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Brisbane Australia

This is the author's version of a work that was submitted/accepted for publication in the following source:

Taboada, Manuela B. & Coombs, Gretchen (2013) Liminal moments : designing, thinking and learning. In Reitan, Janne Beate, Digranes, Ingvild, & Nielsen, Liv Merete (Eds.) *Design Learning for Tomorrow – Design Education from Kindergarten to PhD*, Oslo, Norway.

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Liminal moments: designing, thinking and learning

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Abstract: *This paper provides a contextual reflection for understanding best practice teaching to first year design students. The outcome (job) focussed approach to higher education has led to some unanticipated collateral damage for students, and in the case we discuss, has altered the students' expectations of course delivery with specific implications and challenges for design educators. This tendency in educational delivery systems is further compounded by the distinct characteristics of Generation Y students within a classroom context. It is our belief that foundational design education must focus more on process than outcomes, and through this research with first year design students we analyse and raise questions relative to the curriculum for a Design and Creative Thinking course—in which students not only benefit from learning the theories and processes of design thinking, conceptualisation and creativity, but also are encouraged to see it as an essential tool for their education and development as designers. This study considers the challenges within a design environment; specifically, we address the need for process based learning in contrast to the outcome-focused approach taken by most students. The authors base their reflections on teaching design students at a university in Queensland, Australia.*

Keywords: *Design education, design thinking, creativity, threshold concepts*

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Introduction

The current context of university teaching, as described by Biggs and Tang (2007) and Friedman (2003), focuses on the teaching of the professions to very large groups of students that are not necessarily interested in the “higher” end of the higher education system. This fact alone has a strong impact on all disciplines and an interesting effect on teaching design in a university setting.

Friedman (2003), briefly describes the trajectory of design education from the apprentice artisan craft traditions, through professional education and into universities. He highlights the need to understand design as a planning process that involves a multitude of skills always directly related to the production of artefacts. He states that “artefacts are in fact the implementation of a design solution”, and implies that the act of designing starts way before the production of the artefact. Similarly, Buchanan (1998) describes two stages on the evolution of design education and how theory relates to practice in each of them. In 1998 Buchanan envisioned a “third era” of design education as he forecast schools that would be informing the practice through the new knowledge created in their design studios and research efforts. In a setting where theory goes beyond practice to develop solutions for problems yet to be perceived by the industry, instead of following trends, according to his vision, design students would determine and create future trends. We agree with Clark (2003) who suggests that there is “opportunity for design to define itself as a field with its own knowledge/s that facilitate, not only thinking about design and through design, but of design as a way of knowing, thinking and doing”, and with Lloyd (2012) that role of designers is changing into becoming more focused on social engagement and on the process of designing rather than on problem-solving outcomes.

The purpose of this paper is to reflect upon the introduction of a new first semester unit on design thinking to the Interactive and Visual Design program at Queensland University of Technology (QUT), and to raise questions on how to optimise learning in units that deal with disciplinary threshold concepts (Meyer and Land 2003) in design. We describe and analyse the course environment and some current trends in design education, and compare these to the achieved outcomes of the unit through a general student perception survey and in class observations.

This is a position paper that results from the realisation of a problem that needs to be addressed. While it does not aim to offer any final solutions or recommendations, it aims to help design educators reflect upon what could be the real threshold concepts (learning “portals”) students need to get through during their design course to learn how to **be a designer**, as opposed to how to **do design**. It is our hope that the results of this investigation can inform design educators about these concepts and about some of the challenges of teaching students solely focussed on the outcomes of design instead of the processes of learning through design.

Teaching and learning design in a higher education context

Teaching Design

In order to set the context of this study it is useful to look into what is the current environment around university teaching (and learning) in general, and around design

education specifically. Tony Fry (2003) claims that currently the essential thinking activity in university setting has been “forgotten”, and that as a consequence,

the abilities of a self to comprehend its (fractured) being, the (difference of the) being of others and the being of the worlds of dwelling constantly diminishes. In contrast, the ability to operationally function in the maintenance and extension of projected, and frequently incommensurate, worlds increases.

When Biggs and Tang (2007) describe shifts in university settings, they mention the change in the type of students that search for a higher education degree, with special emphasis on students who now come from a broad range of backgrounds and that in their majority are not necessarily “used to” the traditional academic ways of learning; their main objective at university is to acquire the necessary skills and knowledge that will guarantee them a good job. In other words, they are not used to and some times not interested in thinking about or reflecting upon their practices. They want to learn to “do”, instead of learning to “be”. This tendency might be more prevalent within the creative industries where there is increased emphasis placed on finding a measurable outcome for creative degrees.

In addition, Smith, Hedley and Molloy (2009) observe that most students’ lives are “often fractured between work, family commitments, personal issues and study”, and that this context influences and contributes to the way they learn. The situation is no different with the contemporary design students. Both Biggs and Tang (2007) and Smith, Hedley and Molloy (2009) suggest that models of teaching (and teaching design, specifically) should evolve in order to accommodate the new needs of the students. Biggs and Tang (2007) emphasize aligned teaching as a way to help most students to engage with learning on a “higher level”. Smith, Hedley and Molloy (2009) propose a model of delivery that is focused on problem-solving activities strongly rooted on experimentation and theory. Following this thought Sharma (2011) observes a movement towards cohort-based learning where smaller groups of students engage with academics in more informed discussions based on already available, open-source online material. He believes the movement in this direction has already started and the general low lecture attendance rates are a good sign of this change. Another sign is the frequent sharing among students of extra material available online that is related to course content, and that students subsequently engage in discussion via online social networks.

The new, contemporary design practice has a strong focus on design thinking as its main product, rather than any specific media or product type as it once was. With the evolution of technology the production of design artefacts has become easier and cheaper, and most of the time the designers themselves have full control over the whole process—from creation to production and marketing. If we think about the print industry as an example, in the beginning the main concern of the “designer”, or “typographer” was to set the lines of text properly so that the newspaper page could be read easily and with a minimum number of mistakes. This process involved a couple of people in different roles, large-scale machinery, and toxic (and non-washable!) ink. The text was written by the copywriter, page laid out by the type-setter, on metal types and wood, which was put into the printing machine and “stamped” onto pages of paper as many times as copies were needed: then to the next page and to mounting the newspaper, packing and delivering it to houses and / or points of sales. Neither the copywriter nor the typesetter knew exactly how their pages were going to look until the first one was printed. The design was defined by the production process and

existed for the purpose of making it work properly, neatly, and maybe make pages look a bit nicer to read. The process went through many hands, and the focus was primarily on producing the artefact.

Today, in contrast, the other side of this industry is that the writer sets his own text on a computer, most of the time seeing exactly how it will look if printed. Much written media is consumed in its original digital form: the copywriter sends their article to the newspaper's online system that will "digest" it according to the styles defined by the designer (who based it on theories of legibility on screen and matched it to the newspaper branding guidelines), and publish it almost immediately. In other desktop publishing situations the graphic designer has full control over the design, photography, illustrations and most of the printing process. If they want, they can work by themselves, from any country in the world without leaving their home offices. With 3D printers becoming more popular, even product designers can develop, prototype and sell their products to be printed in their customer's home.

These shifts in the design process indicate that the differentiation of a design service / consultancy no longer relies on the quality of the graphics, or the aesthetics of the products they create. The main point of difference becomes the thinking that goes behind that solution and how that solution will transform the client's business, life, social interactions and create new cultures (Brown 2009, 2008; Vogel 2010). High level, top edge design companies value and focus on the transformative powers of design through multidisciplinary teams, collaborative work within teams and with stakeholders, and community / social development around their products. Central Design, IDEO, Someone In London, and Futurebrand are just a few examples of these global design companies.

Therefore, the current challenge for the academics in higher education design courses is to find ways to prepare the students for this world of critical, strategic design, that is highly technological but should be focused on human experiences. What are the practical changes that need to be made in our courses to accommodate the changes in the industry, its new demands, and specifically, the changes in the way students learn?

Friedman (2003) advocates the need to think of the design solution as a series of skills, tasks and planning process that comes before the production of the artefact. Design courses should focus on developing design thinking skills rather than focus mainly on production. Buchanan (1998) agrees by stating that the focus on developing skills to solve problems of the present through a stronger flow of communication between industry practitioners and educators is valid, but that this should evolve into a different relationship between theory and practice. He believes that theory should go beyond practice developing idea and solutions for problems yet to be felt by the industry, through studio practice and design research. Tim Brown (2008, 2009) crafts the term "Design Thinking" to represent the strategic role of design in igniting ideas and the identification of issues at very early stages of development of a "solution", as opposed to the common view of design as a "tactic" activity that "builds on what exists and usually moves it (only) one step further. Designers than have their roles shifted from simply solving an aesthetic problem to become the core strategists and thinkers, helping not only to solve, but also to better outline the problems (Brown 2008, 2009; Lockwood 2010).

These arguments easily underpin the idea of aiming for a transformative design education, where the higher levels of reflection and transformation are achieved through the act of learning how to become a designer. This also aligns with QUT

Creative Industry focus on practice-led research where the practice is to inform and generate new knowledge and this new knowledge, in turn, transforms and helps the practice evolve.

As teachers of design we understand that “creative spaces” need to be devised for students so that they exercise their own ideas and design processes. These spaces involve not only physical space and diverse opportunities and freedom to experiment, but also time to think, research and connect ideas, and to engage on rich conversations that allows for multiple perspectives to be explored (Gadamer 1977; Shaw 2002; Polanyi 1967; Rust 2004; Senker 1995). These can help consolidate formal “new knowledge” acquisition, harness and build upon learners’ tacit knowledge (Polanyi 1967; Rust 2004; Senker 1995), and also help new knowledge and innovative ideas to emerge.

Literature shows that creativity is strongly related to trust and diversity (Goldschmidt and Tansa 2005; Myers and Torrance 1967); (Atkinson 2002; Polanyi 1967; Torrance 1967). Trust, however is something that takes time and effort build, and it does not exist if it is not authentic (Cole-Edelstein 2004; Healey 1997)mar(Marzano 2006; Palmer 1997; Polanyi 1967). One cannot be “forced” into trusting someone else. As is well described by Brookfield (1995), it is the very subtle actions of the teacher that will make students feel secure enough to trust, or that can easily undermine any possibility for trust to happen.

On the other hand, Clarke and Clayton (2010) state:

Australian design schools appear to share an assumption that the undergraduate degree is structured around the imperative of educating graduates capable of taking up—or generating—employment in design: that students will have the skills, conceptual reach, entrepreneurial capacity and confidence to make a transition from university design education to paid work in a design related field, or to higher degree research and its implicit professional pathway.

This outcome-focused view of design education although understandably necessary, can undermine or make it harder for students to engage with concepts that are not obviously related to the direct outcomes described by Clarke and Clayton (2010). Therefore, the ultimate transformative experience in design teaching will come from a strong bonding of creative trust between students and tutors, which should provide stronger engagement with more abstract issues and also reinforce and inform connections to the needs of the industry. We believe design thinking combined with process-based learning can help engage students in their self-transformation.

Smith, Hedley and Molloy (2009) suggest a model of learning to the course of Interior Design that builds upon students tacit knowledge of design—the knowledge they already have about the designed objects and environments they interact with. Students develop and improve their own design process through adding and relating knowledge they already have with the knowledge they gradually “acquire” during their university program. The connection between these different instances of knowing, the comparison, usage and adaptation of knowledge to solve design problems is what constitutes their learning, and what will build the scaffolding for the creation of new knowledge. Smith et al.’s (2009) approach “incorporates diversity, exploration, and consolidation, as the student learns about designing by designing and critiquing design from the different perspectives of the three strands”.

This was the sort of approach we incorporated to the Design & Creative Thinking unit recently introduced to the Interactive and Visual Design program at the School of

Design, Creative Industries. The aim of the unit is to offer a foundation in design thinking and introduction to the processes and methods designers employ when working in a contemporary cross-discipline environment. It does so by introducing design history, creativity theory and the evolution of design thinking. The delivery was structured between weekly lectures (1h) and studios (3h). Lectures address social, cultural, economic and technical themes that have continued to shape the design industry and the role of designed objects in society, as well as its practitioners, styles and methodological approaches. Studios consist of problem-based learning activities and group discussions. During studios, apart from creativity and observation and interpretation exercises, students were given a variety of design briefs and had different time frames to work on them. Their solutions were presented during in class critiques. Assessment consisted of two items: (i) a written essay—as one of the unit objectives is to develop academic writing skills—and (ii) a design charrette at the end of semester, where students were given a brief and had 48 hours to develop and present their design proposals.

Learning Design

Our experience teaching first year design students has revealed some challenges. During the course, one of the main issues was to engage students in the course, motivate them to attend lectures and secure their attention and meaningful participation on the practical activities. After the course and through analysing the survey data, we realised that students could not grasp the real purpose of the unit—possibly the cause of our engagement issues. One of the students expressed in the end-of-semester survey, “I feel like hardly any of it [what they learned during semester] is actually relevant to what we should be learning”.

It has been our experience that classroom numbers drop off dramatically after four to five weeks, leaving tutors to reinterpret and deliver lecture material. This practice counters what we hope tutors accomplish in their tutorials, namely, process-based activities that encourage students to problem solve. In addition to this issue is the acute focus that most students give to assessment. While this is an understandable goal of students in a university environment, it seems to be at the expense of learning to work through problems to achieve better outcomes. There’s a reluctance to engage with new and unexpected tasks or processes unless they will be assessed in some manner.

The authors are sympathetic to the challenges university graduates face—decreased employability and pay rates, increased competition for jobs. Nowhere is this more evident in creative fields where there are more graduates than there are jobs (directly related to creative practice degrees). Indeed this reflects a tendency for most creative practitioners as the emphasis on combining ‘the creative’ with ‘industry’ has encouraged students to instrumentalise their creativity at the (often) expense of that very creativity. What might compound this pressure on educators are the characteristics of this generation of students, Generation Y (Gen Y): an age group born into technology, reliant on it in every manner, distracted by it in every context, and who have short attention spans and demand immediate rewards. How Gen Y attributes relate directly to some of these pedagogical challenges is difficult to quantify: the authors express this based on their experience with this age cohort.

For instance, one of the observation tasks the students were given during their studios consisted of sitting outside, by themselves, for twenty minutes to silently

observe what happens around them. Later the students were asked to design a poster addressing their experience. Students were instructed to leave their mobile devices in the classroom. The aims of this exercise were (i) take the students out of their comfort zone of screen-based thinking and research, (ii) to encourage students to develop a different perspective upon a familiar place—once “removed” from it and silent, (iii) to start familiarizing students with open-ended possibilities and uncertainty and (iv) to start developing some critical interpretation and visual translation skills. As a result of this exercise we had students that were extremely excited and produced posters that addressed interesting political, social, ecological and even sometimes humorous issues, such as the strong relationship between coffee and academics. On the other hand, some students didn’t “get” the purpose of the exercise and saw it as a “waste of time”. Some students also didn’t engage with the activity and told us they “decided to go for a walk” instead of sitting in one place, or stayed with a group of friends, rather than by themselves.

We are assuming that the creative process is a complex one, and within the context of design, this process gets compounded with design’s inherent goal of posing solutions through a variety of tangible design outcomes generated through processes of interaction, feedback, prototyping, and ultimately a product (or experience) of some sort. Yet, from our experience teaching Design and Creative Thinking, there appears to be resistance to focus on the process aspect of design. Most students look for quick solutions and don’t engage with the criticality of the design work. Research skills are limited, and there is very little will to do further research into the design problem they are working on. Visual research is mostly digital and they don’t look further than the screen for their sources of inspiration; creativity is limited by what has already been done. We might also speculate that some of this reflects a generational tendency to want things ‘right now’ (the pun on Generation Y - Generation Why-Not-Now?).

It has also been our experience that students in our design course (as opposed to other courses such as architecture) are quite reluctant to critique each other’s work as part of the design process. We might speculate that this may be one, a reaction to critiques where the teacher asserted their power; or, again a generational tendency to get affirmations and recognition for just showing up. While scant literature may support these assertions, it has been clear that there is a certain anxiety towards the future that is pervasive in the study body that supports this contention. We also want to make clear there are many students who do engage with process, who focus on the problem-solving—and “problem-finding”—aspect of design and are not wed to immediate outcomes, as can be demonstrated by another student’s statement on the end of the year survey: “The best aspects were that I learnt from the assignments and tasks in the studio. I had a lot of moments where things all came together and related and I understood things”. Further, we have encountered many students who actively seek critique for their design process and are enthusiastic about reworking their designs to better respond to mock briefs.

DESIGN THINKING: A THRESHOLD CONCEPT IN DESIGN LEARNING?

Meyer and Land (2003) define threshold concepts as “portals” of knowledge that the students go through when advancing on their learning. They characterise these units of knowledge as being transformative, irreversible, integrated, troublesome and

bounded. Transformative and irreversible because as students learn the concept their understanding of the discipline, industry or self is transformed and there is no going back to seeing things the way they saw before—an ontological change, ostensibly. Integrated meaning that it pulls together a broad range of knowledge in the discipline and helps make sense of it. Bounded as it helps delimit the boundaries of the discipline; and troublesome because it is not always concepts that are “easy” to understand and make sense of, and it can be often counter-intuitive or seem “illogical” to the students coming from a certain point of view.

One of the aims of adding a unit in first year first semester that deals with issues of creativity and design thinking was to create the opportunity for students to focus on the conceptualisation aspects and thought process behind the design (making) work, helping them access and experiment with diverse conceptualisation, research and prototyping processes as early as possible in the course. This allows them to apply, refine and make sense of these skills throughout the entire course and in different sorts of projects. More importantly we aim to initiate students on the Design Thinking approach, where designers engage not only in finding solutions for a set problem, but in actually scoping the problem itself. In order to achieve this, it has been our practice in this class to provide students with open design briefs that mostly addressed social issues. Students were then asked to think of the problem and how it could be tackled. The focus on making something look good or functional is removed from the initial stages of designing. Actually the act of “making something” is given a lower priority in relation to the act of mapping the environment around the given issues, its stakeholders and social implications. All this helps students to outlining the problem through different perspectives before crafting possible systemic alternatives.

By removing the immediate focus on tangible / aesthetic design outcome from the aims of this unit, and concentrating on the methodologies of design strategy, creativity theories, research methods and prototyping as a development tool we intend to get students to understand the value of spending time on and developing the research and thinking stages of the design process. This, however, adds a level of “troublesomeness” (Perkins 1999) to the unit that we did not foresee. Flagging the idea that Design Thinking characterises as a threshold concept in design education.

In a preliminary analysis, Design Thinking as a concept in itself fits within all five attributes of threshold concepts described by Meyer and Land (2003). There is no question that once you understand the meaning of Design Thinking it completely changes the way you see your role as a designer, the design activity and its outcomes, and after you cross this “portal” it is very hard to go back to the previous perspective of what design might constitute. This therefore characterises Design Thinking as a “transformative” and “irreversible” concept (Meyer and Land 2003). In terms of being a “bounded” and “integrative” concept, Design Thinking does help define the boundaries of what is meaningful design and what is merely “aesthetic” design. More importantly it defines design as a highly human-dependent and interdisciplinary activity—as opposed to the current technocentric view that good design (specially graphic design) can be made by one single person (a competent trained designer, preferably) sitting behind a computer screen. Design Thinking also allows students to realise the connections between the concepts they are learning in other units and how they integrate these concepts into a holistic, critical and meaningful pedagogical process.

However, what interests us most and came to our utmost attention was that Design Thinking actually demonstrated to be a “troublesome” concept (Meyer and Land 2003; Perkins 1999) for student learning. It was noted that the concept of design thinking in

fact contradicts students expectations that design is about “making things” and using technology to generate the desired outcomes. Most of the students were surprised—and somewhat disappointed—to sit on a class where they were taught about the thoughts behind design and sometimes asked to do nothing but observe a certain situation and think about the constraints and opportunities that could emerge from it. This sense of discomfort of the students is demonstrated by their comments on the end of semester survey. Some of these comments describe feelings of time being wasted and information not being relevant “to what we should be learning”.

Therefore, our main question is: What can we to do and what should we change in the way the unit is delivered and assessed in order to take students through the “Design Thinking Portal” in a more subtle, confident and conscious way?

Action Plan

Considering the contextual issues and the raised questions we decided to review the curriculum of this unit. To put in practice what we have been praying, we decided to use a design thinking approach to the task. We believe that design thinking can add some dimensions to curriculum design practices—which is already a genuine human-centred design process. However, what is different about our approach is that instead of focusing only on the usual teaching and learning aspects of the unit, we want to consider other broader aspects such as student lifestyle, teachers profiles, general expectations from students, teachers, the department to which the unit belongs, the university as a whole and more importantly the role of this unit in helping students become designers and thinkers that will make a difference in the future of the industry.

The first step of this process was to map the environment around the unit (Figure 1), determine the main issues (constraints) we want to address and the outcomes we want to generate—these are more than the learning outcomes of the unit, they represent what we want to achieve with and through this unit by the end of the semester in general terms.

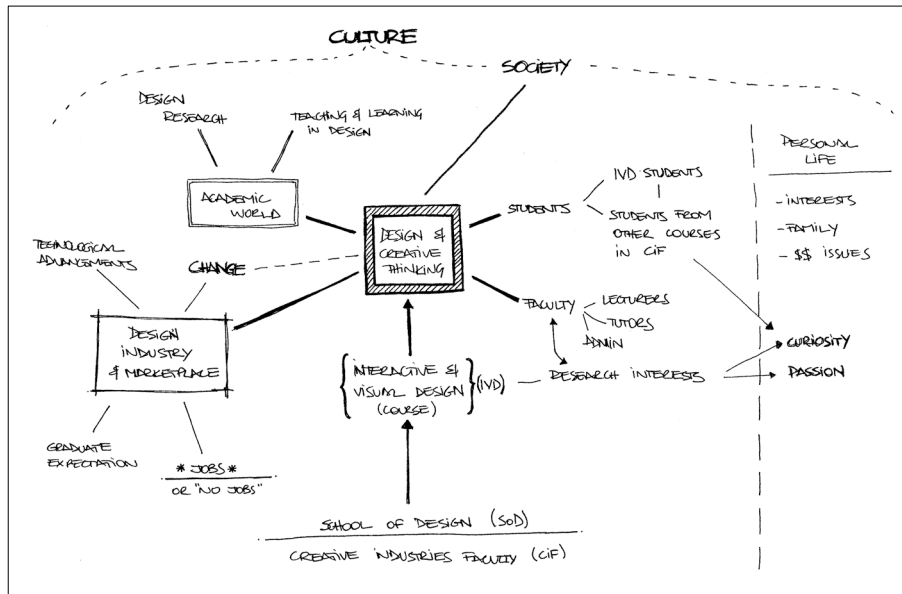


Figure 1 – Design & Creative Thinking environmental map

We chose to address two main topics in the first iteration of change:

ISSUE 1: DESIGN THINKING = A TROUBLESOME PORTAL

Design thinking was identified as a threshold concept which offers some contradictory troublesome knowledge that is mainly caused by the mismatch between students expectations of what they “should be learning” in such a unit, and what is actually delivered. In order to tackle that, we feel we need to address the differences between learning to do design and learning to be a designer, an epistemological obstacle between the roles making and being, acquiring and becoming, which determines how transformative the journey through this unit will be for the student.

Therefore, what we want to achieve by addressing this issue is the creation of a “smoother passage”, a conscious crossing of this conceptual portal, where students can identify and reflect upon the liminal moments of learning, as they know what to expect and understand the transformation they will go through.

The plan is to make the focus on process explicit from the beginning by clearly stating it and by embedding it into the first studio activities so that students can discover it by themselves.

ISSUE 2: WEAK ENGAGEMENT WITH THE NEW KNOWLEDGE AND ACTIVITIES

As part of the process of becoming, or as a matter of fact, for the “transformation” to happen and the crossing to occur students should engage with the designed learning activities. As described on the previous sessions of this paper, current Gen-y students have diverse modes of learning, a busy lifestyle and an urge to get things done quickly. They are also described as performing better when challenged and left alone to complete a certain task. We want our activities to follow and tap into that potential, offering guidance as an exciting road of “discovery”—almost disguised as game tokens that they will “find by themselves”. This implies in changes in modes of delivery and assessment activities.

As a consequence, the plan we outlined for the next iteration of the unit is based on one line of thought: give voice and ownership of the unit to the students without losing control of its content and learning objectives. This sounds obvious but is not easy to implement. We will work in two levels: one that will help students think about the purpose of the unit on a high level; and another one that will engage students on developing their own briefs and designing some of the assessment criteria.

More specifically, to tackle issue 1, we intend to survey the students at the beginning of the semester and ask them what they think the purpose of the unit is. The answers will be shared in class and together we will outline and explain how each activity will lead and prepare them to achieve that purpose. This will be approached the first design brief they have to think about. The collective design will be implemented through semester. At the end of the semester students will be asked again what they thought the purpose of the unit was, if they think they had achieved it, and how. Comparison of the two answers will help us have a better idea of how students expectations change during semester and which activities give them a sense of achievement of their goals, which activities clearly relate to the “passage”, to the understanding of the threshold concept.

We will address issue two by involving students in designing their own assessment criteria. One of the assessment items in this unit is related to academic research and writing skills. It is our intention to make this more aligned to industry standards of writing not losing focus on the academic rules. So students will be pointed to and search for examples of outstanding practice in industry and academic writing in the field of design thinking, critical design and creativity. Together we will deconstruct these examples and they will be asked what elements they think make those pieces excellent. From the results achieved with this, we will design their assessment item (around industry and academic writing skills and styles) and criteria.

This way students will be defining parts of the delivery mode and activities of the unit, as well as the parameters of assignment. We believe that by giving more ownership of the process to the students we might achieve better results in terms of engagement and quality of assessment.

We understand however that giving that much power to the student cohort could have negative implications on the unit. For instance, students might read that the coordinator and teachers are not sure what to do about the unit; they might feel insecure about the quality of their learning if so much is being defined by them, who are just entering the university; teachers might feel unsure about the possibility of having to deal with unexpected results from the interaction with students. All this, however are issues that the process of Design Thinking brings, and it needs to be based on trust on the process and on the creative and tacit knowledge of the stakeholders (students and teachers in this case).

In order to balance the strong student input in the unit, similar activities will be undertaken with industry stakeholders and other faculty members. They will be asked what they think should be the purpose of a unit such as this and also to engage on some deconstruction of content of some renowned design publications. As such we are able to compare the perspectives of students with those of industry and faculty, and to balance these as we outline and apply new approaches to delivery, activities and assessment.

Conclusion

Course curriculum can be seen as a sequence of portals that students go through during their journey of learning and discovery. One of the challenges of doing this is that this should not be limited to change of curriculum on isolated units, rather there is a need to identify and map the threshold concepts that students should go through at a course level and apply the changes consistently.

Buchanan (1998), Fry (2003) and Palmer (1997) analyse teaching from a philosophical perspective and advocate that teaching can be a way of changing paradigms and shift ontologies, and question the paradigmatic assumptions (Brookfield 1995) that surround their teaching and their practice. Buchanan (1998) states, "in the very process of teaching students how to design, the design educator is also investigating the nature of design, seeking to better understand its methods and principles". This is in line with the design thinking approach and the cycles of prototyping iteration and improvement through reflection on the process.

This paper is the result of the realisation of design thinking as a threshold concept in design education and on its role as transformative—though contradictory—notation. Using a design thinking approach to re-design the curriculum for this specific unit is an attempt to facilitate change from bottom-up by altering the way first-years engage with the design activity from the start, so their approach at the end of the course is more holistic, critical and media independent, and they pass through conscious transformations to **become** designers and critical-thinkers.

We agree with Buchanan (1998) when he suggests that "we must be alert to new developments and prepare our students for a changing world – not only in technology but in the needs and expectations of the human beings whom we ultimately must serve". If we teach what we love (Palmer 1997) and teach to change the world (Brookfield 1995), we need to enable our students to envision the future of a viable world (Fry 2003), and to empower them with techniques, skills and wisdom to design and build this world.

References

- Atkinson, Dennis. 2002. *Art in Education: Identity and Practice*. Edited by Liora Bresler, *Landscapes: The Arts, Aesthetics and Education*. London: Kluwer Academic Publishers.
- Biggs, John, and Catherine Tang. 2007. *Teaching for Quality Learning at University*. 3rd ed. Berkshire: Open University Press - McGraw-Hill
- Brookfield, Stephen D. 1995. "What it means to be a critically reflective teacher." In *Becoming a Critically Reflective Teacher*, 1-27. San Francisco: Jossey-Bass Publishers.
- Brown, Tim. 2008. Design Thinking. *Harvard Business Review*, June 2008, 10.
- . 2009. *Change by design: How design thinking transforms organisations and inspires innovation*. NY: Harper Collins.
- Buchanan, Richard. 1998. "Education and Professional Practice in Design." *Design Issues* no. 14 (2):63-66.
- Clark, Hazel. 2003. "How, what and who should we teach?" *Design Philosophy Papers* (5).
- Clarke, Karina, and Jacqueline Clayton. 2010. Can design students change the world? A study of final year project selection and the future design practices of graduating designers. Paper read at CONNECTED 2010 – 2ND INTERNATIONAL CONFERENCE ON DESIGN EDUCATION, at Sydney.
- Cole-Edelstein, L. 2004. "Consult, deliberate or empower?" *Water - Journal of the Australian Water Association* no. 31 (8):3.
- Friedman, Ken. 2003. "Design Education in the University: A Philosophical & Socio-Economic Inquiry." *Design Philosophy Papers* (5).
- Fry, Tony. 2003. "Dead institution walking: the university crisis, design & remaking." *Design Philosophy Papers* (5).
- Gadamer, Hans-Georg. 1977. *Truth and Method*. Translated by Joel Weinsheimer and Donald G. Marshall. 2nd, revised ed. London: Continuum.
- Goldschmidt, Gabriela, and Dan Talsa. 2005. "How good are good ideas? Correlates of design creativity." *Design Studies* no. 26 (6):593-611.
- Healey, Patsy. 1997. *Collaborative Planning: Shaping Places in Fragmented Societies*. Edited by Yvonne Rydin and Andrew Thornley. 1st ed, *Planning - Environment - Cities*. London: McMillan Press.
- Lockwood, Thomas. 2010. "Foreword." In *Design Thinking: Integrating innovation, customer experience, and brand value*, edited by Thomas Lockwood, vii-xvii. NY: Allworth Press.
- Lloyd, P. (2012). Embedded creativity: teaching design thinking via distance education. *International Journal of Technology and Design Education*.
- Marzano, Giuseppe. 2006. Relevance of power in the collaborative process of destination branding. Paper read at 11th Annual Conference on Graduate Education and Graduate Student Research in Hospitality and Tourism, at Seattle, USA.
- Meyer, Jan, and Ray Land. 2003. Threshold Concepts and Troublesome Knowledge: Linkages to Ways of Thinking and Practising within the Disciplines. In *Enhancing Teaching-Learning Environments in Undergraduate Courses Project*. Edinburgh: School of Education, University of Edinburgh.

- Myers, R.E., and E. Paul Torrance. 1967. "Can teachers encourage creative thinking?" In *Creativity: Its Educational Implications*, edited by John Curtis Gowan, George D Demos and E. Paul Torrance, 158-163. New York: John Wiley & Sons, Inc.
- Palmer, Parker J. 1997. "The Heart of the Teacher: Identity and Integrity in Teaching." *Change: The Magazine of Higher Learning* no. 29 (6):14-21.
- Perkins, David. 1999. "The many faces of constructivism." *Educational Leadership* no. 57 (3):6-11.
- Polanyi, Michael. 1967. *The Tacit Dimension*. London: Routledge.
- Rust, Chris. 2004. "Design enquiry: Tacit knowledge an invention in science." *Design Issues* no. 20 (4):76-85.
- Senker, Jacqueline. 1995. "Tacit knowledge and models of innovation." *Industrial and Corporate Change* no. 4 (2):425-447.
- Sharma, Arun. 2011. "Close the lecture theatres." *The Australian*, 25 May 2011, 34.
- Shaw, Patricia. 2002. *Changing Conversations in Organizations: a Complexity Approach to Change*. London: Routledge.
- Smith, Dianne, Peter Hedley, and Michael Molloy. 2009. "Design learning: a reflective model." *Design Studies* no. 30:13-37.
- Torrance, E. Paul. 1967. "Ten ways of helping young children gifted in creative writing and speech." In *Creativity: Its Educational Implications*, edited by John Curtis Gowan, George D Demos and E. Paul Torrance. New York: John Wiley & Sons, Inc.
- Vogel, Craig M. 2010. "Notes on the evolution of design thinking: a work in progress." In *Design thinking: integrating innovation, customer experience, and brand value*, edited by Thomas Lockwood, 3-14. NY: Allworth Press.