Curriculum Design Thinking: A New Name for Old Ways of Thinking and Practice?

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Abstract
The term design thinking has two current meanings—the study of the practices of working designers—the other meaning refers to the human-centred ‘open’ problem solving process decision makers use to solve real world ‘wicked’ problems. Design thinking in this latter sense has increasing purchase outside the design fields per se. 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. Although many remain skeptical of the concept and its broad application, many design and management schools in North America and elsewhere, now include course offerings in design thinking. The lack of such courses in Australia presents an opportunity to design a curriculum for design thinking, employing design thinking’s own practices. Curriculum development is something of a wicked problem in itself, aiming to develop a future course of action based on current precedents and other sources of information, which are then trialed in practice. This paper describes the development of a design thinking unit at Swinburne University through design thinking practice.

1. Introduction
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, to the application of this human-centred ‘open’ problem solving process to real world ‘wicked’ problems in other areas (Rittel & Weber 1973). This transfer from design to non-design domains is possible, it is argued, as design possesses a distinct logic of practice (see Bourdieu 1990) capable of application to a range of real world problems. Thus, Buchanan (1992) suggests that design thinking, as consistent with Dewey’s pragmatism, has logic (technologia) with potential applications to different fields. Common denominators for definitions of design thinking are the pragmatist notion of experiential knowledge, abduction, and wicked problem solving. What these concepts mean is the first topic of discussion here.

2. Abductive, wicked and synthetic?
That design thinking as the logic for ill-structured problem solving is fundamentally pragmatic has also been noted by several scholars (see Melles 2008; Ockham 2000). Romme (2003), for example, specifically claims that:

Design is based on pragmatism as the underlying epistemological notion. That is, 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. The pragmatism of design research can be expressed in more detail by exploring the normative ideas and values characterizing good practice in professions such as architecture, organization development, and community development (p.562).
Design thinking often refers to the pragmatist notion of experiential knowledge making (see Chiasson 2001). Following James and Dewey (see Goodman 2002), this implies that knowledge making, emerges out of embodied practice and experience; this is also true for aesthetics (see Spector 2004).

Abductive logic focuses on what Josephson (see Josephson & Josephson 1995) calls ‘inference to the best explanation'; a decision making process common in legal, medical and other reasoning (see Walton 2004).

For design specifically, Bodker and Christiansen (1997) relate abduction and scenarios to design thinking in the following manner, ‘We view design as a process of cooperative abductive thinking in which scenarios crystallize a shared understanding of the product (to be), thus populating the space between theory-driven and situated design’ (p.230). This translation of abductive reasoning into the design domain suggests that (future) concept proposals provide answers to circumstances of design problems as potential futures (see Figure 1 below). In human-centered and participatory design the experiential knowledge making is brought about through collaborative prototyping.

Following Rittel and Weber (1973), 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). While this interpretation has some value, it is misleading in that Rittel and Weber (1973) developed the notion of wicked (indeterminate) problem solving in relation to relatively large scale (urban) planning decisions. The nature of the wickedness had to do with the complexity of the sources and processes involved in making decisions in such a space. It is not the case that all design problems can or should be so characterized, in that in many industrial applications the degree of uncertainty and fuzziness in the designing of a toaster or chair for mass production is not complex in the relevant sense.

The final characteristic often alluded to in relation to design thinking is designerly logic. The idea that design constitutes a different mode of thinking to that of science and the humanities is not new (e.g., Simon 1996; Cross 2006). In relation to this, Charles Owen (2007) suggests that different fields are concerned more or less with both symbolic and real questions and methods and locate themselves along a continuum of analytic—synthetic and symbolic-real concerns (see Figure 2 below). Owen suggests that the combined effect of design thinking and science thinking for problem solving with designerly aims is better than either alone (Owen 2007, p.22).
If design thinking embodies the concepts outlined above, it may provide an answer to the search for a theory and science of design distinct from both empirical science and humanities and arts traditions. 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 delivery (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 broadly social innovation (Brown & Wyatt 2010). In these other fields the employment of designerly strategies, e.g., visualization, co-design, 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 design, students must be exposed to these concepts through readings so that they are able to see the intellectual heritage of the notion design thinking and can begin to see the potential and limitations of such a concept for practical applications.

3. Design thinking as product innovation

Tim Brown (2008) suggests that a shift to designerly thinking in product innovation has come about through designers taking on innovation as upstream innovators with a focus on physical products and systems and services, ‘rather than asking designers to make an already developed idea more attractive to consumers, companies are asking them to create ideas that better meet consumers’ needs and desires’ (p.2). Citing a range of past and present examples, Brown illustrates design thinking as a three stage process with the following diagram (see Figure 3). Effectively then the shift to design thinking in other fields can be seen as a by-product of the expansion of the innovation process to include the ecology or system of the product(s) being imagined.
The essential insight from such work and that of IDEO in general is that product innovation and development should remain a central aim of design thinking. The translation of design thinking into the management domain has also generated descriptions which contrast design thinking with conventional decision making.

4. Management, business applications

Stressing the relevance of wicked problem solving for business and management, Dunne and Martin (2006) contrast typical design thinking 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)’. This characterization of management and design is, of course, idealistic but offers an avenue for design thinking to spread its wings, so to speak. A concrete example of design thinking in practice, however, illustrates the method in action outside of design.

Holloway (2009) describes and exemplifies the design thinking practices of SAP Design Services Team (DST) created by the Hasso Plattner Institute, as follows:

Beginning with a holistic, “360°” understanding of the problem, including customer’s needs (explicit and tactic), the end-user’s environment, social factors, market adjacencies, and emerging trends, etc., 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.52).

One of the key environments for this is the project ‘war room’, which are described as follows:

The design thinking approach also encourages teams to create “project war rooms” and to work visually using pictures, diagrams, sketches, video clips, photographs, and artifacts collected from their research to create immersive work environments that allow the team to gain deeper, more intuitive empathy and understanding of their users’ needs. Using rapid iterative development cycles, teams build rough, “throw-away” prototypes for validation with end-users and project stakeholders (p.51).

Similar strategies have now become common practice for design thinking 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 organizational (re)design. Such strategies have also developed in other institutions teaching design thinking, such as the tools developed for K-12 education (see idesigntinking http://www.idesigntinking.com/). Thus, together with design thinking for social innovation, the scope for the practical application of design thinking is enormous. For curriculum design, some measure of this breadth should be included in the curriculum design so that students are exposed to these cases and able to trial such approaches also.

5. Design thinking: course 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. And indeed the recent history of design thinking in North America now includes course offerings, at the Rotman School of Management, Toronto (Canada) and Stanford University’s D-School. As things currently stand there have been three broad approaches—design thinking as program units, design thinking as course logic, e.g., Masters in design thinking, and design thinking as individual seminar or lectures, and design thinking (in combination with any of the above) as a general philosophy for schools. Five examples follow

Open University UK: U101
http://www3.open.ac.uk/study/undergraduate/course/u101.htm

From the School of Design, U101 is an online undergraduate (first year) course available to students in a range of disciplines and on completion can count towards degrees outside design, for which it is a foundation course. According to website ‘The course is presented in four blocks corresponding to the different levels at which design thinking can have an impact on our lives: at the individual, group, social and global level... Central to the course is an online virtual design studio, where you will upload your practical work—using images you have created—to discuss with other students and your tutor’. There are five tutor marked assignments and a design portfolio and a 1500-word essay make up the end-of-course assessment.

University of Minnesota College of Design: DHA 1101W
http://graphic.design.umn.edu/documents/DHA1101W_000.pdf

Introduction to design thinking is a semester long first year course for design majors and other students. According to the syllabus, ‘This course is an introduction to the theories and processes that underpin design thinking and practice. Students investigate the interactions between humans and their natural, social, and designed environments, where purposeful de-
sign helps determine the quality of those interactions, the practice of the design professions, and the power of design in culture. Assessment consists of three written papers, three exams; two creativity projects and two creativity assignments. A mixture of weekly book chapter and journal article readings create a reading thread through the semester. One hour lectures refer to the readings and the tutorials later in the week are taken up largely with assignment and project work development and critique.

**North Carolina State University: D100/D101**

http://itunes.apple.com/us/podcast/d100-design-thinking/id289217952

One hour lectures focus particularly though not exclusively on design thinking in architecture and other design disciplines. The course has an art; architecture and design focus as opposed to a business. According to website, 'Design topics including: processes, methods, philosophies, theories and special topics such as making choices in a consensus driven organization or in a collaborative venture. A companion course to the second semester discipline specific Fundamental Studios'. D101 meanwhile 'evolves from the direct application of design thinking principles in the various design disciplines. It is intended to give a variety of perspectives from which to proceed into the design process. Students are expected to write reflections on the material presented in class, to develop a personal philosophy of design statement and to conclude with the construction of a design thought model that represents each student’s thinking process. A review of relevant films and invited lecturers from the design disciplines'.

**Simon Fraser University: TECH 124 Design Thinking**

http://www.techone.sfu.ca/documents/doc/22

Within the Faculty of Communication, Art and Technology (FCAT), TECH 124 is a first year semester long course with readings and project work (40%), and individual design journal (15%), and mid term exams on readings and lectures and workshop style tutorials. The course is aimed at design students and has a design focus, as evidenced by set texts—Lawson, B. (2005), How Designers Think; Norman, D. (1988), The Design of Everyday Things. According to the website, 'Investigates the role that design and the designer play in the world around us, and explores how design facilitates our understanding of our environment and facilitates communication with others. It examines the importance of precedent in design and how examples, models, patterns or standards reflect learning and critical thinking. Throughout the course students will, individually and in teams, use design questioning processes as tools to develop their critical thinking skills and to explore the role that design plays in their lives and the daily functioning of their communities'.

**HPI: Universitat Potsdam: Design Thinking School**

http://www.hpi.uni-potsdam.de/d_school/studium/curriculum.html

Two twelve week modules are offered at basic and advanced levels. The six week project work in the basic course is developed together with industry partners, as is the advanced track. Attendance is two full days per week. A presentation documenting students projects from 2010 gives a picture of the level of work (http://www.hpi.uni-potsdam.de/fileadmin/hpi/d-school/material/Programm_2010.pdf. This is a course for postgraduates with strong design backgrounds aiming to develop particular skills, with each team of four to five from a range of faculties working with industry partners.
Review Summary

Courses to date enrol primarily design students and may form part of a broader base of foundation studies for such students. Enrolment is allowed by non-designers and encouraged at the postgraduate level. 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 suggests the need for a mixture of project work and readings in curriculum design. Where possible project work in teams should address real world problems; it was particularly the opportunity to use on-campus locations that seems useful in course design.

6. Designing a course for delivery in 2011

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. Together with an understanding of design, cases of its application and non-designer understandings of design thinking provided information for an approach to this curriculum design as itself 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).

As a result of reviewing these precedents and considering the characteristics and needs for design thinking as reflected in the literature, a semester long program to be delivered in semester 1, 2011 was developed. A project-oriented semester long course (12 weeks) with relevant readings and mid-point assessment of projects, outcomes and aims to expand the designerly basis of undergraduate designers (http://courses.swinburne.edu.au/subjects/Design-Thinking-HDC011/local). The course has the following aims and objectives:

The unit aims to introduce students to concepts and methods associated with design thinking in a range of design and non-design contacts. This unit will explore key concepts associated with the practices of design thinking, such as ideation and prototyping, ill-structured problem solving, collaboration/participation and human-centredness. This introductory unit will complement the other issues addressed in the design management minor and concepts and practices in business and management. Students will have the opportunity to develop their design thinking competence through application to real-world projects.

The following outcomes would be developed: applying design thinking strategies and concepts to real-world problems via reports, mini-tests and presentations; developing expertise in the framing and solution of real world problems using design thinking and show in reports, and presentations; developing expertise in the range of tools and methods used to solve such problems and demonstrate this in reports and presentations; communicating design thinking applied to a specific context in the public setting of a presentation. Assessment processes aim to group students to work on projects on campus initially, which will require combined human-oriented, service-scoped designerly outcomes. Milestones through the semester stage the process and feedback possibilities. Projects need to be undertaken by groups of students in on-campus locations, e.g., library, health service, bookshop, where human, space and product innovations are required. Propositions should embrace all issues and follow a process.
7. Discussion

Here it is claimed generally that a focus on applied, albeit wicked problems, requires a general informed eclecticism that is less concerned with abstract theoretical outcomes than practical user-oriented solutions (Rittel & Weber 1973). The development of program offerings includes an intellectual and practical review of ideas and resources in a way reminiscent of research through design. This has been the case with the development of design thinking at Swinburne.

Owen (2007) suggests that a number of questions remain to be answered about teaching design thinking. How long should the program be? Who are the best candidates for the program? What levels of experience and schooling should be required for entrance to the program? What is the ideal mix of design tools and thinking and tools and thinking from other fields to best prepare students for their working environment? What mix of academic and internship experience should be planned?

These questions continue to be relevant for the development and teaching for all programs. They are particularly relevant to designers and design schools embarking on an expansion of their programs in this direction. Answers to these questions will develop as further programs are developed and evaluation of such programs is provided. The pragmatic value of a theory is measured by its results and applications. As further evidence comes in about the scope, application and success of design thinking in other areas, so may we better judge the value of this ‘new deal’.
REFERENCES


Chiasson, P. 2001, Peirce's pragmatism: the design for thinking, Rodopi, Amsterdam, Atlanta, GA.


