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First year design “Visualisation II”: The hybridisation of analogue and digital tools.

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Abstract

This paper discusses first year students’ responses and outcomes to the integration of digital technologies in their second semester foundational visualisation class; ‘Visualisation II’. As the second class in the Visualisation series, previous analogue knowledge taught in ‘Visualisation I’ is compounded with new digital technologies establishing the introduction to a myriad of hybrid visualisation tools and techniques for design exploration and design artefact. This research examines the differentiation between analogue and digital design, common precedents of the two, and reflects upon the environment and class structure with the learning experiences and confidence of surveyed participants.

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Keywords: Design education, first year, visualisation, digital tools;

1. Introduction

Visualisation is a crucial part of communicating the process and product of design. It is essential for first year design students to learn the fundamentals of visualisation methods in order to progress with their degree, creatively and intellectually (Box, 2007). This study examines the teaching approach that took students beyond the introduction to basic computer skills, through the hybridisation of analogue and digital visualisation methods, to enrich the design process.

The first year School of Design classes ‘Visualisation I’ (Vis I) and ‘Visualisation II’ (Vis II) were newly created and conducted in 2011 at the Queensland University of Technology (QUT) in Brisbane, Australia. Vis II held, in the second semester of 2011, had a total of 394 students enrolled. This class included Interior Design, Industrial Design, Architecture and Landscape Architecture, all of the disciplines from the School of Design. The class was correspondingly divided into streams of study based on the student’s discipline. Vis I focused on teaching analogue design skills including a variety of hand drawing techniques. The main objective for Vis II was to introduce a set of basic digital design tools using software relevant to each discipline, to supplement and develop the analogue skills taught in Vis I, exposing students to a range of visual communication tools. Each stream met on a different day of the week, although the class overall had the same learning outcomes and assessments, the streams had different

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content each focusing towards the needs of the individual discipline. All of the streams had similar class structure with 2 hours of computer lab sessions followed by 2 hours of studio per week.

Each discipline stream began the semester by creating a physical model. The model was represented using analogue drawing techniques, and was recreated in the computer using 3D modeling software. The type of model, drawing methods, and software used all differed depending on the discipline stream. It was the process of physically creating the model and the translation of it through analogue and digital techniques that assisted in tying the studio and computer lab portions of the class to each other. This iterative process exposed students to a range of visualisation methods taking the class beyond an introduction to basic software tools; it allowed students the opportunity to combine methods and mediums of visualisation into a hybridised design process. The focus for Vis II was to preserve the importance of traditional communication methods, whilst instilling appropriate design conventions during the introduction of digital and hybridised techniques. Whilst the students were equipped with varying levels of knowledge, it was intrinsically difficult to construct the class content to align with the students' mixed skills and confidence levels within each discipline. The purpose of this study is to ascertain the strength of the teaching methods utilised and the outcome of the student's learning.

2. Literature Review

"Visualization is at the heart of creativity; it's the mechanism that enables your imagination to focus. It is an essential tool" (Box, 2007). Visualisation considers the full design process, including the production of the initial sensory information (Lawson, 2006), through to pencil meeting the paper, to the final revelation of design completion with a varying level of documentation and enough detail for recognition whilst remaining conceptual.

Visualisation communication of design, both as a process and final output of design, is taught with three types of external representation modes: analogue, digital, and the hybridisation of both mediums (Ibrahim & Pour Rahimian, 2010). The analogue medium, in a design discipline context, is defined as encompassing everything void of Information Technological influences and generally articulates design visualisation by freehand or manual drafted/crafted methods (Brandon & McLain-Kark, 2001). Digital medium involves some form of human-computer interaction commonly using Computer Aided Software (CAD) and/or Virtual Reality (VR) tools (Brandon & McLain-Kark, 2001; Ibrahim & Pour Rahimian, 2010). Whether the continuity of the design process can be interrupted or affected by the transition from analogue to digital design tools (Ibrahim & Pour Rahimian, 2010), it is important for the pedagogy of emerging post-digital designers to identify with these issues and form an understanding of appropriate design strategies using a manner of hybridisation methods. It is understood that "post-digital designers more often design by manipulation than by determinism, and what is designed has become more curious, intuitive, speculative and experimental" (Sheil, 2008). The influence digital design (specifically CAD) has on the design praxis undoubtedly changes the nature of design in both positive and negative respects (Brandon & McLain-Kark, 2001; Ibrahim & Pour Rahimian, 2010; Oxman, 2006, 2007; Steele, 2002; Walther, Robertson, & Radcliffe, 2007) and with the increasing proportion of design practices adopting hybrid modes of experimentation (Sheil, 2008), necessitates the integration of these techniques early in the undergraduates experience to eliminate any negative effects of digital design influence.

The integration of digital media into the early years of undergraduate study have allowed for greater confidence in future learning as learning presumptions have not had time to formulate and students are still responsive to new methods (Iordanova, 2007). Creativity and imagination occur predominantly in the early developmental and schematic stages of the design process (Brandon & McLain-Kark, 2001) which is traditionally fashioned by the graphic representation of ideas through manual techniques (Brandon & McLain-Kark, 2001), however digital tools assist in the development of three-dimensional spatial visualisation/reasoning skills of first-year students (Scribner & Anderson, 2005; Sheryl & Beverly, 2000) whereby integration of digital tools in the early stages of design therefore facilitates the design process.

Within the design disciplines, communication is achieved primarily through the use of graphic images, with text assuming a minor position in the ‘reading’ of design (Yee, 2007). Sketching and drafting by hand are integral aspects of the design activity and seen as ‘thinking tools’ for designers (Lawson, 2006; Suwa & Tversky, 1997) and comes in several types including most crucially design drawings, diagrams and visionary drawings (Lawson, 2006). Architectural educators acknowledge the importance of exercises including abstract representation in two dimensions such as drawings, and three dimensions, physical models, in the early stages of design education (Erem & Umer, 2011). The use of digital tools including CAD software within the design disciplines typically have been utilised to support sketching, drafting, and rendering techniques while incorporating three dimensional modelling processes (Brandon & McLain-Kark, 2001). Some researchers have found that these tools are mainly used in the design studio as a representational tool rather than within the design process (Iordanova, 2007) often implicating the comprehension of the user (Walther, et al., 2007).

The effects and constraints of employing purely one media type during the design process has been widely researched (Brandon & McLain-Kark, 2001; Ibrahim & Pour Rahimian, 2010; Marx, 2000; McLaren, 2008; Walther, et al., 2007) however the process and effect of hybridised techniques have yet to be formidably categorised and tested during the design process. This is presumably due to the immeasurable possibilities and incarnations of hybridisation. It is expected that design students depart from their educational environment with the understanding that the process of design includes creative problem solving regardless of the method utilised during the process (Walther, et al., 2007). It has been determined that appropriate digital tools are not capable of replacing analogue tools in the creative idea creation during the conceptual phase of design (Ibrahim & Pour Rahimian, 2010). The design process is a hybrid of manual techniques and computer modelling (Marx, 2000).

3. Methodology

All of the students from Vis II were asked to complete the university wide Learning Experience Survey (LEX) towards the end of the semester. After the semester concluded students were invited to complete an online survey with 10 questions. Within both of these surveys students had the opportunity to make written comments. The data from the surveys was collected and analysed using a qualitative grounded theory approach finding the emergence of three main themes; *learning experience*, *student confidence*, *learning environment and structure*. This research data validates the potential of discipline specific visualisation praxis collectively affirming the importance of suitable design strategies using a series of hybridisation techniques and methods.

4. Findings

The range of comments analysed from the two different surveys was vast including negative comments mostly focusing on aspects of the class that were beyond the control of the teaching team such as; timetable issues, quality of facilities, and tutor to student ratio. This study focuses on the positive comments from students highlighting effective teaching and learning experiences which will continue to inform the next iteration of the Vis II class in 2012.

4.1. Learning experience

Approximately half of the comments from students reflected on their learning experience within the Vis II class, indicating students are conscious of what they have learned within the class and the importance of that learning experience within the course of study. Students were able to accept the value of their role in their decision-making in terms of the tools they need to use and develop within their career: *“I found that this subject taught me the basics for many programs...it is a great stepping stone for further self learning...the variety of programs we learnt is a good*

thing because it provides us with an experience and...with the knowledge to decide which programs we want to continue with and learn to use well” [L14].

Many of the students were able to foresee how the learning that took place within this class was important to the rest of their course of study and how this was going to influence their abilities in following assessments and semesters of study. The application of knowledge created within the university was also determined to be relevant for use in practice and within industry: “The things we have been taught in this unit will be VERY useful in the duration of this course and the skills we have learned will help us in the industry” [L15]. “Skills covered have immediate practical application in other units, and form the basis for professional work” [L16].

Students reflected on effective learning of analogue and digital medias and understood that the combination of methods is relevant to communicating design ideas and assists with the design process: “...the relationships between analogue and digital medias were made much clearer, and the intention behind learning both mediums of communicating architectural ideas was made very noticeable” [L22]. “The interaction between analogue and digital media enriched my learning experience and provided a helpful start for the rest of the course” [L43].

The use of physical models was introduced to assist in the transition from analogue to digital tools. Some students identified this method as helpful within the transition between medias: “The model making was a good way of linking the two types of media” [L44].

4.2. Confidence

Competent visualisation knowledge allows students to make design decisions with confidence. To help determine the level of confidence of the student, the survey asked them to measure their own confidence levels, before and after the completion of the unit. Students indicated their confidence levels with computers and design related software before enrolling in the class and after completion. Figure 1 is a graph, which depicts the majority of student’s confidence increased from having little confidence to feeling mostly somewhat confident and very confident.

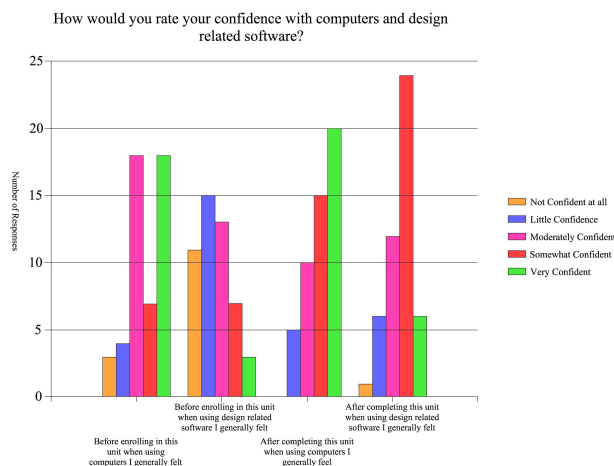


Figure 1. Confidence with Computers and Design Related Software

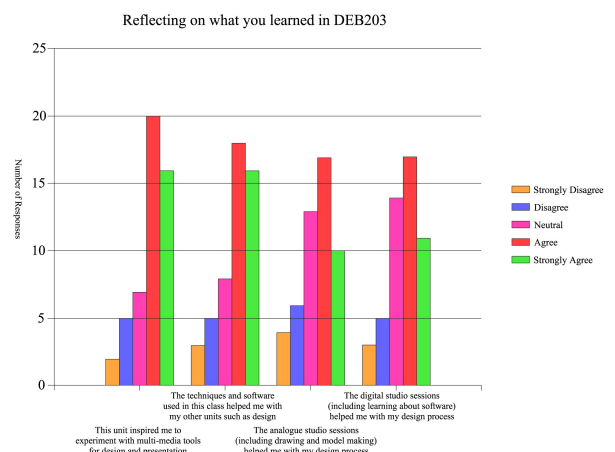


Figure 2. Confidence with Computers and Design Related Software

4.3. Environment and class Structure

Contributing factors to the outcome and success of this class found the learning environment and timetable were influential. Evident in all disciplines the common problem arose in the structuring of the class, not only physical barriers, but the time factor. Students indicate that the digital portion of the class needed more time than what was allocated: *“...the limited time we had this semester could have been better used for the digital side of things”* [E10]. *“...need more time to practice digital media before applying to design”* [E18].

Students recognized that there was a range of skill levels within the class and that this was not only a challenge to the teaching team but for them. A student suggested separating the class by levels of capabilities: *“Maybe split into beginner/advance so learning needs can be better met”* [E1].

It was acknowledged that this class was intended to introduce design students to the basic skills using a few software programs. One student suggested the need for the creation of another class, which would focus on developing digital design skills further reaching higher levels of competency: *“...it would be great if there was another unit for the next year...where we learned more advanced skills in computer programs like revit, archicad, as the stuff we learnt was all very basic...we really need...intermediate and advanced lessons in these programs”* [E2].

Significant to this study the results of the surveys authenticate the increase of student’s aptitude and confidence before and after completing the class: *“I feel much more confident undertaking the...design tasks and using the listed design software”* [C10].

It is clear that students enter their first year of study with differing skills sets and expectations, the challenge in setting up any first year curricula lies in attempting to address the diversity of students (Allam, 2009; Brinkworth, McCann, Matthews, & Nordström, 2009). Some of the students identified themselves as ‘beginners’ which indicates that the students differentiated their skill levels from one another: *“it was quite difficult for the beginners to keep up during most classes...it made the classes less enjoyable as I often felt left behind and constantly trying to catch up”* [C17]. Other students claimed they did not learn more than what they started with *“I feel I have not really learnt much new things or important things than the knowledge I already had”* [C19].

5. Discussion

Vis II endeavoured to transition students from the primary analogue or hand drawing techniques, learnt in the previous semester, to amalgamate their skills with digital design by educating the student the fundamentals of hybridised graphic design communication. The hybridisation of media can allow for more innovative forms of visualisation permitting the student to develop their own style or technique, which enhanced their design process and artefact. Hybridising techniques taught were varied by discipline, however the main objective remained concurrent. The introduction of the fundamentals of analogue and digital visualisation techniques was ultimately the scaffolding for independent student exploration of hybridisation possibilities and potentials. Open encouragement for the student to explore and develop their own approach to hybridisation essentially initialises independent learning whilst challenging their analytical aptitude.

Figure 2 reveals that students acknowledged the learning experience in the Vis II class encouraged experimentation with different tools. Students also indicated that the results of their learning from this class informed their process in other classes within their design course. The analogue and the digital portions of the class assisted with the development of their design process.

6. Conclusion

After completing the semester students, emerged with a greater understanding and heightened confidence in the technological portion of each discipline. While the surveys have indicated that a moderate to high degree of students' skill level whereby confidence has significantly increased, several issues remain unresolved and warrant addressing before the commencement of the subsequent iterations. It is apparent that staff/student ratio, time constraints and class structure compromised by the limitations of university facilities are strong factors antagonising the success and satisfaction of students experience in a tertiary environment. Focusing on the improvement of the learning environment will be beneficial to the improved teaching of this class where an ideal environment would be the creation of a hybrid space, studio spaces with computers, allowing for the hybridisation of visualisation methods to be taught together. The results of this research will influence the evolution of the common visualisation course of the design disciplines and have a direct impact on corresponding design units, further enriching the pedagogy of design. As a consequence, future iterations of this unit will take on board a series of recommendations from the student's comments retrieved from the qualitative LEX and customised survey.

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