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A Case Study on Experiential Learning in Architecture: Accessible, Climate-Responsive, and Flexible House Designs

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Abstract: *Architectural education is based on acquiring theoretical and applied knowledge. As a result, experiential learning theory was frequently applied to architecture design courses. As experiential learning refers to gaining knowledge by doing, it allows the students to experience implementing the theoretical knowledge and refine their design solutions by communicating with the teachers. The present study aims to integrate experimental learning in a theoretical course named "Building Information" on housing designs for first-year undergraduate architecture students. After eight weeks of the theoretical lecture period, the students were assigned to design a house using one of the specific approaches, namely accessibility, climate responsiveness, or flexibility. The occupants of the houses were defined, and the students determined their spatial needs. After the critique sessions, the house designs were presented with drawings and analogue models as the final product. Three selected examples from each design approach were evaluated in the study. The results showed that the students gained and implemented theoretical knowledge more efficiently with the integration of experimental learning.*

Keywords: climate responsiveness, accessibility, flexibility, housing design, architectural education, experiential learning

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Introduction

Experiential learning is one of the eminent approaches in education that allow the students to go through the learning process by collaboratively discovering and problem-encountering/solving with a minimum amount of guidance from the instructor (Kirschner et al., 2006). This approach to learning has been addressed by different names in various studies, such as problem-based learning (Barrows & Tamblyn, 1980; Schmidt, 1983), experiential learning (Boud, D., Keogh, R., & Walker, 1985; Kolb, 1975), inquiry learning (Papert, 1990; Rutherford, 1964), and discovery learning (Anthony, 1973; Bruner, 1961). Under these various names, experiential learning methods were studied to teach students targets in different scientific areas (Kirschner et al., 2006).

Architectural education has been one of these scientific areas that adopted experiential learning theory. The nature of learning by doing and critiquing processes

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of the design classes makes it suitable for implementing this theory. There are several studies applying experiential learning in architectural design courses. Demirbaş and Demirkan (2003) conducted a study evaluating the effects of Kolb's experiential theory learning styles. Their study comprised a first-year interior design course at Bilkent University, Turkey. Based on their research, assimilating learners obtained higher scores, while accommodating learners had the lowest. Kvan and Jia (2005) explored the learning styles of architectural students and their reflections on their performance at the Architectural School of Chongqing University in China. Their study with 91 undergraduates showed a significant correlation between learning styles and academic performance.

In their study, convergers obtained lower marks in one class while assimilators were successful in another. Djabarouti and O'Flaherty (2019) investigated the impact of experiential learning in architectural design at a school of architecture in the UK. They divided the students into two groups; while one was exposed to experimental hands-on learning, the other was not. The results showed that integrating experiential learning in the architectural design studio could enhance the student's ability to understand the complexities of specific topics better. Yüksel and Uyaroğlu (2021) focused on adopting experiential learning in their introductory design studio class at Baskent University, Turkey. The teaching target of the studio was developing students' comprehension and internalization of body and space relations. According to the study, the experimental exercises contributed positively to the students' acquisition of body and space relations.

The present study employs an experimental learning approach in a first-year architecture theoretical course called "Building Information" at Süleyman Demirel University, Department of Architecture. The learning goals of the Building Information course are the housing theory and components in terms of architectural design. The students were asked to design a house considering one of the specific design approaches accessibility, climate-responsivity, and flexibility.

The study aims to direct students to employ the learned knowledge in their design practice in this context. The study results are presented by the analogue models and the evaluations of the house designs of the student groups on three different design approaches.

The basis of experiential learning theory is about utilizing experience as the most effective instrument for learning. The theory defines learning as the process whereby knowledge is produced by transforming the individual's experience (Kolb, 2014). According to Kolb, the experiential learning theory is based on the learning approaches of Lewin (1948), Dewey (1934), and Piaget (1970). The model of the theory comprises a four-stage cycle shown in Figure 1. It suggests that students grasp the knowledge through Concrete Experience (CE), then Reflective Observation (RO), followed by Abstract Conceptualization (AC), and the subsequent Active experimentation (AE), and then it goes back to the beginning of the cycle. These phases must be processed to achieve efficient learning (Healey & Jenkins, 2000). Kolb defines four learning styles: divergent, assimilative, convergent, and accommodative. The students' learning styles depend on which of the four stages they prefer dominantly (see figure 1).

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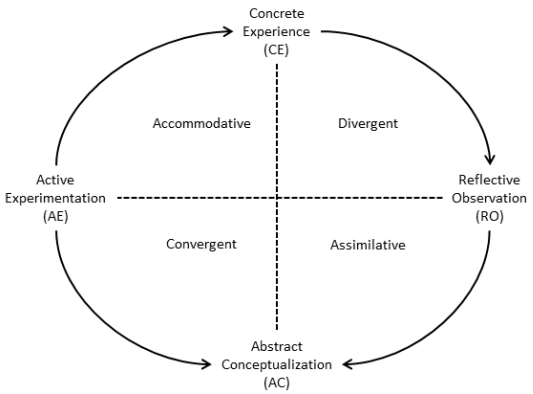

Figure 1. Kolb's experiential learning four-stage cycle (Kolb, 2014)

Kolb's Experiential Learning Theory has been adapted to several education departments on the undergraduate level, including architecture (Srinivasan, 2011). The experiential learning theory is commonly implemented in the architectural studio because the students perform the applied design processes (Lueth, 2008). In a typical design studio, students are assigned to accomplish a creative decision-making process supported by technology, history, and theory. This process necessitates problem-solving, effective communication, and integration with different areas (Kurt Çavuş et al., 2021; Mackintosh, 2014; Ünver, 2021). This process relies on the relationship between the design student and teachers through criticism and feedback. Thus, the main objective is to encourage critical thinking and integrate the experiences of acquiring knowledge of architectural design. As Dewey (1934) and Kolb (1975) claim, the experience needs to be the core element of learning, which is also indispensable for architectural education (Yüksel & Uyaroğlu, 2021)

Methods

The research material of the study comprises a first-year undergraduate architecture course named "Building Information". The teaching goals of the course are principles of housing design, components of houses, and activity areas within. The theoretical lectures on housing topics were given during the eight weeks. The students were asked to choose one of the accessibility, climate responsivity, and flexibility design approaches. After literature research on the approaches, they were given four weeks to define the occupants of the houses and specify the spatial needs that would lead them to their design ideas.

The final products were not predetermined outcomes for the students or teacher; instead, they resulted from critical thinking and decision-making. Thus, the critiques held during classes played a crucial role in the social interaction between the teacher and the students. As Ashton (2000) suggested, the students can reflect on their learning experience on the design product when the communication is well provided in the critique sessions.

A review of the final products of housing designs was done on the 1/20 detailed analogue models. The assessment criteria reflected the selected design approach, occupancy scenario, and provision of spatial needs on the houses. Three selected examples of house designs from each design approach were presented in the study results. The outline of the methodology of the study is given in Figure 2.

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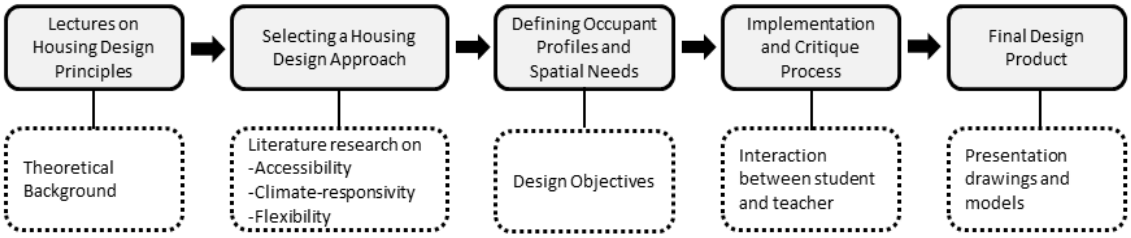

Figure 2. Outline of the study.

Result and Discussions

Accesibility

The accessible housing approach refers to design to ensure an independent life for occupants with disabilities or at an older age. It was expected that the student groups to design the house according to the accessibility of the users and provide them with spaces where they could continue their life without obstacles.

In Figure 3, the example design of Student Group 32 is given. The house was designed for a disabled sculptor by Student Group 32. It includes an entrance hall, bath, open kitchen, living room, physiotherapy room, and sculpture atelier. All of the furniture, spaces, and heights were chosen to accommodate wheelchairs.

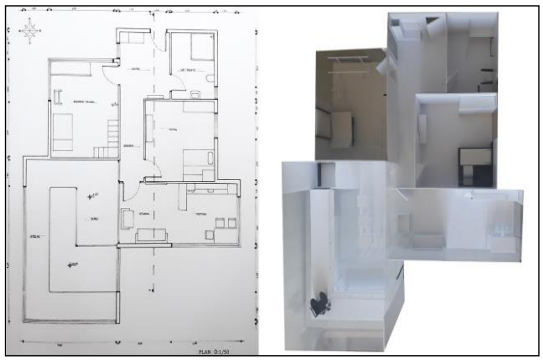

Figure 3. Plan and model top view of the example house of Student Group 32 – Accessibility.

In Figure 4, the example house design of Student Group 5 for the accessibility design approach is presented. It is designed for a single disabled musician. Inside the rectilinear outline of the house, an elevated and 45° rotated stage is placed for the performance's visibility and audibility. Around the music stage, the functions of the entrance hall, kitchen, living room, kitchen, bathroom, and bedroom are located.

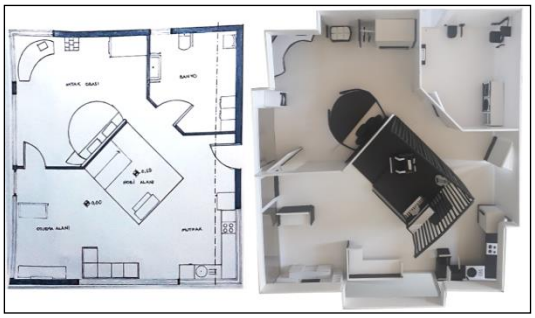

Figure 4. Plan and model top view of the example house of Student Group 5 – Accessibility.

In Figure 5, the house design of Student Group 38 is given for the accessibility content example. It is designed for a single older adult who has Alzheimer's disease. The house is designed with longitudinal hung memory boards in the vertical circulation, containing photos and reminder posts to help the user's disease.

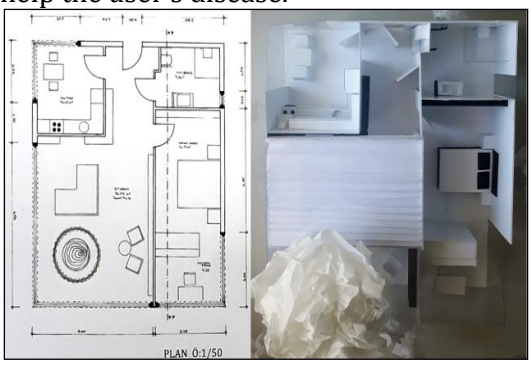

Figure 5. Top view of the example house of Student Group 38 – Accessibility.

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Climate Responsivity in Housing

In this housing design approach, the student groups were expected to choose a climate region in Turkey and design the house according to that climate. The students conducted literature research on the vernacular houses of the specific region that they chose.

In Figure 6, the example design of Student Group 37 is given, located in Turkey's east climate region. The house was designed for working bachelor roommates by Student Group 37. It includes an entrance hall, living area, study room, bathroom, and bedrooms. As the climate of East Turkey has cold winters and hot-arid summers, students decided to design an underground house using the slope and leave only the south façade open, as the eaves efficiently provide sun control. The underground façade is protected by the cold winds in winter and overheating effect in summer, together with the heat capacity of the earth.

Figure 6. Plan and top view of the example house of Student Group 37 – Climate-responsivity.

In Figure 7, the example house design of Student Group 34 for the climate responsivity content is given. It is designed for a single person who works as a yacht designer in his home office in the northern climatic region of Turkey. The house comprises an entrance hall with its ship atelier on the ground floor, while on the first floor; it has a living room, kitchen, bathroom, and bedroom. As the most significant specialty of the climate of Northern Turkey is the rainy weather, the roof of the house was designed with a steep gable roof, just as in the region's vernacular architecture. The house's orientation is south, and the building was designed with a wooden structure, as it is the local material.

Figure 7. Model views of the example house of Student Group 34 – Climate-responsivity.

In Figure 8, the house design of Student Group 40 is given for the climate responsivity content example. It is designed for a single-parent family interested in pottery in the climatic conditions of Southeast Anatolia. The spaces in the house are designed around an interior courtyard, which is the most significant specialty of the Southeast Anatolian vernacular houses. The courtyard has a swimming pool used by the users in summer and cools the air by evaporation in the hot-arid summers of Southeast Anatolia.

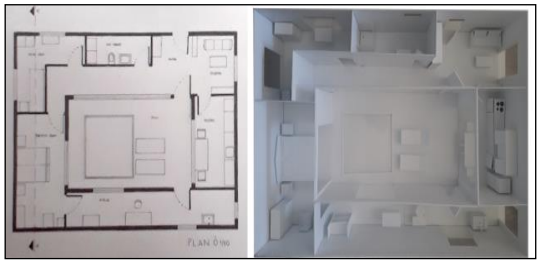

Figure 8. Plan and top view of the example house of Student Group 40 –Climate-responsivity

Flexibility in Housing

In this approach to housing designs, the student groups were expected to define a necessity for transforming the space to change the internal functions according to the users' needs. The flexibility of the design was limited by the changeability of

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the furnishing, moveable walls and separators, and operable façades

In Figure 9, the example design of Student Group 33 is given. The house was designed for a university student by Student Group 33. It includes an entrance hall, a bathroom, and a total space that contains sleeping, living, and kitchen functions. Since the occupant has indoor sports hobbies, the students designed the entire space as a flexible training area with moveable furniture and walls.

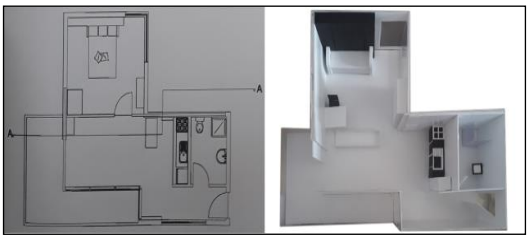

Figure 9. Plan and top view of the example house of Student Group 33 – Flexibility.

In Figure 10, the example house design of Student Group 2 for the flexibility content is given. It is designed for a couple without children that have office functions in their house. The house comprises an entrance hall, office rooms, WC, kitchen, living room, bedroom, and bathroom. Student Group 2 has designed a moveable wall system in the living area that can be transformed into a smaller living room and an extra bedroom in case of need for a bedroom for a child or a storage area.

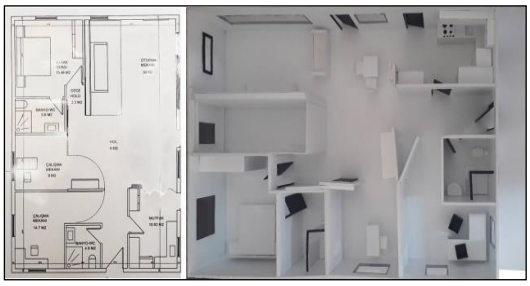

Figure 10. Plan and top view of the example house of Student Group 2 – Flexibility.

In Figure 11, the house design of Student Group 18 is chosen for the flexibility approach example. It is designed for working bachelor roommates; one is an architect, and the other is a pianist. The house comprises an entrance hall that meets the elevated piano area, separate bathrooms, WC, kitchen, living area, architect's office room, and bedrooms. The students located moveable separators between the living area, kitchen, and piano space to be transformed into the options of one big living room and separate rooms in case of need.

Figure 11. Top view of the example house of Student Group 18 – Flexibility.

Integrating a theoretical course on house design principles with experiential learning allowed students to apply the learned knowledge. The students' feedback approved the positive influence of applying the theoretical knowledge by design task. Similar remarks were reported by the students in a previous case study at Istanbul Technical University in 2015-2016 (Bregger, 2017). Compared to the earlier theoretical lecture period, knowledge of house design approaches, defining occupants, and designing in response to their needs was delivered more efficiently by including four weeks of integration of an active learning period.

The benefits of introducing active and experiential learning to the theoretical courses in architecture were also regarded by the previous study by Salama (2010). Critique sessions during the design period were constructive in terms of questioning

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and retransforming the knowledge acquired by experience. The influence of critique sessions on communication between the student and teacher in design teaching was also regarded by Oh et al. (2013).

Conclusion

Experiential learning is a widely respected approach in architecture education as it reinforces the knowledge elicited by the students as they experience the process. It allows the students to employ the learned knowledge in their designs and assume it by trial and error. So, the present study sought to exemplify experimental learning in a theoretical course of Building Information for first-year students, which is concerned with housing knowledge at Süleyman Demirel University, Department of Architecture.

It is aimed in the study to make students employ the learned knowledge in the practice of their designs in terms of the specific approaches of accessibility, climate responsivity, and flexibility. The students were asked to define an occupant type according to the selected design approaches. Then, they were to find the most proper solutions for their house designs regarding the identified variables.

The research results were presented in the study by interpretation of the analog models and drawings of the house designs of the student groups. It is observed that experimental learning helps architecture students pursue further than the learned theoretical knowledge. Further studies are needed to assess the effect of experimental learning in theoretical architectural classes to achieve a better quality of education.

Authors statement

The authors hereby declares that this research is free from conflicts of interest with any party

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Author(s) Contributionship

Ali Berkay Avci contributed to research design preparation and literature review, data collection, data visualization, data analysis, and article drafting.

Şefika Gülin Beyhan contributed in supervising the research design, data analysis and reviewing the article draft

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