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Exploring Alternate Teaching Models: Understanding Space away from the Design Studio

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Abstract

The purpose of this research is to introduce the concept of scale and space to B. Arch students away from physical presence in a studio. The research question explored is, can an online studio teaching method inculcate in the students' similar learnings as a physical studio if multi-disciplinary methods become part of the teaching tools and methodology?, The research looked into the notion of space and how it can be understood away from the studio space and what methods of teaching should be used. The methods and measures used to develop this understanding went beyond the conventional methods of a typical design studio, and relied on multi-disciplinary and alternate methods for getting access to research information. These included online tutorials, documentaries, online discussions and feedback, online interviews, home-based workshops and self-learning exercises. The research procedure focused around two architectural design studios at different public sector universities in Karachi in 2020. Eighty-two students from both universities answered quantitative research questions and qualitative interviews were conducted of three faculty members from each university who were part of these studios. The students of both the universities were part of the sample. All students included were in their final year of study. Similarly all faculty members teaching them were interviewed. The findings point towards the importance and outcomes of using multi-disciplinary methodology, with heavy reliance on alternative pedagogical methods, and how

this methodology led to inculcating an understanding of scale and led towards development of the thesis project.

Keywords: architectural curriculum, multi-disciplinary, teaching models

Introduction

Thesis design studio is an intrinsic part of any architectural curriculum. The aspects addressed within this studio range from understanding of space, scale, proportions, aesthetics, materials, textures and certain construction principles. Various architectural schools prescribe to different thought processes, and based on this the focus of the studio changes from space, to technical details, to larger social understanding to aesthetic qualities and proportions. This paper explores the possibility of achieving similar objectives through a different method of teaching, which was not studio centric and was online in the face of Covid-19.

The literature reviewed (Alalouch, 2018; Dunin-Woyseth, 2007; Jenson, 2007; Kuhn, 2001; Salama & Wilkinson, 2007) outlines various pedagogical approaches to design studio teaching, with the studio always being the main subject which leads to processing architectural knowledge. Some of the teaching methods are traditional, whereas others follow a multidisciplinary approach to teaching and learning, in order to grasp different aspects of the environment, ranging from spatial, to social, to economic, to historical, to political (Jenson, 2007). As concluded from the literature review, the multidisciplinary approach helps students assimilate the cues from the environment in various ways, and connect it to architecture and built form, as per the instructions of the studio teachers. The multidisciplinary approach is well suited for the design studio because architecture responds to all aspects of life, and design responds to social, physical, cultural, psychological and climatic studies, thus the overlap occurs with various disciplines like sciences, engineering, psychology, social sciences, cultural studies and various forms of arts. In this research however, the online system of teaching forced the usage of alternative teaching methods and helped connect the tutors and reviewers from all across the world which resulted in various forms of learning for the students. Many of these tutors were non architects and belonged to other disciplines as well, thus they brought with them alternative ways of understanding space.

The results for this research were drawn from a structured sixteen weeks online

semester, with students enrolled in the B.Arch. program final year, and working on their thesis project. Some aspects of this program were heavily structured, whereas others were left flexible and there was room for adjustment as per the learnings of the pupils. The paper introduces the setup of the studio, the preparation and brainstorming done, the research methodology adopted for initiating the studio, the focus on the understanding of the different scales, aspects and contexts. The second part of the research paper presents the findings of the studio, along with the analysis and co-relationship with the initial objectives. These aspects are then analyzed, based on the theoretical framework developed in the initial part of the research paper, to arrive at conclusions related to the larger research question, which is if an online studio teaching method inculcate in the students' similar learnings as a physical studio if multi-disciplinary methods become part of the teaching tools and methodology? The research also reviews the various methods used for inculcating this understanding.

A mixed use methodology was used for this research, which was based on qualitative interviews of the faculty engaged in teaching the thesis studio and survey questionnaires from students. The methodology for the research paper is based on understanding the setup on the two studios in two public sector universities. The structure of the studios, the format of the assignments, the studio results, the feedback received from the students and the overall pattern followed through the sixteen weeks of instruction, are some of the areas of analysis, within the larger framework of an alternate method of teaching in the face of COVID-19.

Literature Review

According to Salama and Wilkinson (2007) the four different kinds of the pedagogical approaches to architecture teaching can be classified into academic, craft, technological, and sociological. Each of these approaches emphasize a different aspect of the built form, which becomes the driving force of the design studio, and is governed and linked to the larger vision and design philosophy of the teaching institution. While the academic approach emphasizes the traditional principles of design, linking it up to design and compositional theories, the craft training views architecture as a discipline in which hands-on experience is of supreme importance and is to be achieved by direct exposure to building sites or can be achieved as an apprentice to a master craftsperson. Thirdly, in schools where technological aspects

of design are considered of supreme importance, beauty and aesthetics may take a back seat, and be preceded by pragmatics and scientific principles. Lastly, in design studios being backed with 'sociological' approaches, the understanding and requirements of the society take precedence, and studios are oriented towards more of an urban scale addressing social aspects with emphasis on contextual connections in terms of society, economy and geography (Edelson, 1996; Maturana et al., 2021; Ruiz & Ramírez, 2008; Salama, 2022; Salama & Wilkinson, 2007; Sorguc et al., 2009)

Whichever school of thought is followed by an academic institution, the studio is always the main forum for assimilation, acquisition and processing of knowledge gained through various inputs. Studio assignments are designed to develop in students a sense of inquiry, enhance critical thinking and analyze the stimulus being received from the environment in various forms. The student is taught to process the information in order to not only makes sense of the various stimuli, but also to conceptualize and create a meaningful built environment, which connects back to the original cues. Over the years, a number of tools have been developed to create this connection, which range from heavy reliance on digital technologies (Kvan, 2000), to working on live sites, hands on material exploration and engagement with community (Alalouch, 2018; Dutton, 1987; Justice, 2017; Nasar, 2007; Salama, 2022; Salama and Wilkinson, 2007; Zeisel, 2007). The thesis studio is always the culmination of the various design studios taught over 4-5 years. In developing an understanding of design and its outcome, the drawing board may take a back seat, if these alternative tools of design are used. The emphasis then is on using these alternative tools to achieve similar results of developing critical thinking, sense of inquiry and taking cues from the environment, but there is greater emphasis on consciously enhancing and using all five senses. But the question arises that if the teaching method becomes online, and is virtual, what is the impact on the learnings of students?

Some alternate pedagogies revolve around art of self-education (McClintock & McClintock, 1968), project-based work, rapid iteration of design solutions, formal and informal critiques, use of precedent and thinking about the whole and the creative use of constraints (Kuhn, 2001). These were some of the cues that helped in redesigning the studio methodology in the face of COVID-19. Thus, the focus shifted towards multi-disciplinary methodologies.

The learning objectives of the thesis studios under study aimed at multi-disciplinary methodology are advocated in the literature reviewed. It is assumed that the heterogeneity of issues in studios benefit the students in the long run. This method breaks free from traditional teaching methods and focuses on discourses including spatial, economic, social, political and physical aspects (Castro et al., 2016; Jenson, 2007; Tillander, 2011). This approach helps students pick up different queues from the environment, and analyze and process according to their capacity and understanding. In the face of COVID 19, the exposure to environment and sites was limited, thus alternate methods had to be chosen to full fill this gap, and the literature reviewed provided a framework for the alternate methodologies to help answer the 'what' and 'how' of design (Fernando, 2007). In addition, as advocated in the literature, design assignments requiring smaller decisions on the part of the students had greater learning, as this approach was found to link up reasoning, emotion, intuition with the tangible aspects of design (Dunin-Woyseth, 2007).

The literature review findings were put to test via the primary research and a design studio framework based on multi-disciplinary methods, with reliance on spatial, economic, social, political and physical aspects was developed. The framework connected to the larger reality of conducting a design studio in a virtual space and was not based on physical interaction.

Theoretical Framework

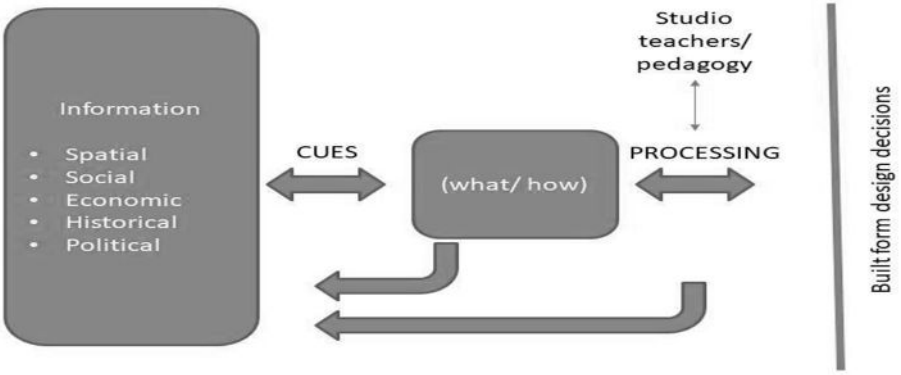
Based on the literature reviewed and the indicators outlined for exploring alternative teaching methods which were reliant on a multidisciplinary approach, the following theoretical framework was put together that was used to design and analyze the outcomes achieved in the form of learnings related to space in the online thesis design studio (Figure 1).

According to the literature reviewed and while being engaged with academia teaching B.Arch. courses it can be ascertained that B.Arch. thesis requires students to understand spaces along with their social, historical, political, spatial, heritage and cultural aspects. Thus, data collection is required for all of these aspects. This data set has to rely on both secondary and primary sources. In the face of Covid-19, and all teaching being online, the methods of primary data collection were restricted. The students and faculty had to rely on other mediums to generate the data, like

voice and sound recordings, online engagement via talks and tutorials, literature and various online archives. While the methodology of data collection changed and there was reliance on multiple disciplines and methods of data collection, the question remained if these methodologies were able to develop understanding of space adequately. Thus, the theoretical framework for this paper, which was based on a foundational review of existing theories that outline the various pedagogies used in B.Arch. teaching, served as a roadmap for developing the argument that if the teaching method changes what impact is seen/ felt on eventual spatial understanding by students in the final year of their thesis studies. The theories helped develop this framework and led to the explanation of various results.

Figure 1

Theoretical Framework Outlining Indicators of Holistic Research for B.Arch. Thesis



Methodology

Participants (faculty and students) of two B.Arch. thesis studios were used to generate the data. Students from both universities responded to survey questions and quantitative interview questions. Qualitative interviews were conducted of three faculty members from each university, who were engaged in teaching the thesis studios. In short, a mixed methods approach was used for conducting this research (Groat & Wang, 2013). The reason for collecting this sample size was based on the fact that each studio was taught by three faculty members and on average one class had forty-two students. All respondents were in their final year of study. Similarly, all faculty members teaching them were interviewed. In all

eighty-two survey forms were collected. In the qualitative interviews with the faculty questions related to strategies for engaging students, means of developing understanding social and historical aspects and approaches related to understanding of scale were asked.

The B.Arch. thesis studio setup

Architectural Thesis is an extensive and time bound exercise (over two semesters) in which it is expected that the students practice research and design skills learnt in previous academic years. The students in final year are advised to pursue independent study and choose a topic of their own interest under the guidance of studio advisors. A topic exploration with substantial in-depth study is expected which is to be documented comprehensively in the area of interest. The independently conducted research in a focused and directed studio environment enables the student to underpin relevant issues in the social, political and spatial aspects of the selected context. Thus, it creates solutions under the umbrella of architectural design proposals and interventions.

During the ninth semester, the advisors ask students to prepare and submit a well-defined proposal of their respective research topics. The students choose individual research topics, but are at times constrained within a proposed larger theme. Students are encouraged to write down a three-hundred-word proposal and introduce the topic and describe its relevance to the field of architecture. A few research questions are outlined around the topic of study. In the ninth semester the students conduct their secondary research around the topic outlined, and identify the contextual relevance. At the end of this semester, students conclude their research and present the possible design projects that best correspond with their research.

During the tenth semester, students start developing a program brief for the selected architectural project. The site selection criteria inform the identification of the site. Concept development is done through a workshop which acts as a transition phase from research to design. Next, preliminary and schematic building design matures as a result of zoning. Detailed master planning, individual units planning, elevation and sections are the final outcomes of the tenth semester. The expected efforts are to correspond with the time commitment of a yearlong project and the level of proficiency required of a thesis student. The preparation and brainstorming

at the beginning of the ninth semester, aims at enhancing critical thinking, problem solving and analysis. This process was marred by the arrival of COVID 19 and students had to enter the digital learning platform. Google meet and Microsoft Teams were used as a platform for a large group meeting, digital screen projection and sharing but it does not fulfill the requirements of studio space.

Normally the architectural design studio has three different modes; demonstration mode, discussion mode and presentation mode (Fernando, 2007). In a demonstration mode the instructor introduces new concepts to the students or trends to tell the next requirements of the studio. Students can ask questions within this mode, and such type of sessions are easy to conduct online but to assure the students attendance the instructor needs to ask questions randomly in between. Discussion mode includes desk critiques, in which the students discuss their progress with the instructor, which requires scribbling on the sheet and the study models need to be discussed in detail by pointing at different sections. This is an imaginative process in which the instructor and students are discussing and projecting possible creative ideas. This mode requires mind and hand coordination. These sorts of discussions are difficult to generate online, and it was observed in the virtual teaching that instructors and students faced difficulty in understanding each other clearly. Although an application called Zoom allows scribbling on screen which the person on the other side can see with one second delay, but this method does not compare with physical teaching. During presentation mode, students present their work by putting it up on the soft boards in the form of sheets and models and instructors critique it, in a physical setting. Other jurors can also be invited to these presentations. This mode of teaching was also carried through smoothly in online classes, although some shifts and adjustments had to be made as the entire panel would not be available in front all at once, and only a limited aspect could be zoomed into. The most powerful tool of communication for a designer or an architect is to draw and explain, and in doing so one need to use the power of his/her hands. Drawing is possible on digital screens as well, but it does not give the similar freedom as drawing on paper, because there the mind-hand coordination works best.

In the face of COVID-19 the research methodology adopted in studios for the both case studies was hybrid. It was segregated in three types of interactive sessions over the total period of time stipulated for the semester.

a) Physical research for site, case studies.

b) Web research for case studies and literature review.

c) Distant research based on online questionnaires, qualitative interviews and collection of data through emails.

These three types of data collection strategies, integrated with the specific mode of required data, helped focus on the stage wise research as required in different phases and times. Since the basic mode of conduct for the thesis studio was online, therefore, some specifically designed guidelines were introduced to students in order to make them familiar with the techniques of conducting hybrid research. The focus of the research was on the understanding of the different scales and contexts. Considering the novel mode of teaching in studio online, the basic software inducted for mutual student- teacher discussions, presentations, and other relevant activities was Microsoft Teams. By virtue of its nomenclature, the online teaching mode involved two main aspects while disseminating information:

a) Through live sessions of discussions.

b) Through electronic dissemination of information.

The processing of understanding of all data related to scale and context was then elaborated through predefined routes that were introduced in the studio from time to time. These predefined routes were the specific methods through which the students were to present the collected data individually. These areas included; selection of topic, development of concept, site analysis, design brief, design concept, zoning and linkages, architectural drawings and architectural models.

Some of the steps taken for overcoming obstacles involved using the following methods:

a) Mind mapping of ideas and discussion on these during the online sessions.

b) Short listing and convergence of scattered ideas towards one or two options.

c) Development of limited options in accordance with the student capacity and available resources / time etc.

d) Consolidation of ideas into one selected option.

e) Connecting students to relevant experts online (often belonging to multiple disciplines) who had worked on similar ideas and researches.

Table 1

Explains the difference between Physical and Virtual Thesis Studio Setups and Adopted Methodologies

Stages of thesis studio	Physical Studio	Virtual Studio	New Methods incorporated for online learning
Stage 1- Introduction	Physical introduction to thesis studio in the form of a class lecture	An online lecture/ live class or recorded class	Mentoring, Role Playing, Coaching, Objective based activities
Stage 2- Framing the question and literature review	Discussion of existing knowledge Bylaws & design standards with tutors in studio	Discussion of existing knowledge Bylaws & design standards with tutors online	Online Support and Reference Materials, Web sites, video, audio, books, eBooks
Stage 3- Case and precedence studies	Precedence study either of international or local cases.	Precedence study of case studies available online	
Stage 4- Primary Research	Site Study & Analysis	Virtual tour of the site. Find local resources to create street views. Online lecture from expert architects on the influence of site condition design	Establishing contacts on site and using virtual means to collect site related information through that contact
Stage 5- Concept Development	A physical one-day workshop with the objective of making maquette around key words	Online lecture series on various topics like concept design, design as per typology of building etc. Students make these models at home and submit online for sharing with tutors	Collaborative Learning Virtual classroom and workshop
Stage 6- Zoning diagrams, schematics and master planning	Regular Studio critiques and planned pinups	Discussion of design development through online sharing with tutors. Virtual critiques and juries.	
Stage 7- Model making	Physical model	3D modelling using software	Heavy reliance on 3D virtual modelling.
Stage 8- Final Jury	Physical jury	Physical jury with SOPs as it was mandatory by the local Council of Architects and planners	

Findings

Findings from Interviews of Faculty

The interviews were conducted with six full time faculty (three at each institute), all of them having ten years or more of teaching experience. All of them responded in the affirmative that they used collective feedback methods and focused on peer learning. The techniques used for engaging the students revolved around discussion on points of connection between student designs. Flexibility was offered in terms of the number of times the students wanted to show their progress. If they were not prepared to show progress weekly, some leniency was provided. The aspects which helped most in understanding of the social features and political underpinnings of the site were interviews with the locals residing or working in the context for which intervention was being designed. These interviews were carried out online through identification of people living in the area via snow ball sampling. The method which helped understands the historical aspects were through reliance on online archival data via virtual library resources. In order to understand the sense of scale, the students either measured the spaces they had access to them, or re-created the spaces in the virtual realm, using various three-dimensional software. Majority of the faculty were satisfied by the results they obtained via the online studios, and the adaptation of a virtual methodology that crossed over various models of architectural teaching proved beneficial. Some of the techniques used for creative thinking were having the peers question the design decisions, presenting the design decisions to the local community virtually, developing imaginative scenarios and rigorously setting up milestones and following them.

A multi-disciplinary method used in the studio teaching also helped greatly. Artists, historians, social scientists, anthropologists, urban planners and development professionals were identified as key informants by the faculty and they were either invited to the virtual studio space for talks, or their work/ documentaries/ research papers were referred to. This methodology helped in triangulating the data obtained by the students and faculty, as part of their research led to verification of the findings.

Findings from Student Questionnaires

The online questionnaire was circulated virtually and feedback was taken from eighty-two students within the two schools selected for this research. The questions asked in the questionnaire were based on the frame work which

encompassed different types of issues and methods used by students during their online studies.

The results are summarized in Table-2 and bar graphs of responses from students.

Table 2

Findings from Student Responses

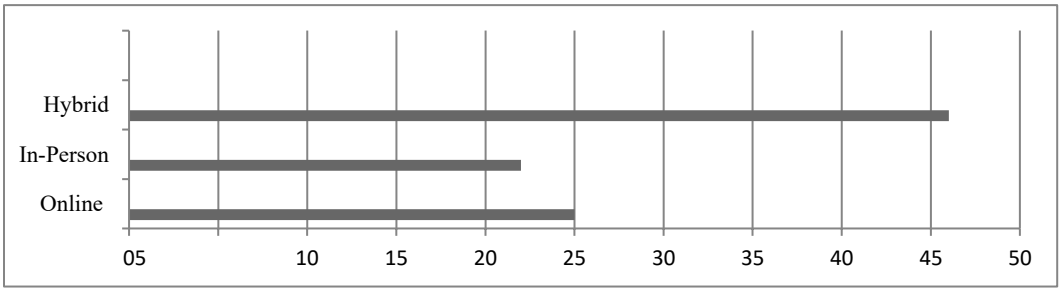
S. No	Question About	Response from Students (percentage)					
1.	Mode of Teaching throughout 2020-2021	31% students preferred online teaching		27% students preferred in person teaching		56% students preferred hybrid style of teaching	
2.	Modes of discussion with studio Instructor (multiple could be chosen)	71% Verbal Discussion	72% Power point presentations	44% Computer generated Drawings	24% Reading Materials	20% Online messages	
3.	Starting point of online studio to be engaged	27% Chit Chat	59% Collective discussion	30% Universal Concerns	9 % Jokes	36% Directly to work	
4.	Teachers' method to engage students in online session by involving other multi-disciplinary professionals	47% of the students preferred talking to professionals from other disciplines		39% preferred discussing points of connection with professionals from other disciplines	14 % were not sure which strategy worked better		
5.	Frequency of visits to the site during Covid-19	24% visited once a week	15% visited twice a week	37% visited once a month	11% visited twice a month	13% had another frequency	
6.	Most effective means to understand social aspects of thesis	20% thought online discussion with teacher were helpful	20% thought in person site visits were helpful	20% thought that discussion with peers and professional were helpful	15% thought Libraries and other sources were helpful	25% thought that videos and documentaries were helpful	
7.	Most effective means to understand historical aspects of thesis	15% thought online discussion with teachers was helpful	For 20% in person site visits were helpful	For 25% discussion with locals in the selected area	For 20% libraries and other sources	For 10% documentaries were helpful	For 10% news archives were helpful
8.	Means to develop the understanding of scale	For 40% Manual Drawings helped	For 40% Computer generated drawings helped	For 10% Conceptual models helped		For 10% Physical measurement of spaces helped	
9.	Most effective means to understand political aspects of thesis	For 38% online discussion with teachers helped	For 30% in person Site visits / meetings with locals helped	For 20% library and other sources helped		For 12% Structured focused group discussion helped	
10.	Rating of process of research through online system versus in person	24 % through it was easier to conduct	58% thought it was somewhat challenging	18% thought it was very difficult to handle			
11.	Effective tools to trigger conversation during online class	13% preferred political discussion	15% preferred discussion over a historical video	52% preferred discussion about society	70% preferred discussing current affairs	20% preferred watching a documentary or another professionals work	

Graphical Representation of Student's Responses

Responses from Students

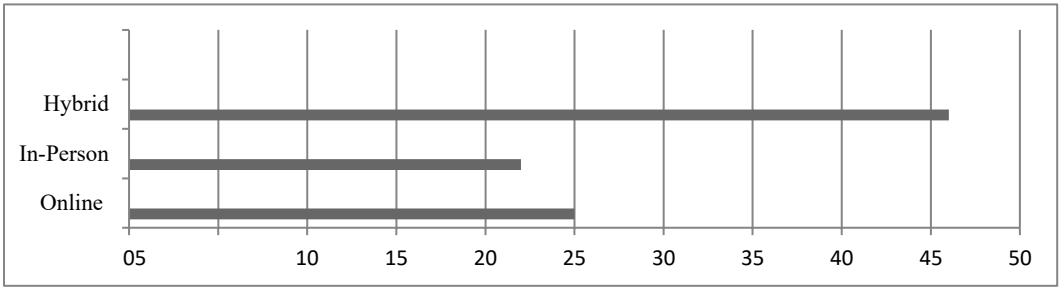
Please specify the mode of teaching throughout 2020 or 2021 Fall and spring semesters

82 Responses

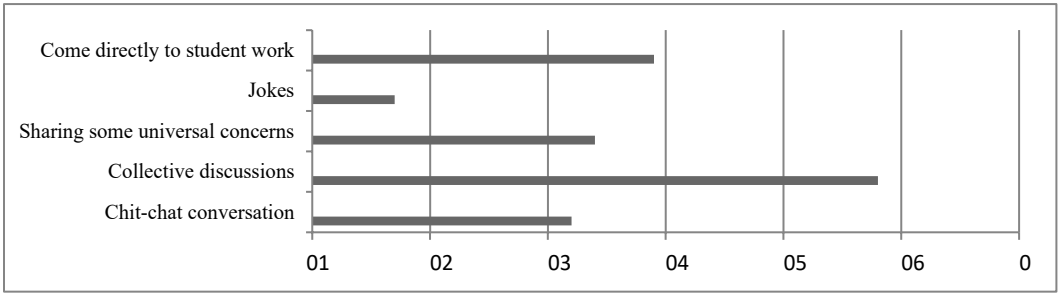


During the Thesis Design Process, what type of mode of learning were you using for your discussion with studio instructors?

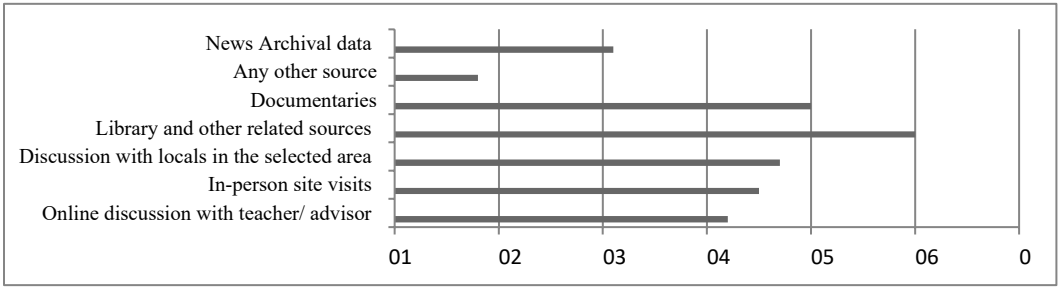
82 responses



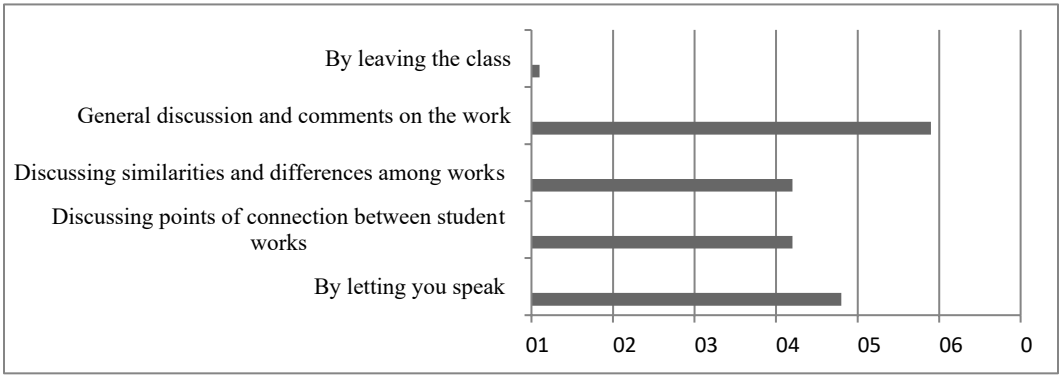
How do you take a start of the online design studio for an engaging session throughout in the virtual space?



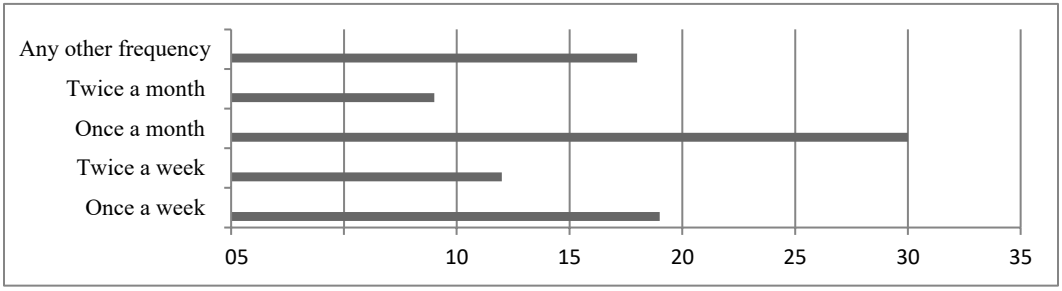
What were the most effective means for developing the understanding of historical aspects relevant to your thesis?



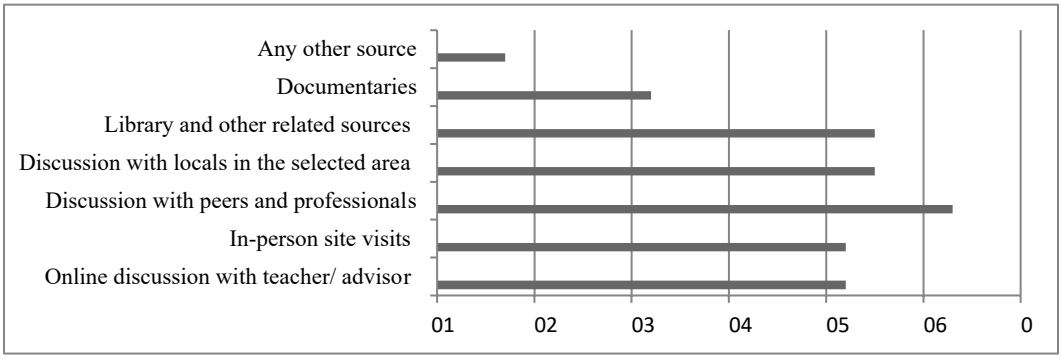
How did your teachers keep you engage during the class for an interactive online session?



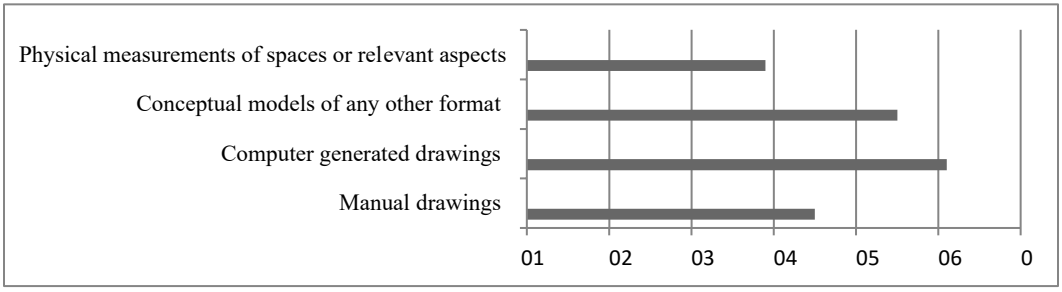
How often did your teachers ask the student to visit the selected site for developing the understanding of available space during the semester when accessing the site was difficult due to COVID?



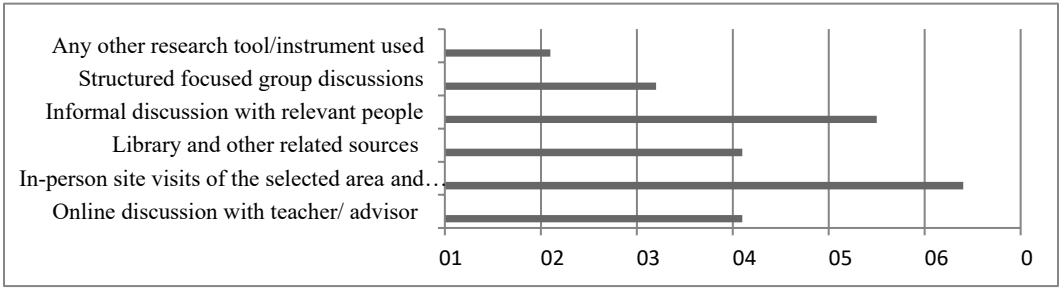
What do you think were the most effective means for developing the understanding of social aspects relevant to your thesis?



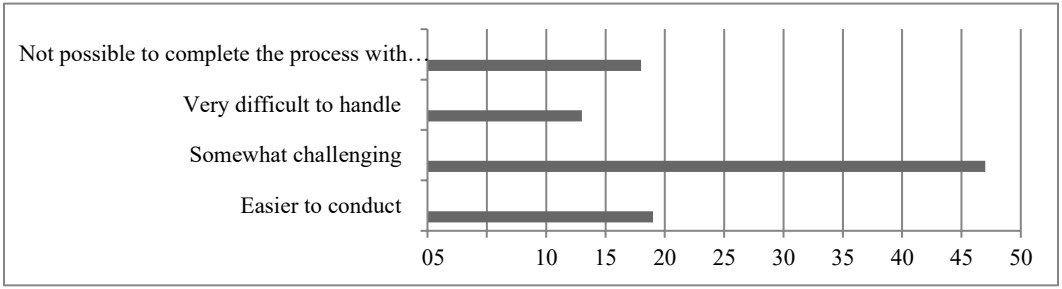
What means were you able to use effectively to develop the understanding of scale in the design process?



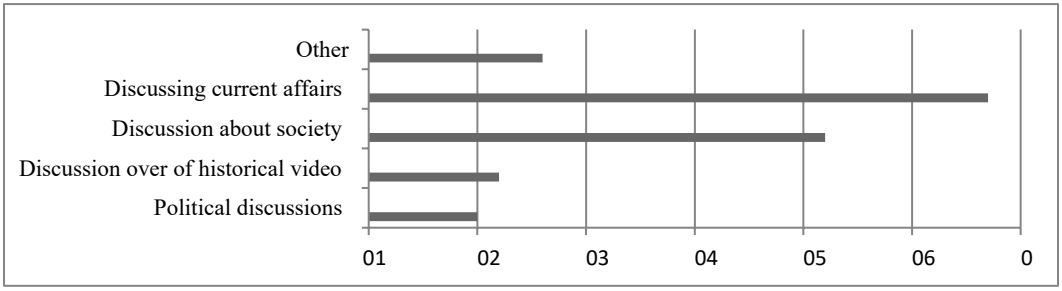
What were the most effective means for developing the understanding of political aspects relevant to your thesis?



How do you rate the process of research through online method in comparison to normal one?



Do you think that healthy conversation is the key ingredient of Studio teaching, if yes then which effective tools do you use to trigger a conversation during an online class?



Most of the students preferred the hybrid mode of teaching. While the students were comfortable in online discussions with teachers, they took the advantage of virtual presentations as a tool to communicate with teachers. Collective discussions started by the teachers gave a comfortable edge for students to manage virtual discussions. In these discussions' students were allowed to speak about their work. Most of the students responded that they were advised to visit the site in person at least once a week where possible.

Most of the students felt that discussions with peers and professionals were virtually helpful for handling social aspects of their thesis research, while libraries and similar resources were mostly used for dealing with historical aspects of research. Students were more comfortable with computer generated drawings for developing their understanding of scale. In person visits to site and meetings with locals around the site were helpful for developing their understanding about

political aspects of their chosen sites. It is important to mention that most of the students found the online system of studio teaching challenging despite all facilities and technical help from the University information technology department at their disposal. In addition, according to the responses, current affairs discussion initiated by teachers and invited speakers and professionals helped to trigger the relevant discussions in online classes.

Students highlighted some relevant concerns to improve the quality of their thesis during online studio teaching system. These included, increasing number of teachers, clarification of problem statements, and professional help in analyzing data by engaging experts and including professional opinions through online sessions. Another aspect that the students felt could add to online teaching was timely comments from tutors and greater frequency of one-on-one discussions. Yet another important remark made by the students was about strict control practiced by teachers in terms of weekly submissions or discussions, and that they would prefer some leniency towards this as at times they felt ideas needed greater time to mature and develop.

Furthermore, working with Kuhn (2001) propagation about 'creative use of constraints', in the face of Covid-19, the two thesis design studios worked around a multi-disciplinary framework for collecting and analyzing research data. The students were not restricted to any one method of research teaching and were encouraged to incorporate aspects of various methods cutting across various disciplines. This idea was received well by the students and it was appreciated in the student responses. Table 3 summarizes the tools employed for each of the approach that were used for the two thesis studios, to create a hybrid methodology. Table 3 also outlines how these methods were adopted for giving feedback and data collection.

Table 3

The Tools Employed for each of the Pedagogical Models used for the Two Thesis Studios, Focusing on Hybrid Methodology

Model Type	Tools used in conventional situation	Tools employed for thesis studios	
		For data collection	For Feedback
Traditional/ Academic	Traditional principles of design and compositional theories	Reliance on theories of architecture taught in previous years and online literature available.	Group discussions Tutors ensuring studio milestones are met and time is managed well
Self-taught based on craft	Working on live sites and with hands on materials	Self-taught methods-exploration of scale via making 3D models and typological analysis	Video recordings of weekly progress
Technological	Digital tools	Digital tools in the form of 3D simulations	Discussing points of connection between different studio projects in online classes
Sociological	Engagement with community	Virtual engagement with community: Spatial, social, historical, economic and political data collection via online questionnaire and qualitative interviews Review of online archives and documentaries by students Snowballing method for recruiting participants in the online interviews	Regular juries often inviting international jurors

Discussion

The structure of the studio, the format of the assignments, the studio result, the feedback received from the students and the overall pattern followed through the sixteen weeks of instructions are some of the areas of analysis, within the larger framework of an alternate method of research used within the thesis studio of the B.Arch. program at the time of COVID-19 and in the face of online teaching.

Traditional model

Within the traditional model students link up with the traditional theory and principles of architecture design (Dutton, 1987; Jenson, 2007; Maturana et

al., 2021). This model helps form in grounding the thesis studios within a given context. The dependence of the thesis studio initially on this model helped the students build a number of narratives which were based on the literature reviewed around the research questions outlined by each student for thesis research. These narratives were grounded through connection with space and outlined research objectives. The idea was to help students look at various architectural typologies, and everyday spaces through a different lens and mature their understanding of form and existence through connection with theoretical and literature review. Similar thesis questions coming from the students were grouped together, and the tutors ensured peer learning by facilitating online discussions and peer learning.

Self-taught Model

Learning from the self-taught model of studio teaching (Kvan, 2000) students were introduced to questions about scale and were assisted in self-teaching through various questions posed to them. They were taught to think about what makes a space private, and what makes a space public? What are the ingredients of a built environment within which human beings move and stay, have their needs fulfilled and interact with others? Questions raised in online teaching revolved around how students should document spaces and the experiences of these spaces? Debates were also generated around the various ways of connecting our bodies to the spaces we occupy, the various ways people inhabit, move, feel, and narrate experiences about spaces, and the policies and processes that determine who can live, where, and how? These questions assisted in decoding the various ingredients and the scales that go into defining and understanding a space and its scale.

The general idea was to introduce students to a broader, more interpretive understanding of space, what it contains and what it may possibly be built of/around/for and to understand the spatial qualities from a different vantage point, which was self-taught and virtual at times. The students were connected to professionals exploring the notion of space and scale through virtual meetings. The students were also encouraged to review the works of these professionals online and interact with them virtually. The method used by the tutors to ensure adequate progress with meeting the learning outcomes was to ask the students to pre-record a five minute video of their weekly progress which was shared with the tutors beforehand. These short videos were reviewed by the tutors and feedback was given in the live session where other students would also be present. The video recording by the

students ensured that the students thought about the data to be put in the video, about the narrative and the quality and content of their drawings and sketches. This tool became a self-critiquing tool and the restriction of the time limit ensured the narration was crisp and clear. This model relied heavily on the work of other professionals, and literature, videos, documentaries and other forms of virtual data available.

Technological Model

Using the technological model (Kuhn, 2001; Stankiewicz, 2004) there was heavy reliance on virtual means of interacting in the face of COVID-19. This interaction was not just with the tutors and peers, but also for generating primary data in the form of online qualitative interviews with different stakeholders and quantitative interviews via different online platforms. The virtual means were also used for juries and critiques, with the opportunity to invite jurors from anywhere around the world, which became a source of rich feedback and comments. The students also relied heavily on three-dimensional modeling software, which they had learnt in previous years, for getting a sense of scale and assessing the context relevance of their proposals. This tool overlapped with methods of self-teaching and trying various design options, which were then discussed with tutors and peers in online live sessions. Invited speakers from various disciplines also helped create the multi-disciplinary approach.

Another tool which was heavily dependent on technology and came in handy for online learning was the weekly progress videos which were recorded by the students, and shared online with their tutors for comments and feedback. Lastly, for contextual and theoretical understanding, the students relied on online archives and readings. The findings from this virtual source were verified, triangulated and cross checked with the online interviews of various stakeholders.

Sociological Model

The thesis studio design took the students through a variety of experiences that defined the idea(s) of "space" in everyday settings and beyond. Using an approach which integrated the findings using virtual tools, and compensated for the limited physical experiences and sensory narratives, there was heavy reliance on the sociological model (Alalouch, 2018; Dutton, 1987; Salam and Wilkinson,

2007). The spatial, social, historical, economic and political aspects and impacts of the design interventions were addressed as best as possible, via various methods for triangulation of data, cross checking with findings of peer working on similar projects and reliance on archival materials around similar topics.

Analysis

Since COVID-19 demanded a relook at the methods to teach design studio, the four developed models present within the literature served as starting points, and four cornerstones of the revised methods of teaching. There was heavy reliance on digital technologies thus the model presented by Kvan (2000) was most relied upon. Furthermore, the models of self-education and project-based work helped in rapid iteration of design solutions, formal and informal critiques (McClintock & McClintock, 1968), use of precedent thinking about creative use of constraints (Kuhn, 2001). These were often based on multi-disciplinary methodologies. The methods also relied on online qualitative interviews with individuals, site visits following the standard operating protocols (sops), virtual interviews of various stakeholders to get experts opinions and online collective sessions with peers and tutors. These followed cues from other models (Castro, 2012; Dunin-Woyseth, 2007; Ghanbari, 2015; Jacobs, 2016; Jenson, 2007; Salama & Wilkinson, 2007; Sweeny, 2004). The understanding of scale and context were facilitated by reliance on professionals belonging to other disciplines and focus was learning about their methods of documentation, analysis and representation. Furthermore, the methods of constant monitoring of time lines and outputs, regular feedback, thinking of mitigation processes, reliance on online archives and constant review and critique of student work helped overcome the difficulties of online teaching and learning.

There was some learning in these methods, which can greatly benefit the teaching of thesis students. One of the outcomes was the incorporation of methods used by professionals from other disciplines. Another aspect was using the various online resources and building upon them to strengthen the understanding of a context and the research around it. The third was tapping into possibilities of connecting virtually with creative practitioners internationally for relevant feedback. From the studio faculty point of view, some of the strategies that helped during virtual teaching was to stay focused, accepting the challenges of technology and using it to maximum potential, video recordings of progress by the students every week and peer reviews and feedback. Online juries where external jurors were invited

from various geographical locations and various professional backgrounds helped greatly expand the pool of ideas and led to critical and creative thinking. Constant communication between tutors and students, short listing and convergence of scattered ideas towards one or two options, development of limited options in accordance with the student capacity and available resources and time.

Conclusion and Recommendations

Several studies have looked into alternatives to studio instruction in architecture, including working on real-world projects, utilizing digital tools, conducting inquiry through design, and incorporating an advocacy and community engagement component. The goal of this research is to analyze alternative teaching methods for B. Arch thesis students for conducting research and understanding the notion of scale away from a physical studio space. Some of the questions addressed in this research are; if students can develop the same skills from an online studio if multidisciplinary methodologies are incorporated into the teaching tools?

Two architectural design studios of public sector institutions in Karachi served as the focal point of the study for this research. Quantitative research questions were answered by eighty-two students from both Universities, and three faculty members from each university participated in this research. The results highlight the value and benefits of employing a cross-disciplinary, multidisciplinary methodology that heavily relies on alternative instructional techniques. The initial framework developed by the tutors reviewed the thesis pedagogy in light of the various teaching models highlighted in the literature and used internally by various Universities where B.Arch. curriculum is taught. The pedagogy based on these various models, ranging from sociological, to crafts based, to technological, to academic, aided in the creation of thesis projects by fostering a knowledge of scale. These techniques included several insights from various creative professionals across the globe that significantly improved thesis pedagogy and was something to learn from. These included greater exposure of the students to alternative research methods, and using restrictions as opportunities. Another element was strengthening the comprehension of a situation and the surrounding research by building upon different online resources. Furthermore, online juries that included external jurors from a range of professional backgrounds and geographic locations considerably widened the pool of ideas and encouraged critical and creative thinking amongst the students.

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