ITU A|Z • Vol 13 No 3 • November 2016 • 119-133

Do architects' and users' reality coincide? A post occupancy evaluation in a university lecture hall

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Received: June 2016 • Final Acceptance: October 2016

Abstract

Post Occupancy Evaluation provides a good opportunity to make the built environment much more sustainable by correlating building performance to the occupant's needs. The need for socialisation for youth on a university campus is particularly important. This paper argues that in viewing educational spaces from another perspective, and in particular shared social-academic spaces, POE can be a valuable instrument of reflection.

This case provides new insights into the university's educational building design considerations and into engaging users, designers, university coordinators and researchers in a variety of issues of POE to provide a more holistic understanding.

The purpose of this study is to find out whether spatial characteristics and overall aesthetic affects students'/occupants' work performance and satisfaction. It aims to identify the environmental quality design criteria and whether criteria such as building layout, thermal, lighting and sound comfort, and maintenance are among the designer's expectations. User's ideas were elicited and from them suggestions for space enhancement were taken in consideration. The study also aims to find out how the building affected the students and their behaviours with its construction in the Istanbul Technical University campus, and on the other side, how satisfied students are with this new building.

A multi-way analysis based on questionnaires, interviews, observations, photographs and behavioural maps is used to achieve the set goals. In this way, a detailed study of the Lecture Hall could contribute to setting the basis for future possible constructions of educational buildings.

Keywords
Educational buildings, POE, Satisfaction, User.

doi: 10.5505/itujfa.2016.96729

1. Introduction

It is very rare for designers to regularly use the building that they have planned. Thus, architects generally have to make informed predictions about its future use. The design should feed architects', stakeholders', implementers', and certainly the users' contentedness. Users are the ones who feel and experience the designer's predictions. It is important to consider whether the expectations of the designer and the actual experience of the user coincide.

It is commonly accepted that most buildings do not fully satisfy the needs of their end users (Zimmerman & Martin, 2001; Bordass & Leaman, 2012). In order to measure the level of satisfaction, Post Occupancy Evaluation is an assessment method that involves the users to give clues to the building's performance. For the architect, POE is an important device in the tectonics of a project. Thus, it is instrumental in helping to understand the building's performance from the occupant's point of view. It gives the needed feedback to the architect for the designed building (Tanyer and Pembegul, 2010). What happens when the target user is known? Does this make the designer's job easier? In cases where the users are youth, their dynamism should be part of the built environment. Consequently, POE is a method that can help the architect to match the design to the dynamism of the youthful user. In this manner, the building is able to perform better over time.

According to Salama (2008), POE influences the decisions that are to be taken in the future. Technical, physical and socio-behavioural aspects can be improved in the future inspired by the POE results. "The most cost-effective way of improving the service of future clients" is the application of the evaluation two or three years after the final completion of the project. This is what RIBA suggests in the "feedback Stage-Stage M" of the Plan of Work (Cooper, 2001). Additionally, according to Chikezie et al. (2013) it is important to evaluate the building so as to guarantee its final significance.

The POE described in this paper collects users', designers' and implementers' thoughts about the Istanbul Technical University Lecture Hall building. Rarely do architects take part in the feedback process, so this is a notable example of that kind of participation. The research focuses on evaluating a new building dedicated to students. Uniquely, this paper aims to measure student satisfaction and behaviour within the designers' own predictions.

The behavioural element is among the core considerations in measuring the user's perception and needs, because this is where we uncover their interaction with their surroundings. Furthermore, behavioural maps and direct observations are important tools in measuring the behaviour of the occupants. Another aspect related to the occupants' behaviour is the functional aspect, which in itself can be measured by work and productivity. All data researched and collected helped in giving a better view of the proper use of the building.

The researcher looked at the overall quality of the building and its compounding comforts such as thermal characteristics, air movement and noise. All of these evaluations form what is called the POE process. The process of POE which is related to the elements of building performance should help the researcher gather sufficient information to run the analysis. This includes data collection about technical aspects of the building that generally consist of an analysis of security, acoustics, lighting, sanitation and HVAC.

Another aim in this study was to critique recent building interventions. Because the building is being constantly observed, it becomes clear that there are constructions that do not reflect the user's needs and feelings. Thus, this research contributes to the idea that the user's opinions melded to the designer's concepts could bring satisfactory results.

2. Post Occupancy Evaluation - POE

POE evaluation dates back to the mid to 1960s (Preiser and Nasar, 2008). During those years, there was an increased interest in research on human behaviour and building design. Such an interest was manifested by the creation

of both the field of Environmental Design Research and several professional associations. Of special note, and one of the best known associations, is the Environmental Design Research Association (EDRA), founded in 1968. Members of these associations come from various fields of research such as design, psychology, sociology, and anthropology. The variety of professionals signify the wide range that POE would covers.

In Britain, France, Canada and the United States, POE was a participatory design method of evaluating the student housing sector (Vischer, 2002; Zimring, Rashid & Kampschroer, 2000). Preiser at al. (1988) and his colleagues express the need for such an evaluation as a method of having adequate feedback. Feedback from the occupants and users are of a profound importance. Consideration of this need is increasing daily due to the increase in the standards of living. User expectations from the environment surrounding them have also increased. Thus, the evaluation is two-sided. On one side it seeks to determine how satisfied people are with a particular setting, while at the same time, it "can provide feedback to clients and designers on the impact of settings on behaviour" (Wener. R., 1989, p.228)

Preiser at al. (1988, pp. 4-5) make a categorization of the benefits that POE brings in the short, medium and long term. In this study, the essence of the research is to determine the benefit from short-term post-occupancy evaluation, which Preiser at al. defines as follows:

- Identification of and solutions to problems in facilities.
- Proactive facility management responsive to building user values.
- Improved space utilization and feedback on building performance
- Improved attitude of building occupants, though active involvement in the evaluation process.
- Understanding the performance implications of changes dictated by budget cuts
- Informed decision making and better understanding of consequence of design. (Preiser at al. 1988, p.5)

Furthermore, Riley concerns himself with not leaving the process only for the finished building, preferring instead continuous feedback "throughout the building delivery cycle" (Riley. M., at al., 2013). However, there are scholars such as Watson (2003) who think that POE is such that it can be conducted any time in the life of the building. The essential part of receiving feedback is to fulfil the objectives of the evaluation which are defined in the words of Preiser and his colleague as "an appraisal of the degree to which a designed setting satisfies and supports explicit and implicit human needs and values of those for whom a building is designed." (Preiser at al., p.12)

Over time, research on POE continues to deepen and intensify, not only in its focus, but also in the methods and techniques used. Moreover, in the wide range of POE studies Zimring and Reizenstein (1980, p. 431) consider that three "conceptual dimensions are of particular use in cataloguing them: generality, breadth of focus, and applicability." Generality is dependent on the intended results of the research study and is a good place to start when focusing on the aim of the evaluation. (Zimring, Reizenstein, 1980).

Breadth considers the attributes of the study (Zimring, Reizenstein, 1980). What Zimring and Reizenstein mention as the third dimension of POE is the time of application (1980). Applicability, as an important feature of the POE, aims to improve the living quality of and to influence all the people related to that specific building. The people in consideration include: users, designers, financiers, etc. (Zimring, Reizenstein, 1980). "An important feature in the majority of POE studies is that they involve a systematic investigation of opinions, perceptions, and viewpoints about building environments in use, from the perspective of those who use them." (Salama, 2008, p. 108).

2.1. POE and educational buildings

The literature on the value of POE of educational buildings is tightly connected to the successfulness of building performance. Educational environments should assure quality for high educational achievement. POE as a tool is not only used in the design of

good buildings, but also to improve buildings already constructed.

Educational buildings are among the types of buildings that are most in need of rapid evaluation and maintenance. School buildings have a back history of evaluation that extends to more than half a century. (Lackney, 2001). Plenty of examples are from Scotland and the USA. New Zealand and Australia have also seen a wide range of POE in a wide range of building typologies among which educational buildings make up a considerable percentage (Watson, C., Thomson, K., 2005). The latter is widely covered by Henry Sanoff with his experience in North Carolina. Sanoff's leading institution, the National Clearinghouse for Educational Facilities (NCEF) with its center in Washington, DC brings a wealth of experience in the POEs of educational buildings. Their collection of research on the three known types of POEs; the Indicative POE, the Investigative POE and the Diagnostic POE (Palm, 2007) provide a valuable platform for lessons to be learned by the POE process to identify the usefulness of the existing learning spaces and in gathering information for the future. In England such an assessment is crucial in the recruitment of new students and academic staff (CABE, 2005).

Among the problems identified by the Commission for Architecture and the Built Environment in the new school buildings are problems with acoustics, lighting and improperly ventilated spaces (Wheeler, A., and Malekzadeh, M., 2015). According to Michelle Bound and Claire Flemmer, productivity is improved wherever these environmental issues are considered (2014). For example, temperature and ventilation concerns are grounded in user's asthma problems, good acoustics and spaces without noise are vital for learning, natural light has an influence on the body and human mind, and good maintenance, and flexible design requirements also influence educational outcomes (Lyons, John B., 2001). According to Kahil et. al. (2011) "The educational process and learning activities may be de-motivated and interrupted due to poor environmental conditions." Hence, it is vital to consider environmental aspects in a more efficient way. However, this should not be the only concern. An overall performance of the building including "the building's appearance, its evaluative quality, the meanings and evaluative responses it conveys to the users' should also be part of the investigation (Preiser. W., Nasar. J., 2008).

For example, Chris Watson and Keith Thomson (2005) in their research about bringing post occupancy evaluation to schools in Scotland, gave importance to the increase in the feeling of inclusiveness in the process. The method of participation in those cases is thought to bring greater transparency. Thus, researchers, and in cases where these researchers are the architects of the buildings, architects, assimilate better what is fundamental and do not present subjective illustrations of the results (Watson, Thomson, 2005). In the evaluation of the Faculty of Arts and Science of Dokuz Eylul University, Rengin Zengel and Ilkim S. Kaya (2011) advance the idea of participation. Their research showed that students not involved in the university environment have a great risk of not using the building. Still, their participation and satisfaction may change based on their status in the institution. Freshman have a different attitude compared to seniors, for example. Zengel's research is still not completed. Accordingly, they propose not only student views about the educational building but all of the user's perspectives.

POEs that are conducted in educational settings in Turkey are limited in quantity. Most of the authors focused on campus assessments (Cubukcu, Isitan, 2003) but there are cases that evaluate buildings as well (Dursun, Ozsoy, 2008). POE as a performing tool still plays a small part in the recent boom in higher educational building construction. In 2010, there were about 156 universities in Turkey (Günay & Günay, 2011) and now in 2015 there are about 200 universities (YOK, 2015).

In the context of this growth, examination of the success of an educational building is vital. The benefits that such research bring are for not only the users, but also they offer solutions to school management, government

Figure 1. *View of the Lecture hall location (University Construction and Technical Support Office).*

and designers. Additionally, lessons learned from this literature review revealed that there are few, if any, cases where the designers themselves conduct POEs for evaluating their own building performance. From time to time, POE has served as a tool for measuring user satisfaction. Planning and applying POE in Turkey is still a research field to be developed. Nevertheless, bringing together the users' and architect's thoughts is a crucial part of achieving the project's set goal.

3. Case study: Lecture hall, Istanbul Technical University Ayazaga Campus

The lecture hall taken as a research case in this study is located in the Istanbul Technical University's Ayazaga Campus. The building was designed by Hasan Sener and Ahsen Ozsoy and was constructed in 2011. It is thought to meet the need for high capacity lecture halls for the whole campus. The building is located in the social-cultural zone defining the main open public area of the Campus. As a monolithic building of steel construction containing four stories, it provides 9200 m2 of enclosed area. The building with its 12 grand lecture halls serves 1700 students (Binat & Şık, 2014).

The Lecture Hall site (fig1. is in the centre of the campus, while the structure is recessed to offer a wide green area. Such an approach in design brought richness to open area socialisation spaces for the whole campus (Erkol, 2015). The glassy main façade of the building provides a visual connection as well as a physical one. The canteen, as the most populated space in the building, dissolves naturally into the large open green space in front of it.

Spatial divisions in the building layout show a hierarchical organisation from the ground floor that is public and lively, to the upper floors which are more private and quiet. Moreover, there are spaces where students of different academic programs attend common lessons and spaces where lectures that are more specific take place. The building offers spaces that houses lecture rooms, seminar rooms, computer laboratories, instructors' rooms and a cafeteria (Binat & Şık, 2014).

The building is relatively new (5 years) but as Wener (1989, p. 228) says "the more immediate and discreet the feedback, the easier it is to change and improve the system" . What should not be forgotten here is the fact that students are there for 4 years, so it is the ideal time to elicit their opinions, reactions and comments about the building.

The Lecture Hall was recognized in the Building Category at the 2014 National Architecture Award Programme (N. Muge Cengizkan, 2014). Such an award makes it even more important to put into context the results of the study.

3.1. Aim and methodology

The aim of the research paper is primarily to evaluate and receive feedback about a building that is being used by a huge number of students. Additionally, we want to explore and investigate qualities, characteristics, needs and satisfaction toward the Lecture Hall building in the Istanbul Technical University campus.

It will be a critical evaluation from the occupant point of view. The main objective depends on the holistic approach of POE to assess functionality and satisfaction of the building as an educational building of mixed use. The research is based on a mixed approach to determine the quality of the building and how the building impacts the life of the campus occupants. Tools for gathering information included questionnaires, in-depth interviews, analysis of architectural design, direct ob-

servations of the students' behaviour, experience of spaces, and photographs to document the building.

The building design analysis takes into consideration flexibility in the adapting of spaces, space hierarchy and circulation with connectivity. Direct observation is documented by photography and behavioural maps in different time intervals and weather conditions.

The questionnaire was applied to participants in the midterm week of early summer 2013, before the term ended. On the other hand, the researcher observations have been done periodically until a short time ago. The researcher monitored recent interventions to the building such as the addition of an open café in the south façade, and the reorganisation of some interior spaces on the ground floor.

The study consists of two main points. Firstly, the overall architectural quality, including functionality, accessibility, size of the spaces, safety and the aesthetics of the building. Secondly, environmental factors such as; heat control, temperature significance at work, noise, ventilation and natural lighting are considered.

The interviews took place in the different areas of the building in order to get the students' honest opinions. Though they filled the questionnaires by themselves, the interviewer was present to elicit extra information as the students considered their responses.

3.2. Findings

The research was conducted in three sections. The first section features the researchers' observations in terms of building usage. The second section presents the results of the questionnaire to measure the level of satisfaction in the main spaces of the building. Specific findings for specific units could be the basis for providing possible solutions. The third section contains the data/ information/comments of the Construction and Technical Support Office of Istanbul Technical University.

- Section 1-Researchers' observations

In examining the Lecture Hall building, a number of mechanisms were used, among which the first is the researcher's view. Initially, the researcher tried to keep in mind the building design philosophy while visiting and spending time in the space in order to experience it first-hand. Then, gathering articles and other written information helped not only in deepening knowledge about the building but also in establishing further steps and in preparing the questionnaires.

The building based on the observations of the researchers is surveyed in terms of the space's function and the way students use it. The table below shows the areas and the way they are used by the occupants. It represents not only the variety of activities that take place in the building as a whole, but also the large variety of activities that the cafeteria space in particular serves. It gives the impression that the building is a second library or study area where team work and discussions can take place.

The researchers made observations before and during the interviews or conversations with the users. It is of note that the student response in general was that the building fulfils their needs on the whole. Spaces are accessible and easily identifiable.

In the time of the research, ground floor was not accessed from all the doors the design offers. Students could not leave the building wherever they wanted to, despite the availability of exists. A considerable number of the students visit the building to use the canteen in the ground floor, but not the entire building.

We use the concept of the lecture hall as an additional campus building where, besides the academic spaces (auditoriums and seminar rooms) there are spaces where students can socialize. This concept is already confirmed by students' responses. It can be observed from the steadiness of their comments that the building in general terms meets their needs. The highest level of agreement is on the availability of natural light and the dimension of spaces. In particular, the cafeteria had the highest rate of positive responses, focusing on the natural light.

This research as mentioned above was based on a series of short non-technical statements that were focused on

Table 1. *An analysis of the use of spaces (author's observation).*

SPATIAL CLASSIFICATION	ACTIVITY	ATTRIBUTES
Transitional spaces	Entrance foyer	Social, quiet, noisy
	Corridors	Social, accessible
	Staircases	Accessible, social
Indoor spaces	Lecture room	Writing, reading, teaching, collaborating
	Seminar rooms	Writing, reading, teaching, collaborating
	Academic offices	Writing, reading, quiet, noisy, independent
	Multipurpose areas	Social, quiet, noisy, independent, group, writing, reading, teaching, collaborating, eating, drinking, manifestation ceremonial events
	Toilets	Accessible, clean
Outdoor Spaces	Outdoor entrance	Talking, smoking, drinking, socializing
	Outdoor café	Talking, smoking, drinking, eating, reading, writing, socializing,
	Large green space area	Laying, reading, smoking, drinking, eating, talking

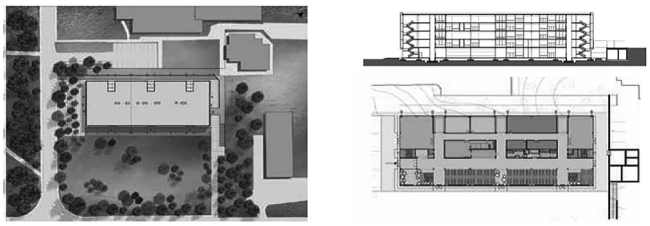


Figure 2. *Analysis of the architectural design of the building, according to the spaces mentioned in the questionnaire (Binat & Şık, 2014).*

Figure 3. *On the left the main entrance; on the right the behavioural map of the users (courtesy of the authors).*

functionality, the quality of the building and of course, the impact the building has on student life.

Asked about the accessibility of the building, all occupants replied that it is very accessible from the road. On the campus, there are several signs that guide you to the building. There is, however, a problem with occupants defacing the glassy facade at the entrance in front of the door that identifies the building. This makes it more difficult to recognize the building for those looking for it for the first time (Figure 3).

On the other hand, the students were very satisfied with the signage inside the building. These clear signs made it easier to remember and identify the spaces they wanted to reach. That said, in the discussions there were comments about the lack of information in the entrance foyer to help freshmen orient themselves in the building.

Vertical and horizontal accessibility was considered very adequate. Most of the participants of the evaluation supported the idea of not facing difficulties. For instance, they defined the lifts as spacey, comfortable and of an adequate size.

Lately, changes have been made on the ground floor. A gift shop, a stationary shop and an open-air café on the south façade are the new components that have been added. The open-air café, has removed the wooden deck which was part of the original design and has generated a canopy on the south which is a poor quality intervention for the Lecture Building.

- Section 2-Questionnaire results of the occupants

Having briefly reviewed the building observations, POE from the standpoint of the users plays an important role in order to provide a broad view about the building. Thus, another mechanism conducted was the questionnaire. It focuses in from an overall evaluation of architectural features to specific technical aspects of the building spaces. 27 users of the building were contacted by means of face-to-face meetings on the promises of the building. Almost all the interviewed students, lecturers, cleaning and security staff used the building more than 3 days a week for at

least 2 hours a day. Questions emerged along the way regarding the reasons for using the lecture hall. They were asked to evaluate in general the architectural design qualities from both an aesthetic and a technical perspective.

Sometimes, especially in the examination periods, the demands on the ground floor of the building exceeds its capacity of use. Students look to use it frequently. Such a situation is confirmed by the interviews as well as by the on-site observations. 60% of the interviewed students visit the student centre frequently. Within this segment, the rate of occupants using the building varies from 3 days to 6 days a week. The busiest period seem to be the midterms and the final examination periods, since the building offers a huge space where students feel comfortable for group work and discussion. This kind of collaboration cannot take place in the library due to the need for silence.

From the responses we see that the usage of the building was the greatest between 09:30 and 14:30 and functions primarily for studying and following lectures (60%), then relaxing, eating and drinking something (43%). The staff at work in the building make up the rest of the functionality of the building. Among the responses interviewers elicited were unexpected details like the fact that users prefer to use the building just for having a cup of tea. "The tea there is delicious" was one response.

The graph below (table 2) gives an overall evaluation of the building from the students' perspective. Clearly, occupants expressed their positive feelings and experiences about the building. Students expressed that the configuration of the spaces were comfortable and aesthetic, though there were students who would prefer more colourful environments. Additionally, students expressed their appreciation for the spaces considered in the building. They especially pointed out that the learning space met their spatial needs.

The variety of spaces and flexibility in the entrance hall promote student learning. Thus, for a better and easier evaluation of the building, the questions were directed to the properties of each space individually. More precisely, the building was divided into lecture rooms, seminar rooms, academic offices, circulation and what the students gave most importance to - the entrance hall. This hosts many activities you would expect to be found in the cafeteria

Design qualities such as dimensions, accessibility, and aesthetics, in addition to the physical environmental factors like lighting, noise and thermal comfort were criteria upon which the specific rooms of the building were evaluated. In this aspect let's see the results of each space individually.

Lecture Rooms

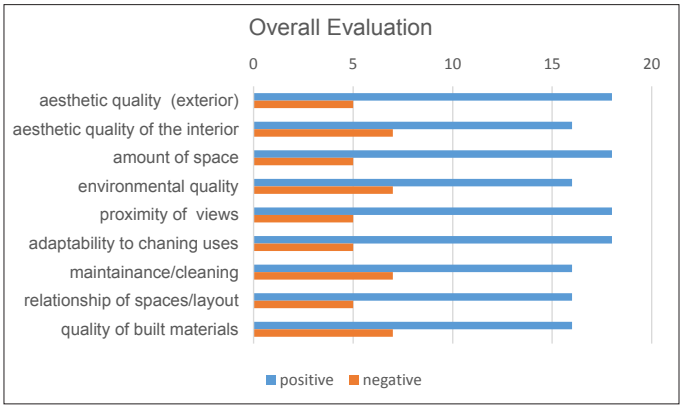
There are 12 lecture rooms in the building. This translates to 1700 students using the building at the same time. They are double height rooms and are located on the first and second floors of the building.

The students were asked about the frequency of use of the lecture rooms in comparison to other spaces. Most of them (72%) pointed out that it is the second most used space, after the cafeteria. They expressed that they were glad to have lectures in such spaces. It was explicitly stated that the well-designed spaces were characterized by comfortable dimensions and ample daylight. More than half of the participants in the survey (56%) were critical about ventilation and the noise that it brings as well as heat control (75%). The latter is mentioned in relation to its influence on learning and productivity, and 80% of the students agree on that. Their evaluations and degree of satisfaction is tabulated below in Table 2.

Cafeteria

Using the same adjectives and grad-

Table 2. *An overall evaluation of the building.*



ing technique in the study, students were asked to evaluate the main space (entrance hall) which has a multipurpose character. Likewise, students are impressed by cleanliness and usefulness, and they are contented with the quality of lighting, it's large and comfortable dimensions, as well as the good ventilation. They do not share the same opinion about temperature in the building, finding it too hot in summer as well as too cold in winter. Noise is another problem raised by students, but overall they find the hall inviting, relaxing, large enough and functional.

On the whole, users also find it aesthetically attractive. Only a few (13%) would prefer space that is more colourful. Nevertheless, it is a space heavily frequented and used for a variety of purposes such as eating, drinking, chatting, studying, socializing, and protesting (Figure 5).

The most frequented time intervals vary according to time and space. In the fall term the most frequented space is the ground floor, due to the bad weather, and during the spring term is the open area in the south façade. Usage peaks during examination weeks and daily lunch breaks.

The schema in the figure 6 shows frequency of use, circulation and the way in which students use this space. Group studying, sitting, having a cup of tea and using the corners as individual places are among the most popular activities in the indoor usage of the building. Reading, having a cup of tea, smoking, talking, laying in the grass and even playing are among the most popular outdoor activities (Figure 6).

The changes in the south façade over time (Figure 7) have also affected the usage of the outdoor spaces and the activities that take place there. The introduction of an overhead shelter is thought to have been made as a result of students' needs. The use and the number of activities in the outdoor space has been improved by this new structure, even though the architects were not consulted about this addition. This kind of a supplement attached to a the coffee shop has encouraged students to frequent the outdoor space more and has led to the space to becoming more vibrant.

Coffee is a simple beverage to be consumed outside, accompanied by a cigarette. It enriches the social and public life of the students. The use of the canopy should have been thought of in collaboration with the designers in order not to create physical barriers between the indoors and outdoors and psychological barriers between users. Based on the architects' conceptualization of transparency on the ground floor who wanted to achieve a diffuse border between the interior and the exterior, the new addition is misleading.

Seminar Rooms

Seminar rooms are located on the south zone of the building. The south façade is composed of movable perforated metal plates that help in saving energy and controlling light. Additionally, these spaces have also individual control of ventilation. Findings of users' interviews about the seminar room (Figure 8) have shown appropriate

Figure 4. *(on the left) View from the lecture hall. (N. Muge Cengizkan, 2014); (on the right) view from the hall in front of the lecture hall. (Courtesy of the authors).*

Figure 5. *Examples of the way the ground floor is used (http://www.sendika.org/wp-content/uploads/2014/03/itu-ders-1.jpg).*

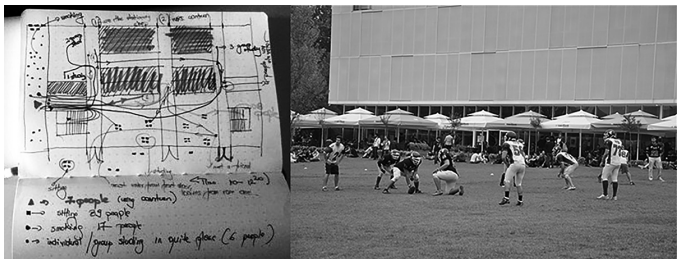


Figure 6. *On the left, usage of the hall in 15 minutes' survey (courtesy of the author); On the right activities in the outdoor (http://www2.itu.edu.tr/tr/haber/?98f324b9-e233-45c7-b8e2-216ec90d76fb).*

ventilation and natural light. In addition, it was found that the dimensions were adequate for the function that the seminar rooms serve. More than 60% of the users evaluate these rooms on par with the other spaces, except that they find the heat control is better in the seminar rooms when compared to the other spaces. This is due to the individual control of ventilation.

Academic Offices

Teachers who use the offices pointed out their satisfaction at being able to spend their working hours within this building. They expressed that the spaces are large, quiet, well-ventilated and well-lit. At the time the questionnaire was conducted, heat was a persistent problem here as in all other spaces.

Circulation

Among the questions asked, was an evaluation of circulation (fig.9). All users show the same high level of satisfaction. Elevators and wide staircases, plus the horizontality of the building layout seems sufficient to accommodate the student flow.

Table 3 summarizes the responses collected on spaces and the occupants' satisfaction level. In general, users are very "satisfied" with the natural light, ventilation and dimensions, but "dissatisfied" with noise, temperature and heat control.

- Section 3-University Construction and Technical Support Office Review

Many approaches to Post Occupancy Evaluation include interviews with the designers, stakeholders and other important role takers in the buildings. The construction and maintenance staff may bring another perspective. They are aware of the positive and the negative aspects concerning the functionality of the building. They know how efficiently the Lecture Hall works. Their thoughts, added to their ability to effect change, and the users view, may facilitate improvements in building.

The technical data may provide enough information to be considered in building maintenance. It is that part of Post Occupancy Evaluation that deals with the technical aspects of the setting. To achieve this, in depth interviews were carried out with 4 people on duty for the building construction and maintenance.

Figure 7. *Facade before (above) and after (below) the addition of a canopy (Courtesy of the authors and http://wiki.eanswers.com/tr/%C4%B0stanbul_Teknik_%C3%9Cniversitesi, retrieved 10 February 2016).*

There were 5 main issues upon which the interview was built: sustainability, safety and security in the building, materials' HVAC, and sanitation.

The interview started with questions gathering data that would help the evaluator understand the building and its challenges better. The researcher discovered that the building costed less than it was predicted, while the construction lasted 6 months longer than was planned.

Staff stated that the building does not use any type of renewable energy. Instead, the double skin facade satisfies not only the level of natural light and the control over it, but at the same time it enables a reduction in electricity consumption. The teaching staff gave maximum points to the double skin facade for their not having to deal with glare from sunlight. Meanwhile, energy saving for the artificial lighting is achieved by sensory florescent lighting fixtures. The same method is used even in the wet spaces that employ photocell sinks. The staff brings up the challenge of the lack of an automated system that

Figure 8. *View from the seminar room (courtesy of the authors).*

Figure 9. *View from the circulation (courtesy of the authors).*

would give them fuller control over the artificial lighting.

The building performs well in terms of natural ventilation. The construction and management staff are of the opinion that the building is conducive to natural ventilation. In the time of the research, there was a problem of not having enough security staff to open the all present doors. This situation decreases the possibility of natural ventilation. As an addition to that, the work coordination group acknowledged the existence of some management problems in the building, this being one of them.

Assessment on safety and security shows that the building is equipped with safety instruction in case of fire or other hazards with the help of alarms and guiding panels. The fire alarm works properly, and has been tested by a fire drill.

The building does not provide lockers for students to store their books, bags and personal belongings. Monitoring the spaces is not possible as there is no camera observing the space. There is, however, a plan in place to address this soon.

Feedback about the materials used in the building is full of satisfaction for the fact that the materials used are acoustic absorbers and they are in good condition. The staff believes that

Table 3. *Satisfaction level in specific spaces.*

	Natural light	Temperature significance at work	Noise	ventilation	dimension	heat control
Lecture rooms						
seminar rooms						
academic offices						
cafeteria						
circulation						

less satisfied | equally satisfied | more satisfied

they will remain so for a long time. They commented that epoxy and wood as materials help in reducing the potential noise in the building.

Heating in the building is provided by a central system. There is no individual control over the spaces. The noise in the lecture classes is such that it disturbs the students. Other complaints came from the insufficient plugs for computer usage. The work coordination staff claim that they had dealt with the students' request by increasing the number of plugs. Apparently, they are still not enough.

Among the issues covered in the interview were that of sanitation and the wet spaces. Student in general were very satisfied with the cleanliness of the working and wet spaces. Toilets are well equipped. There is no sign of vandalism by users, but the technical staff complains about basins being frequently out of order and there being no way of repairing them, except by replacement.

The findings of this section have outlined the importance of management in improving building performance.

4. Discussion

Educational building assessment deals not only with the physical quality of the building, but also with what the building concept offers to the users. The latter is merely anticipated. Agreement in the feelings, thoughts, and expectations of the architects to the users' feelings, experience and perception are signs of an outstanding structure.

The survey results showed that the designers' objectives and the researchers' findings agree. For example, the ground floor that was envisioned by the architects as a social area to be highly frequented, public and lively, is not only that, but the survey also showed that pockets of the space offered privacy, individuality and peace. The building is of mixed-use and the students appreciate the common spaces. Lecture halls and classrooms are more than comfortable. Functionally, the building is responding well to the goals it had. Size of the spaces, natural light and the control of lighting, materials used in the building and the colour of the building are among the elements that users appreciate in the setting. Heat control, ventilation, noise and its impact on learning are among factors that need to be thought through more in terms of management of the building. On the other hand, the Construction and Technical Support office has always been responsive when giving assistance for the maintenance of the building. They have increased the number of plugins, and replaced toilet equipment in need of repair. In addition, they have been increasing the variety of foods in the cafeteria and launched an open-air café, indicators that this office is responsive to user needs and collaborating.

The use of an innovative system in the wet spaces and resulting impossibility of repairing them is the reason why technical staff address it as a problem which has been solved by time. As for the issues of heating and cooling, it appears to be a problem of management and budget. During the interviews with the technical staff, researchers passed on the student complaints about the air conditioning, and during recent observations, it was found that this problem has ended. The whole building is now fully air-conditioned.

5. Concluding remarks

Evaluating is as important as designing. It tests the design quality with regard to user perception. Since the impact of design quality on learning environments is crucial for raising responsible and successful professionals (students), POEs are needed and desirable in order to recommend new proper design, and also to guide managers of the building to improve learning outcomes. Application of this study aims to improve the quality of spaces.

More in the line of Zimring(1980), this paper shows the multiple facets that the study intended to address. It is not focused only on a single characteristic. With the help of the questionnaires, interviews and direct observations, the intention was to evaluate the building performance.

In the present research, the "ITU Lecture Hall Building" is evaluated by user perception as to the quality of the environment. The data collected gives certain clues to help effect positive change.

The process of achieving feedback, with the objective to find out the problems and to focus on them (Watson, 2003), can lead to improved performance of the evaluated building (Vischer. 2002). Thus POE, can be considered as a holistic method of knowledge accumulation.

In this study, Post Occupancy Evaluation of the Lecture building on the Istanbul Technical University campus, the relation between users and the building was investigated. The idea behind it is not to have feedback on specific design decisions, but to suggest changes to improve students' quality of life. The findings of the research show that the optimal functioning of the building is related to design as well as effective management. However, the time that this study was conducted and the introduction of new interventions in the building, further research is recommended in the future.

There was a time limitation and seasonal limitation in the research. Results should be tested to newly designed units that are added to the building. In addition, a limited number of students and other users' participation indicate the need for applying the study to larger sample sizes.

Nevertheless, the findings showed a need for air conditioning, a crucial element in the quality of life of the building users, which were kindly considered by management staff. In this respect the paper achieved its aim of improving space quality. Buildings are prone to continuous changes during its course of use. Thus, it is important to have a constant quality improvement check.

To conclude, the design and implementation stage in building learning environments is vital, but of even greater importance is the role of effective management. As the findings have shown, the majority of results are in line with the designers' predictions. Moreover, when designers, occupants and management cooperate the satisfaction is high.

Bringing together evaluation and reflection, this study may be considered a guide for the University to apply the same methodology in further studies related to the Lecture Hall or other buildings.

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