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Re-considering the Architectural Design Studio after Pandemic: Tools, Problems, Potentials

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Abstract: The Covid-19 outbreak has significantly influenced all disciplines from economics to politics, especially health, and forced every discipline to develop new strategies to adapt to this situation. For this reason, education has been suspended as of mid-March 2020 in our country; after the break, education methods have changed in a mandatory and rapid way and largely switched to distance education. This compulsory transformation has required the creation of new methods and approaches, especially for applied courses. In this context, this article focuses on a remote architectural design studio experience and explores this experience's problems and potential. This research is in the framework of an adapted architectural design studio setup enriched by authors with online environment-specific tools, including components that centralize participatory production (collaborative learning approach) and enable interaction such as workshops and seminars. The studio (201 A) was experienced in the 2020-21 fall semester by remote conducting with 2nd-grade architecture students. In the article, the process is revealed in detail, and the architectural design studio has been discussed extensively with the student survey and the instructors' experiences. As a result, it has been observed that the studio's components, such as interaction, collectivism, multilayeredness, dynamism, making criticism, and juries, can survive in distance education. Although verbal communication difficulties were experienced in the remote studio, visuality/screen sharing supported the communication throughout the process. However, it is obvious that the content, methods, and tools for remote architectural design studio education should be developed with a different and new approach than face-to-face education. In order to develop more effective methods in this scope, research is required to continue, prepare a large number of experience environments supported by these studies and, most importantly, share these experiences.

Keywords: Remote education, Architectural design studio, Covid-19, Virtual design studio.

1. Introduction

In the last year, a concept has entered our language that we have hardly ever used and that many of us have never known before. Pandemic!... It quickly surrounded our lives, caused us to question our habits, and began to transform all activities. Almost every discipline has been compelled to develop strategies to adapt to this unusual situation within its dynamics. All media and actors, from economy to politics, especially health, rearranged their practices; education methods and ways of doing business have changed. Moreover, in all this process, it became essential to be/stay at 'home' and to become qualified in solving all social and vital needs within the safe boundaries of the 'home'. Working from 'home', shopping from 'home', socializing at 'home', getting education from 'home'...

Of course, universities, like all institutions, were in the same situation. At first, distance education was a new subject for many of us, even though we were in the 21st century. Some applications were encountered, but there was no standard way until the pandemic. Moreover, it was a method that academia mostly kept their distance and believed that it had/could have many deficiencies. However, the possibility of education being interrupted forced us all to this method. The first experience (which was the 4th week of the second semester of the 2019-2020 academic year after the first encounter with this pandemic) required rapid adaptation, the curriculum and methods were already planned, and they were also started to be implemented. Therefore, the structure designed according to face-to-face education has been able to continue with distance education opportunities without significant changes. However, right after realizing that the pandemic is a long-term process, the 2020-2021 academic year was handled more comprehensively this time and was programmed according to distance education conditions. Each university has tried to choose the tools and methods appropriate to its structure and develop strategies to use them effectively and as competently as possible. However, there has been a more painful process, especially in applied courses and programs where these courses are concentrated.

1.1. Methodology

This article focuses on an architectural design studio experience conducted remotely due to pandemic conditions and investigates the problems and potential of this experience. The method of the investigation was detailed in Figure 1. Accordingly, the question "how should architectural design studio be after the Pandemic?" is the first step of research. To answer this question, firstly, the nature of the architectural design studio has to be revealed: What kind of environment is an architectural design studio? What are the components of the architectural design studio? In order to provide a comprehensive answer to these questions, literature research has been conducted on the subject, and the experience of researchers has been utilized. On the other hand, remote education subject and experiences have been investigated both in general and in architecture education; these investigations are presented in the second section of the article. Under the guidance of this research and the instructors' experiences, an adapted studio model was designed. That model is applied in the second-year studio on the Özyeğin University

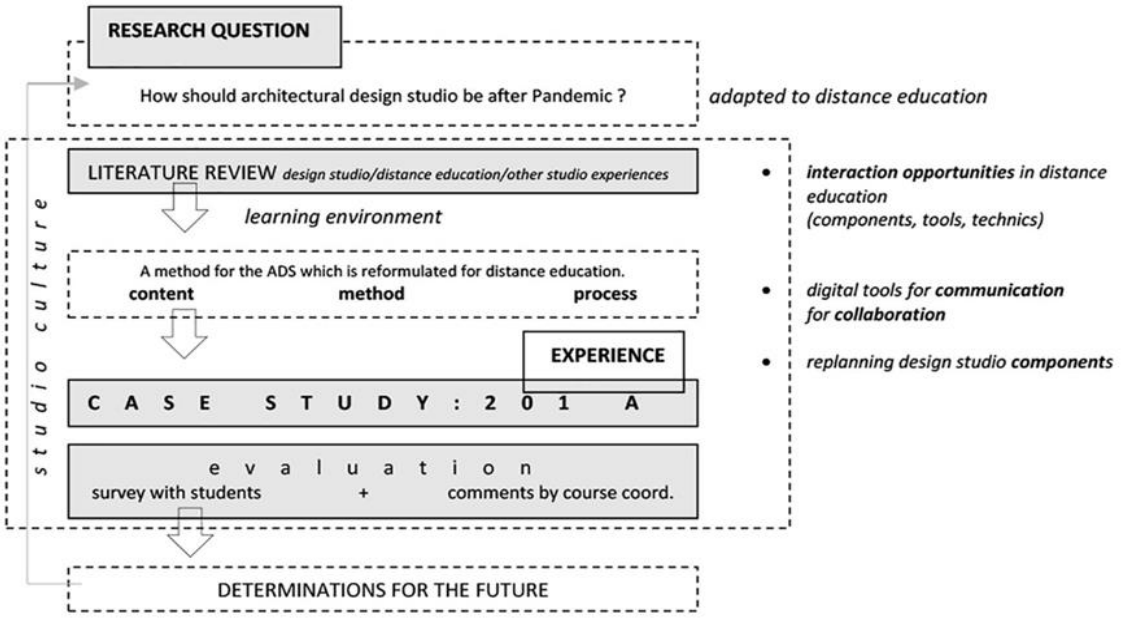

Figure 1: The framework of the article

department of architecture. In the third section of the article, this model is presented in detail with all its components. It was evaluated with the student questionnaire and instructors' reviews at the end of the semester. In this way, the problems and potentials encountered in the remote education process in architectural design studio practice were revealed.

2. Architectural Design Studio and Remote Education

The primary pedagogical approach in design education is specified as a studio-based approach (Dreamson, 2020; Fleischmann, 2020a). Architectural design studios form the backbone of architectural education, where students synthesize and use the technical and theoretical knowledge gained in other courses. On the other hand, the traditional design studio is a physical space and has a pedagogical system. This system includes an education model based on learning by doing, in which students take part as reflective practitioners (Schon, 1984).

In terms of recognizing a problem, exploring for an architectural purpose, handling contextual influences, and negotiating programmatic demands, the architectural design studio is the first environment where students are faced with problems of immense complexity (Caglar & Uludag, 2006). The nature of contemporary architecture design studio is based on students' experience on a given design problem. Because of this nature of the studio, the design-related skills and fundamental inclinations that are acquired in these studios influence the future designing actions of the students (Kararmaz & Civavoğlu, 2017). Design studios are active spaces where students take social and intellectual actions such as drawing, communication, modelling (Saghafi, Franz, & Crowther, 2012). Also, design education is a very interactive process (Fleischmann, 2020b). Studios are social learning areas where students interact between themselves and with the instructors. The architectural design studio's learning environment is a culture where instructors and students share their experiences (Yurtsever & Polatoğlu, 2020).

On the other hand, the rapid development of information and communication technologies has affected traditional educational models, and remote education or blended education models have begun to come up. The design studios were also affected. The inclusion of technology in design studios was realized with web-based tools and 3d virtual worlds (Gül, Wang, Bülbül, Çağdaş, & Tong, 2009). In the literature, blended education experiences and virtual studios are also found before the pandemic. In the blended education model, the traditional studio method is supported by online digital media (Fleischmann, 2020a). For example, in the study by Gül, Wang, Bülbül, Çağdaş, & Tong (2009), the blended education model created by the use of collaborative virtual tools allowed two studios in different geographies to co-produce. Virtual design studio trials also occur at different times in the literature. According to Çagdas & Tong (2005), the first comprehensive virtual design studio was the collaboration of six designers in different locations in 1994. In the last two decades, virtual design studios have become more accessible (Iranmanesh & Onur, 2021). However, the traditional approach of architecture training has slowed down the widespread use of virtual studios. Aydınlı (2016) also underlines that the reflections of the transformations of technological developments in the practice of architecture have shown relatively slowly in architecture education. Although there are significant technological developments in this area, the studio model is still preferred in architecture education, where practical, face-to-face interaction is continuous (Fleischmann, 2020a).

However, the global COVID-19 outbreak has necessarily accelerated the adaptation of architecture education to the virtual environment, requiring creating online education environments at a rate that would not usually occur (Dreamson, 2020; Varma & Jafri, 2020). This sudden transformation of the education method has led to several challenges for educators who maintain the traditional on-site education model and are not familiar with online learning and teaching methods (Dreamson, 2020). The availability of hardware

and software platforms, network connectivity, digital divide, low interaction, lack of concentration, fatigue, and time management issues have emerged as initial problems. Some of them are caused by sudden transformation and lack of familiarity, while others are problems that can be overcome by the careful planning of the instructors (Varma & Jafri, 2020). Some studios have attempted to continue the setup -almost unchanged- carried out during face-to-face education as much as possible in the distance learning process. However, some studios have tried to develop an online environment adapted setup and use the potentials of this environment to create solutions to the problems of this environment. For example, Iranmanesh & Onur (2021) examined architectural design studios from different semesters and stated that the studio setup consisted of a cycle of online submission, virtual meetings, screen-sharing, feedback sessions, and class discussions in general. Ceylan, Şahin, Seçmen, Somer, & Süher (2020) stated that physical studio's all activities related to the design process were transferred to the remote studio. Also, they noted that the preferred communication platform (Adobe Connect) was insufficient for the interactive and shared environment in the studio from time to time, so the studio was supported by different drawing and modeling software. Ockerti (2020) said that "Efficient learning can take place in any environment; educators are tasked with adapting to the new environment, thinking about new methods and tools."

What issues have distance education replacing face-to-face education raised in terms of the architectural design studio? The major change in the transition to online education is the physical removal of the studio environment and participants (Yorgancıoğlu, 2020). While the physical studio environment is a shared place equipped with social interactions, each student/participant in remote education is available in their personal space (Yorgancıoğlu, 2020). On the other hand, accessing all online resources from anywhere at any time, the possibility of synchronous or asynchronous communications has led to a significant improvement in flexible learning. There is no doubt that more problems were encountered when both the student and instructor had not had a similar experience before (the pandemic period is also that kind of experience). For example, the student should be aware that he cannot be passive in an internet-based studio, while the instructor must adapt to technological equipment (Sagun, Demirkan, & Goktepe, 2001). The technological challenges encountered during the transition to remote education are combined with computer deficiency, internet access problems, psychological and emotional problems. The disruption of the adopted pedagogical approach has led to concern among the instructors and students (Yorgancıoğlu, 2020). With the transition to remote education, it was observed that the time and workload spent by many design studio instructors increased (Yorgancıoğlu, 2020). Fleischmann (2020a) stated that students' most challenging issues are lack of motivation and social isolation. The reduction of informal communication among students also appears as a negative aspect of the online studio (Iranmanesh & Onur, 2021). Similarly, according to students' opinions from 25 different architecture schools, the lack of peer learning and peer support in distance education was the most negatory aspect of the remote studio, and the negative effects of this situation on mental health were emphasized (Grover & Wright, 2020). Fleischmann's (2020a) research with students from different design disciplines found that the students' favourite aspect of online education is about getting more feedback from instructors and peers. According to the study conducted by Iranmanesh & Onur (2021), it was observed that students' ability to do individual research and use computer-aided design programs increased. According to the findings of Ceylan et al. (2020), the students found it positive to be able to watch the recorded studio lectures again and thus stated that they kept their concentration high during the lesson. In addition, Grover & Wright (2020) reported that, according to the common opinion of studio instructors, online education has a positive effect on acoustics and noise control, punctuality of students, and timekeeping in training.

3. Experiencing Remote Education in Architectural Design Studio

What happened at the architectural design studios during the pandemic? Some academics thought that remote education could be possible in a design studio, but it was a big question mark for the other group. While the world was trying to adapt to the pandemic and develop/change itself, architectural design studios did the same thing. What problems did remote education bring to the architectural design studio? With another look, could this crisis create new possibilities?

3.1. Studio 201 A

The interaction between the instructor and the student, and among the students and the studio's energy arose by this interaction, is one of the essential components of the design studio. How can interaction be achieved in online education with a group that cannot physically share the same space, also some of them even never meet with each other? How can this interaction be prevented from weakening due to lack of face-to-face and physical expressions?

The studio setup (Figure 2.) presented in this article was built on these questions and applied in Özyeğin University, Faculty of Architecture, Architecture Department in the fall semester of 2020-2021. Studio (201 A) was maintained with fourteen students, a faculty member, and a research assistant, and horizontal relations were established with other studios in two juries held during the term. The 201 A was planned in the scope of the course plan and its objectives; the subject was set as "children and space". The program developed within the framework of the study subject has been enriched with tools specific to the online environment. The methods and components used are mentioned in detail in sub-headings.

201 A Studio has tried to design a method that recreates the studio atmosphere with online opportunities and includes the competencies

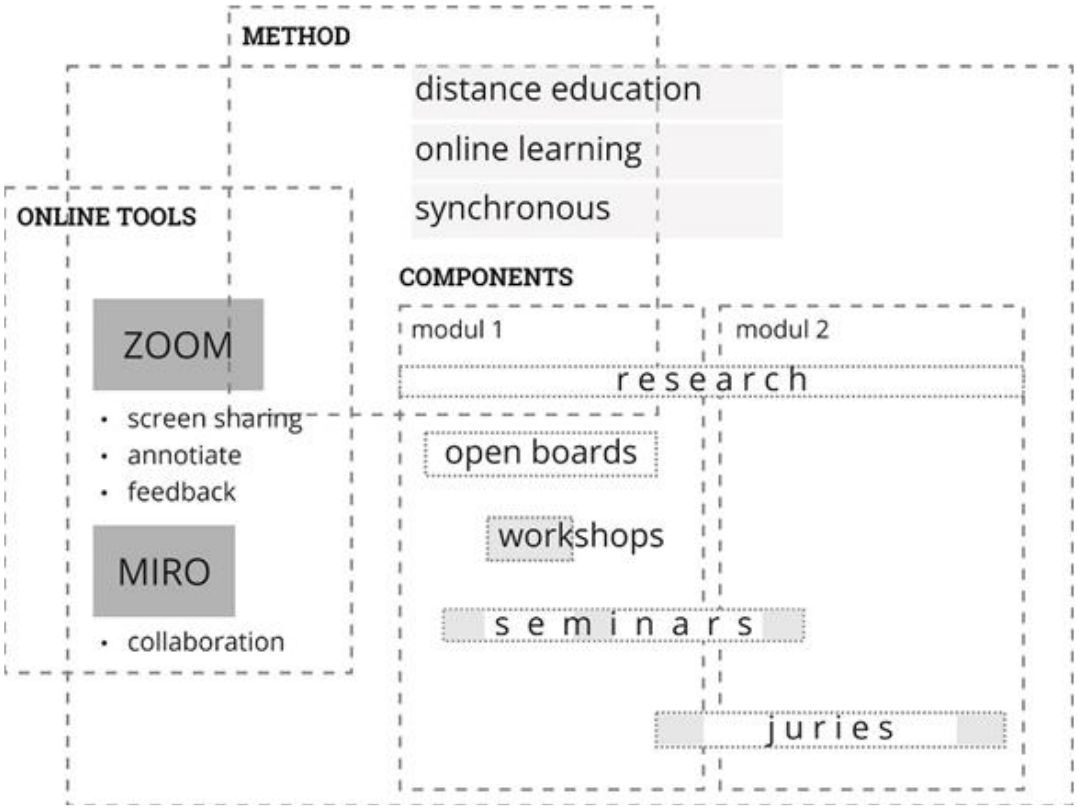

Figure 2: Method, components, and tools of the studio

that the studio should provide to students according to its location (Second Year, First Semester) within the architecture education (Figure 2). In this context, a remote synchronous education program[1] has been implemented. Besides, the lack of motivation and depression of students due to the pandemic conditions have been the factors that educators should consider. It is aimed to create dynamism by editing the combination of different components in the studio process. Different exercises and methods have been introduced to support the students' intellectual skills, especially in the first module of the two main modules. These methods can be listed as research, reading, writing, creating concept maps, seminars, and workshops. The method and components of the studio are described in more detail in the next section.

Adaption of Feedbacks and Juries to Virtual Environment

The remote education model uses two different communication methods: asynchronous and synchronous. Courses can be performed as asynchronous, synchronous, or a combination of both. Asynchronous one does not have a simultaneous transmission of communication and information; communication is carried out with various electronic correspondence tools. Participants do not need to be online simultaneously in this method. In the synchronous communication model, users in different locations are constantly interacting. Communication via video and microphone is supported with various visualization interfaces. This model requires a specific time to be defined.

In design studios, crits form most of the dialogue between the instructor and the student. This process in which student production is discussed is a cycle of continuous impact and response. This interaction is an important feature that separates architecture studios from other disciplines' educational approaches (Fleischmann, 2020b).

Giving feedback through sketches on paper in the traditional design studio requires different digital tools to be included in the virtual studio. In Zoom, students digitally presented their projects through screen sharing, and the instructor could give feedback with a variety of digital drawing tools (Figure 3.). The problems of online education related to technical hardware and infrastructure such as Internet break, synchro distortion are encountered here from time to time. Furthermore, there are communication problems in these cases, so it can be challenging to understand the crits. However, all students' ability to easily follow their classmates' crits and join the dialogue between the instructor and the student is a positive aspect of online feedbacks. The survey found student opinions in this direction (detailed in section four).

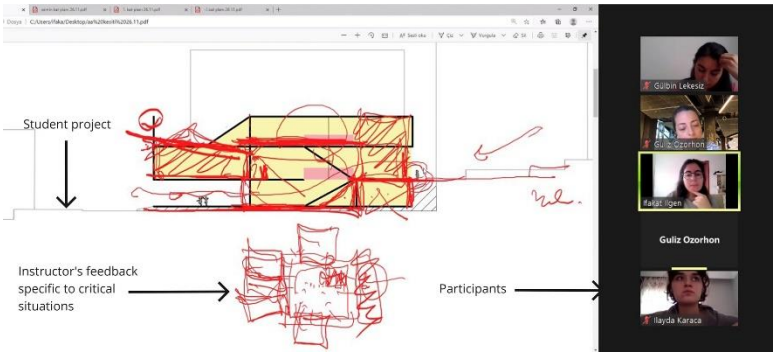

Figure 3: Giving feedback

[1] Remote synchronous education is called the case where students and teachers interact simultaneously using the Internet from different locations. In this way, students and teachers can use virtual classes, auditory or visual tools to ask questions, get answers, use multimedia resources provided in the course content, present, communicate with other students or teachers (Çavuşoğlu, 2013).

Two juries were carried out during the 201 A studio period (Figure 4.). Three different groups worked in parallel branches on similar issues assembled in these juries. Juries, an indispensable part of design education, have a significant and essential place in virtual studios. In fact, jury and such tools are much more important because the ability of students in different groups to meet/communicate in the workshop and/or in other places, to observe each other's production is eliminated in online education. Another advantage of online juries is that jury participation from different locations is facilitated. The students' opinion on this issue was that they could listen to their peers' crits more easily.

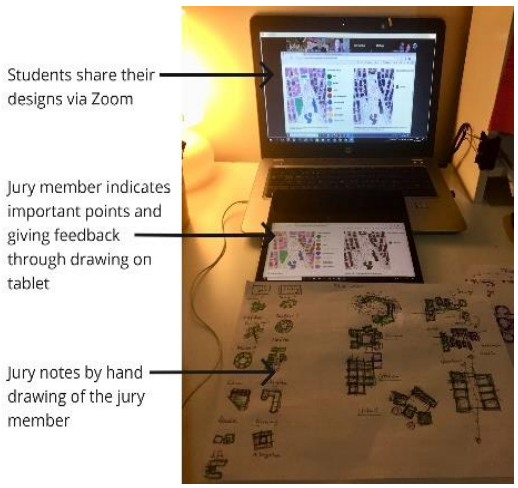

Figure 4: Juries

Transformation in Architectural Presentation Methods and Tools

Sketching is a design tool that the designer refers to in expressing first ideas and creating concepts. Design tools have also transformed as a result of technological advances. It is becoming common for architecture students to use computer-assisted presentation techniques. The production of digital presentation materials has not been one of the challenges of remote education. On the contrary, students have expressed that saving printing is a positive aspect of the virtual studio. Besides, different presentation materials have been produced using the potential of digital tools in the studio process. Students have been encouraged to create alternative dynamic presentation items such as video and gif.

Online Tools

The main channel where studio structure was created and communication was established with the student was Özyeğin University LMS (learning management system). Weekly documents, zoom links shared with students via LMS, and students' submissions received via this system. Synchronous courses were conducted on Zoom on the day and time of the course. The recorded courses or seminars were shared with students through the Panopto. Students used computational tools that they chose within their skills and knowledge for individual production. In the studio's open boards, which is a widely referenced channel, especially in the early period, all participants worked on the same program simultaneously.[2]

3.2. Studio / Content, Method, and Program

This article discusses an online studio with all its components. Although the article's primary motivation is to focus on remote education experience in the architectural design studio, making the method understandable will only be possible with the combined evaluation of content, programs, and studio outputs. Therefore, in this section, the content and program of 201 A will be presented in the context of the studio method.

It is identified İstanbul/Koşuyolu as location and "Children and Space" as a subject in 201 A studio. Therefore, the studio has carefully looked at children and space in –metropolis-Istanbul, including children in the city, children in the metropolitan area, children and space in present-day Istanbul. An architectural program or typology was not given to students in the studio to conduct their research freely. Instead, concepts such as dreaming, exploring, learning, growing, and key actions such as art, sports, games, books –students can recommend more– are listed to guide students. Students developed

[2] Miro is the online collaborative whiteboarding platform that enables distributed teams to work effectively together, from brainstorming with digital sticky notes to planning and managing agile workflows (miro.com).

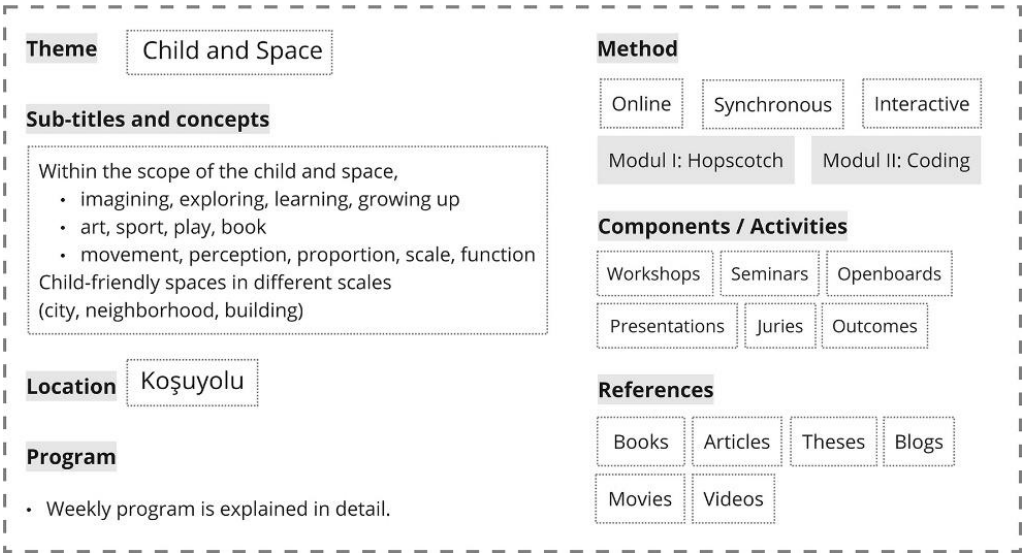

Figure 5: Content of the information sheet of the studio

scenarios and program through sometimes collective, and sometimes individual studies and spatial organization and structural constructions are designed to be compatible with this program.

It is important that students (especially now, with the reason of online education conditions that involve many ambiguous situations) should see/understand the semester ahead of them in the first course/meeting as clearly as possible. The first zoom meeting was to get to know[3] each other and share the course's content, schedule, and method with a detailed information sheet (Figure) with the students. These sheets are the meeting sentences to be established with the student in the design process, which is addressed with the various dimensions such as conceptualization, forming design principles, form, function and technology integrity, indoor and outdoor relations and organization, evaluation of environmental data in design (Özsoy, Çağdaş, Kocagil, & Sönmez, 2000).

The studio content is constructed into two multi-layer modules: (1) hopscotch, (2) coding (Figure 6.). The first module focuses on creating the research ground of the design studio - step by step - and the emergence of critical decisions on topic/context; the second module focuses on the development process, detail, and representation of the design.

1. Modul / Hopscotch

Modul 1 covers the period from the beginning of the semester to the first jury. The scope of this module is for students to understand the subject and to develop their original ideas. In the process, the studio topic "children and space" was researched with many tools and examined in-depth with different dimensions. For this review, film[4] and short videos were shared, and texts were read on "child" and then "children and space". This module is the basis of the studio, which results in students producing their strategy and scenarios and demonstrating their first design ideas through them. Students were expected to present comments and suggestions with different instruments such as sketches, posters, animations, and short videos in this module.

[3] The definition here includes both the brief self-introduction of each participant and understanding the knowledge and gains of students through a small exercise.
[4] For example, 95cm: Mega City's Mini Citizens, filmed by MAD (Center for Spatial Justice), which tells about the daily life of children in Istanbul through their eyes.

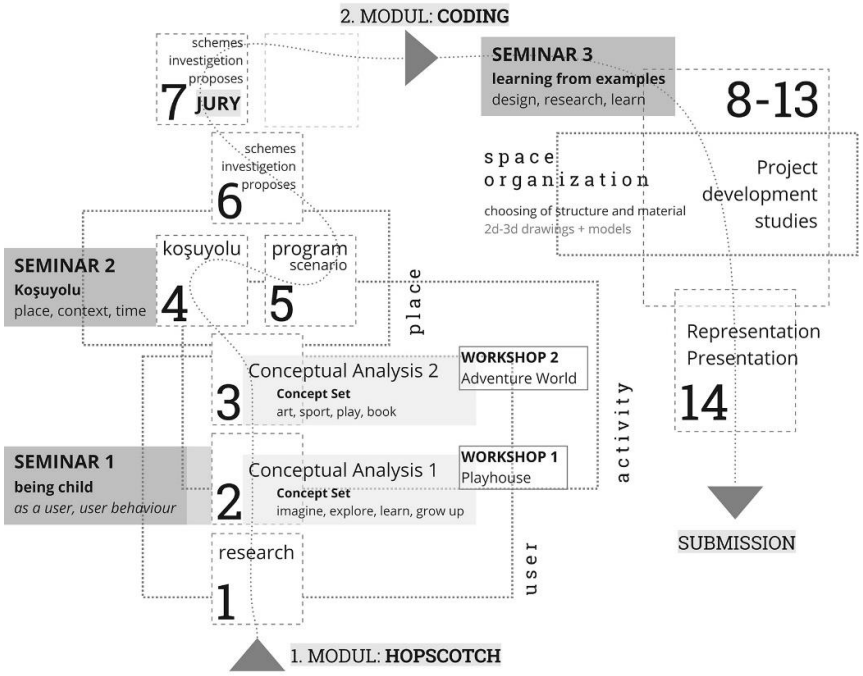

Figure 6: Setup of the studio

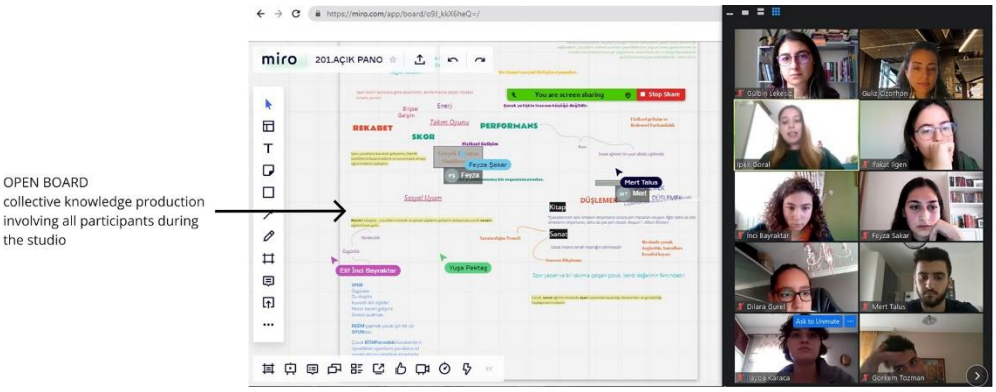

Figure 7: Open board

This module includes tools to create collective thinking/producing opportunities in the studio environment. One of these tools is the "Open Board"[5] (Figure 7), which works on a common file simultaneously, allowing students to combine their research results and individual comments in a holistic way. A shared folder has been created for the faculty members' recommended studies and the publications that students have achieved through their research. There are also two short workshops in this module. It is clear that workshops that support different stages of the design process have significant contributions to the studio. Similarly, short workshops within 201 A have been critical steps in the dynamic structure of the studio process. This one day of short exercises allowed students to think multilayered and holistic about a design problem while also experiencing different design process steps (analysis, synthesis, and decision making). Furthermore, workshops' contents were planned

[5] In order to create these boards, an application called Miro that allows multi-participant digital work simultaneously was used.

to allow students to develop different perspectives for the studio's subject "child". The first workshop has been developed to raise awareness about the child's ergonomics, the size of children, and dimensions' spatial provisions. In this study, students were expected to design a playhouse that responds to the child's basic needs (such as dreaming, exploring, learning, growing (Figure 8.). The second workshop was

In this module, two invited seminars have been organized to support the studio. In the first of these seminars, the title of "Being a Child", a comprehensive sharing about children, different childhood stages, and child-space interaction, was carried out by a psychologist Ö. Yaşar. The second seminar was the seminar titled "From Yesterday to Today Koşuyolu", which was given by F. Öncel in the early period of students'

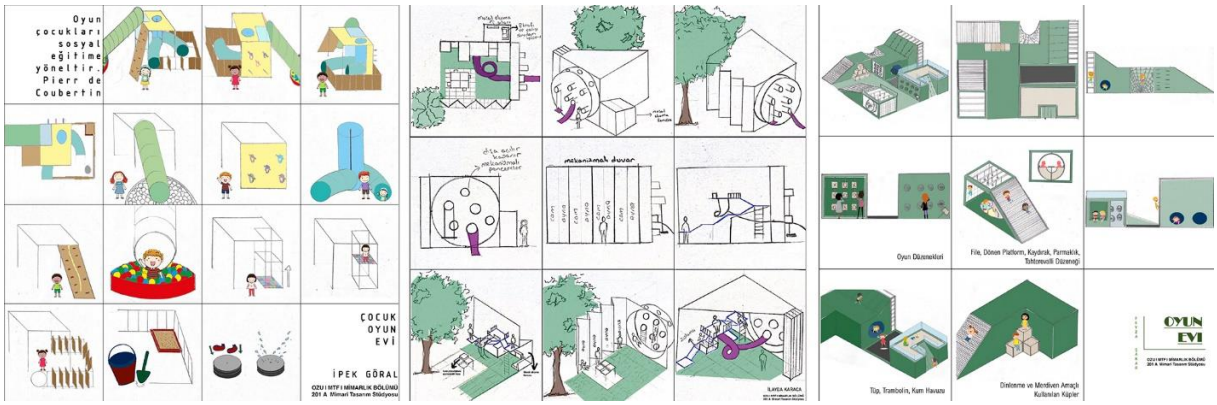

Figure 8: Three outcomes of the first workshop (Playhouse)

Figure 9: Snapshots from the videos produced in the second workshop (Adventure World)

planned at the centre of children and movement. This time, students were expected to create an incomplete world[6] –a space– that allowed children to participate in the 'action' focus (with arts, sports, games, and book keywords) (Figure 9.). Students have been offered a variety of key concepts in both their research and workshops. Through these concepts, they have been expected to develop ideas/programs specific to the architectural problem.

research on the site. The transfer of information in these seminars is significant for the studio because there is no chance to observe the user (child) and make technical trips to understand the location (the Koşuyolu) because of the pandemic conditions. In addition, students have easy access to the location's basic information through web pages and various channels (such as aerial photos, street views). One of the main reason the place was chosen as Koşuyolu was

[6] This workshop was inspired by Francoise Bilgin's article "Children in urban space, a place for children: Adventure areas".

the diversity of remote access to information about this place.

2. Modul / Coding

Modul 2, referred to as "Coding", covers the conceptual approaches developed in the first module, realizing scenarios and programs into an architectural whole. Modul 2 is the process of maturing the first design ideas and schemes that students put forward in the first modul. In this process, students were expected to rationally organize and describe the architecture, function, form, circulation, and construction issues they will build on their preferred architectural program in the second and third dimensions. Instructors did not give a specific program to students within the studio. Students have created their scenarios and programs in parallel with their research on the user and the location. As a result, different scenarios such as children's library, children's street, children's art centre, children's drama school, children's workshop have emerged.

The effective participation of students in discussions and reviews in the studio has been encouraged to ensure the process can conduct efficiently. The first module primarily formed through collective operation and production, while the second progressed mainly through individual studies. However, studio instructors encouraged students to participate in the discussion and comment on other students' work in all courses. In this respect, the lessons just before and after the juries and juries have prepared a major basis. In this module, a seminar was conducted by G. Lekesiz to investigate children's spaces with examples titled "Design, Research, Learning".

The second module, moving from concept to detail, required simultaneous production at different scales. Many topics have been discussed in this context, from topography, construction, landscaping, to material selection criteria. This program has therefore continued for continuous and exceeding the course hours and almost full participation.

4. Evaluation

At the end of the course, it is important that both students and course instructors make their assessments of the course. These assessments are even more critical for the future, given that our experience in remote education is very limited. For these reasons, Studio 201 A participants were asked to survey at the end of the semester with questions about the remote studio experience. The survey was produced via Google Forms and passed on to students online.

4.1. Questionnaire

It was aimed to collect quantitative and qualitative data with the questionnaire and the students' perspectives on the studio method to reveal by giving survey statistics. Survey questions which are 25 in total, are grouped under four main topics: a. Remote education, b. Remote education tools, c. Studio components, d. Self-assessment. The answer of 21 multiple choice questions was measured using the linear Likert scale (1 strongly disagree, 5 strongly agree). Quantitative research data was analyzed with Google Forms which the current online survey creation tool.

a. Evaluation of Remote Education Experience

At the first step of the survey, participants were expected to evaluate their remote education experience. They were asked to express positive and negative aspects of the studio process in items. Students have answered 16 positive and 26 negative items on remote education experiences.

The benefits of the remote studio are as follows, according to students:

— **Saving Time**

Students stated that they could use their time more efficiently in the distance education process.

"We did not waste time for some situations such as printing.", "I spent the time I used to spend on the road, on my project.", "I spent the time I gained by watching my asynchronous lessons at 2x speed, on my project."

— **Getting Feedback**

In the distance education method, it is understood from the statements below that students follow and understand the feedback more efficiently**.**

"A chance to see everyone's criticism.", "We had the opportunity to listen to the crits of other friends so that we could see our deficiencies.",

"Maybe more topics could be covered face to face, but I think feedback was better and more understandably."

— Also, students pointed that the physical comfort created by the home environment and stated that they improved themselves in the use of technological equipment on this occasion.

"I think that listening to a lesson in the comfort of home has some bad aspects, but it reduces the fatigue of the previous day to some extent, and it helps to listen to a better lesson.", "I have improved myself a lot in using computer programs."

According to the students, the compelling aspects of the remote studio are:

— **Lack of Motivation**

The students stated that being away from the campus environment and friends and not being face to face with the instructors caused low motivation.

"It gives the feeling of doing the lesson just to do it.", "I think it decreases motivation to participate in front of the computer.", " I loosely tried to continue to learn something since there was no tension in meeting them face to face.", "When we were on campus, we were chatting among friends, asking questions, doing this job with a fun and a friend was looking at this, he also was starting to work, but now all is different. How long can we work in a family environment?", "In face-to-face education, we could be more efficient by helping each other with our friends about our shortcomings. This is not possible in distance education."

— **Difficulty in Effective Communication**

Students stated that they sometimes had difficulty expressing themselves during the studio.

"There were cases when we had difficulty expressing ourselves on the computer, especially at juries.", "I think that the computer is reduced the efficiency of communication, sometimes incomprehensible points occurred in feedbacks.", "I generally could not answer the teacher while I was getting crits because of worrying about voice confusion, and I could not explain my problem."

— **Dependence on Technology / Technical Problems**

Problems in the technology tools and technology addiction are other cases that students think that negative.

"We are dependent on computers and online tools, the internet may be disconnected, the computer may be broken, or everything can be deleted with a click of a button.", "Due to internet malfunctions, my research was constantly interrupted, or I dropped out in the middle of lectures."

b. Evaluation of Remote Education Tools

The Zoom application, which is used as the common communication tool in the studio process, has been evaluated by students. Survey results show that students have had difficulty communicating effectively with their studio instructors via Zoom from time to time (2.18). However, they mostly had no difficulty expressing themselves (3,82) and understanding critics (3,09) (Table 1).

Site analysis, an essential stage in the architectural design studio, was conducted based solely on data collected on the internet due to remote education. Students believe that they have had sufficient knowledge of the Koşuyolu by doing remote research (4.09).

c. Evaluation of Studio Components

The course components are classified as open boards, readings, seminars, workshops, and juries**.** Students have been asked to evaluate each component in terms of their contribution to their project development. Two different workshops, three different seminars, and two juries have been evaluated separately in the process. The questionnaire results show that the students' common opinion is positive (
). Students also selected workshops as the most helpful component (72,7%) (Figure 10).

Table 1: Results of the student questionnaire

	Question	Mean
Evaluation of the remote education tools	I had difficulty communicating with the instructors via Zoom.	2,18 / 5
	I had difficulty expressing myself via Zoom.	3,82 / 5
	I had difficulty understanding the crits taken via Zoom.	3,09 / 5
	I think that I have enough information about Koşuyolu through research with virtual platforms.	4,09 / 5
Evaluation of studio components	I think that research on children and space has been useful for developing my project.	4,45 / 5
	I think that reading on children and space has been useful for developing my project.	4,27 / 5
	I think that writing on children and space and designing posters on child and space has been useful for developing my project.	4,09 / 5
	I think that the seminar on "Being a Child" helped me develop my perspective on the subject.	3,45 / 5
	I think that the open boards we created via Miro contributed to my thought production.	4,55 / 5
	I think that the first workshop "Playhouse" has been useful for developing my project.	4,36 / 5
	I think that the second workshop "Adventure World" has been useful for developing my project.	4,36 / 5
	I think that creating dynamic presentation techniques (gif, video) has been useful for developing my project.	3,92 / 5
	I think that the seminar on "From Yesterday to Today Koşuyolu" helped me understand and analyze Koşuyolu.	3,73 / 5
	I think that the seminar on "Design, Research, Learn" helped me learn from project examples.	4,64 / 5
	I think that the crits I took on the first jury have been useful for developing my project.	4,09 / 5
	I think that the crits I took on the second jury have been useful for developing my project.	4,36 / 5
Self-assessment	I think that I was able to deepen my research through digital platforms.	4,09 / 5
	I think that I am sufficiently contributed to open boards.	4,55 / 5
	I listened to my peers' crits.	4,73 / 5
	I had difficulty in distance education in studio 201.	3,91 / 5
	I think that remote education is reduced my efficiency in the scope of studio 201.	3,64 / 5

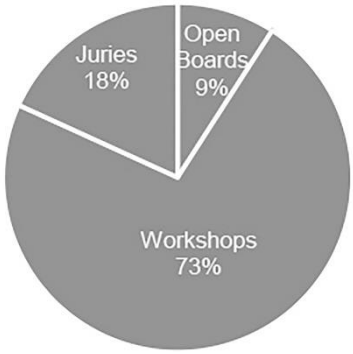

Figure 10: Evaluation of the most helpful component of the studio

d. Self-assessment

Students were asked to evaluate themselves for their performance during the studio process in the final phase of the survey. This section revealed that students often listened to the crits of other students (4,73). However, students have stated that they are generally challenged during the remote education process (3.91) (Table 1.).

4.2. Studio Instructors' Overview on Remote Education Experience

Design studios are environments where original architectural patterns are defined by experimenting with ideas and approaches from the ground, discussing the thought base of architecture (Turgut & Açımuz İşbakan, 2019). The learning process takes place in the interactive environment of the studio with the interaction between the student-instructor-studio, instead of a linear flow of information from the tutor to the student (Özgüven, Kumsal, Bayram, & Cantürk, 2020). The combination of architecture students with community members, together with the assistants and the instructor, or the director, of the studio, creates an opportunity for a comprehensive learning situation (Salama, 1995). Furthermore, studios have unplanned encounters with students in other groups, their work, and their instructors. The studio's pluralist structure offers these possibilities to create a robust interaction environment.

When creating 201 A's setup, the primary motivation was to create a structure in the virtual environment that could allow similar interaction opportunities in the physical studio environment. It has been investigated which ways and methods can be used to create this structure. For example, the 'open boards' in which all participants in the studio can be simultaneously involved in production have been beneficial in this sense. In addition to the study carried out during the course -just like in face-to-face education- students were observed to be able to (co)work with the program that was also used except the course hours. Students could not reach the studio/studio production during face-to-face education at any time, but they could reach each other's works any moment during remote education. The LMS system has provided continuous access to all information and documents, announcements, and seminar records throughout the period. We also found that students are willing to add their research to the information pool created and access/use the information added here.

Şentürer (1994) describes the design studio as where the architectural design knowledge and skills are intended to be given to participants. She indicates that communication occurs both in visual and verbal language, and this communication occurs randomly in the studio. It was observed that casual dialogue-based education established in and outside the studio with students decreased in remote education. The reason for that could be physical spaces allow surprises. The fact that the studio (i.e. Zoom meeting) takes place within specific hours in remote education and opens and closes in connection with a button blocked the coincidences. In this context, one of the methods used within the studio is to organize short workshops to accelerate the process. In fact, the two workshops that we conducted within 201 A have beneficial above the expectation (perhaps more than those similar during face-to-face education). Apart from the solution recommendations students developed for the given problem, these short studies have enabled us to recognize 'remote' students and explore their skills, potential, and authentic character. Incorporating different representation formats (such as writing, collage, video) into these studies created a dynamic environment and stimulates students' learning

urges. Almost always went beyond the course hours, although it was clear that most students were actively willing to join the studio.

It is clear that architectural design is not a process to teach but a process to experience. Studios are active places where students are engaged in various activities such as drawing, communication, and model making, socially and intellectually (Dutton, 1987). However, it was not always possible to find the complete response of these activities in remote education. The 201 A is a design studio programed for third-term students. So here, students encountered some problems in the architectural design process for the first time (such as understanding the site's properties). They also lacked scale and architectural representations, and, frankly, they did not make it any easier to draw on a computer all the time. Moreover, the screen added another new layer between the product and the producer. They had never made physical models to allow them to perceive the slope of the field as three-dimensional before. In our experience, perhaps the most challenging topic for students was understanding topographic data and being able to recommend architectural solutions for this data. Because of the pandemic conditions, students did not get a chance to examine the work area on-site. Instead, the properties of the place were tried to be transferred to students with a 'remote' multilayered study (seminars, research, and readings). While the students have expressed that they are not having any problems with this, we think that it has created a significant challenge to understand the place.

Furthermore, most students did not know to create three-dimensional digital models at the beginning of the semester; however, they had to learn quickly. At the end of the semester, most students made significant progress in 2d/3d drawing programs. Some students went beyond that and developed a unique/strong language for themselves. In addition to all this, there were some technological infrastructure problems in the studio from time to time. Remote training requires appropriate hardware and required software, as well as a stable internet connection. In a synchronous course, such disruptions can significantly affect communication. Especially in juries conducted with two studio groups in parallel (studio 201 B by Işılay Tekçe and studio 201 C conducted by Ebru Karahan), significant problems have been experienced about internet speed from time to time.

5. Conclusion

Philips (2020) has matched the fact that departments have been shy about adopting online and remote education models in recent years with factory workers' fear of robots. Human beings are distant from what they do not know and do not easily leave the comfort zone. However, universities/university education has to be open-minded and innovative when it comes to the future. It has to be responsible for developing ideas/products for an inclusive, healthy, safe, fair, and equal future for everyone.

Covid-19 has been an inflictor factor in updating conventional tools in the architectural design studio and allowing technology to be more involved in the studio process, and therefore adapting to our age. Also, many approaches in traditional studio culture have been supported by technology tools rather than a fundamental change and have been survived in the approach of remote education. For example, collaborative studies and group production, which are an essential part of the architecture studio, have been experienced using online tools that enable simultaneous co-production. It has been observed that the production is carried out efficiently with the common participation of the entire studio or with smaller groups. Besides, produced presentation element is one of the main changing phenomena in remote education. Digital products have replaced all kinds of presentation boards, physical models, and sketches, drawings on paper in the traditional studio. Factors such as the limitlessness of the virtual environment, the diversity, and the availability of materials have positively influenced the student's level of representation. The use of different representation techniques has been encouraged in the studio process.

In distance education, the individualization of students' work outside the studio has been effective in developing personal skills such as research, access to information, and time management. On the other hand, it has led to a low motivation of students to work. In the context of learning, architecture education should not be considered just the transfer and acquisition of information. If there is no interaction between actors during this acquisition, it is not possible to mention a real gain in the process (Yurtsever & Polatoğlu, 2020). Therefore, in the 201 A studio, communication channels were kept active, and group concentration and collective information production were kept foregrounds. It was intended to provide dynamism with short-term exercises such as workshops. Also, at the beginning of the process, these applications have been an important step in recognizing students.

Field trips, another major phenomenon of the studio, were performed physically in the traditional studio, while remote training took place in a virtual environment. A project area has been selected in which the site-related data is rich. Students who are unable to experience the site physically, with body movements -also depending on the fact that they are second-year, had difficulty understanding the scale. The virtual experience is not enough to support all perceptions. At this point, students have been encouraged to build three-dimensional models to experience space and support site research with written and verbal resources except for visual resources.

As a result, the components of the studio, such as juries, interaction, collectivity, multilayeredness, dynamism, feedback acquisition, are also present in remote education, supported by technology tools. The fact that architecture education is based on visual production/expressions can facilitate adaptation to remote education. Although there are verbal communication difficulties in the studio conducted with remote training, visual/screen sharing has supported communication throughout the process.

Education, by its nature, requires constant renewal, awareness of the realities of time and makes it possible to think about the future. When it comes to architectural and design education, this responsibility and effort make it imperative to rethink each time in relation to many different branches and make strong internal questioning without obeying habits (Özorhon, 2021). The Covid-19 crisis provides strong motivation to rethink the architecture design studio, architecture education, and even the whole of architecture. We need to look for durable models when designing tomorrow's living environment or designing the education of those who will design tomorrow's living environment. For looking ahead and forward-looking designs, it becomes crucial to reveal what has been left behind / our experiences and to be able to evaluate them from a critical and multi-faceted perspective. When it comes to remote education in the architectural design studio, it can be said that our experiences are very limited. Therefore, sharing/discussing each experience is important for the development of more effective methods. This article has discussed the subject of remote education in the architectural design studio with this perspective. It has revealed the problems and potential of remote education in the architectural design studio through experience.

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