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Melles, Gavin, [Howard, Zaana](#), & Thompson-Whiteside, Scott (2012) Teaching design thinking : Expanding horizons in design education. *Procedia: Social and Behavioral Sciences*, 31, pp. 162-166.

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<http://dx.doi.org/10.1016/j.sbspro.2011.12.035>

Teaching Design Thinking: Expanding Horizons in Design Education

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Abstract

The term design thinking is increasingly used to mean the human-centred ‘open’ problem solving process decision makers use to solve real world ‘wicked’ problems. Claims have been made that design thinking in this sense can radically improve not only product innovation but also decision making in other fields, such as management, public health, and organizations in general. Many design and management schools in North America and elsewhere now include course offerings in design thinking though little is known about how successful these are with students. The lack of such courses in Australia presents an opportunity to design a curriculum for design thinking, employing design thinking’s own practices. This paper describes the development of a design thinking course at Swinburne University taught simultaneously in Melbourne and Hong Kong. Following a pilot of the course in Semester 1, 2011 with 90 enrolled students across the two countries, we describe lessons learned to date and future course considerations as it is being taught in its second iteration..

Keywords: design thinking; design education ; transnational education;

1. Definitions & Practices

The term design thinking is used to refer to the study of the practices of working designers (e.g., Cross 2006; Dym et al. 2006; Lawson 2006), and the application of human-centred ‘open’ problem solving processes to real world ‘wicked’ problems in other areas such as business, management and organisations (Rittel & Weber 1973). Romme (2003), for example, specifically claims that: ‘design research develops knowledge in the service of action; the nature of design thinking is thus normative and synthetic in nature—directed toward desired situations and systems and toward synthesis in the form of actual actions’. Buchanan (1992) suggests the significance of the familiar concept to design is that ‘Design problems are ‘indeterminate’ and ‘wicked’ because design has no special subject matter of its own apart from what a designer conceives it to be’ (p. 16). As noted below, a number of design schools have developed courses precisely to focus on design thinking as the approach to product innovation. The approach therefore constitutes an expanding of the horizons of design for design students.

In addition to describing an approach to product innovation, design thinking may, it is claimed, improve decision making practices in other fields, such as health care systems and services (Duncan & Breslin 2009), library system design (Bell 2008), strategy and management (Lester, Priore & Malek 1998; Dunne & Martin 2006), operations and organizational studies (Romme 2003), and more recently in projects where social innovation and social impact matters (Brown & Wyatt 2010). In these other fields, the employment of designerly strategies, e.g. designing with and for stakeholders, through the decision making process creates a better environment, it is argued, for quality outcomes. This transfer to other applied domains effectively means moving design thinking from product innovation to other fields and applications. In relation to curriculum innovation, some institutions have taken on board this broader mandate for design thinking and courses can be found in business and management schools where the focus is introducing non-design students to the capacity of design thinking to invigorate decision making in these other areas. The alternative approach is for design schools to develop students’ thinking beyond a designed product outcome and to focus on business modeling, systems and services. Students apply their innate design thinking skills to ‘non-design’ problems.

Stressing the relevance of wicked problem solving for business and management, Dunne & Martin (2006), for example, contrast typical problem solving in organizations with design thinking as follows, ‘Whereas managers avoid working on wicked problems because their source of status comes from elsewhere, designers embrace these

problems as a challenge' (p.522). The difference in epistemological foundations between management and design is such that their approach to problem solving is practically very different (Rylander, 2009). This characterization of management and design is idealistic but offers an avenue for design thinking to spread its wings, so to speak. Holloway (2009), for example, describes and exemplifies the design thinking practices of SAP Design Services Team (DST) created by the Hassno Plattner Institute, '...design thinking looks beyond the immediate boundaries of the problem to ensure the right question is being addressed. Using interdisciplinary teams, design thinking incorporates diversity and leverages different paradigms and tool sets from each profession to analyze, synthesize, and generate insights and new ideas. The interdisciplinary nature of design thinking also ensures that innovations are naturally balanced between the technical, business, and human dimensions (p.51).

Such practices have now become common place for leading consultancies, such as Second Road (<http://www.secondroad.com.au/>) in Australia, and Humantific (<http://www.humantific.com/>) in the US, specializing in design thinking and related practices for the purpose of organizational (re)design. Strategies have also been developed in other institutions teaching design thinking, such as tools developed for K-12 education (see [idesignthinking http://www.idesignthinking.com/](http://www.idesignthinking.com/)). Together with design thinking for social innovation, the scope for the practical application of design thinking is enormous and continues to grow. For curriculum design, some measure of this breadth should be included so that students are exposed to these cases and able to trial such approaches also.

2. Teaching Design Thinking: Global Precedents

Clearly if the practice of bringing design thinking to new fields is more than the latest fad it could represent something of a gold mine for curriculum renewal in design schools. Indeed the recent history of design thinking in North America includes course offerings at the Rotman School of Management, Toronto (Canada) and Stanford University's D-School, and St Gallens Management School. Judging a review of existing courses, as things currently stand there have been four broad approaches – design thinking as course logic, e.g. Masters in design thinking; within a course as a discrete program unit; as individual seminars or lectures; or a combination of any of the above as a general philosophy for schools. Before designing the current design thinking undergraduate course (HDC011 at Swinburne University), global precedents of similar programs and courses were reviewed.

In attempting to develop a distinct approach for Swinburne University, a review of five course offerings and their characteristics was conducted to identify common and differentiating features with a view to Swinburne course development. Courses reviewed for curriculum design (see Melles 2010) included: Open University UK: U101 (<http://www3.open.ac.uk/study/undergraduate/course/u101.htm>); University of Minnesota College of Design: DHA 1101W (http://graphic.design.umn.edu/documents/DHA1101W_000.pdf); North Carolina State University: D100/D101 (<http://itunes.apple.com/us/podcast/d100-design-thinking/id289217952>); Simon Fraser University: TECH 124 Design Thinking (<http://www.techone.sfu.ca/documents/doc/22>); HPI: Universitat Potsdam: Design Thinking School (http://www.hpi.uni-potsdam.de/d_school/studium/curriculum.html).

Although there were a number of other possible offerings that could have been reviewed, these five proved sufficient.

With an understanding of the design, cases of application and non-designer understandings of design thinking within programs and courses it was evident this curriculum design itself was a wicked problem which could be addressed in a way reminiscent of research through design (see Wayne 2003; Wiggins & McTighe 2005; Zimmerman, Forlizzi & Evenson, 2007). In examining the course precedents, we noted the significance of readings varies between courses with a majority still employing design-oriented texts. Lectures also tend to focus on design and innovation issues. The degree of project work and industry involvement varies with the level of the course – undergraduate or postgraduate. A common feature in practice and in courses is also the use of visualisation tools and other strategies, including prototyping, familiar to design students. This review of leading edge schools and their programs suggested the need for a mixture of project work and readings in curriculum design. Where possible it was deemed project work in teams should address real world problems. It was the use of focusing on problems on campus locations that proved useful in the course design.

Courses reviewed divided roughly into two kinds: those delivered within design/engineering schools aiming to focus on the distinctive nature of design practice; and those delivered by business/management and other schools or institutions, which aimed to introduce non-designers to the benefits of design practices. Although our enrolment fell into the first category, we aimed to try to introduce students to the broader issues in management and business. This, we believed was a distinctive focus and gap in current offerings which offered both opportunities and challenges. Specifically, we felt that students with design backgrounds would find it difficult to resist transforming the design thinking problem quickly into a conventional design brief for industrial, graphic or product design solutions. This proved partly true in the results of the pilot. ..

3. Course Design & Delivery – Melbourne & Hong Kong

HDC011 Design Thinking is one of four subjects being delivered as part of the Design Management Minor and available as an elective subject to all design students from Industrial, Interior, Communication and Digital Media Design courses. A semester long program was developed for and delivered simultaneously delivered in Melbourne (n=15) and in Hong Kong (n=75) in Semester 1, 2011. The Hong Kong component was delivered by City University of Hong Kong as part of a transnational program whereby students could complete a Swinburne Bachelor's degree. Transnational or cross-border education is highly regulated and requires that curriculum, student outcomes and assessment meet comparable standards to those in Australia.

As part of quality assurance, a moderation meeting was held in early August to discuss the teaching, student outcomes and results, and experiences in both countries with a view to develop the course further for Semester 2, 2011. An integrated approach was taken to the different components of the curriculum, i.e. the different course elements (described below) aimed to reinforce each other and lead to students gaining both intellectual and practical experience with the area. Assessment processes require groups of students to work on projects which require combined human-oriented, service-scoped designerly outcomes. Projects need to be undertaken in on-campus locations, e.g., library, health service, bookshop, where a combination of human, space and product innovations is required. Milestones throughout the semester stage the process and allow for feedback opportunities.

The teaching component comprised of a one hour lecture and a two hour tutorial each week. These aimed to help students understand the key concepts of design thinking from a set of core literature. The twelve lectures, delivered primarily by the author, addressed topics in the readings. Two lectures were delivered by outside experts with experience and interests in this area – one a PhD student of the author with experience in working for a design thinking consultancy on projects involving organizational change. A second contact of the author was recruited from the National Australia Bank (NAB), who discussed implementing an organization wide application of design thinking into service design. These guest lectures from practitioners in the field proved valuable, providing students with the view of how this is being practically applied in industry.

Complementing the readings and the lectures were multimedia presentations addressing design thinking and its implementation. These presentations, available through online video channels such as YouTube, included Tim Brown (IDEO), Roger Martin (Rottman School of Management), and Shelley Evenson (Carnegie Mellon).

We decided to use the D.School Bootcamp Manual (<http://dschool.typepad.com/news/2010/12/2010-bootcamp-bootleg-is-here.html>) as it provided an accessible (and abridged) introduction to the Design Thinking Mindset as a process of Empathy-Define-Ideate-Prototype-Test. The manual also introduced students to methods relevant to each stage. Other resources were used to supplement this including tutorial classes introducing the IDEO Methods Cards – both in deck format and the mobile application. Several decks were purchased and made available in the library for students to increase the awareness and accessibility of possible methods. Since the aim of the course is a twelve week introduction to design thinking it is not feasible to incorporate a fully implemented project. Instead it was hoped students would be exposed to a plethora of examples, theoretical and practical, and employ some of these in their project work, which they did.

Students were required to complete core readings and respond to them in their blog, answering key questions in regard to the article content and the application of design thinking in different areas. The Reader Guide Questions

were: What problem does this text address?; How is design thinking defined in this text?; How is it applied – in what concrete situations?; What questions for you remain unanswered?; How will you integrate this into your literature review and project report? As students developed their projects, they were also asked to write a weekly blog post (in addition to the reading entry) on the progress of their project.

Following on from these readings, students were individually required to write a 1500 word design thinking literature review that included all of the core readings as well as seeking out five additional references to include in relation to their group project.

As discussed previously, students were required to work in groups on a semester long project to resolve a problem on campus that related to a service or system. They were required to use and move through the five stage design thinking process of Empathy, Define, Ideate, Prototype, and Test (Stanford D.School, 2010) in an attempt to understand and design a resolution to the identified problem. Students would meet and work together out of class time for up to three hours per week on data gathering and analysis. In the image above a team is working on the redesign of a combined student services café and bookshop as a response to a poorly designed campus environment.

The last two lecture spaces in the program were used to practice and deliver project presentations, which had to follow the Pecha Kucha format (see <http://www.pecha-kucha.org>) of 20 slides x 20 seconds. In Hong Kong many students chose to develop a video presentation to identify the problems and the solutions that they had developed. All course materials were available over the university Blackboard™ (version 9.1) Learning Management System. The reflective learning blog, design thinking literature review and group project proposal were to be delivered in week 8. Students who had regularly engaged with the readings by attending the lectures and addressing the reading questions in their blogs were better prepared to deliver this than those who did not regularly do so.

An example of what could be achieved by students was uploaded to the ISSUU site (http://issuu.com/kane_rowlingson/docs/final_finished_document2). Here the students discovered some of the hidden transitional issues which made interaction between students possible.

4. Discussion

During this first iteration of the course several lessons were learnt. Some of these lessons related to difficulties in teaching a course for the first time and adjusting to the response of students with design backgrounds, encountering design thinking in this format for the first time. The main lesson learnt was that it was difficult albeit not impossible for students to move from a narrow product, space or interface design perspective to one encompassing a broader system and organization sense. There was a tendency for the project problem to quickly be defined as a product or interior design problem as opposed to a broader issue such as poor networking among students. A second ‘intellectual’ problem was that although these were mostly third year students this was the first time they had to read a number of texts critically and write a literature review. Even if their prior curriculum transcript suggested they had read and written papers this was not evident in their submitted papers. The third major problem was the time limitation, which did not allow, given other challenges, for students to fully develop and test proposals. This limitation is inherent in the course however and not easily remedied.

The course is now being delivered for a second time in Melbourne and an evaluation research project in development to assess the student experience. The course will be delivered in a partner institution in Hong Kong again in January 2012 and results from that teaching will inform future developments. Further to the development of this unit in design thinking, the author is also contributing to the development of a Masters program in Design Studies which will include design thinking and strategic thinking as major unit components. This will be delivered to a wide non-design audience from 2012. Additionally, the course HDC011 was developed in line with a two-year, funded EU-ICP Development Grant focusing on design thinking and involving seven institutions in which the author is one of the project leaders and authors (see <http://eciu.web.ua.pt/detail.asp?lg=en&id=16881>). Thus, a visit of one partner from Denmark, resulted in the co-development of a design thinking unit for that Business & Design School. Therefore, the single unit HDC011 in design thinking represents the commencement of a broader commitment to the development and integration of design thinking across a number of initiatives at the university

References

- Bootcamp Bootleg D.School. 2010. Available at <http://dschool.typepad.com/files/bootcampbootleg2010v2slim-1.pdf> . Hassno Platner & Institute of Design at Stanford University.
- Bourdieu, P. 1990, *The logic of practice*. Stanford University Press, Stanford, CA,.
- Brown, T. 2008, 'Design thinking', *Harvard Business Review*, vol. 86, no. 6, pp. 84-92, 141.
- Brown, B.T. & Wyatt, J. 2010, 'Design thinking for social innovation', *Stanford Social Innovation Review*, vol. winter, pp. 30-35.
- Chiasson, P. 2001, *Peirce's pragmatism: the design for thinking*. Rodopi, Amsterdam, Atlanta, GA.
- Cross, N. 2006, *Designerly ways of knowing*, London, Springer.
- Duncan, A.K. & Breslin, M.A. 2009, 'Innovating health care delivery: the design of health services', *Journal of Business Strategy*, vol. 30, no. 2/3, pp. 13-20.
- Dunne, D. & Martin, R. 2006, 'Design thinking and how it will change management education: an interview and discussion', *Academy of Management Learning & Education*, vol. 5, no. 4, pp. 512-523.
- Dym, C., Agogino, A., Eris, O., Frey, D. & Leifer, L. 2006, 'Engineering design thinking, teaching, and learning', *IEEE Engineering Management Review*, vol. 34, no. 1, pp. 65-92.
- Holloway, M. 2009, 'How tangible is your strategy? How design thinking can turn your strategy into reality', *Journal of Business Strategy*, 30(2/3), pp. 50-56.
- Khisty, C. & Arslan, T. 2005, 'Possibilities of steering the transportation planning process in the face of bounded rationality and unbounded uncertainty', *Transportation Research Part C: Emerging Technologies*, vol. 13, no. 2, pp. 77-92.
- Lawson, B. 2005, *How designers think: the design process demystified*, 4th Edition. Architectural Press, Oxford,.
- Martin, R. 2009, *The design of business: why design thinking is the next competitive advantage*. Harvard Business Press, Boston, Massachusetts.
- Melles, G. 2008, 'An enlarged pragmatist inquiry paradigm for methodological pluralism in academic design research', *Artifact*, vol. 2, pp. 3-11.
- Melles, G. 2010, 'Curriculum design thinking: a new name for old ways of thinking and practice?', *Proceedings of the DTRS8 Conference*, UTS Sydney, pp. 299-308.
- 'Problem solving through design', *New Directions for Teaching and Learning*, 2003 (95), pp. 39-44.
- Rittel, H. W. & Webber, M.M. 1973, 'Dilemmas in a general theory of planning', *Policy Sciences*, vol. 4, no. 2, pp. 155-175
- Romme, A.G. 2003, 'Making a difference: organization as design', *Organization Science*, vol. 14, no. 5, pp. 558-573.
- Rylander, A. 2009, 'Design thinking as knowledge work: epistemological foundations and practical implications', *Design Management Journal*, vol. 4, no. 1, pp. 7-19.
- Simon, H.S. 1996, *The Sciences of the Artificial*, Massachusetts, 3rd Edition, MIT Press.
- Spector, T. 2004, 'Pragmatism for architects', *Contemporary Pragmatism*, vol. 1, no. 1, pp. 133-149.
- Wiggins, G.P. & McTighe, J. 2005, *Understanding by design*, 2nd Edition, Alexandria, AScD.
- Zimmerman, J., Forlizzi, J. & Evenson, S. 2007, *Research through design as a method for interaction design research in HCI*, in *Proceedings of the SIGCHI conference on Human factors in computing systems—CHI '07*, pp. 493-502. New York, New York, USA: ACM Press.