

THRESHOLD CONCEPTS IN PROPERTY EDUCATION: A CASE STUDY

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ABSTRACT

First year Property Economics students enrolled in the Bachelor of Urban Development at QUT are required to undertake a number of compulsory subjects, alongside students undertaking studies in other disciplines. One such common unit is 'Stewardship of Land', an interdisciplinary unit that introduces students to the characteristics of land and land tenure with a focus on land use and property rights. It covers a range of issues including: native title, land contamination, heritage values, alternative uses, the property development process, impact of environmental and social factors, and the management of land, both urban and regional. Teaching such a diverse content to a diverse audience has in previous years proved difficult, from the perspectives of relevance, engagement and content overload.

In 2011 a project was undertaken to redevelop this unit to reflect 'threshold concepts', concepts that are "transformative, probably irreversible, integrative, often troublesome and probably bounded" (Meyer & Land, 2003). This project involved the development of a new set of underlying concepts students should draw from the unit, application of these to the unit curriculum, and a survey of the student response to these changes.

This paper reports on the threshold concepts developed for this unit, the changes this made to the unit curriculum, and a preliminary report on survey responses. Recommendations for other educators seeking to incorporate threshold concepts into their curricula are provided.

INTRODUCTION

Curriculum design is an important aspect of any teaching, and particularly important in higher education. Exactly what curriculum in higher education means is not always clear, nor universally agreed (Ratcliff, 1997). Some feel that a unit outline essentially delineates a curriculum, but this certainly is not the case (Fraser & Bosanquet, 2006). One of the outcomes of this study has been a recommended change to the outline for Stewardship of Land, a first year first semester unit taken by all urban development students, including property economics majors. Whilst unit outlines are important, curriculum is more than an outline and can be construed as "...The structure and content of a unit...The structure and content of a programme of study...The students' experience of learning...[or a]...dynamic and interactive process of teaching and learning." (Fraser & Bosanquet, 2006). Other authors have identified an emerging curriculum in higher education that revolves around knowledge, action and self (Barnett, Parry, & Coate, 2001). An attempt has been made in reviewing Stewardship of Land to incorporate all these perceptions of curriculum. One of the vehicles in the redevelopment of this curriculum has been threshold concepts.

Threshold Concepts

Threshold concepts are characterised as ideas within a discipline that open doorways into new and more complete understanding. Threshold concepts have been defined as concepts that are "transformative, probably irreversible, integrative, often troublesome and probably bounded" (Meyer & Land, 2003). Since this original paper, the literature has exploded with research into threshold concepts appearing in a wide range of fields. Whole books have been devoted to the topic, such as *Overcoming Barriers To Student Understanding : Threshold Concepts and Troublesome Knowledge* (Meyer & Land, 2006), *Threshold Concepts within the Disciplines* (Land, Meyer, & Smith, 2008) and *Threshold Concepts and Transformational Learning* (Meyer, Land, & Baillie, 2010). A number of international conferences have been held and numerous journal papers have been published. Such concepts have been identified in a wide range of discipline areas, and globally work is ongoing to identify even more.

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Previous experience in Stewardship of Land has been that students often have difficulty with concepts, and particularly with integration of ideas. It seemed apparent that likely there were threshold concepts that only some students were understanding, and which the teachers were only subconsciously aware of. An exploration of the literature indicated that there are several considerations when identifying and applying threshold concepts in a higher education context. These limitations include the limits of constructivism, the need for a broad base of knowledge, and the characterisation of a built environment interdiscipline (Chynoweth, 2009) to ensure that discipline based threshold concepts are being framed correctly.

Much of the discussion above is based around a constructivist epistemology. Such an approach positions the learner as an information constructor, a person who actively constructs or creates their own subjective representations of objective reality. New information is linked to prior knowledge, thus mental representations are subjective. Within such a framework, one might expect that students will create their own understandings. And to a large degree they do. But those understandings may be naive, disintegrated, or even misguided (Perkins, 2006). It is for this reason that Mayer (2004) suggests that students need some guidance to come to more complete understanding. One of the reasons students may have trouble developing their own threshold concepts is that they are not practicing professionals or academics in the field. They do not have either breadth or depth of knowledge or experience. This means that there is still a place for lectures and directed content to impart a groundwork of knowledge to the students (Eckerdal et al., 2006) and once that broad grounding is provided, threshold concepts will make more sense. This is particularly so for an interdisciplinary unit such as Stewardship of Land. Threshold concepts can operate at multiple levels, and within a broad, interdisciplinary unit, threshold concepts may exist both at the interdisciplinary as well as disciplinary level (Coward, 2010). One of the challenges of this unit is the diversity of students, perspectives, and backgrounds, as well as the diversity of information being provided. This can be confronting for students, and "...the puzzle often remains as to how to reconcile the different disciplinary facets within the subject without confusing students" (Yang, 2009, p. 597). Appropriate threshold concepts may be that reconciling force.

IDENTIFYING THRESHOLD CONCEPTS

For this project a staff focus group was held that sought information about what the stumbling blocks to student understanding were perceived to be, and what the students needed to be able to conceive, following a similar methodology to Yorke-Barber, Atkinson, Possin, & Woodall (2008). Following preliminary discussions with current staff in the unit a number of candidate threshold concepts were drafted for the teaching staff focus group. This can in itself be a difficult task, and in this instance was possible through experience with the unit and subject area over a number of years. These were presented to five UD staff, including the Course Coordinator (responsible for all units in the Bachelor of UD), the Planning Subject Area Coordinator (SAC), Spatial Science SAC, staff from Construction Management and Property Economics, as well as the two staff from the project team, current unit coordinator and primary lecturer. This group included four staff who had taught directly into the unit, including two coordinators. Just getting this group together was inspiring, because of the collegiate atmosphere it engendered. As an interdisciplinary group they came together to solve a pedagogical and curriculum issue, a far cry from the norm where "...faculty members individually, independently, and often unilaterally design and conduct the learning experiences..." (Ratcliff, 1997, p. 97). These candidate concepts were discussed and it was felt that these encapsulated the high-level focus of this first year introductory unit. It is important to remember that the identification and verification of threshold concepts is a difficult task (see Davies, 2006). For many academics, the concept of the threshold concept may itself be a threshold concept. That is, the idea that there exists particular ideas or ways of viewing things that are integrative, irreversible, troublesome and transformative may itself be an idea that is integrative, irreversible, troublesome and transformative (Meyer & Land, 2005). For this reason it is argued that simply asking an academic, practitioner, or even student to quickly relate what are the threshold concepts in their discipline may be a fruitless exercise. This focus group was far from a fruitless exercise. The group was able to better define the role of the unit, differentiate interdisciplinary perspectives from purely disciplinary ones, discussed how they felt these concepts met the definition of threshold concepts and were in addition able to make direct comment as to the suitability of the proposed learning and assessment tasks. The threshold concepts the focus group agreed upon are shown in Table 1. Here comment is made as to why it is believed each idea meets the criteria for being a threshold concept. For the criterion of being integrative, a diagram has been constructed for each concept showing how lecture topics and ideas that are presented in this unit have been clustered together into a meaningful conceptual framework. These four diagrams are shown in figures 1 through 4. Tacit interconnections between topics, ideas and concepts within each threshold concept area are shown via connecting lines, indicating that the relationship between a particular topic and the threshold concept might not be immediate to students, but by following through a logical train of ideas the connectivity becomes clear. To ascertain whether this really was the case for the students, they were asked to complete a survey, and responses are explored in the next section.

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Table 1: Candidate concepts and how they meet the criteria for Threshold Concepts

	transformative	probably irreversible	integrative	often troublesome	probably bounded
Humans are dependent upon and constrained by the natural environment	The realisation that clean air & clean water, and everything we eat or consume comes from the natural environment can change people forever.	Learning that milk comes from cows, oxygen comes from plants, and clean water from forests won't easily be forgotten	See Figure 1	As built environment students built careers and learn their 'trade' they will be met with conflicting views about the power of man to control nature.	Possibly extends beyond this interdiscipline, and is more generally applicable some elements are constrained to built environment.
An urban development professional is a Steward of Land	Realisation of the power and responsibility these students have may forever change them	Once students become more self aware, they will not easily become less self aware.	See Figure 2	All focus group members concurred that this is a troublesome concept for first years to grasp.	The concept itself by definition has limits that constrain it to urban development professionals
Land use is governed by society	One this is understood, students don't ask what land use does this society have, but what society does this land use have.	This realisation is empowering and not easily reversed.	See Figure 3	Young people in particular typically think, 'that's just the way it is', but our systems are created by us, and are constantly changing with society	Bounded by thinking about land use.
Human civilization is built on soil	Many first year students have never even thought about soil, but it is underneath everything	Once you learn about soil, it's hard to ignore it. It's everywhere!	See Figure 4	Students have spent their whole life ignoring soil. Now we tell them it is the basis of everything!	Specific to the built environment, physical civilization, and soil.

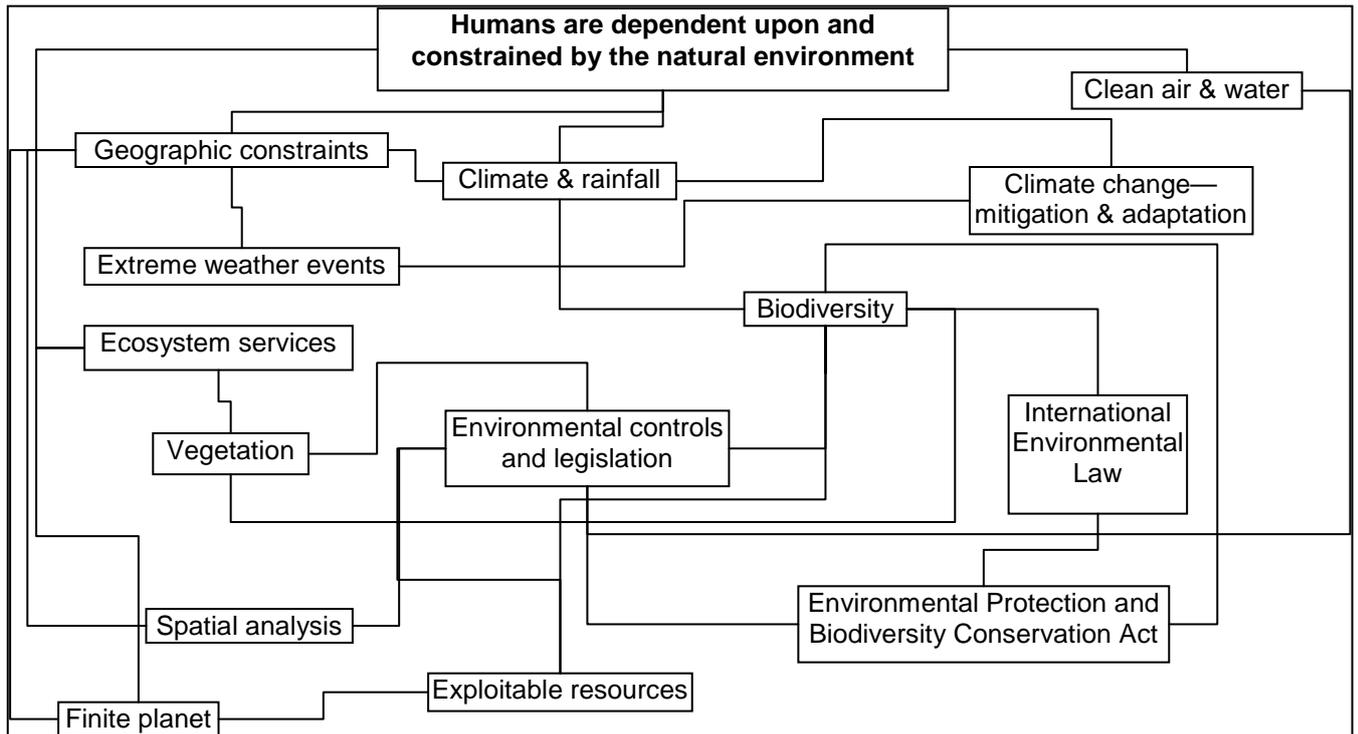


Figure 1: Integration of lecture topics under 'Humans are dependent upon and constrained by the natural environment'

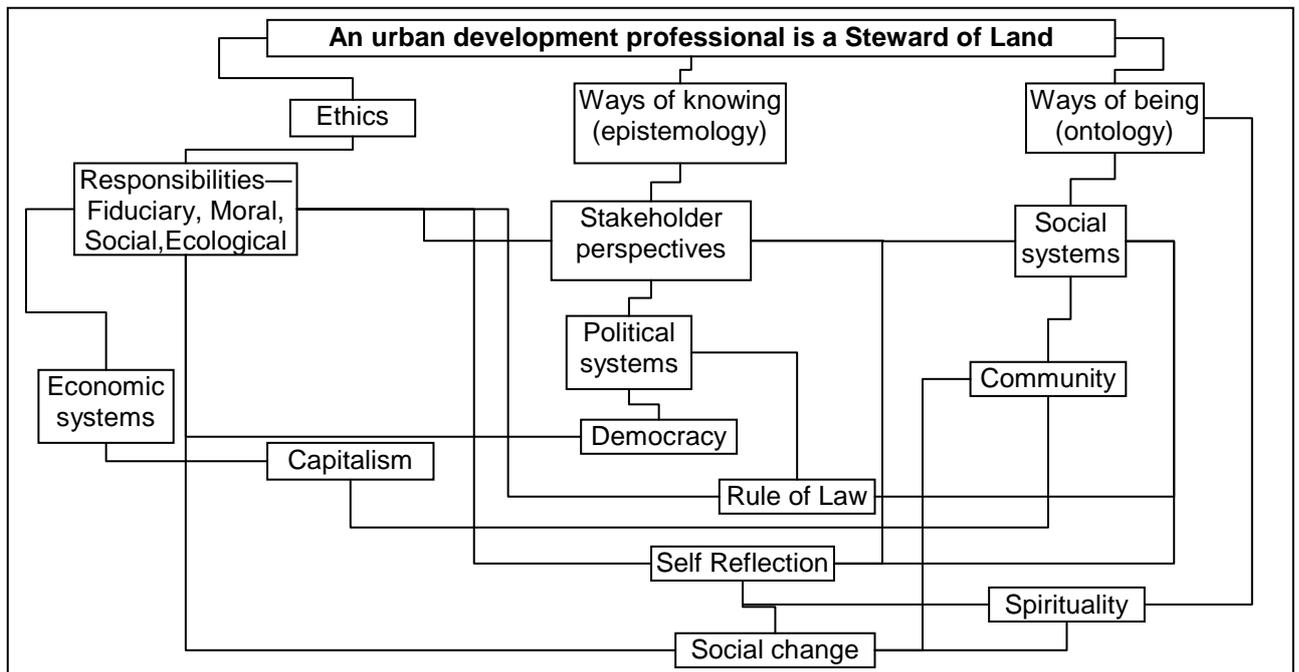


Figure 2: Integration of lecture topics under 'An urban development professional is a Steward of Land'

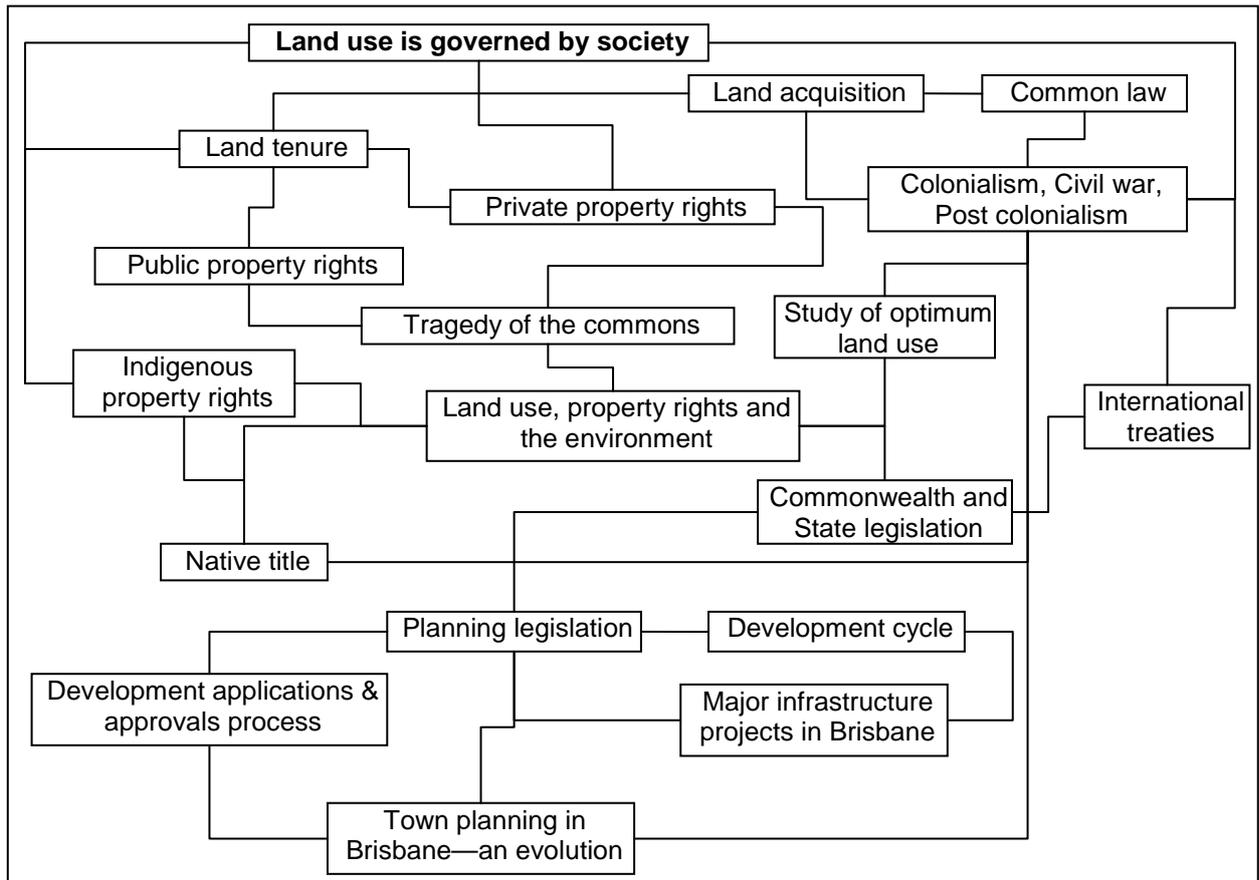


Figure 3: Lecture topics integrated under 'Land use is governed by society'

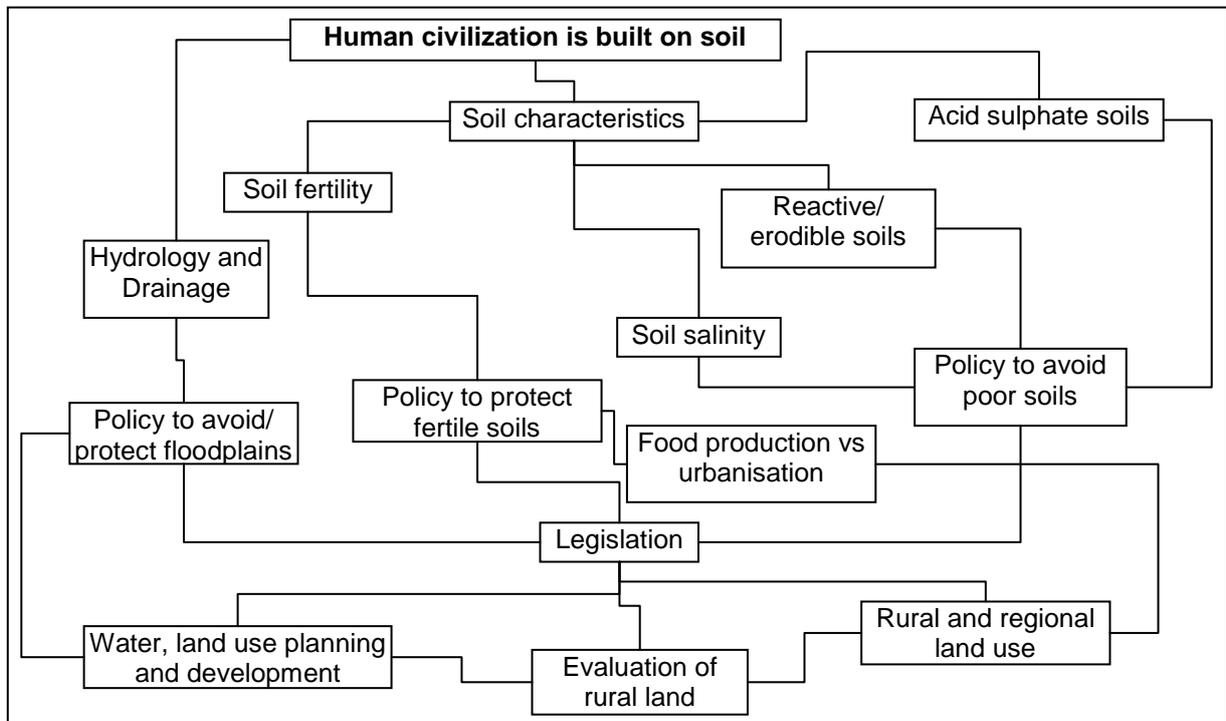


Figure 4: Integration of lecture topics under 'Human civilization is built on soil'

SURVEY RESULTS

Following the approach of Yorke-Barber, Atkinson, Possin, & Woodall (2008) an online survey was delivered via email to students at the end of semester 1 2012 (June). They were asked what ideas were the most troubling, which were stumbling blocks to their understanding, how they overcame those stumbling blocks, whether they have devised their own 'threshold concepts', and whether they felt the threshold concepts as articulated above were helpful to their learning. The survey was sent to both the 2012 class and the 2011 class. The lecture material for both classes was very similar, and the same lecturer and unit coordinator were involved in both years. Unfortunately there were technical issues with the field controls in the electronic survey instrument used, meaning that responses from both cohorts were concatenated. It is believed this confusion in the survey led to a lower response from the 2012 cohort. Those students have been contacted again to ask if they will reconsider taking the survey. Despite this technical difficulty, responses were received and provide a qualitative insight into the effectiveness of the threshold concepts presented to this class.

Sample Responses

The online survey was constructed in two parts: the first asked students to reflect on their learning experience in more general terms, without explicit mention or explanation of what threshold concepts are. The survey would not allow students to come back to the first section after they had moved on to the second section. The intention was to gain their opinions 'untainted' by the rubric explaining what threshold concepts are. Below are samples of responses of the four open ended questions asked in the first part of the survey. Note that spelling is correct in all of the student responses displayed below.

What aspects of Stewardship of Land did you find most challenging?

- *Understanding assignment briefs!*
- *Land surveying [this assessment was removed in 2012]*
- *Working in groups*
- *Literature reviews*
- *Complexity of legislation*

What concepts or ideas can you identify that allowed you to 'put it all together', that allowed you to 'make sense of all the pieces'?

- *The idea that we have an obligation to act responsibly with land and property*
- *The flow charts. The idea that land is a major factor in everything*
- *Nothing in the course correlated with anything*
- *The concept of land not necessarily belonging to one person but to the community as a whole.*
- *There was nothing that produced a light bulb moment in particular.*
- *Understanding the definition of stewardship itself.*
- *Investigating legislation*

What concepts or ideas formed the greatest stumbling blocks to your understanding?

- *A lot of the lectures spoke about topics relevant to stewardship but not necessarily how they were relevant. There were a few lectures I wrote off, mistakenly as I thought they weren't relevant, only to find out later that they were.*
- *The relevance to industry*
- *The complexity of the laws*
- *Property responsibilities and law*
- *Common law*

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- *Native title*
- *Statutory regulations*
- *I struggled to understand why the ideology of 'stewardship' remains largely superficial and no real action has been taken by leaders to actually be stewards*
- *that the economic system conflicts with sustainability and the idea of land stewardship*
- *The biophysical analysis of concepts concerning stewardship*

How did you overcome these stumbling blocks?

- *Only through my own reading for assignments did I begin to piece it all together.*
- *I still haven't really overcome this- most likely because I have trouble accepting this fact!*
- *Research*
- *Luck*
- *Participate all lectures and tutorials + put time aside for weekly studies*

For the four threshold concepts, students were asked to rank on a seven point scale “How useful are the following concepts in enhancing your understanding?”, and were given opportunity to provide comments. At this point they had read an explanation of what threshold concepts are and why they may be relevant for this unit. Graphic representations of responses are shown in figures 5 through 8, and below each graph are examples of typical additional comments that students made.

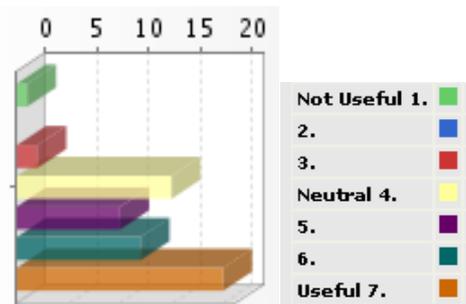


Figure 5: Survey responses for ‘Humans are dependent upon and constrained by the natural environment’

- *It is an obvious but important truth needed in the real world industry.*
- *Very obvious, however, as a CM what was its relevance*
- *Useful for urban planning*
- *This one, I believe is the most relevant of all.*

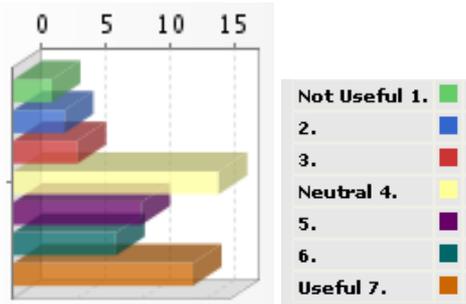


Figure 6: Survey responses for 'An urban development professional is a Steward of Land'

- *I don't think so... so much development is harmful, greedy and focused on profit making.*
- *I think this concept is correct and presents the urban development professional in a different view.*
- *Again this is ideal, but I don't think it is practiced in the real world*
- *Still do not understand what is meant*
- *Don't really care too much. Still find 'Steward of Land' to be too vague and 'old-time' a description for the unit.*
- *Important for students to realise this and embrace the environment in their profession when it is easy to ignore and exploit it.*

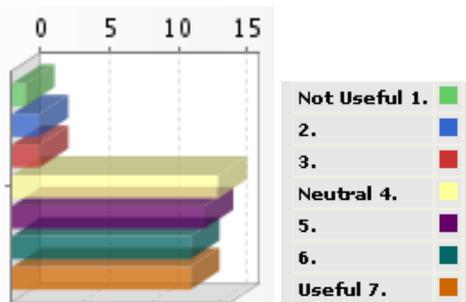


Figure 7: Survey responses for 'Land use is governed by society'

- *Very much so. Really that statement should read 'land use is governed by the economy'.*
- *I liked coming to this realisation. My previous understanding of land use was based around the owner generally having complete control and interest in the land.*
- *But it isn't really, is it? It's governed by the government.*
- *society consists of people with many different interests*
- *Understand the impact native title and indigenous land rights can have in land development.*

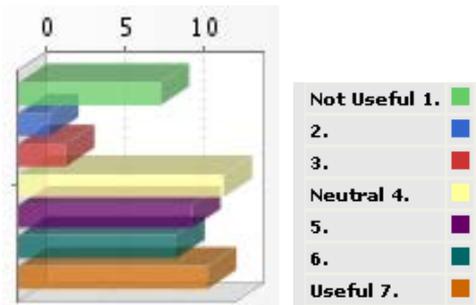


Figure 8: Survey responses for 'Human civilization is built on soil'

- *Sounds too obvious*
- *Knowing about acid sulfate soils was very relevant*
- *Have learnt nothing in relation to this topic. Do not understand it.*
- *Not useful for planners*
- *Think this is sort of understated in UDB101 - could go further with this concept.*

DISCUSSION

The results above show a diversity of opinion, but there are some specific findings that can be put forward. The thing first-year first-semester students find most troubling is not concepts but general university skills. This is not at all surprising, and data from social media for this unit (see Blake and Gray, this conference) indicate that students struggle with essay composition, making sense of complex data, particularly in document form, literature reviews, how to successfully work with others, interpretation of academic documents such as assignment briefs, and rigorous mathematical calculation and documentation. One of the assessment tasks was to prepare three short essays (up to 500 words), that included references, based on the lecture and reading topics. This produced a large amount of stress amongst the students, evidenced both in tutorials and on social media, with one student even commenting "Can honestly say that I would rather juggle with soap in prison than do this assignment again". This has important implications for future unit delivery, as scaffolding of not only content and concepts is required, but also of academic skills and professional practice.

Regarding making 'sense of all the pieces', there seemed to be a polarisation between those who engaged and those who didn't engage with the unit. This highlights the need to ensure that activities that students are asked to undertake in lectures, tutorials or through individual study allow and encourage them to engage more fully.

When concepts were specifically addressed, legal frameworks proved troublesome, but again engagement was still an issue for some. Others extended from ideas that were presented and commented on the disjunct between ways of conceptualising in an academic environment and their lived experience or perceptions to date.

Once students had completed this 'baseline' set of questions, they answered specific questions around the usefulness of the threshold concepts presented. For the 2011 cohort, this survey was the first time they had been introduced to this terminology. For the 2012 cohort, this framework was presented from the first lecture. Despite this, for the first concept the scores from 2011 and 2012 were overwhelmingly towards 'useful', with only three responses at the 'not useful' end of the spectrum. This pattern tended to be repeated for all four concepts, as shown in Table 2. This table shows the mean, mode, combined two 'lowest' (very not useful) and two 'highest' (very useful) responses, the ratio of these two response sets, and the ration of neutral responses to the very useful grouping.

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Table 2: Mean usefulness and mode for each concept

Concepts (n=60)	mean	mode	Very not useful	Very useful	Ratio VNU:VU	Ratio N:VU
1. Humans are dependant...	5.48	7	1	32	0.03	0.47
2. An urban development professional...	4.77	4	7	22	0.32	0.73
3. Land use is governed by society	5.17	4	3	26	0.12	0.58
4. Human civilization is built on soil	4.55	4	11	22	0.50	0.59

These results can lead to a number of conclusions about the appropriateness and utility of the four concepts used in this unit. Some of these may be obvious, others are counter-intuitive.

In terms of net usefulness of concepts to student learning, concept 1 is far and away considered the most useful. But it is possible that this concept is a general truism, rather than a discipline specific threshold concept (see Deudney, 1990; Ekins, Simon, Deutsch, Folke, & De Groot, 2003). Remember, discipline threshold concepts tend to be 'bounded', that is, they are of particular relevance to the discipline in question, but might not be applicable beyond that sphere. That said, it is reasonable to argue that this concept does fit the threshold concept mould in other respects, and the students themselves see it as valuable. Indeed, 30 times more students see this concept as 'very useful' than those that consider it 'very not useful'. Most telling, the mode response is at the extreme of the useful responses.

In terms of mean usefulness, the remaining threshold concepts are ordered 3, 2 and 4. For these three, the mode usefulness was 'neutral'. For the worst of these, twice as many students felt number 4 was 'very useful' as those that considered it 'very not useful'. However, for every four students that found concept 2 'very useful', three felt 'neutral', or unconvinced, about its usefulness.

Of the three 'less convincing' concepts, it is possible that these are more like true threshold concepts than number 1. In particular these concepts may be troublesome (some students in tutorials complained that thinking about this stuff made their brains hurt) and perhaps require a transformation that some students are unwilling to take on (perhaps they have a preconception of what a, say, property economics professional looks and thinks like, and are unwilling to discard that). It may also be that these are not appropriate threshold concepts, despite being formulated and approved by an expert disciplinary focus group.

Another option here is that there were deficiencies in the teaching, particularly in the timely delivery of relevant content, and problems with access to teaching staff. The literature on threshold concepts states that it is not sufficient to simply articulate threshold concepts, they must be embedded within a well developed and appropriately delivered curriculum (Perkins, 2006). Logistical issues in 2012 led to reduced student contact, and some materials were not delivered in the format or within the timeframes that were originally intended. Specific student feedback via the university student feedback system identified these issues as primary concerns the students had with the unit. Threshold concepts offer a lot of potential for improving the student understanding of diverse and complex disciplinary knowledge. But they do not replace a well developed and well delivered unit curriculum.

CONCLUSION

Threshold concepts in Stewardship of Land proved to be an integrating force, and served as a strong backbone for the development of a unit curriculum. The particular concepts 'Human civilization is built on soil', 'Land use is governed by society', 'An urban development professional is a Steward of Land' and 'Humans are dependent upon and constrained by the natural environment' were developed by a focus group of built environment disciplinary academics. Of these concepts, the last was found by students to be most useful. The other concepts were very useful in developing an integrated curriculum, but were perhaps more troublesome for students. Future delivery of this unit will require more contact time, and better exploration of the connection between the unit content, threshold concepts, and the relevance of each concept to specific built environment disciplines such as property economics.

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