"Peer Critique" in Debate: A Pedagogical Tool for Teaching Architectural Design Studio

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Post-digital architectural education aims to empower future architects by developing open-mindedness and technical skills for the design of non-standard spatial configurations. Students can learn through exploration and experimentation, using three-dimensional graphic design software to generate initial designs and quality feedback, with a mixed model of peers and panel judges assessing final projects. Ratings of individual contributions and performance are commonly found in literature on peer assessment, but qualitative comments from peers can also provide good information on strengths and weaknesses. This study shows that peer critique in the form of debate can be an effective pedagogical tool for educators to provide quality feedback to the presenting group. This paper explores how architecture students responded to this method in a design studio for a master's degree in architecture in a university in Hong Kong. Interviews were audio-recorded, transcribed and subsequently analysed using the coding system of qualitative software NVivo 11. The responses of the students were positive, although they experienced differences in feedback from different stakeholders.

INTRODUCTION

UNESCO/UIA (2011) advocates that architectural education is to enable future architects to meet the worldwide challenge of combining cultural heritage with sustainable human settlements. It calls for a transformation of professionals to acknowledge social context, embrace environmental sustainability and develop learning capacity in architectural design. Modernism in architecture follows a conventional belief in systems based on scientific rationalism resulting from research data and findings (Healey, 1992). However, since modernist architecture was first taught, methods and styles have evolved; and architectural education now places greater "emphasis on issues in social responsibility, sustainability, environmental responsiveness, environmental integrity and human health" (Milburn and Brown, 2003: 47). Architectural education goes beyond nurturing a group of academically competent, creative, critically minded and ethical professional designers, and the curriculum needs to foster international, socially responsible citizens who are intellectually mature and environmentally sensitive in their design work (Ozorhon *et al*., 2012). Ultimately, architecture graduates can produce practical, inspiring and exploratory solutions to deal daily with complex types of problem solving before they start their professional careers (Megahed, 2017; Schön, 1988).

The design studio is commonly regarded as the heart of various modes of learning in both undergraduate and postgraduate architectural education. Architecture differs from other subjects because it is interdisciplinary, comprising both art and applied science; and architectural students need to take an active role in learning; they should learn through doing and by reflecting on actions while recognizing professional practice and identifying a path towards professionalism (Schön, 1988). In the studio sessions, they may gradually develop skills to visualize and represent abstract concepts in graphics and verbal languages, acquire architectural thinking and ultimately develop a problem-solving capability (Demirbaş and Demirkan, 2008; Megahed, 2017). To prepare for contemporary architectural practice, student architects are strongly encouraged to 'think outside the box' with imaginative ideas and designs. They need to build the capability to visualize abstract concepts in graphics, communicate effectively and construct physical models (Megahed, 2017). This means that architecture educators need to create a collaborative, learner-centred, experimental, problem-based learning culture that inculcates social interactions between them and their students (Yuan *et al*., 2018). While students devote much of their time, energy and effort to practising core professional skills, there are many opportunities for them to evaluate their work through iterations of presentations and discussions in a design studio (Oh *et al.,* 2013).

Megahed (2017) points out that critique in a design studio, although it serves as part of assessment for evaluative purposes, encompasses an in-depth educational purpose. Critique can serve as formative for interim review or summative as final assessment (Nguyen and Walker, 2016). This can be conducted for individuals, with peers, by a panel of experts or the public, and the feedback format can be dialogical seminars or panel discussions, on paper or digital; the final product presentations may be evaluated publicly (Utaberta *et al*., 2013). No single rigid assessment model in a design studio is better than others, because it depends on the learning capability of students (Ozorhon *et al*., 2012). Feedback from instructors, peers and external judges forms the foundation for students to reflect on and revise their design work. This type of critique offers a positive and constructive experience sharing and externalizing design thinking and judgement. With a variety of assessment tasks, students are enabled to acquire skills in self-monitoring and making evaluative judgements about their own or peer performance through the integrated learning opportunities and the possibility of interrelationships between teaching, learning among peers, tutors and the juries in the learning environment (Cahill *et al*., 2010).

We will use peer debate and peer critique interchangeably in this paper and will explore student experiences of peer debate in the design studio of a master's degree in architecture in Hong Kong. The study focus is on the students' experiences of the group critique process. A qualitative exploratory approach is used in this paper because data were collected and interpreted based on a case study. Participants were chosen from two cohorts of the master program in architectural education run by a university in Hong Kong in 2015 and 2016. Interviews were conducted after students had submitted their final coursework, and marks were finalized to prevent potentially undue influences on them. All data were collected and analysed based on students' feedback during

face-to-face interviews. Five students participated, one international student and four students from Hong Kong. They all had more than one year's working experience in architecture, which was stipulated as a course prerequisite. Each interview lasted 60 minutes, and semi-structured discussions were also held. The interview process was audio-recorded, scripts were transcribed, coded using the qualitative software NVivo 11 and reviewed by two researchers. Discussion and recommendations for design studios are followed by a consideration of the limitation of the study.

BACKGROUND OF THE STUDY

In the post-digital era, architectural students need to be equipped with advanced technologies as a toolkit for designing complex shapes for unusual spatial configurations (Davis, 2014; Riccobono *et al*., 2013). A design studio with the themes 'Atavist Anatomies' and 'Force Matter' was run in the second semester in both 2015 and 2016 as part of the master program in the Chinese University of Hong Kong. It served to challenge form and geometry imposed under modernist paradigms and encouraged students to solve problems through a "dialectic between pre-conceived solutions and observed facts" (Ledewitz, 1985: 4). In the course outline, students were informed about constraints under modernism, in which matter was limited by idealized geometry, and they were encouraged to reframe their mindsets to accept that matter is not shapeless, comes with its own properties and characteristics and can constructively inform the design of non-standardized forms in a 21st-century architectural education. The course was structured with a four-hour studio and tutorial twice a week for sixteen weeks. There were three phases, with five weeks each for tectonic (theories of structural design) exploration, conceptual design, and detailed design and prototyping; presentations were made in the final week (Figure 1). Additional individual tutorials were arranged for students on a demand basis. A learning management system was used to allow students to access course materials and video tutorials, and to submit assignments. Assessment included the individual design assignment and a group project.

The intended learning outcomes of the group project were to enable students to:

1. critically investigate and evaluate theoretical concepts and drivers behind evolving architectural design; tackle novel situations and ill-defined problems; understand design as an ongoing process, not as a product; and develop a comprehensive understanding of contemporary theoretical discourse;
2. explore through teamwork new ways of representing architectural concepts verbally, graphically and by means of physical models; and to develop and propose new ways of representing architectural concepts verbally, textually and graphically.

Students were intentionally divided into groups based on their prior experiences. Feedback was given and received from peers within a group and among groups before moving forward to the third phase—individual projects. Except in the final presentation, students were given a mixed mode of feedback in three phases: peer-to-peer; peer non-presenting groups to the presenting group in peer debate, the professor and student format; and the professor with peer groups to the presenting group in the last round. They were expected to participate actively, not only as creative architectural designers in using 3D software to make modelling as expected in post-digital architectural education but in building professional skills in communicating their work and the ability to make constructive critiques to peers through self-assessment and exercising critical analysis through the strengths, weaknesses, opportunities and threats (SWOT) model. Visualization of the peer debate can be viewed at https://www.youtube.com/watch?v=J66oTY2rU5Y&feature=youtu.be.

METHODOLOGY

This paper received ethics clearance from the university to conduct interviews with students. It focused on student responses to their perception of their learning experiences of active exploration of 21st-century architectural design, and feedback through peer debate and by a panel of judges on their final project. All students were invited voluntarily to the case study after all marks had been finalized by the Board of Examiners. Students who showed interest in being interviewed made their responses to the researcher. Interviews were arranged with those students who submitted a consent form and confirmed interview schedules and agreed on audio recording during the interview. Interview questions included:

1. How did they find the learning experience in design studio?
2. What was the learning experience in feedback through peer debate?
3. What was the learning experience in feedback from the panel judge?

After interviews had been conducted, the audio files were transcribed. NVivo 11 was used with a coding scheme that included learning experience with child coding learning strategies, feedback with child coding peer feedback, and panel judge, teacher support. The coding scheme was cross-checked by two researchers. The emerging themes were a discussion on learning by exploration of actions, learning from peer debate, learning

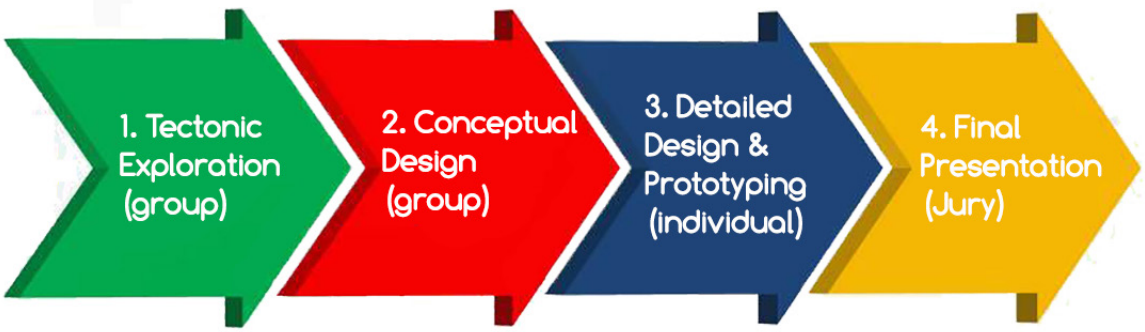

Figure 1. Structure of the architectural design studio

from the panel judge, and learning from and with the teacher in the paper.

FINDINGS AND DISCUSSION

The faculty set up individual and group assessment tasks in which students were arranged in groups to provide opportunities for peer learning in the initial phases so that they built skills, knowledge and confidence to work on individual projects.

Learning by active exploration

In the four phases of the design studio, students went through the process: research, design and building of prototypes, and presentation. They had to conduct cultural research, because architecture is conceptualized around socio-cultural and environmental influences. Based on experiments with design software tools, students transformed their concepts through prototypes. In the final phase, students prepared a full portfolio with typical architectural planimetric drawings and a physical model.

Schön (1988) clearly pointed out exploration and testing approaches for constructing arguments and further developing new ideas. The first phase of the course started with experimentation with 3D software and building a project based on technical direction. Some students had no knowledge of any software. They needed to take the initiative to learn in areas with which they may not have been familiar, such as computer programming. Student D noted that '*part was pretty much like self-taught because you needed to figure out yourself how you did program, how to do rendering*'. One common notion among all interviewees was that they were actively pushed to learn through trial and error when they carried out exploration and experimentation with different types of tools on tectonic systems and found answers by themselves (Figure 2). Instead of completing like any other project, students were asked to '*explore capability of a robot and find ways to improve it before going into the final design*' (student E) and learn from modifications they could make. Concurrently, students made a number of attempts to diagnose and learn from failure, and student D remarked that '*he enjoyed this process rather than playing safe*'. Going beyond what past models had performed, they were encouraged to cope with analysing problems encountered through experimental investigation. In addition, some interviewees reported that they explored together with the professor when they could not resolve the problems themselves.

Learning from peer debate

In the group assessment process, students' learning capacity can be empowered if they adopt an open mindset to reflect on comments and suggestions through objective analysis from peer teams. However, students commonly feel stressed, especially when receiving critiques from peers and panel judges (Bachman and Bachman, 2006). The peer debate session was arranged with ten to fifteen minutes for group presentation, followed by fifteen to twenty minutes for peer critique and responses from the presenting team. Debate teams were formed to comment using the SWOT model to the presenting team, with one team focusing on strengths and opportunities and the other focusing on weaknesses and threats in the design. Students regarded this mode of peer feedback to be different from the traditional grading and marking provided by peers. It was structured in the form of open discussion. This meant to serve to minimize the induced anxiety of the presenting team. When the two teams debated with one another, tension towards the presenters was offset without any feelings of embarrassment or the need to respond defensively to negative comments. The merit of having such a peer debate was that '*students can better understand the weaknesses and strengths and learn about others' spatial possibilities with open mindedness*' (student A), while the commenting team could '*show how much they knew*' in the debate process (student B). While examining 'weaknesses' and 'threats', students needed to critically think '*what the problem was…what was the problem coming up with that…how those kind of tectonic systems were applied in the real world*', and tried hard to '*link up cases*' (student C). As a memorable moment, student A noted that when '*peers' tectonic system was being challenged, students started to get fears and defensive upon*'. Nevertheless, the debate team commenting on weaknesses and threats needed to exercise good communication skills, because the team still had to '*put it in a nice way*' (student B).

Peer debate was a better way to learn because '*we did learn more about the subject in the debate session*' (student B). Although students '*were scared*' at the beginning, '*they turned out to be pretty well at the end*' of the presentation (student D), and she felt very positive about the experience: '*That was pretty interesting, and I think students inspired from their own content, because you would see what's good and what's bad when you integrate some similar concepts*'. Student A made a similar comment: '*It really helped us to under-*

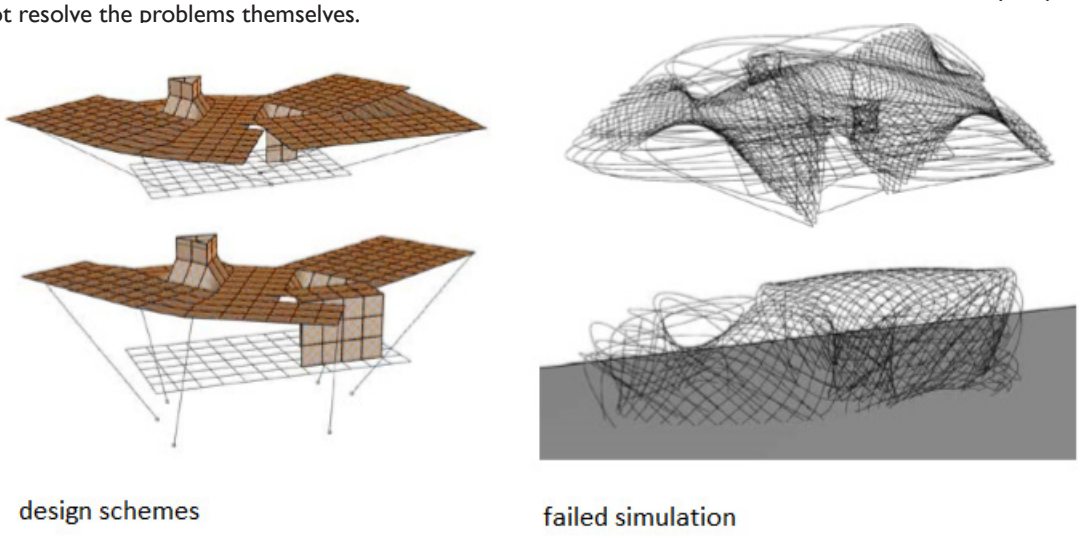

Figure 2. Student testing of design concepts with 3D software

stand what we are doing logically and to categorize the strengths and weaknesses while doing the same model but in different ways. It's a very good experience to see.'

Learning from the panel judge

Schön advocates that educators should teach like "scientists do instead of their results" (1988: 4). These students were encouraged to focus on what they had learned, particularly in the process of development rather than solely on the end-product, because they could then learn what errors they had made and how they then came up with alternative solutions by fixing errors and gaining constructive feedback for renewal of concepts. However, a panel of external judges made their professional judgement based on the final product. Student D responded positively when she received complimentary comments, '*critics were going really well, they liked the project pretty much*'. In fact, the panel was quite interested in how the project was developed and the use of emerging technologies in the studio. On the other hand, students perceived that the external panel was in a position to determine standards, and '*the criticism by external reviewers was seldom encountered from our professors, and the view of design is subjective anyway*' (student E). Owing to the different levels of knowledge and experience, student D commented that assessment made by the panel judge '*was based on the final outcome rather than taking into consideration the learning process as focused by the professor*'. Student D felt that the panel judgement was primarily based on the final product, and somehow it was perceived to have undermined the continuous learning efforts made by students in assessment, which was experimental in this architectural design studio.

Learning from and with the teacher

A teacher can set high expectations on students, who can be inspired if there are collaborative learning moments with the teacher. Technically, the teacher is the expert to design and deploy programming skills using the 3D software in the course. As student E experienced difficulty to find ways of working with the software, he recalled that '*the teacher made a quick and clear tutorial about this*'. While students can learn from errors and mistakes, student C could gain positive support from the teacher '*After we did some mock-up and tested the feasibility of those details. Although the way of ground fixing method seems to work, our tutor suggested a better solution for that*'. With the extensive experience that a teacher has, the relationship between teacher and students is like that of master and apprentice (Oh *et al.*, 2013). However, student D found that she had a lot of satisfaction because '*he pushed me to the very end, as we worked out a thing in the best way for me*', despite that she was unwell during the initial period of the study. Student motivation may be gained through successful experiences, but, more importantly, students were motivated because the teacher showed that he cared and was readily providing prompt and constructive feedback in addition to the individual meetings run twice a week. The teacher was highly respected by students; interviewees from both cohorts commonly remarked that he is the expert in the field and was there to co-construct knowledge with them along the way.

DISCUSSION

In the post-digital period, under the impact of advanced technology and a globalized culture in learning, students are encouraged to take the initiative for their learning. Although different learning approaches are deployed by educators, scholastic activities provide opportunities for students to experience the process of creative exploration, solution generation and critical evaluation for the best solution (Armstrong, 1999; Kvan and Jia, 2005). An architectural design studio sets up a learning environment for students to build capability by solving problems when they work through projects and design solutions (Oh *et al.*, 2013). In this case study, various assessment tasks provided opportunities for them to assert self-directed exploration and learn through experiencing and experimenting with 3D software and receiving critiques of their design concepts. Students gradually reduced their dependence on teachers while developing self-regulatory learning and skills in making critiques while working through various types of assessment task.

Many Chinese students pay attention to relationships between peers and tend to be reluctant to provide negative comments to one another (Nelson and Carson, 2006; Hu and Lam, 2010). Feedback through the debate format may be more accepted by students when comments are made on the balance of potential and limitations of a project rather than receiving a quantitative score without knowing the strengths and weaknesses. This may increase the validity and reliability of the final assessment (Friedman *et al.*, 2008; Tucker, 2013). Group critique is collaborative in nature, and students are provided with opportunities to learn their strengths and weaknesses after presentations based on comments from peer teams and the professor, and follow-up discussion (Chandrasekera, 2015). These assessment tools are complementary. Although there are different formats for critique in a design studio, students may learn different ideas from a distributed learning model (Hokanson, 2012; Utaberta *et al.*, 2013). This critique methodology is often cited to be specifically effective in terms of assessment control and feedback quality. Given good information and rendered objective evaluation guidance in the course handbook, students are encouraged and motivated to reflect and respond positively and openly in the feedback process. In addition, they are directed to learn proactively and collaboratively, eliminating the potential criticism of simply grading peers with scores.

A systematic critique is adopted for developing an integrated teaching and learning assessment approach. Students' ability in problem solving can be further improved by using the SWOT analysis model. Seymour (2010) further advocates that critique requires practice. Students therefore need good guidance and practice so that they can provide quality comments and learn to make objective responses to criticism. As motivation for continuous improvement, students may develop abilities in professional communication, critical thinking and evaluation by exploiting the positive dimension in criticism (Utaberta *et al.*, 2013). Peer critique becomes a collaborative learning platform in which students are transformed into proactive, independent learners.

With regard to the judgements made by the external panel, not all feedback was positive: some students considered them to be an ineffective learning experience due to discouraging and confusing comments made by assessors. However, students need to develop skills to shift the differences in points of view so that they become competent lifelong learners (Fastré 2013). A mixed mode of feedback can simulate the real working environment in which architecture graduates need to manage diverse and sometimes conflicting demands by stakeholders.

However, educators may plan different forms of critique that focus on enriching learning experiences. In addition to being a source of expertise or authority in lectures, faculty can also be coaches or facilitators in group critique, or companions to provide support in one-on-one consultations (Goldschmidt *et al.*, 2010). Students may be motivated to interact more closely in intergroup competition, and cooperative learning can be achieved during rounds of competition for the best design (Shih *et al*., 2006). To engage students through experiencing iterations of presentations and reviews of their work, educators need to balance building student confidence and pushing boundaries for creativity in architectural design so that students can adopt an open mindset for "sustainable learning" (Nguyen and Walker, 2016: 99).

CONCLUSION

Contemporary architecture may achieve reflexivity and be socially constructed (Ley, 2003). Learning in a design studio is an essential component in architectural education for intellectual, technological, social and personal development, but it is also a live experience for students to prepare for their future as architects (Harrison *et al*., 2015). In preparation for the contemporary mode of practice in architecture, Hong Kong students need to adopt a new paradigm of learning, from exploration and experimentation to having an open mindset for sustainable learning through continuous reflection. The group critique using the SWOT analysis model in this design studio was intended to maximize students' ability to sharpen their sense of creativity, supported by theory and evidence. Students are assessed on performance capability from design conception to effective prototyping and socio-cultural impact (Oh *et al.*, 2013; Megahed, 2017). During the process of critique, students' learning capability is increased, building heightened confidence and satisfaction, enabling critical reflection, producing quality performance and initiating learning responsibility (Dochy *et al*., 1999; Seymour, 2010). This may cater for the future market, because it demands a high degree of autonomous critical thinking and skillful communication by practitioners.

Teaching and learning in an architectural design studio evolve dynamically through adapting educational ideas from other disciplines within the given pedagogies (De La Harpe and Peterson, 2008). Studios generally have low faculty–student ratios, and the teaching faculty plays a significant role in stimulating students in their commitment to continuous and transformative learning throughout the educational process. Goldschmidt *et al.* (2010) stress that the role played by an educator in a design studio should not only focus on knowledge and professional skills but also on the need to be capable facilitators. They can influence their students through sharing their passion for architecture, tactfully engaging students to pursue excellence in architecture and as individuals. It is recommended that faculty's directive and facilitative approach in delivering critiques is the key channeling method to empower students to build confidence and a desire to push for imagination and creativity in contemporary architectural education (Oh *et al*., 2013; Yuan *et al*., 2018). Culture created through a design studio is becoming the cornerstone of architectural education (AIAS, 2016). Although two cohorts of sixteen students were invited for the study, only five could be reached after all grades had been finalized. To extend the current study, further research on the impact on student creativity through different modes of feedback can be considered.

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