From Studios to Laptops: Challenges in Imparting Design Education Virtually

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Abstract. This paper investigates the challenges faced by design educators with this new shift in education paradigm, from traditional studio-based learning to online modes of instruction and discussion. The paper reports findings of a study which includes a survey of 150 users of online education and in-depth interviews of ten design educators who are currently taking classes online in India. The findings suggest technical modifications that can be made to designs of online education portals as well as to online design pedagogy so that they can cater to design education in a more efficient manner.

Keywords: E-learning · Design education · Studio based learning · Virtual classrooms · Online teaching challenges

1 Introduction

In the wake of the COVID-19 pandemic situation, most of the countries have observed a long period of lockdown. This has resulted in an unprecedented explosion of online education. Though online classes have existed for a long time, they have taken a newfound relevance with the constant need of virtual connection between students and instructors in present times [1]. Particularly, in the case of studio-based design education, this is a recent phenomenon, and is facing teething issues. This paper reports findings from an investigative study conducted with design students and teachers. The aim of this study was to understand the differences in teaching and learning experience of online studio based design education as compared to conventional methods. The study followed a mixed methods approach to understand issues and pain points faced by the users of online platforms while imparting design education online.

1.1 Background

Studio based education is different from conventional lecture classroom setup and studio spaces are an important part of design education. From a teaching and learning perspective, the primary difference between the two set-ups is that studio based classes allow students to apply theoretical knowledge and skills to create new artefacts. They also promote collaborative learning as well as self-reflection among peers through group activities [2, 3]. Teachers can demonstrate and assess students' performance simultaneously in a studio based setup, resulting in better physical and verbal interactions. With the advent of platforms for online teaching and learning, many studio

P. Zaphiris and A. Ioannou (Eds.): HCII 2021, LNCS 12784, pp. 507–516, 2021.
https://doi.org/10.1007/978-3-030-77889-7_35

based learning activities are now being performed virtually. The authors posit that this shift might change the teaching and learning experience for teachers and students respectively.

Studies which have investigated teaching paradigm shifts of online design education have reported academic stress due to online education [5]; benefits, challenges and strategies of online education [6]; challenges in online education during the COVID-19 pandemic [7]. Literature has also suggested pedagogical changes that can be incorporated in order to overcome its challenges like the reported benefits of combining studio classrooms with online technologies [5, 8], benefits of 'blended learning' that include enhanced learning for students, improved assessments/critiques and decreased faculty workload [9, 10]. It was also noted that a lack of "felt connectedness" affected the teacher satisfaction and learnability of design students [11]. Benefits of using virtual tools alongside physical interaction have also been reported. However, there is limited literature available on the use of online platforms for design education and it may be argued as one of the reasons why online design education is still at a nascent stage [12].

Worldwide lockdowns due to COVID-19 pandemic have not given the opportunity of physical interaction and the teaching and learning mode have been purely virtual. It is argued that design activities such as peer-learning need face to face interaction which is difficult to achieve in full online mode [8, 10, 13]. Further, due to sudden lockdowns in many countries, there was no time to reform educational practices and policies especially for courses involving hands on practices. Online platforms such as Microsoft teams, Zoom, Cisco WebEx etc. became popular among various educational institutions to conduct virtual classes. However, these platforms were not designed specifically for education, particularly in the area of design. Online portals have been constantly updating themselves with features based on user feedback. However, they still have a long way to go in order to improve the teaching and learning experience of their users. This has resulted in a need to identify features for an online education platform that has tools to conduct virtual design classes. This paper reports an investigative study that identifies issues faced by design educators and students while using online platforms for design education.

2 Research Methodology

The study was conducted in three parts: Firstly, an internet-based analysis was done for three popular online platforms used for education in India, to investigate how different features of such portals are being used for education and which of those features are liked and disliked by users. The methodology was content analysis of online reviews posted by users of these popular online portals. The portals which were analyzed were: Zoom, Microsoft Teams and Google Classroom (Fig. 1).

No.		Google Classroom	Microsoft Teams	Zoom Classes
1	Maximum number of users	250	250	1000
2	Accessibility from all devices	☑	☐	☑
3	Compatibility with different OS	☑	☑	☑
4	Easy account management/accessible through all accounts	☐	☐	☑
5	Sharing of documents like lecture notes	☐	☑	☐
6	Quick assignment process	☑	☑	☐
7	paperless assignments	☐	☑	☐
8	Can add comments/Post its to a lecture	☑	☑	☐
9	Scheduling/Calendar	☑	☑	☑
10	Integration with Notes/Docs	☑	☑	☐
11	Automated Quizzes and tests	☑	☑	☐
12	Quality of video and audio	☐	☑	☑
13	Co-visibility of users	☐	☑	☑
14	Learner sharing - with each other	☐	☑	☐

Fig. 1. Sample of internet-based analysis done on three popular online portals used for education in India

Next, based on the findings of the above-discussed analysis, a questionnaire-survey was designed to investigate how users in India are interacting with the popular online education portals. The survey was taken through a google-form and was shared with design students and educators through emails and WhatsApp messages. 150 participants who used online portals for design education participated in the survey. 75.8% of the participants belonged to the age group of 18–25 years and of these, 77 were females and 73 were males. This survey aimed at investigating the most used, liked and problematic features of the popular online education portals presently being used in India. The survey also highlights the pain points of the users while they use these platforms in a country where high internet bandwidth is still a luxury (Fig. 2).

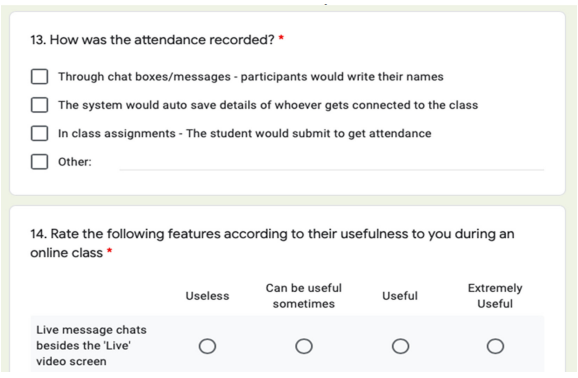

Fig. 2. Sample questions from the survey

Lastly, semi-structured interviews were conducted with ten design educators, 6 males and 4 females, who are currently taking online classes to understand the pain points and desirable impacts of using online portals to impart design education. Purposive quota sampling [14] was used to select the participants for this study. This allowed us to focus on people who would be most likely to experience or have insights into the topic of online design education in India. The interviews were conducted telephonically, and the duration of the interview ranged between 20 min to 35 min. The average duration for all 10 interviews was 28.6 min. The average age of the participants was 33.4 years (st. dev. 5.4 yrs.) and the average experience of working in the design education sector was 4.8 (st. dev. 4.14 yrs.) years. The profiles of the interviewees are summarized in Table 1. Thematic analysis was conducted on the interview data post transcription [15]. From the transcript of interviews of each participant, for both the questions, six 'themes' in responses were identified which are discussed in the subsequent section.

Table 1. Profiles of Design Educators who were interviewed

No.	Gender	Age	Designation	Stream	Exp.
P1	M	36	Associate Professor	Interaction Design	3
P2	M	30	Assistant Professor	Architecture	5
P3	M	34	Associate Professor	Fashion Design	10
P4	M	44	Dean	Fashion Design	15
P5	F	29	Assistant Professor	Interaction Design	3
P6	F	25	Teaching Assistant	Architecture	1
P7	F	40	Teaching Assistant	Design	2
P8	F	36	Teaching Assistant	Interaction Design	4
P9	M	29	Educator	Fine Arts	3
P10	M	31	Teaching Assistant	Design	2

3 Findings

While the findings of the survey revealed the most used, liked and problematic features of online design portals, the observations from the interviews gave insights on the possible modifications towards online design pedagogy as well as technical challenges that can be taken up to redesign online education portals for a more efficient impartment of design education.

3.1 Findings from the Survey

150 participants participated in the survey, who had used online portals for design education. Of these 68% participants reported mostly using zoom classes, 45.8% reported using Google classroom while 19% used Microsoft Teams. Blackboard and Google meet was used by 7% of the participants while other online portals were used by less than 2%. So the findings reflect on the features of the portals used by the majority of the participants.

Listed below are key findings from the survey on the usage of the design portals:

1. The duration of an online design class was reported to be longer than 1 h by most (86.2%) participants.
2. 93.5% reported that most of the lectures were live and not recorded and the majority (70.6%) also preferred it this way.
3. It was also reported that the participants (64.1%) would keep their videos on for most of the time, and when they could not, it was due to either low internet (48.4%) or privacy issues (37.9%).
4. A majority (71.2%) of participants used their laptops to attend the class and 64.7% could access it on their own without the need for any external authorization (for example the institute authorities).
5. The main problems faced due to internet connectivity issues were loss of live instructions (68.6%) and freezing of screens (67.3%).

Listed below are key findings from the survey on the design features of the portals and participant awareness about those features:

1. The online portals had provisions to create separate teams/chat rooms during a session (to aid group work). However, only 24.8% of the users were aware of it and 68.6% reported that they did not know of any such feature in their education portal.
2. The feature Screen sharing was used mainly to give presentations on powerpoint (66%) or to demonstrate the working of a design software (43.8%).
3. The grid view, which allowed to see the peers was a feature that was important to 52.9% of the users while 41.8% reported that it didn't really matter whether they were able to see their peers or not.
4. Although the softwares had features to assign and submit assignments, 72.5% of the users were unaware of those and would use emails or Whatsapp to share their work with the faculty.
5. 52.9% users would take snapshots of the lists of participants and 34.6% would check the chat boxes and messages to record the session attendance.

Table 2 lists the most used, least used features and the most critical problems faced by the users while Table 3 enumerates the pros and cons of the experiential and technical aspects of the portals while attending their online design education classes as reported in the survey.

Table 2. Most used and least used features of the online education portal

No.	Most used features	Least used features	Most critical problems
1	Screen sharing	Renaming participants	Echoes and lags in audio
2	Session recording	Virtual backgrounds	Freezing of screens
3	Feature to mute participants by the host	Sticky notes with offline lectures	Simultaneous audio from multiple sources
4	Scheduling/Calendar	Inbuilt assignments	Pop-ups during lectures
5	Chatbox besides live video		Privacy issues

Table 3. Pros and Cons of experiential and technical aspects of online design education portals

	Experiential Aspects	Technical Aspects
Cons	Restricted interaction/Lack of connect	Problem in scanning and uploading
	Less feedbacks from class	Unsupported file extensions
	Less Peer learning	No uploading confirmation feedback
	Slow lecture delivery	No option to edit the uploaded file
	Difficulty in concentrating	Internet bandwidth dependency resulting in Audio/Video Lags, Screen Pixelations etc.
Pros	Time and space flexibility	
	Flexibility to share/present	Flexibility to watch recorded sessions anytime
	Slow learning in terms of skill development	

3.2 Findings from the Interviews

Ten design educators, 6 men and 4 women, who are currently taking online courses were interviewed to consider the pain points and desirable impacts of using online portals to provide design education. The interview recordings were examined by identifying the following six recurrent themes from participant responses:

1. **Types of users:** A key finding of the study was that an instructor and a student are not the only key users of an online design education portal. Moderators (from the instructor's end) and attendee (who technically helps the student while he/she attends the class) are also key users of such a portal.

   It was found that moderators play an active role in organising classes, managing assignments and acting as a communication link between students and teachers. In order to have a smooth online class session, it is essential that moderators have a fair technical knowledge about the software/online platform used to conduct classes. This becomes more important with faculty who are not very technically updated, for example for any emeritus professor, learning a new software to conduct class is extra load to which they might not be very comfortable. In the interview, moderators pointed out a few problems that they are facing in currently available platforms. These problems were related to coordination between faculty and students. For example, P8 reported that, " *The professor who I was helping would continue the lecture, while I as a moderator had to look at student queries through the chat box. This was not very efficient because there were always interruptions from students while reporting the query and that led to a lot of confusion."*

   It was observed that most online platforms have not categorised their functions recognising moderators as a distinct user. Hence, while creating such platforms for online design studios, it will be helpful to attend the needs of diverse user groups.

2. **Attendance:** Marking and keeping a track of attendance was a common pain point observed in this study. It was reported that attendees keep logging in/out multiple times in a single session. This could be due to technical reasons like low internet network connectivity. While the portals generally show/record a list of active participants attending a session, the instructor is unable to keep a track of attendees who joined in the middle of the session. It was reported in the interview that users are using conventional methods for managing attendance in online classes. For example, P7: "*Earlier I used to write the names on a piece of a paper, later I used to take snapshot of the screen to take a note of who all are attending the class session*"; P2: *"The number of attendees shown in the status bar keeps on fluctuating because students can go offline in between and then come back again. However, when I take attendance at the start of my lecture, I ask students to raise their hands as I say their name."*
3. **Live Demonstration**: For a design educator, a live demonstration of the design process - 'how' he/she works on a project is as, if not more important as the theory and the 'steps' behind it. This has suffered a setback in terms of the natural flow, because the instructors have to keep in mind various other things like the camera angle, lighting, poor video quality, audio lags etc. and are not able to really demonstrate the process naturally. For example, P9: *"While sketching, it's hard to keep the sketch in the range of the camera. I can't keep the sketching surface still as I need to rotate the paper time and again."; P7: "Apart from audio/video lags, it is hard to keep a track of the camera angle/focus and perform at the same time. We took help from another person for holding a camera during these classes."*

   Even in cases of recording and uploading the process, the entire thing becomes extremely tedious and time-consuming.
4. **Group Work:** One of the features of studio based learning is doing projects in groups. Conventionally, the students would be divided into small individual groups to work on a project in the class. This process involved students getting up from their seats to interact, share, discuss, ideate, and create with their peers. Classroom group works have suffered the most in online education as not all portals allow breaking into teams while a session is going on. Even for the ones that do, the formation of teams is random unless a moderator manually selects them. In the next session, however, the teams are to be manually selected again if the same group has to present the work. As design education thrives on group interactions with peers, such limitations are detrimental to the way studio classes function. It was also interesting to note that most users were unaware of these features in the portals that provided them due to inefficient user experience designs. For example P2: *"I didn't know if such a feature exists in any online classroom tool. Honestly, I have never explored it."*

5. **Assignments and assessments:** There are a lot of hand on assignments in design education, which require the critique of a teacher during the process of creation. For example, P9: *"I need to look while the students work many times while teaching… students are not able to sketch and share simultaneously. Even if there are no network issues, problems like lighting conditions or camera resolutions are demotivating for students to show their work"*. Further, design assessments are interactive, so that the student can learn how the teacher observes and then rectifies a mistake. Virtually this does not happen, where both the student as well as the teacher only share the final outcome. Moreover, most of the 'hand-done' assignments which are not directly shared through a common software need to be uploaded and then assessed, which is a very tedious process. For example, P2: *"Architecture students submit A0 size sheets in pdfs through mail. One problem is that the files are heavy, another issue is that assessing the sheet with those dimensions on a desktop/laptop screen is very tedious"*
6. **Student presentations:** One of the important learning outcomes of a design program has been imparting soft-skills, where the students are taught the art of presenting their designs to a client, learn the value of getting critiques and experience the growth in their thought process through peer review and interaction. To conduct such presentations in the natural state are presently very difficult in an online class. For example P6: *"I have seen a drop in the level of class participation in design presentation sessions in online classrooms. Most of the time I have to repeat the same thing to every individual again and again."*

4 Discussion and Conclusion

A face to face interaction between a teacher and a student is irreplaceable. However, this study finds relevance amidst the leap towards a global design community, where design education can be imparted irrespective of the geographical location of the teacher as well as the student, besides dealing with rare situations like the Covid-19 pandemic.

The contribution of this study is towards the manner in which design research leads to shifting pedagogy of design education as well as to the design updates and features needed for technological resources and facilities that have become an integral part of the design curriculum. Technical and pedagogical suggestions from the findings of this study are listed in Table 4.

Table 4. Technical and pedagogical suggestions from the findings of this study

Technical suggestions	Pedagogical suggestions
UX features which are upfront so that users can identify them easily in the portal	E-learning protocols should be made in design institutes which specify the roles of instructors and moderators in an online studio
Automatic tracking and recording of attendance based on the duration for which a student is logged in. Cumulative records of the attendance report for the course duration	There should be a limit to the maximum number of students for an interactive/practical design session online
Embedded Plug-ins of popular design and presentation software in the portal	A protocol to schedule queries within a session should be made to avoid audio lags and confusion
Provision of a moderator/attendee) during the class with specific controls like mute/formation of teams etc	Different modes need to be developed for online presentation as well as for peer reviews
Recording of short timed sessions which are shared directly	Ways need to be identified to ensure efficient virtual demonstration of the design process to students
Formation of non-random teams within the class which can continue through multiple sessions	
In-portal assignment submission and assessment with privacy controls	

5 Limitations and Future Work

The aim of this study was to understand the differences in teaching and learning experiences of design studio education using online platforms. The study was more of an investigative exploration on the topic hence the authors would like to point a few limitations to this study which can be attended to while extending further research in this area. Firstly, the entire study was conducted digitally using online survey forms, feedback, and telephonic interviews. The data collected is based only on the experiences that were recalled by the participants at the time of reporting and not based on direct observations of online design classes. Future studies can be planned to observe teaching and learning experiences while users are attending an online design studio class. Also, in-depth analysis of user interviews with more participants can be done to gain further insights into the online learning and teaching experience. Moreover, future studies can look into other fields of design education like jewellery design, vehicle design, graphic design etc. to suggest more elaborate modifications to the online design education.

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