

Chapter 16

Project-Based Learning in Architectural Design 6: Applications of Connectivism

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ABSTRACT

This study examines the experiences of students and teachers of Architectural Design 6 in the pre-pandemic and current pandemic periods. This analysis focuses on the applications of the Theory of Connectivism in the instructional pedagogy of Project-Based Learning. It seeks to understand the effects of online learning in a practice-oriented, studio-intensive course of architectural design. This draws on mixed methods of multiple case studies and surveys of online learning that magnifies the effects of the internet, technology, and social connections in education. The challenges found in online learning were technological and personal difficulties. In both eras, similar technologies were used to exchange design ideas and identified digital methods that match the activities in different design phases. Expectations of the tangible products of learning, regardless of the learning modality, were the same – high grades, improve performance, gain mastery and attain course objectives. Noticeably though, students lowered their expectations to merely survive and pass the course. On a lighter note, teachers expressed optimism and hoped that they were able to continue education. Both students and teachers count on the information and inspiration from their online resources, networks, and technology, consistent with the Theory of Connectivism.

Key Words: Online and face-to-face learning, Connectivism, Project-Based Learning, technology in education, Architecture pedagogy

1. INTRODUCTION

Design-based architecture courses use real-time situations initiated by the teacher, then guided and monitored to steer the student into self-exploration, independent learning, and reflection. There are many advantages of the studio as a learning environment - it speeds up learning: there is an exchange of ideas with classmates; compares and competes with their peers; the teacher can immediately measure the student's phase and make necessary adjustments; the student learns self-discipline; and engagement improves the hard and soft skills ensuing the attainment of knowledge, skills, and attitudes. For the agents of space – the architects, the studio itself is a learning tool, a place where they learn how to learn. The learning space (Ariani & Mirdad, 2016) can motivate students to study and progress and influence the quality of their work. Grounded on the idea that learning happens in the process, the product, in this case, the architectural design output reflects

the success of the process. With the abrupt turn to fully online classes due to the pandemic, what are the effects of online learning in a practice-oriented, studio-intensive course of architectural design?

Considering the pandemic that caused unprecedented disruption of lives including education, the use of the internet now is not only an option but a crucial aspect of learning. Internet is the fastest source and storage of information. It is a tool for experimentation and exploration. Communication is made easier and convenient with it. On the internet, information can be personalized, collaborated, and shared. And it is a venue for formal and non-formal education. Internet connects learning, and on the other hand, the connection by students, teachers, groups, and organizations sustains the cycle of learning. In this view, knowledge is created through connections of networks by networks, as defined by the principle of the Theory of Connectivism.

2. LITERATURE REVIEW

2.1 The Theory of Connectivism (Siemens, 2005)

The Theory of Connectivism is a pioneering learning theory using the internet (Siemens, 2005). It was coined by George Siemens who co-created the Massive Open Online Course (MOOC) in 2005. This theory is relevant to the current digital age where technology and networks are crucial response to the varying needs of learners. In retrospect, Connectivism as a learning theory in architectural design courses is nothing new. Much related research has been done globally but because of the amplified education challenges caused by the pandemic, it is fitting to magnify too, its importance in education specifically in architectural design courses. The theory suggests that technology, social connections, and personal networks have an impact on learning (Downes, 2010). With Connectivism, knowledge is created from connections not only from teachers but also from interactions of students to students, students to teachers, teachers to teachers, and the public to learners. According to Siemens (2004), learning is outside oneself through organizations and networks and occurs in chaotic environments that quickly change. These conditions represent a combination of the theories of self-organization, network, and chaos (Siemens, 2005, Downes, 2010). To put these to context, students learn from the comments, consultations and discussions with teachers, classmates, professionals, and community. But the vast information, the design problem itself, motivation and the learning style of students make the condition chaotic. Which leads them to ask for guidance, seek more information, and synthesize them. Suitably, studio or face to face learning provide such setting but with some limitations. In studios and classrooms where students are asked to recite, many are reluctant to answer because of reticence, no prior knowledge, or fear of criticism by a person of authority (teacher) and their audience (classmates). On the contrary, in online social networks like Twitter and Facebook, they react to others by posting opinions and comments freely. This is due to the anonymity, absence of authority, and lenient censorship. While opinions and comments in these networks are classified as non-informed and informed knowledge (sociological youngster, 2016) the notion of learning is taking place. In this example, learning occurs between interactions with others using the internet, the information from many sources is disorderly, confusing, and constantly changing but is organized by careful selection and association.

Project-Based Learning

According to Hmelo-Silver & Eberbach (2012), PBL is an instructional method that is learner-centered where they learn by solving "ill-structured problems". The problem is real-

life, therefore disorganized, and chaotic. Students work with others, identify what they need to learn to solve the problem. PBL aims for students to learn independently, work with others, solve problems and think critically. In the context of architecture education, PBL as described by Capraro, et. al (2017), provides the contextualized, authentic experiences necessary for students to scaffold learning and build meaningfully powerful science, technology, engineering, architecture, and allied concepts supported by language, arts, psychology, socio-cultural, environmental, and relevant studies. Because an architectural design course is driven by a problem, where all the learning starts with a real-life design problem, students choose what to learn and how to do it. In doing so, students need to think critically thereby enriching their higher cognitive processing skills. In terms of the classroom setting, Project-Based Learning is long-term or 1 to 2 major projects per semester; real-world, fully authentic tasks, open and narrow; following broad steps of management; problem-solving is rather practical; product-oriented and assessed individually or by group (Brassler, 2017). Consistently, PBL matches the learning approach in architectural design courses for one PBL is context specific. In an architectural design course, the problem given by the teacher triggers the student to ask, investigate and choose the actions to search for solutions. Students are actively involved in the learning process in formulating the design questions, choosing, and analysing the design concept and schematics, and translating information from textual to graphical. It fosters social interaction and sharing of knowledge done through student collaboration, consultation, discussion, and juries. Additionally, it is anchored on outcomes, wherein the final output showcases the effort and time exerted by the student to produce it. In light of the pandemic, PBL propels learning without the need for physical connection. Although the nature of design courses is project-based, the details and formalities of its pedagogy are not substantially explored in Philippine architecture education.

3. METHODOLOGY

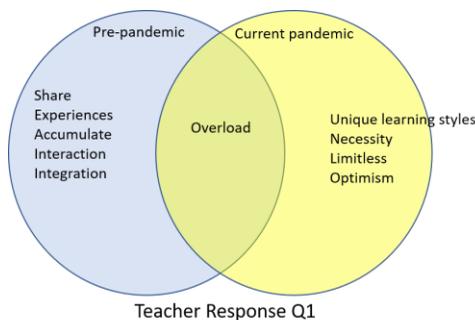
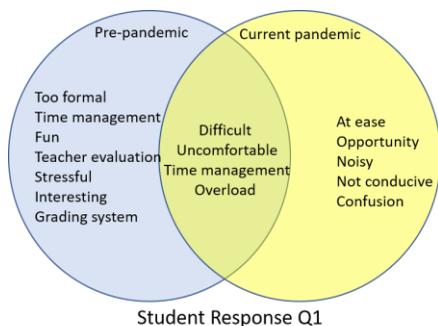
This mixed-method study addressed how students and teachers engage using technology in the online learning of the course Architectural Design 6. A simple mixed methods design is a collection of qualitative and quantitative data that were assembled in parallel, analysed separately, and then merged (Creswell, 2014). In this study, the survey data and interview responses were used to test the theory of Connectivism which predicts that connections and human networks enrich the experiences of teachers and students in online learning modalities. The responses were coded manually. From there, themes were created and shown on the Venn diagram for further analysis. In the multiple case study interview, 4 students and 4 teachers participated. To answer the main question, 4 guiding questions were raised: 1. what are the perceptions of online/face-to-face learning 2. how are ideas exchanged using technology 3. what challenges are faced in these modalities, and 4. if the expectations from the learning modalities are met. Because prior experiences influence how the present is perceived (Trafton, MIT, 2019), it is vital to know the teacher's and students' experiences before the pandemic. Thus, the questions were framed within two eras – the pre-pandemic and current pandemic. In this current era, Architectural Design 6 was offered twice, on the 2nd Term of the School Year 2019-2020 from January to May 2020 and 2nd Term of the School Year 2020-2021. The latter class was asked to participate because they provide the most current experiences. In the survey, students were asked on the frequency of use of internet platforms on the different design phases.

3.1 Survey Population and Sample Selection

The sample population was purposively selected. 1. Institute: students from Far Eastern University, Department of Architecture 2. the curriculum structure: students are under the 2018 curriculum, 3. Class hours for design courses: 8 hours per week 4. Units enrolled: 25 units, all attended Architectural Design 6. Of the multiple sections of Architectural Design of 2nd Term, the School Year 2020-2021, 31 students agreed to participate. From a total number of 40 students in one section 31 or 77.50% responded. In support of this, Nulty (2008) cited that 60% - 70% response rate as desirable and adequate.

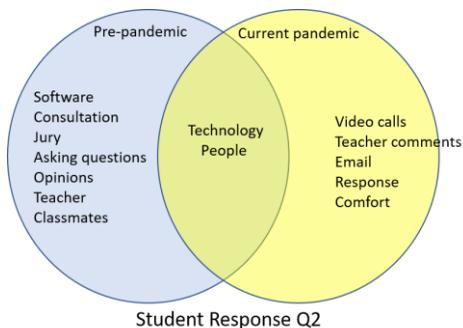
4. RESULTS & DISCUSSION

The results clearly show that in the delivery of Architectural 6, the Theory of Connectivism is significant in all activities of the course and in design process starting from the problem discovery, definition, design up to delivery, students use the technologies and their social connections to solve the design problem. Teachers also indicated the same value for technology and networks as source of learning. However, given the possible methods of delivering the course, the basic methods already used in the face-to-face learning were applied. This apparently indicates that there is no innovation in teaching methods which would likely increase student engagement. Analysing Q1, both perceive the course as difficult and overloaded. Q2 provided similar results for teachers and students that technology and people support learning. However, when asked what challenges they experience in Q3, technology itself was problematic. This supports the assumption that slow internet connection and technology adeptness needs to be improved. Lastly Q4 responses signify that despite the challenges, teachers and students strive to improve delivery, gain mastery and skills needed in the course.

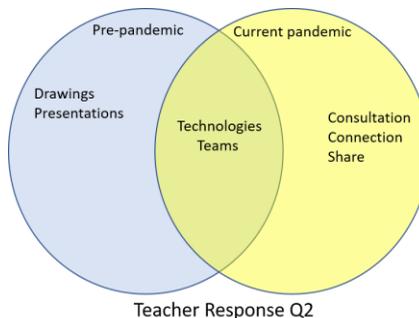


The Venn Diagram of Student Response Q1 shows the similarities and differences of answers regarding the perception of the experienced learning modalities. It indicates that regardless of modalities students feel uncomfortable, overloaded, difficult, and need time management.

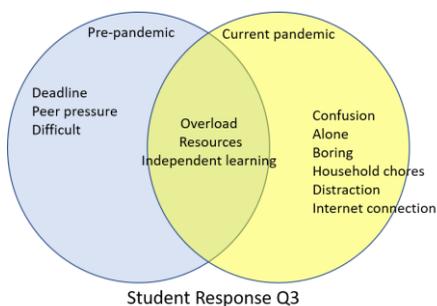
The first set of theme shows that the face-to-face learning environment is for sharing, interaction, and integration. But the other set of theme shows that teachers are concerned with the unique learning styles of students. The common idea in Q1 is that teachers feel overloaded.



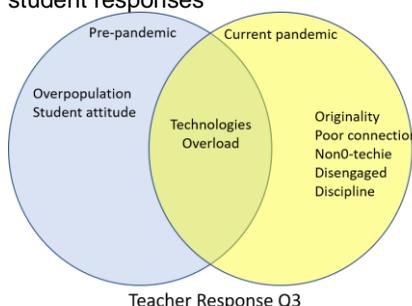
This diagram Q2 indicates that students rely on technology and people in the exchange of ideas.



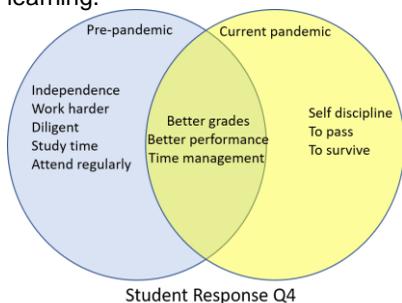
This diagram of Teacher Response Q2 indicates that technology and people are crucial in the exchange of ideas. This result is similar to the student responses



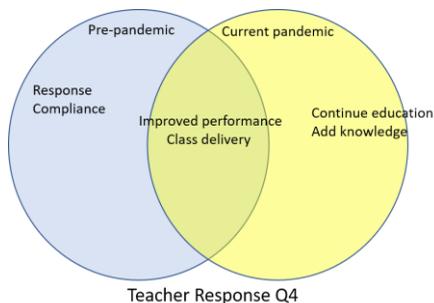
As shown here in the Student Response Q3 the challenges that the students face are work overload, lack of resources, independent learning.



Teacher Response Q3 the challenges that teachers face are work overload and technologies



The Venn Diagram suggests that regardless of era, students aim for better grades, better performance, and improved time management.



The diagram indicates that teachers aim for improved performance and class delivery.

Interviews and survey showed that in the different phases of design, digital online learning tools are suitable. On the Discovery Phase where research, case studies and schematics are done, microblogging is applicable. On the Define Phase where students continue research, case studies, sketching and modelling Lives Streaming has the components for students to show their works. During the Design Phase where collaboration, consultation, research, drafting, rendering, and modelling takes place, the use of Virtual Worlds is practical. Lastly, on the Delivery Phase where students present

their projects to the class and public, video conferencing provides relevant tools. As illustrated by the authors' model shown below.

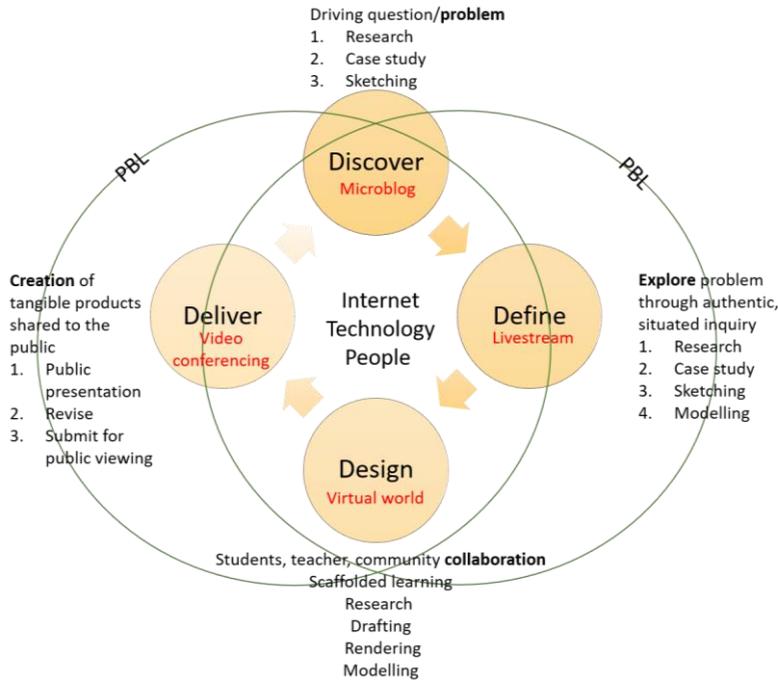


Figure 5 Connectivism Model in Architectural Design 6 (Deabanico, E.G. & Pinugu, J.N., 2021)

5. CONCLUSION AND RECOMMENDATION

Applying the principles of Connectivism, the findings indicated that the use of the internet, technology, social connections, and personal networks are necessary in design courses. However, the internet disruptions and lack of technological know-how limited the opportunities it provided. It illustrated the online methods like live streaming, virtual reality, gaming, blogging, and others need to be examined and match its functions with the different stages of design. Many learning systems are possible online but were not fully explored. There were no innovative digital interventions on the typical problems in all Design Phases like slow internet connection, difficulty in sending large digital files, loss of spontaneity in discussion and feedback, and originality.

Finally, it is recommended for teachers to provide innovative methods that will increase student engagement through virtual games, microblogs, etc. Create learning platforms considering student learning styles –visual, verbal, musical, physical/kinaesthetic, logical/mathematical, social, solitary, and combination considering different methods. Assess student learning capacity and provide tutorial services or alternative projects that suit their learning phase. Institutions should provide financial and other forms of assistance to students and teachers especially related to acquiring appropriate learning tools and equipment. Lastly, provide school platforms that will function during intermittent connections and offline.

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