

Evaluating the effectiveness of online teaching in architecture courses

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Introduction

Traditionally architecture students learn to design in studio environments wherein a tutor, often a practicing architect, periodically reviews students' work (Schön, 1983). Advancements in IT technologies during the last few decades have enabled the development of online tools, such as Learning Management Systems (LMS), to better facilitate learning and teaching for architectural education. Past research indicates that online learning provides potential opportunities for enhancing student engagement (Francis & Shannon, 2013), sharing knowledge and promoting peer-to-peer collaboration (Chiu, 2008). While on-line and "distance education" (the analogue predecessor of on-line) architecture courses have existed since the 1980s in many parts of the world, they have become more common in recent years, and in 2020 have become ubiquitous. With the increase in on-line learning, it is timely to consider the effectiveness of this mode of delivery for architecture courses.

Architectural programmes are typically comprised of design studios and theory/skill-based courses. To date, there has been a lack of formal evaluation of both types of courses in their online modes of delivery, and how they relate to each other, and to more conventional face-to-face teaching. In particular, several major questions remain unanswered. What is the student learning experience in online architectural courses? What are the main issues pertaining to online teaching tools? What differences exist in terms of learning, between online studio courses and non-studio courses? What aspects of online courses do students typically like and dislike? Where does the greatest potential for further development of architectural online programmes lie? To answer these questions, this research explores the effectiveness of online learning within architectural programmes, in terms of both design studios and theory/skill-focused architecture courses. This research reports on the results of a survey of students ($n = 88$), enrolled in courses ($n = 15$) at three Australian universities. To assist with interpreting the results of the surveys, three in-depth interviews were conducted with course convenors.

Research Results

From 15 courses at three Australian universities, in total 93 students participated in the survey and 88 completed responses (15 Year 1, 21 Year 2, 41 Year 3, three Year 4 and 10 Year 5) have been received. Surveys were sent to seven online studios. 50 students participated in the survey and 47 completed survey results are received. Six online non-studio courses have been included in the survey. 33 students participated in the survey and 31 completed students' responses have been received. For blended learning courses, survey was sent to students enrolled in two blended learning courses. 10 students' complete responses were received.

Figure 1 shows participant's age groups in the three types of courses. 35.42% of students in the online studio courses and 31.25% of students in the online non-studio courses are in the 41-50 age group. This profile is very different to that of on-campus students, indicating that flexibility provided by online modes of delivery enable mature students, who are often working full-time, to complete their courses. In contrast, the students in blended learning courses have a more typical on-campus age profile, with 60% in the 21-30 age group.

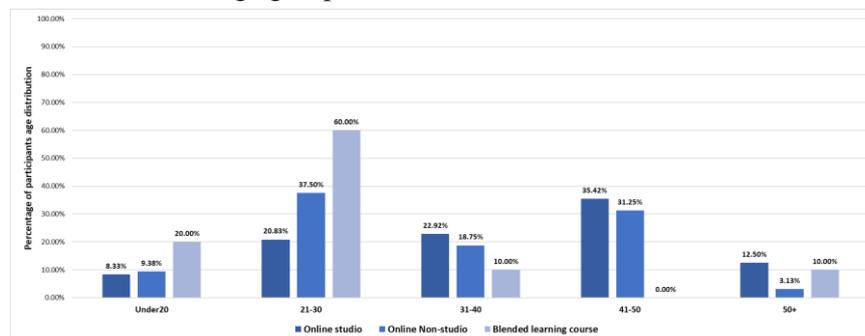


Figure 1. Participant's age group

Table 1 shows the survey results for the three course types and Table 2 is the categorisation of survey questions in terms of positive/negative experience. The data overwhelmingly confirms that students appreciate the flexibility of on-line learning, in both studio and non-studio courses. Students are able to remotely learn from any geographical location, and with a relatively flexible schedule. Students are neutral about online tools in non-studio courses and negative about them in online studio courses. This reveals the necessity of the development of online teaching tools which meet the needs of studio teaching. It is clear that current on-line drawing and associated interactive discussion tools are not satisfactory. While engagement with teacher and peers was positive in online studio courses, it was neutral or negative in other courses. This may also be due to the nature of studio, where tutors must interact with students in a more intensive and sustained way.

Table 1. Likert scale survey results (Strongly agree -1, Agree -2, Neutral -3, Disagree- 4, Strongly disagree -5) Note, slight variations in questions to accommodate different delivery modes.

	Questions	Online studio		Online non-studio		Blended learning	
		Mean Score	SD (Standard deviation)	Mean Score	SD (Standard deviation)	Mean Score	SD (Standard deviation)
1	I prefer online delivery to face to face mode	3.02	1.06	2.84	1.29	3.40	1.43
2	My learning experience with this online studio/online course/blended learning course is positive	1.98	0.99*	2.23	1.12	2.90	1.60
3	I have experienced difficulties using the online learning tools	3.44	1.07	3.26	1.24	3.70	0.68*
4	This online studio effectively helps me to develop my design project/ The online tutorial /tutorial is effective in terms of helping me with my assessment.	2.06	0.84*	2.32	1.17	2.60	1.43
5	The online lecture information is helpful	1.92	0.77*	1.84	0.69*	2.50	1.51
6	The interaction with my tutor is effective	2.13	1.06	2.42	1.23	2.80	1.32
7	The interaction with other students is helpful	2.35	1.02	2.52	1.09	1.70	0.68*
8	The online critique is helpful	2.00	0.95*	-	-		
9	Flexible time is the biggest advantage for this online studio/course	1.49	0.83*	1.74	0.82*	2.70	1.42
10.	Flexible location is the biggest advantage for this online studio/course	1.30	0.62*	1.61	0.80*	2.90	1.37
11.	Better engaging is the biggest advantage for this online studio/course	2.77	1.26	2.87	1.12	3.10	1.29
12.	Lack of self-learning motivation is the biggest obstacle for this online studio/course	3.02	1.45	2.68	1.35	2.50	1.51
13.	Difficult to interact with teacher is the biggest obstacle for this online studio/course.	3.00	1.23	2.90	1.17	1.80	1.03
14.	Difficult to communicate with peers is the biggest obstacle for this online studio/course	2.96	1.22	2.84	1.13	3.67	1.32
15.	Overall the course learning outcomes are achieved	1.96	0.78*	1.97	1.02	2.90	1.29
16	The online component of this course is helpful	-	-	-	-	3.10	1.37

*SD<1

Table 2. Categorisation of survey questions.

	Questions			Mean			Positive/Negative		
	Online studio	Online non-studio	Blended learning	Online studio	Online non-studio	Blended learning	Online studio	Online non-studio	Blended learning
Learning experience	2, 4, 15	2, 4, 15	2, 4, 15	2.00	2.17	2.80	Positive	Positive	Neutral
Delivery mode	1	1	1	3.02	2.84	3.40	Neutral	Neutral	Negative
Difficulty level of using Online tools	3	3	3	3.44	3.26	3.70	Positive	Neutral	Positive
Interaction with peers	7, 14	7, 14	7, 14	-	-	-	Positive	Neutral	Positive
Interaction with teachers	6, 13	6, 13	6, 13	-	-	-	Positive	Neutral	Negative
Self-engaging, motivation	11, 12	11, 12	11, 12	2.89	2.79	-	Neutral	Neutral	Negative
Course content	5	5	5, 16	1.93	1.84	2.80	Positive	Positive	Neutral
Online critique	8			2.00	-	-	Positive	-	-
Flexibility	9, 10	9, 10	9, 10	1.39	1.68	2.80	Positive	Positive	Neutral

The last question in the survey allowed an open text response to the question, “do you have further comments for this online studio/courses?”

Figures 2, 3 and 4 are the matrix coding which shows the correlation between positive/negative experiences reported in open questions and various aspects of their learning experience. The first of these, Figure 2, shows the matrix coding of online studio open questions. The results show that flexibility strongly associated with positive experience and communication and interaction are related to negative experiences. Online tools are responsible for more negative experiences than positive. In the Likert scale questions, the results suggest that students do not have significant difficulty in using the online teaching tools. However their experiences with using online tools have been negative. One student specifically comment on Collaborate Ultra which is the main online teaching tools for online studio: “Collaborate Ultra ... lacks a fair amount of flexibility to draw over and share ideas through sketching. It’s too artificial, and ideas are then limited to what the program can do, rather than your thought process.” Figure 3 shows the matrix of online non-studio open questions. From the figure we can see that flexibility and course structure are strongly related to positive experiences, whereas there are both positive and negative experiences for communication and interaction, with slightly higher percentage of the positive. There are both positive and negative experiences associated with online tools. Figure 4 reports the results for the blended learning open questions. For this set, course structure is closely related to negative experiences, followed by feedback received. The sample size for the courses is, however, the lowest of the three.

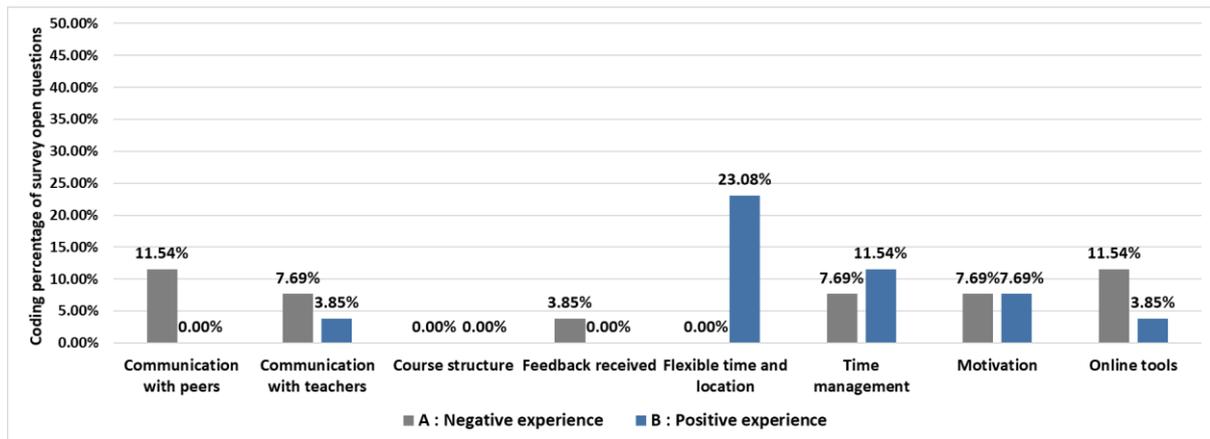


Figure 2. Matrix coding of online studio open questions

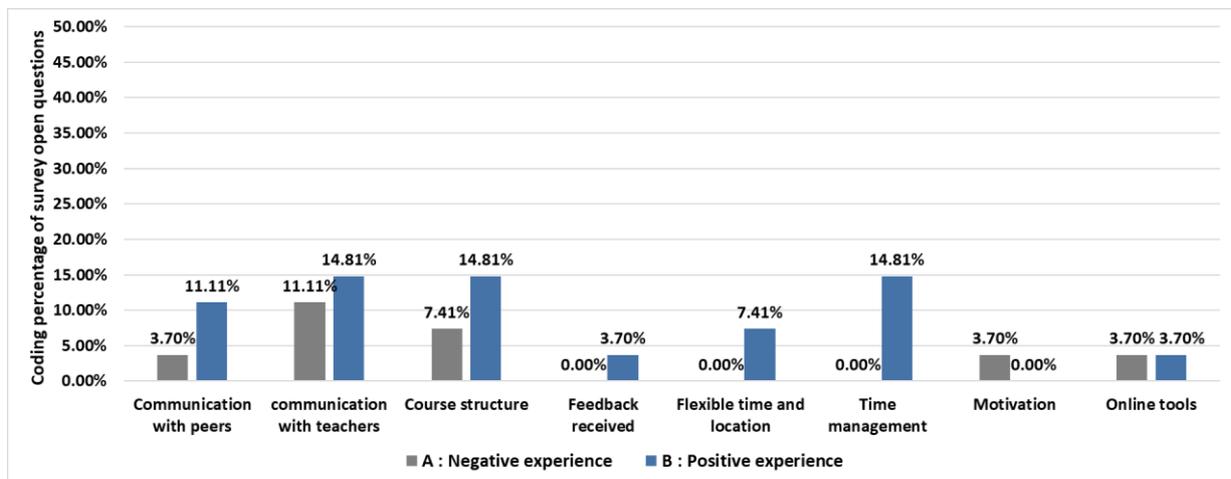


Figure 3. Matrix coding of online non-studio open questions

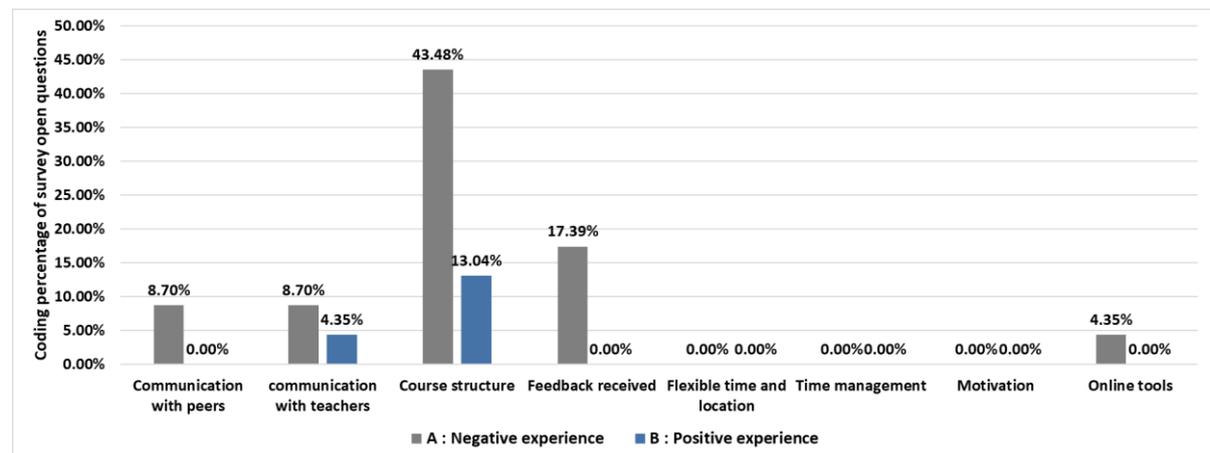


Figure 4. Matrix coding of blended learning open questions

Interviews and surveys were conducted with both students and course convenors, and based on subsequent analysis the following conclusions have been made:

Firstly, the typically most favoured aspects of online courses by participating students, is the flexibility that such online courses allow. Online teaching allows students to be able to learn anywhere, and with relatively flexible scheduling as well. It also provides greater opportunities for students to complete their degrees on a part-time basis, and especially accommodating for mature students. Such also applies

to online critiques, in particular it enables the possibility of inviting international external reviewers from around the world to provide specialist feedback to students. And of course, these methods also greatly beneficial in the presently challenging COVID-19 situation, during which time the majority of teaching has switched to online delivery models.

Secondly, we have seen a clear need for further development of online studio tools. In order to assist with students' design projects, tutors need to be able to provide feedback about students work, including via sketching (be able to draw on top of students work, etc.); however current online studio tools are too limited in this respect. Current tools are working acceptably for lecture-based non-studio architecture courses, however they are suboptimal, since course convenors often currently need to manually combine together multiple online teaching tools, in order to meet all of their requirements. Therefore there is a definite need for better integration of current online teaching tools, to enable them to interoperate more smoothly with each other.

Thirdly, data indicates that students have generally positive learning experiences during online courses, however students also experience a lack of learning self-motivation compared to traditional non-online teaching models. This is indicative that online architectural programs hold great potential, provided that further exploration is done for methods to enhance students' self-motivation in online teaching environments.

Fourthly, some of the tasks that were expected to be challenging such as site visits and physical model making, can still be conducted acceptably via online teaching methods. However the biggest challenge with online architecture studios, is the manufacturing and fabrication, such as the use of 3D printers, laser cutters, or CNC machine.

Publication generated from the project.

The research results have been submitted to Architectural Science Review (Q1) journal, and is currently under-review.

Funding expense:

Online survey *QuestionPro* (two six-month subscription): \$ 944.7

Incentive for participants: \$1579.7

Research assistant: \$1,817.37

Proofreading \$150

USB storage: \$40.91

Book& journal: \$159.12

Microphone for interview: 133.64

In total: \$4,825.44

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