glare and shades (Table 1).

In their texts, students mentioned that the design studios are not only a co-working environment but also a space for interaction. The earlier research indicates that a class with poor acoustics can become a distracting and boring space of learning. (Yang et al., 2013; Dockrell and Shield, 2004). The student views support these research and emphasizes the significance of auditory comfort due to the communication and flow of knowledge at the studio (Table 2).

Students emphasized the importance of indoor air quality through examples, such as insufficient ventilation, polluted air, ambient temperature that is too hot or too cold and humidity that is below the comfort level, which cause the air to become uncomfortable and unhealthy (Table 3).

One reason why the component of the physical environment is dominant in the post occupancy evaluation of the new classroom is the failure to provide any improvements on this issue during the transformation. Students who experienced similar issues in the previous studios have a particular sensitivity towards this issue.

The other spatial comfort component the students consider important is the variety of furniture and ergonomy. It is known that ergonomic thus more comfortable furniture allow students to focus better and to participate more actively in the lesson (Knight and Noyes, 1999; Espey, 2008; Harvey and Kenyon, 2013).

According to Taylor (2009), which focuses on the impact of studios on learning and teaching, the flexibility provided to the students and the acade-

Table 1. *Selected examples of student views on visual comfort.*

[P5] "The studio must be a well-lit space for ease of work".
[P19] "Natural lighting and ventilation must be used at the maximum level throughout the day. There should be a lighting system that is adaptable to the needs of the user."
[P23] "What I will look for in my work space is sufficient light. I think my desire to work decreases and I am not productive enough in dark spaces."

Table 2. *Selected examples of student views on acoustic comfort.*

[P1] "Where you work should be a silent place where one can think peacefully."
[P7] "The verbal interaction among the studio users should not disturb the other users in the studio."
[P23] "Since a noisy working space decreases the productivity of the project worked on, auditory comfort should be ensured."

Table 3. *Selected examples of student views on thermal comfort.*

[P22] "For a work space to be productive it should be neither too hot nor too cold yet well-ventilated."
[P23] "The thermal comfort of the studio is very influential on work productivity, the ventilation and air-conditioning system must be well-designed.

Table 4. *Selected examples of student views on features of furniture.*

[P7] "The space must serve the goals of the user, ergonomic and functional furniture must be used."
[P14] "The tables and chairs must be suitable for working on projects."

micians through the transformation of a traditional classroom into a studio with mobile furniture and chairs has a positive impact on the experience of both groups. In the texts collected, we see that the students make remarks on the features of the furniture as well (Table 4).

The results of the content analysis indicate that problems related to spatial comfort appear frequently in the texts. It is concluded that in comparison to the other phenomena, spatial comfort is more dominant and so long as the problems on this issue are prevailing, suggestions regarding the learning experience would remain of secondary importance.

7.2. Features of the learning experience

When the students' expectations on the learning experience are examined, it can be concluded that studios must

Table 5. *Selected examples of student views on creativity.*

[P7] "Studio should have features that increases motivation."
[P17] "Although design is a product of the mind, it is created through inspiration. The space should be enabling that. The teaching space should have details that increases the motivation to learn, the learner should feel free."

Table 6. *Selected examples of student views on work styles.*

[P2] "When a designer faces a design problem, she thinks, observes and researches individually. As the next step s/he wants to present, discuss his/her ideas and exchange views. The studio space should take these into consideration and allow individual and group work."
[P6] "Since it is hard to provide one-on-one education, within in the same space, various areas designated for different work methods must be created. The studio should contain solutions that will not only allow individual work but also support group work."

Table 7. *Selected examples of student views on communication.*

[P9] "In the dialogue between the instructor and the student, considering that the student is inexperienced and that the project is a simulation, a supportive path that is constructive and oriented towards development should be followed. The most significant point in the design education is the healthy dialogue built between the instructor and the student and the success that it entails.
[P18] "There should be a common work space open to all of the departments in the Faculty of Design. Students from different departments will exchange ideas, help each other and share their professional experience. When different questions are asked, different ways of thinking will appear. The design process will become much more enjoyable."
[P20] "We want studios without doors, open to all disciplines! An architecture student who can be influenced by the way a theater student uses the space, should be able to influence another design group in the same manner! Designer should be nurtured by several disciplines."
[P24] "In design education, when the dialogue between the instructor and the learner is built in a correct manner, the rate of benefiting from the experience and knowledge of the instructor would be higher. When this dialogue is established as one between the person who knows and who doesn't know, it would not be possible to gain enough benefits."

be spaces which enable individual and group work, support creativity by motivating working for long periods, providing opportunities for not only interaction and communication among students but also between students and academicians and allowing interdisciplinary collaborations.

When we examine the texts, we see that students want studios that will increase their motivation to work and that will support their creativity (Table 5).

The students stated that besides the individual work spaces, where they will seek answers to their own design questions, there should be settings that allow the flow of knowledge and critiques through debates and thus encourage group work (Table 6).

Studios are learning spaces where everyone can interact with others and where sharing of knowledge is possible. In the texts collected from the students, they suggest sharing of knowledge should not be limited to interior architecture students and academicians but it should involve students and academicians from different disciplines and an environment that would support interdisciplinary work thorough common work spaces should be created (Table 7).

8. Conclusion

Presented study carried out content analyses of individual texts written about a transformed studio by students and reported multiple aspects of environment that played role in students' learning and spatial experiences in the studio environment. There are a few limitations of the study. The first one is related to the fact that the research focused only on the area where the spatial transformation in the building is carried out without considering its relationship to the other related spaces. Moreover, the research was done at a time when the students have experienced the studio for just two weeks. Additionally, due to the fact that the research is carried out as an integrated part of the project taught at the studio, it was not possible to keep the identity of the students anonymous. However, through the democratic and participatory execution of the classes, the students are reassured to freely express their thoughts at every phase of the studio.

Studios must be spaces students frequently use and enjoy spending time in. Beyond being merely physical spaces where education is provided, they should be spaces where each student has control over his/her own "learning"

experience. This control entails being able to modify both physical comfort components and spatial components according to personal preferences and even having a say in the activities that take place as a part of the studio education.

The present work reveals that the students highlight the necessity of a studio environment which goes beyond being a space that fulfills the students' expectations regarding physical environment and furniture components. They seek a space where they can work individually and in groups, be inspired to work for long stretches of time, interacting and communicating not only with their own classmates but also with academicians from their own discipline as well as from other disciplines.

The present research indicates the modifications detached from the views of the occupants will not yield satisfaction. The studio spaces, which are the focus of this work, are turned into large and spacious spaces from constricted, tight places, however this is not enough to fulfill the expectations of the students completely. As a result, we see that the students' expectations regarding studio space and the views of decision-makers, who consider studios merely as physical environments where classes are held, do not match. It is important to handle the processes related to creation of spaces through participatory design workshops where all user groups that will be affected by these decisions are involved in the process.

The buildings and studio spaces, where design education is provided, should be exemplary living environments by offering humanistic standards for future designers and architects. It is not a coincidence that the context of this research and the research that are carried out at universities with very prominent design schools report similar complaints, even when the spaces are high-budgeted designs created by well-known architects. The buildings that look pleasant and nice and that are impressive at first glance can be embraced only as much as the quality they add to the lives of their daily occupants. On the other hand, it is also an issue of debate how much an occu-

pant-focused, participatory approach is pursued in studio education. In other words, the design studio also has the responsibility to be the space where the students learn to include the occupants in the design process. Within that context, the studio where this study is carried out followed a research based approach by employing a user-oriented design knowledge. Applying textual content analysis as a post occupancy evaluation method is a novel approach as well as the original findings of this study. The study is replicable, and it would be interesting to conduct study in different learning environments in different cultures.

From a more general perspective, as we witness an era when the universities redefining their own existence when most of the knowledge and educational training can be freely accessed online, quality of physical environments and their outcomes become even more crucial. At a time the competition in higher education is globally on the rise, the frequently used concept of "being student focused" undoubtedly necessitates spaces developed with a focus on students.

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