

Lessons Learned from Digital Design Studio during the Outbreak of COVID-19

Abstract

Problem Definition: While universities are keeping their classrooms virtual because of the outbreak of COVID-19, it is not yet clear when they will be able to return to the "normal" status. Developing virtual lectures has become a solution for many fields. However, the teacher-centered lecture-style classes are not responsive to design studios, which rely on dynamic, collaborative, and creative processes. Providing similar platforms to instructors for online teaching in different disciplines, from theoretical to practical courses, in Iran has become a challenge for design courses that require studio spaces.

Objective: The aim is to share lessons learned in applying parallel approaches and tools to restore active, collaborative, and creative learning processes into design studio classes.

Research Method: Drawing on Design-Based Research (DBR) approach, which is a qualitative methodology to refine and improve learning practices in iterative cycles of designing, evaluating, and re-designing, this paper aims at sharing some learned lessons from developing virtual design studios using the potentials of the existing digital tools that can bring dynamic learning spaces to design education in the virtual world.

Results: The emerged themes included collaboration and group work, ability to upload and download multiple formats, possibility of student-centered asynchronous time management leading towards improving students' learning experiences, observation of learning and thinking process with the possibility of refinement and improvement, and necessity of digital literacy. Codes and themes were extracted from data as units of analysis using Thematic Analysis in this qualitative research. This paper includes the lessons learned from two different design studios: a Basic Design studio for undergraduate Architecture students, and a participatory design studio for non-designer Ph.D. students. In both studios, Padlet platform was used a virtual space to collaborate and share ideas.

Keywords: Lessons Learned, Virtual Design Studio, Design-Based Research, Online Tools.

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Introduction

Design studios or design workshops are vibrant and active learning spaces. In such spaces, individual work can be conducted in parallel to a teamwork without disturbance. Slow-paced interactions along with fast-paced activities are performed through a variety of tasks in parallel multidimensional forms. Design studio courses are usually taught by several instructors collaboratively. As a result, collaborative work is quite common among the instructors and students. Design studio instructors are in fact facilitators of learning rather than simply educators; they facilitate each student's design process based on the common theme of design studio. Thus, transforming such an environment into a teacher-centered, one-sided class is not a trivial task. However, in the current situation, when design studios need to be conducted virtually, instructors, in most universities and disciplines in Iran, regardless of the inherent differences of each discipline, are provided with platforms that are mostly suitable for teacher-centered classrooms and not for design studios. Other restrictions in Iran, such as poor-quality internet connection in different regions of the country, lack of cameras for face-to-face communications, low level of digital literacy, and many other factors have created additional challenges for instructors and students. These conditions can turn the facilitator into the transmitter of knowledge in a design studio. While it is possible to use a microphone to talk to the instructors in these platforms, scheduling and managing the details suppresses the active participation and interaction and increases the teacher-centeredness in the learning process. Since it is possible to record audio in each class, students can use the class audio file at any time however, recording audio in design studios is not as helpful as conventional classrooms. Studio is an informal participatory environment with a potential for multi-layeredness and simultaneous interactions expanded over time. Listening to the audio of such an environment cannot be a productive substitute for active interaction and participation. On the other hand, studios are designed to be conducted in multiple-hour units; the average time for this type of classes is four to five hours. So, length of such classes could not, at any rate, allow formality in the classroom.

Studio environment should meet different needs of the students and instructor(s): eating, drinking, moving or walking around in the classroom, listening to music, laughing at a joke, chatting, having discussions, and many other things that do not seem to be part of conventional classrooms, but are quite relevant and understandable for those who are familiar with this style of learning spaces and a little difficult to adapt for those who have studied or worked away from such environments. Teaching as a one-sided speaker for about five hours is a difficult and monotonous experience for both parties, the instructors and the students, and detrimental to the creative and collaborative processes in design studios. So, how might we bring active dynamism back to the studios? How could a design-studio instructor change from a one-sided presenter to a remote facilitator so that s/he

can guide the students towards their design objectives? On the other hand, how could a student meet her/his active learning needs by being shifted from a dynamic environment into the physicality of home spaces and virtuality of online spaces? In such a context, development of innovative and appropriate tools, platforms, and processes could be beneficial to meet students' and instructors' needs, where the motivation for discussion, collaboration, peer feedback, and design critiques among the instructor and the fellow students are restored and the required Covid-19 safe protocols are met. What tools does the virtual environment provide for the students and the instructors, and how can these tools be used properly?

Research Method

This qualitative study was conducted within the framework of Design-Based Research (DBR). DBR seeks to increase the impact of educational research into further and better practice through generating “new theories, artifacts, and practices” (Barab & Squire, 2004, 1-14), in iterative cycles of designing, evaluating, and re-designing. It tries to evaluate and re-design the educational settings based on the emerging lessons learned in each cycle of design. This methodology is used by researchers in the domain of learning sciences, and data collection in this methodology limits to small but purposive samples. Virtual teaching and learning in the fields of Arts and Architecture is an emerging and under-constant-experimentation phenomenon. Iterative cycles of design, evaluation, and re-design based on the lessons learned in each cycle improve the subsequent cycles; this is a common approach in the domain of design and in design studios; thus, such an approach aligns well with DBR and seems an appropriate methodology for this study. In this study, we explored the learning experiences of two groups of students who participated in two different studios and areas of design. We collected data using students' performances and feedback to reflect on our proposed virtual design studios. Thematic Analysis (Braun & Clarke, 2006, 77-101) informed the data analysis process. This flexible approach to analysis helped us to analyze the data through iterative cycles of coding, going back to the data, and re-coding based on the emerging codes.

The term “theme” is often used interchangeably with category or unit of analysis to analyse the qualitative data (DeSantis & Ugarriza, 2000, 351-372). Each theme is a collection of codes that is derived from the data. To code, we reflected on our notes and observations and chose the emerged keywords as the codes or descriptive units. After several rounds of reading of the data, we divided the codes into categories or themes. We are aware, that like any other qualitative analysis, we bring our subjectivities, and our personal interpretation has been influential in creating the codes and themes.

Research Background

The design studio appeared as the basis for industrial design education in early 1900s from Bauhaus design school in Germany (Bayer 1975, 89-94). Studio has been commonly used in design related curriculum such as Landscape Design, Architecture Design, Interior Design, and Industrial Design. It is a learning environment where students set up their own workspaces to create and present their designs (Schon, 1983). In studio style classes, students are introduced to a design challenge/problem and then, they work individually or collaboratively to solve the given problem. There are no lectures in studios instead, and the instructor facilitates and leads students to new insights in their projects (Cennamo Brandt; Scott; Douglas; McGrath; Reimer & Vernon, 2011, 12–36)

In such a shared space, students and instructors develop a community of practice in which they support each other and provide constructive feedback. Schon (1983) claims that studio-based education has the potential to be used for students in other disciplines in order to learn the practices of the field. In fact, he extends his hypothesis of studio-based learning to other professions and claims that all professions are “design-like”. According to Schon’s hypothesis, studio-based approach connects theory and practice through creative activities. Crowther (2013) clarifies studio-based education accommodates three types of learning: learning about design, which leads to the development of knowledge in this field, learning to design, which improves design skills, and learning to become a designer. In March 2020, the World Health Organization officially announced the outbreak of COVID-19 as a global pandemic (WHO, 2020). As such, the circumstances impacted the design and development of all courses, including design studios, shifting them towards virtual spaces. Previously, e-learning was rarely used as a learning platform for Arts and Design courses in Iran. With the outbreak of this disease, the past interactions, which were the axioms and requirements of social life, become suddenly obsolete. While some educators believe that e-learning can reduce the quality of experience and the effectiveness of learning (Ubell, 2016), others (including us) hope that the current situation could be an opportunity to develop new approaches to teaching and learning, curriculum improvement, and advancement in digital learning (Milovanovic; Kostic; Zoric; Đorđević; Pesic; Bugarski & Josifovski, 2020, 7024)

The emerging question is, what are the expectations of a pre-Covid-19 design studios that can be met by e-learning? Brown (2008) argues what is needed in a design process is a comprehensive mindset, which takes steps to meet human needs aiming at innovation and sustainability. Within this framework, he suggested three spaces for the process of design: inspiration space for identifying the problems, ideation space, where ideas find their forms through prototyping, and implementation space to design a comprehensive scheme of production to deliver innovation to its targeted users. Since this study focuses on teaching the design process in virtual spaces, it examines the inspiration and ideation spaces.

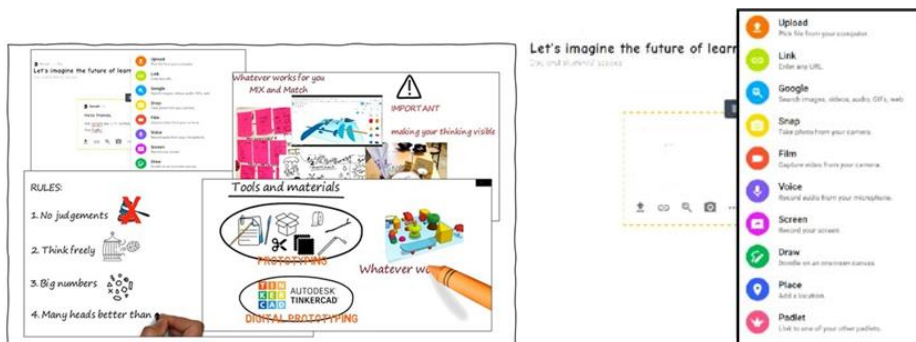
The Suggested Virtual Space

In a face-to-face design studio, part of the learning process takes place when the instructor(s) and students are present in the studio simultaneously. In the virtual design studio, however, this synchronicity is greatly changed: the instructor and the students are located in different physical spaces, even during the virtual studio. On the other hand, the students leave the studio under "normal" circumstances while they stay in the same physical space and possibly the same virtual space when the virtual class ends. As a result, they can spend more time flexibly and work on their projects in virtual spaces without real-time instructor-led interactions.

To avoid the difficult scheduling issues, we considered an asynchronous process which did not occur at a specific time, but instead, allowed students to contribute to a shared digital space whenever they chose over a longer period of time in order to participate more productively. To design and develop the virtual design studios, we drew from a framework suggested by Sanders, Brandt, and Binder (2010). Based on this framework, they suggest considering three elements to virtualize the design studios: form, purpose, and context: form describes the action that takes place, purpose describes why the tools and techniques are being used, and context describes where and how the tools and techniques could be used. Considering the differences in form and purpose in the curricula of the studios, our focus is only on the context; by context, we mean an online space in the virtual world with potential capabilities to be used in a wide range of design studios.

Two Studios

In this article, the lessons learned from the two virtual design studios, of which we have been their facilitators, are presented. Both studios have been designed based on the model proposed above and developed in virtual space during the Covid-19 constraints, using the potentials of the Padlet platform.



Figures 1 & 2.

Padlet's multimedia board, the ability to upload various formats. Source: [authors](#)

One of the studied studios was designed for "Architectural Basic Design 2" and "Architectural Basic Design 3" courses for undergraduate level students, which took place in Spring and Autumn 2020. The difference between Architectural Basic

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Design and Architectural Design studios is in the variety and number of assigned projects and exercises. The Bachelor of Architecture syllabus aims at a wide range of skills, including familiarity of tools and principles of architectural drawing, methods of making models, ability to convert thoughts and ideas into two- and three-dimensional architectural prototypes, familiarity with architectural thinking, form and function, familiarity of structure, materials, concept and space, visualization, imagination and reasoning, critique and analysis of architectural works, goal setting in designing and critical thinking (Ministry of Science, Research, and Technology, 2013), which must be completed within three semesters. Obviously, such a wide range of goals and exercises can only be accomplished through field trips, visits to architectural heritage sites, and students' creative activities, almost all of which were not possible during the Covid-19 pandemic. This active spectrum is nor comparable to the senior Architectural Design classes during one semester, neither conceivable with virtual teacher-centered classes and lectures. The collaboration of the instructor and students, as well as the interaction of the two with the spaces and the buildings, the studio, and the field trips, all make the instructor's work complicated. The emerging question is "what tools and solutions might help re-create this type of learning spaces?" This question led us to explore additional tools and techniques in developing virtual studios.

The second studio is a Participatory Design studio to engage doctoral students in the process of designing in order to improve their learning spaces. This studio was a part of a research project, which was held virtually due to the constrains of Covid-19. Participants in this project were non-designer doctoral students from disciplines other than Arts and Design. It is worth mentioning that these students had participated in the previous phases of this research project, which included questionnaire, interview, and Photovoice. Photovoice is a participatory approach to data collection in which participants take pictures of their surroundings and collectively interpret them with the help of a researcher to identify contextual problems. As a result, participants were quite familiar with the aims and the process of the project. At this stage, they were invited to ideate and imagine their ideal learning spaces through making two- or/and three-dimensional prototypes. This virtual studio was also developed on Padlet platform. Through a recorded video, the work process and "how to use the platform" were explained to the participants. This studio was designed to allow students to participate without the presence of the facilitator.

In both experiences, we have used Padlet as a virtual studio space to interact, share ideas, get feedback from the facilitator, and share descriptions. Padlet is an online post-it board/platform to share ideas and collaborate virtually. This platform allows to share a wide range of educational materials including images, audios, videos, and a variety of files in various formats. A link to the Padlet page containing the necessary explanations was shared with the students, which allowed them to upload their work on the board. Padlet is a user-friendly platform and we explained

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how to use it in the description column for the students. We also reminded them that it was a private space and only they were given access to it as participants of the studios. Figures 1-5 show an overview of the Padlet space in two mentioned experiences.

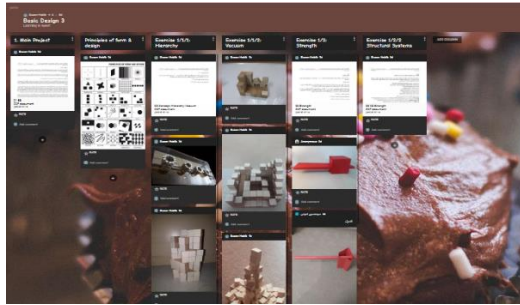


Figure 3.

Architectural Basic Design Studio's Padlet.

Source: authors



Figure 4.

Participatory design studio's Padlet.

Source: authors

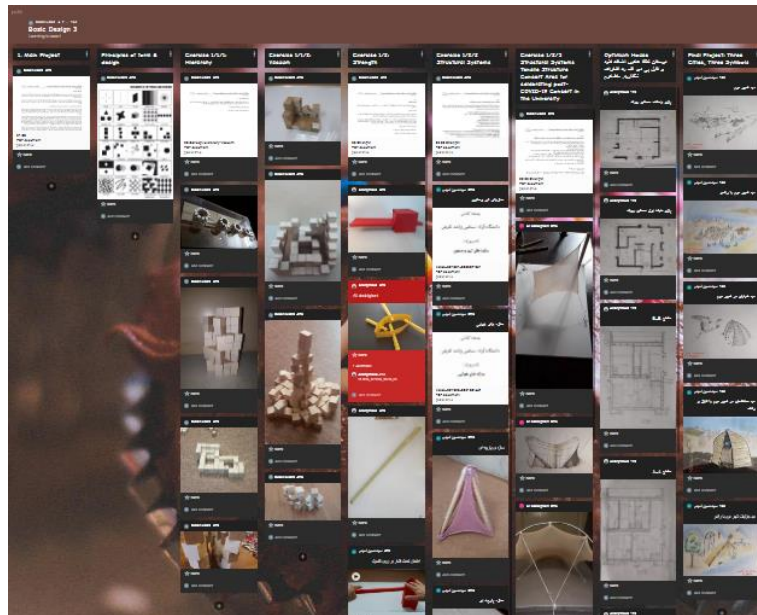


Figure 5.

Architectural Basic Design Studio's Padlet at the end of autumn semester 2020. Source: authors

Results:

Based on our experiences as the authors of this article and the facilitators of two examples of virtual design studios with different goals as well as students' feedback on the process of forming and developing studios in a virtual way, in this article, we share our lessons learned from these two experiences. The table below (Table 1) summarizes the data analysis process based on Thematic Analysis. In this method, the analysis consists of two interconnected and intertwined stages: 1) Our

observation of how students participated; 2) Narratives and feedback from students' experiences.

The Table displays the emerged codes and related themes including "Teamwork Opportunity", "Multimedia Capability", "Student-Centered Time Management", "Concentration and Productivity", "Observation of Learning and Thinking Process", "Possibility of Refinement and Improvement", and "Need for Digital Literacy".

Table 1. Data analysis process based on qualitative method of thematic analysis. Source: [authors](#).

Themmatizing	Coding
Teamwork Opportunity	Possibility to discussion
	Conversation
	Trade off Ideas
	Suggestions and Critiques
Multimedia Capability	Uploading Images
	Uploading Audios and Videos
	A Variety of Files and Formats
	Possibility to Write
Student-Centered Time Management	Enough time
	Time to Think
	Concentration
	Freedom to Choose Appropriate Time
	More Productivity in Private Space
	Asynchronous
Observation of Learning and Thinking Process	Review and Refine
	Observing Others' Works
	Ability to Return to the Page
	A Showcase for Projects
	Observing Facilitator's Feedback on Others' Projects
Need for Digital Literacy	Finding the Content
	Finding the Correct Spot to Upload Data
	Navigate the Content
	Clarity and Visibility

The conditions caused by the Covid-19 pandemic have limited collaboration and interaction among students. By re-defining teamwork, new types of collaborative work can be developed within the existing virtual platforms. Accessible platforms, which enable instructors and students share text, image, audio, and video files and provide the ability to interact, have the potential to support developing studio classes and creating communities of practice. Use of digital assistive tools can delegate part of the time management to the students, where they can return to the platform at their convenient time, share their ideas, and learn from others; this would also be the case for the instructors. At the same time, flexibility and potential for time management for the students to work in their privacy could lead to a concentrated and productive experience.

The learning and thinking processes become more visible, perceptible, and reflective to the students and the instructor. This potentially facilitates learning and thinking processes, providing more flexible time, and the possibility of a concentrated and iterative-reflective learning process. Such a process creates potential possibilities to refine the work-in-progress and makes the process to the next tasks smoother.

On the other hand, students need to obtain digital literacy to be able to fully participate in virtual design studios. Digital literacy, as a “must”, stands out alongside other 21st century’s literacy, and empowers students to achieve their educational objectives.

Discussion

The focal question of this article is how we might use the potential tools and accessible technologies to develop virtual design studios. In this regard, we shared our experiences, in the form of lessons learned, obtained in the role of organizers and facilitators of virtual design studios using existing digital tools and platforms. This can facilitate forward steps towards improving virtual design studios in the future. Lessons learned or design principles are terms that are used for the results of a qualitative Design-Based Research methodology (Van den Akker, 1999; Wademan, 2005); these results are used to improve teaching and learning in the context of each research. Design principles also need to be tested and validated by instructors in other contexts. Cronbach (1975) explains design principles are not generalized principles for other contexts until they are tested as “working hypothesis” (p 125). van der Akker (1999) confirms this claim and notes generalization of the findings in DBR increases when they are validated in “successful design of more interventions in more contexts” (p.9).

Advantages of Using Padlet Platform in Virtual Design Studios

Ability to teamwork: Padlet allows collaboration and participation in online activities. Students are able to discuss with their instructor synchronously or asynchronously, share their ideas, and try to refine them. In this way, all students can participate equally, because everyone has enough time to think; this is contrary to face-to-face studios, where students with higher work pace or more self-confidence generally have the opportunity to participate more in the design studio.

Possibility of individual work with high concentration and productivity: Since students had the opportunity to choose the right time on their own schedules to work on their design project, they did their work with higher concentration and productivity. People who are inherently introverted also prefer virtual studios over the face-to-face because the freedom to choose the time and working alone are more aligned with the introverted approach to learning.

Multimedia capability: Different types of media can be uploaded on this platform (for example podcasts, videos, images, texts, and other formats such as PDF). This

feature allows students to become acquainted with a wider range of project-related information and knowledge through seeing, hearing, writing and reading, and gain a deeper understanding of their own work and that of others.

Observing the learning and thinking process: Padlet, as a dynamic and flexible gallery, allows students to display their work at different stages. Along the way, students witness their own and other students' learning processes, challenges, revisions, as well as refinements and improvements. Since this dynamic gallery can be observed and tracked in full detail in the virtual studio, exploring the thought process and its implications will help develop students' metacognitive skills. Acquiring these skills as well as recognizing their strengths and weaknesses will enable students to learn and improve their skills and thoughts.

Disadvantages of Using Padlet Platform in Virtual Design Studios

Need for digital literacy: Students at Virtual Design Studios faced problems such as feeling lost in the large volume of information, not finding the content they were seeking, and not finding the right place to upload their designs and descriptions of their works. Trying to help them find answers to their questions, we realized that part of the problem goes back to the lack of control over virtual spaces, because e-learning is a whole new experience for students and educators. Virtual education is recently finding its place alongside or instead of face-to-face education, and learning digital literacy is a requirement to acquire this type of education. Digital literacy is called the fourth literacy in the new world (Maphosa & Bhebhe, 2019, 186-199); while reading, writing, and mathematics are initial elements of literacy, if someone is not able to access and create digital information, s/he is not fully considered as literate in the digital world. Therefore, to facilitate education in the virtual world, it is necessary to strengthen students' digital literacy.

Given the limited experiences and background in digital environments, the emerging challenges from junior students in the courses such as Architectural Basic Design studio are predictable; improvements in this ability or literacy can be achieved in the coming semesters. The improvement of digital literacy for both educators and students seems required in the new age; it remains to be seen in the coming years, to what extent students who have experienced virtual spaces in primary and secondary schools will appear more prepared.

Conclusion

Finally, the COVID-19 pandemic caused by the Corona virus accelerated the necessary arrangements at various levels for the establishment and expand of e-learning. Although subsequent thorough steps need to be taken at different levels, it is necessary to use tools and platforms for Arts and Design studios beyond the official platforms of schools and universities. The purpose of this article was to reflect on using Padlet as one of the available platforms to facilitate developing virtual design studios in two different contexts during the outbreak of COVID-19.

After evaluating the first stage of remote design studios, here is our suggestion to the instructors of these courses: as we use virtual spaces as an alternative way of educating students in studio-based learning, we must remember that studios must be evaluated and improved on an ongoing basis. While we use virtual spaces as an alternative, we have to remember that we need to conduct constant evaluation and refinement of the process and the studios, so that we can adapt to online communication tools, enhance our and students' digital literacy, and develop more advanced communication and display methods.

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