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Virtual Education Trials and Evaluation Process in Architecture

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Abstract: The word 'virtual,' which the entire world has become familiar with during the pandemic in 2020, was a phrase that is primarily applicable for higher education in various departments. However, for design students, the online learning medium is a new concept, and the question of how the virtual teaching environment affects the design capability of students is pertinent regarding architectural and design education. This study explores how architectural students' perception of their education medium affects their success in organizational behavior. In this context, an in-depth online interview that aims to understand the perception of architectural students regarding their education medium was conducted to analyze the effects of the learning medium on their educational success. The findings obtained in this study may improve architectural education concerning the virtual teaching experience.

Keywords: Architectural education, sustainable education, virtual education, online learning, higher education, architecture

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Introduction

Acts of human beings vary depending on their genetic structure and environmental conditions. There is an ongoing debate in psychology regarding the genetic-environmental factors that may affect and define an individual's ego, self-consciousness, acts, and intelligence. Despite various studies on the effects of genetic and environmental factors on individuals, there is no concrete result that one of them is more effective than the other. However, it has been established that both genetic and environmental factors may affect the individual's behaviour. This is because their acts and actions need a suitable environment. The impact of the environment on human psychology cannot be ignored, and the impact of the situation may change the regular pattern of human behaviour. In the field of environmental psychology, the interaction between the environment and human behaviour has been researched since the 1960s and has reached a milestone in recent years. This field, which studies human behaviour patterns in specific settings, closely interacts with the subject of architecture. There are many results concerning how specific surroundings affect organisational behaviour patterns. At the beginning of the COVID-19 pandemic in 2020, research on the different settings concerning the effects on human behaviour became especially important. From this perspective, the question of how architectural students perceive their teaching environment concerning changing conditions is important, especially while dealing with this global pandemic and the common patterns of generation Z (Gen Z).

Environmental effects on human psychology show common results over generations. Thus, the behavioural questions cannot be examined without considering generational background. Gen Z'ers (digital natives and information curators) who were born between 1995 and 2010 are known for their web-centric attitude, although most of them tend to work individually, as recent studies have shown (Mohr & Mohr, 2017). The generation's learning habits, which depend on the digital world, may influence communication praxis, especially in working groups and class activities. Individualisation, as this new generation renamed, provides a self-structured programme in which one decides to study whenever and wherever he or she wants. The flexibility in place and time paves the way for developing new interests, controlling daily programmes, and establishing deliberate schedules. According to research, their passion for change fuelled by instant information available through the Internet leads to a lack of patience, which is required for rigid working programmes. For example, most of the Gen Z'ers want to work in at least two countries, prefer technology-based learning as technology is considered their sixth sense, most of them attaches importance to new experience, and most importantly, they are willing to improve and are receptive to innovation as they seek to change (Berge & Berge, 2019). Thus, they prefer managing their time and decisions and are always ready for more information; the education they obtain requires altering its system in the light of lifelong education principles regarding the generation's psychological needs.

For a rapid change in existing systems, an external force, such as pandemic disease, is required. As the virus spread all over the world, countries moved to online teaching platforms for university students. However, online education is a phrase that has existed for years. Together with digitalisation, some departments in universities began introducing distance learning through various names, such as mobile learning, e-learning, or a combination of both, known as D-learning (digital learning) (Persada et al., 2019). Students' feedback about D-learning has been studied in various fields, and because of the generation's positive approach to digitalisation, it is expected that the percentage of those in favour is remarkably high. However, the departments in which D-learning has been used are limited. Because of the COVID-19 pandemic, each department had to give it a try. Regarding the psychological behaviours of the generation, it can be said that the expectations of the Gen Zers' from the education system have been addressed during the period. Nevertheless, although they are receptive to change, this rapid transformation has led to conflicts in handling the situation, especially for those studying design.

Design education is a special kind of teaching that is based on studio education and requires both theoretical and practical knowledge to be shared by a master tutor. In studios, different kinds of rituals and teaching methods are seen that require various mediums of communication. For example, in architectural design lessons, the instructor makes some recommendations and corrections by drawing on the project the student is preparing at home. We can say that architectural education is learned by trial and error method (Fig. 1). However, because of the COVID-19 pandemic, universities have moved from face-to-face learning to online learning; therefore, the design courses are being conducted through virtual classes (Fig. 2). As interrelations are important concerning project development through discussions, design education has been affected by online learning because of different channels of communication. Thus, online learning is difficult for design education as it is primarily based on both conceptual and technical drawings and 3D models. Generally, the base idea involves rough sketches of students, and the idea is shaped on the basis of the critical review of the master tutors. This interaction was easier to conduct in face-to-face education. However, in the current situation, this has to be done through online learning, and the attitude of the students is quite different based on their background. This study attempts to determine architectural students' perception towards online learning, especially concerning studio lectures.

Figure 1. Face to face education, architectural students

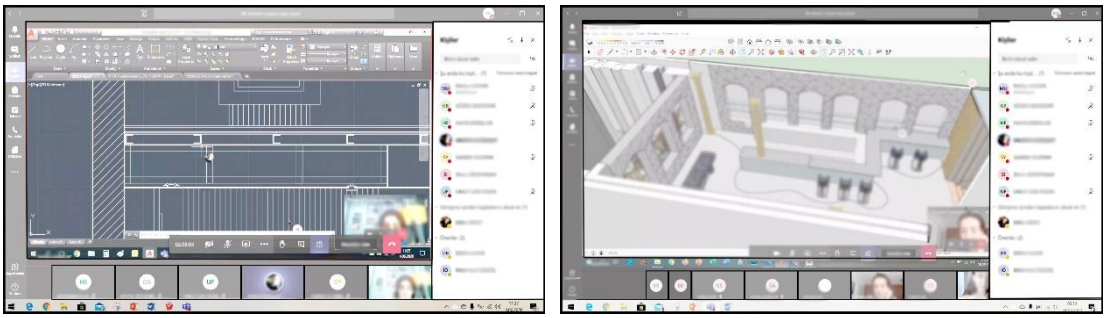

Figure 2. Virtual education, architectural students

While the design department was facing a forced change, studies conducted on digital education systems have gained considerable attention. There are proposals that address the issue of blending technology with the traditional design course environment to achieve a studio course that meets the expectations of the generation. Through surveys, researchers claim that using technology helps reach more students and offers courses that consider the students' personal backgrounds (Bender et al. 2016). Through this, the workload of the faculty stays stable while learning percentages of students advance. Another perspective is that the medium used for conveying information in traditional face-to-face studios includes plotted materials and handout drawings that have a linear structure. On the other hand, in the digital format, a new method for transmitting data offers a parallel structure where the input and output are visible synchronously and asynchronously (Shao et al., 2007). Thus, this supportive environment helps develop various ideas, which are important for design education.

According to Gómez-Zermeño (2020), along with the development of technology, learning resources must be enhanced to meet students'expectations. As assessing information becomes easy, it is important to choose the right information; people should be prepared for this altered environment, as education and Internet technology are key factors in this view. She also points out that for information to be transformed into knowledge, the connection between data and daily life experiences should be constructed, which can be achieved by challenge-based instructive operations (Gomez

Zermeño, 2020). Learning by doing is a method that is mostly seen with Gen Z and it becomes effective with the help of challenge-based learning and empowers self-reliance. Additionally, research has indicated that Gen Zers mostly prefer online and personalized education consumption as micro-experiences (Schwieger & Ladwig, 2018). Based on this, ensuring a more personalized education structure, in which they can access the information whenever they want, can be a solution to retain their interest. Furthermore, because of the very essence of the design courses, they require communication and integration. However, this is not a single information-based area that only teaches the basics; rather, it is a field in which the idea should be examined and discussed with various participants for it to grow (Chen & You, 2010). With Internet technology, it is easier to connect with the masters of various programs and connect students with them through different mediums. Another perspective that supports the idea that design is a field that improves with sharing is that connection and exchange of views between students are important. Therefore, just like face-to-face studios, virtual studios must be structured as they serve a community rather than a regular course that involves one-on-one communication (Broadfoot & Bennett, 2003). Previous research on integrating computation to design courses introduced a website for students, where they could upload their studies so that critical observations of the instructors on each project would be accessible by all students and any design decision made by the student would affect the others, too (Chastain & Elliott, 2000). The development of online education is the need of the century, especially for design courses, while considering the basics of education.

Additional studies have been conducted on the integration of technology with design education. Newman et al. (2018) identified four issues according to the Council of the Educator of Landscape Architecture, especially online learning. These include access, interactivity, online preferences, and concerns about academic integrity. It is accepted that online education has benefits, such as connecting students to instructors across the world, offering the opportunity to reschedule lessons, and increasing student motivation by giving them more control. On the other hand, there is a lack of internal communication, which is important for a design course as new ideas arise from bilateral relations and establish borders for creativity (Newman et al., 2018). The problem of infrastructure is an issue that needs to be addressed as the need for technology-blended education is growing daily. The future seems so clear that concerning technical problems, researchers are attempting to produce a solution for the barriers between online education and students through a cloud-based information system (Kim & Lim, 2019). Attempts are being made to identify possible obstacles and to solve them to create digital education systems that the century requires.

Researchers' concerns about the issue of technological integrity in education are being investigated; at the same time, various studies are being conducted to examine students' interest in online education. George (2018) conducted research on students' performance in a basic hand graphics studio, which is usually an in-class practical lecture but was held online as a part of an accredited landscape architecture program. According to his study, students argued that virtual studios beneficial concerning both

having lectures as shared media for attending later and offering the opportunity to connect with a wide range of instructors during the week (George, 2018). His results provided deep insights regarding the hybrid or flipped course approach for design studios as a possible and influential solution for online design courses, such as graphic courses (George, 2018). In another study held at an interior architecture studio, students examined online and offline courses during a project. Their responses were recorded and analyzed through various aspects, such as psychology. The study shows that most of the students contended more during the offline process, considering the effectiveness of communication concerning avoiding misunderstandings. However, there was no difference in student performance and the project's overall success. It was agreed that a proper interface needs to be structured for online design courses (Cho & Cho, 2014). Therefore, while creating a course program and deciding on the learning outcome, it is essential that the students' perceptions be considered, especially in design courses.

This study aims to investigate the perception of architectural students toward online learning activities. Generally, architecture education is different from other casual learning activities. More specifically, design studios are different environments than other lecture forms. Therefore, the architecture students' attitude towards online studios is important for lecture outcomes. To achieve this aim, qualitative research has been conducted. To find students' perceptions, an online interview was conducted using the Internet. A semi-structured interview form was used. Thirteen students from two different universities responded to the interviews. The students' attitude toward online learning has been determined through several questions. Interviews have been transcribed, and transcripts have been coded with the help of qualitative analysis software, and results have been depicted through coding.

This study has several important implications. First, a qualitative research method has been used to understand how students perceive online learning in this study. Most universities have moved to online learning because of the COVID-19 pandemic. Therefore, this study examines students' reflection towards online design studios based on their perception. Considering this, the intention of the research can be stated as follows:

- To obtain a conscious understanding of online architectural lectures
- To identify essentials required educating architecture students in the online environment
- To examine the architecture students' approach toward online lectures
- To prepare a briefing for architectural design studio instructors regarding online education
- To enhance education in architecture studios by structuring interactive education in online learning

This study aims to identify the perception of architectural students in online learning as part of an interactive community. Therefore, the main problem of this study is "what is the perception of architectural students towards online learning?" The sub-problems are as follows:

- Would they prefer online learning or face-to-face learning?
- How was their reaction to the online drawing lectures?
- How did they find the online studio environment?

Although learning is measured according to the outcome, it is necessary to consider students' perceptions to evaluate a range of variables (Chen & You, 2010). External factors that may affect students' perceptions are important to understand the perceived process for gathering information about the technology integrated design courses.

Materials and Methods

This research a qualitative research method, as architectural students' perception regarding online learning can be better understood through qualitative questions. This method helps address the questions "why" and "how" so that the perception of architectural students can be defined in light ofthese questions. Deeper insights can be gained through qualitative data. Thirteen undergraduate architecture students were selected as research subjects. As this study had a limited number of subjects, a probability sample was not used although purposeful quota sampling was used. To determine their experiences regarding online learning, a semi-structured questionnaire was used. Subjects were asked questions about their perception of online learning, especially design and studio learning. Several in-depth interviews were conducted with subjects, using semi-structured questions.

The interviews ranged from thirty to sixty minutes. Raw data for examining and codification were collated by transcribing the recorded meetings verbatim and typing them into a word processor. Examination and the coding of information were conducted in Turkish and translated into English later to avoid misunderstandings. Some of the impossible articulations in the local language were lost at the interpretation stage, but the fundamental substance was deciphered correctly.

Despite the interpretation of the outcomes causing the loss of certain remarks, the embodiment of the preservation is reflected in the paper. The information was broken down with the assistance of a subjective examination program, NVivo (ver. 10). This information was analyzed by utilizing content examinations, coding, and topical examinations.

Results

The results in the cross-examined tables show that students' ideas for online education in architecture are not stable concerning the advantages and disadvantages.

Findings

More than half of the students preferred face-to-face education (Table 1). For example, AA stated that architectural education be completed only through distance education. DD advocated that it is more logical for project lessons to be held in physical classrooms. EE stated that he prefers face-to-face studio-based education, but it is a preference and cannot be implemented at this point. FF, GG, HH, LL, and MM stated that quality was different, and it was necessary to touch the model for a better understanding. However, a considerable number of participants were in favor of online learning. For example, BB stated that he found it very positive and it was the most productive period; CC found it positive for students; KK argued that online education had many advantages, and NN and PP stated that instructors more easily perceived the produced ideas with the help of technology and that they had more time to improve their projects. Students' sentences included both advantages and disadvantages of online learning; thus, even those who were against online education admitted that it also had certain benefits (Table 2).

Table 1.

Preferance for Online and Face-to-face Education

	AA	BB	CC	DD	EE	FF	GG	HH	KK	LL	MM	NN
Preference for face to face	√			√	√	√	√	√		√	√	
Preference for online		√	√						√			√

When the advantages and disadvantages of online education were evaluated, a different picture emerges. This time, the vast majority of students stated that they had advantages concerning time. The interesting point here was that DD EE and MM, which previously advocated face to face education, stated that they had time advantages in online education. In physical studios, critics discussedthe printed drawings, and plotted them before each critic day was a waste of time.

Table 2.

Pros and Cons for Online and Face-to-face Education

	AA	BB	CC	DD	EE	FF	GG	HH	KK	LL	MM	NN
More economical for practical lectures		√		√		√						√
Time advantage for practical lectures		√		√		√		√	√		√	√
Online education is suitable for theoretical lectures			√	√		√				√	√	
Online lectures are not suitable for theoretical lectures	√	√						√				
Online lectures are not suitable for freshman's		√	√						√			
Undeceive because of social facts				√	√		√					

Again, for making rigid models, each piece as drawing for the laser cutter and both drawing them and getting cut takes much more time than modeling the project via 3D modelling programs on computers. DD and FF admit that online education is more economical considering the outgoings for the model material, cutting prices and printout posters although they have chosen face-to-face studios. The main reason behind the preference of DD, GG and PP seems caused by social reasons, such as being apart from their friends. PP says that it was better on physical studios considering their information interchange between friends even they are doing it on the phone, it was not the same. DD argues that being at home prevents studying while it was easier to sit and study together with friends who study with you as well in the studio. Studios are like libraries for architecture students where they can socialize while studying and gathering ideas from each other. Thus, it is hard for them to abandon it although being onlinhas more benefits. Similarly, the following themes indicate that online education is suitable for theoretical lessons and has economic benefits.

A different picture emerges when online education's advantages and disadvantages are evaluated. Most of the students stated that they had advantages concerning time. The interesting point here is that DD, EE, and MM, who previously advocated face-to-face education, stated that they had the advantage of time in online education. In physical studios, critics discussed printed drawings and plotted them in front of the students, which was a waste of time. Again, to make rigid models, each piece was drawn for the laser cutter and drawing them and cutting takes time, which could be

modelled through 3D modelling programs on computers. DD and FF admitted that online education was more economical considering the cost of the model material, cutting prices, and printing posters, although they preferred face-to-face education. The main reason behind the preference for DD, GG, and PP seems to be the social reason, such as being able to meet friends. PP stated that exchanging information between friends was better in the physical space, and although they communicated over the telephone, it was not the same. DD argued that being at home made it difficult to study, while it was easier to sit and study with friends at the studio. Studios are like libraries for architecture students where they can socialize while studying and gather ideas from each other. Consequently, it is difficult for them to abandon it, although online education has numerous benefits. Similarly, the following themes suggest that online education is suitable for theoretical lessons and offers economic benefits.

Interestingly, the number of students who discussed the disadvantages of the critics and the advantages of access is the same (Table 3). Five students gave their views on both themes. As critics are the main tool for design education regarding the conventional transmission of the idea, it is also difficult for the studentsthem to decide whether being online is beneficial. Interestingly, the number of students discussing the disadvantages of critics and the advantages of access is the same (Table 3). Five students gave their views on both issues. Since critics are the main tool of design education concerning the traditional transfer of ideas, it is also difficult for students to decide whether it is beneficial to be online. Thus, the general impression from architecture students is that online education has benefits that cannot be ignored if they were in a social environment because for a design student, being in a social environment still maintains the importance of living and observing in the building.

Table 3.
Advantages and Disadvantages of Online Critics

	AA	BB	CC	DD	EE	FF	GG	HH	KK	LL	MM	NN	PP
Access opportunity concerning the online critics		√						√	√	√		√	
General disadvantages concerning the online critics			√				√				√	√	√
Scale disadvantage concerning the online critics													√
Technological disadvantages	√				√								

Discussion and Conclusions

As online education is a new phenomenon, students do not have a clear idea about it. It is interesting that, although students mostly prefer face-to-face architectural education, they have also acknowledged the benefits of online education. Additionally, the students expressed that online critics are beneficial as they easily access instructors. However, the number of students who talk about general disadvantages is not negligible.

Students are aware that it is good to have the option of online education rather than no education in the new term. Students, in general, are attempting to adapt to the new system. They have identified certain positive factors associated with online education, especially in theoretical lessons. Students state that it is acceptable to have mainly face-to-face education for the first two years, and online education could be useful for the following terms.

Online education is new for students and they tend to become confused. The findings show that even those who advocate face-to-face education talk about online education benefits. From this point of view, the hybrid system that George (2019) has mentioned seems acceptable. In this respect, the findings of this study support the same.The ease of access, another factor mentioned by students, is in parallel with the issues mentioned by Newman et al. (2018). Besides, technological advantages are important concerning sustainability policies, as stated by Gómez-Zermeño (2020).

This study has some limitations. This qualitative study was conducted using interviews with thirteen students. Therefore, the study results are limited by this sample and have primarily attempted to determine how students perceive online education. It is recommended that quantitative studies should be conducted to determine the spread of this perception. Moreover, a widespread survey can be conducted to identify the lectures that can be conducted online and which lectures are more suitable for face-to-face education. This study only considers the opinion of the students. It is equally important to understand how the tutors feel about online learning and the outcome that they get from this.

In the view of sustainability, online lectures are more practical for older students, especially for the 3rd and 4th-degree students. Findings suggest that older students find more practical and productive the project lessons in an online manner. Moreover, they do not need to plot their projects, and they save paper from waste. Besides, they can repeat the critics of the tutor after the online lecture. Thus, they can gain time and budget with online lectures. In addition to these theoretical lectures are more productive than the face to face education. Based on the results, it can be said that online lectures are more sustainable manner than the face to face lectures.

The study findings suggest that a hybrid application of both online and face-to-face education would be beneficial for students. In particular, freshmen who are new at the university and foreign to the design culture would benefit more from this hybrid

application. Basic design and formal drawing courses are different from high school education, and they are based on other architectural courses. These courses should be conducted through face-to-face education. With the help of digital representation techniques, high-grade courses can be conducted through the online course system. Study findings could assist in improving online architectural education.

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