



THE UNIVERSITY OF  
**WAIKATO**  
*Te Whare Wānanga o Waikato*

*Faculty of Education*

Te Kura Toi Tangata

**Waikato Journal of Education**

Te Hautaka Mātauranga o Waikato

Volume 19, Issue 2: 2014

Special Edition:  
Emergent learning and threshold  
concepts in tertiary education



## Waikato Journal of Education Te Hautaka Mātauranga o Waikato

Special Edition Editors: Ann Harlow, Mira Peter & Anne McKim

Current general editors: Clive Pope and Noeline Wright

Editorial board: Bronwen Cowie, Deborah Fraser, Richard Hill, Clive Pope, Margie Hōhepa, Sally Peters, Beverley Bell, Noeline Wright

The *Waikato Journal of Education* is a peer refereed journal, published twice a year. This journal takes an eclectic approach to the broad field of education. It embraces creative, qualitative and quantitative methods and topics. The editorial board is currently exploring options for online publication formats to further increase authorial options.

The Wilf Malcolm Institute of Educational Research (WMIER), which is part of the Faculty of Education, The University of Waikato, publishes the journal.

There are two major submission deadline dates: December 1 (for publication the following year in May); June 1 (for publication in the same year in November). Please submit your article or abstract on the website <http://wje.org.nz/index.php/WJE> or email [wmier@waikato.ac.nz](mailto:wmier@waikato.ac.nz).

Submissions for special sections of the journal are usually by invitation. Offers for topics for these special sections, along with offers to edit special sections are also welcome.

Contact details: The Administrator Wilf Malcolm Institute of Educational Research, Faculty of Education, The University of Waikato, Private Bag 3105, Hamilton, 3240, New Zealand. Email: [wmier@waikato.ac.nz](mailto:wmier@waikato.ac.nz)

Copyright:



This work is licensed under a [Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International License](https://creativecommons.org/licenses/by-nc-sa/4.0/).

Publisher: Faculty of Education, The University of Waikato

Cover design: Donn Ratana

ISSN: 2382-0373

# Waikato Journal of Education

## Te Hautaka Mātauranga o Waikato

Volume 19, Issue 2, 2014

### Special Edition: Emergent learning and threshold concepts in tertiary education

<b>Editorial</b>	3
<b>Foreword</b>	5
<b>Mastering threshold concepts in tertiary education: “I know exactly what you are saying and I can understand it but I’ve got nowhere to hook it.”</b> <i>Ann Harlow and Mira Peter</i>	7
<b>Dancing onto the page: Crossing an academic borderland</b> <i>Nicholas Rowe and Rosemary Martin</i>	25
<b>Transformed understandings: Subjective interpretation and the arts</b> <i>Kirstine Moffat and Anne McKim</i>	37
<b>‘Crossing frontiers without a map’—the role of threshold concepts and problematic knowledge in religious education and spirituality</b> <i>Peter Mudge</i>	51
<b>Doctorates in the dark: Threshold concepts and the improvement of doctoral supervision</b> <i>E. Marcia Johnson</i>	69
<b>Embedding threshold concepts: The use of a practice—theory—practice cycle</b> <i>Mary Hedges</i>	83
<b>Student and expert perceptions of the role of mathematics within physics</b> <i>Marcus Wilson</i>	93
<b>Modularisation of learning outcomes in terms of threshold concepts</b> <i>Tony Parker and Daniel McGill</i>	105
<b>Forging the jewels of the curriculum: Educational practice inspired by a thermodynamic model of threshold concepts</b> <i>Jonathan Scott</i>	115
<b>‘Nettlesome knowledge’ and threshold concepts: An afterword</b> <i>Susan Groundwater-Smith</i>	123
<b>Contributors</b>	127



## Embedding threshold concepts: The use of a practice—theory—practice cycle

**Mary Hedges**

University of Auckland  
Auckland  
New Zealand

### Abstract

*This article provides a case study report on how applying a threshold concepts framework within an integrated assessment programme can help embed these concepts and facilitate a transformative engagement among students in an MBA economics course. The explicit goal of the course is for students to formalise their prior learning and apply current business-relevant economic theory to their work practices. Many students arrive into the course in a state conceptually identified as a liminal zone, having nascent understandings of their economic environment, at least in the work context, but are troubled as to how to develop, link and apply these economic concepts.*

*In this MBA course, a weekly online discussion forum had two intended purposes: to develop engagement with the course content; and to explicitly enable the students to embed and apply key threshold concepts to their professional lives. Early in the course, students had to discuss specific questions relating the theoretical content to familiar experiences, thereby focussing on the practice-theory link. By the end of the course, they had to relate theoretical content to both familiar and new contexts, extending theory-practice links. This online discussion forum provided the opportunity to explore the 'practice-theory-practice' cycle that the students had to integrate into other assessment items.*

### Key words:

Threshold concepts, masters students, online discussion forum, assessment, case study.

### Introduction

#### MBA programme

MBA programmes are designed for people in management roles and aim to formalise their on-the-job learning (Association of MBAs, 2014). Students enrolled in these programmes range from people with degrees in other disciplines, such as engineers who are now in management roles, to managers who have come 'through the ranks' without formal tertiary qualifications, as well as students moving from an undergraduate degree to a Masters. In all cases their enrolment in an MBA signals their desire to link practice with the theoretical and conceptual ideas that inform it and, in turn, enhance practice.



Within this broader framework, the specific Business Economics course that is core within the University of Auckland MBA programme was viewed by many as a more abstract or conceptual course than the others in the programme. Students were able to see the direct relevance of courses such as Financial Reporting and Control, Operations and Supply Chain Management, Marketing for Growth, and Managing Organisations and People much more readily than the more abstract Business Economics (University of Auckland, 2010). At the same time though, they did appreciate that government economic policy settings had a direct impact on their business and that having a greater understanding of the concepts behind those policy settings, and therefore the implications of any changes in these settings, would benefit them. Upon starting the course, many did not realise that: 1) they already knew more economics than they realised, and 2) their increased economic literacy would inform their decision-making outside a narrow work environment.

Historically this Business Economics course had been developed around a building blocks approach where basic ideas or concepts were taught first (theory first) and these were enriched or extended as a student progressed (Davies & Mangan, 2007). Due to the time constraints of a post-graduate MBA course, a number of these basic principles were taught but only two or three could be extended or deepened to a much higher level. Topics chosen for this enrichment were not always the most relevant to all students. However, a threshold concepts (TCs) approach provided a different way of conceptualising content and providing the shape and structure to the subject. It also made explicit to the students some of the defining features of the economics they were learning. These features could be described within the framework of threshold concept characteristics, namely that they are: bounded, integrative, transformative, probably irreversible and potentially troublesome (Land, Cousin, Meyer, & Davies, 2005).

Debates in the literature examine the effect of semesterisation on students' internalisation of new knowledge (Morris, 2000). Within an MBA programme taught over quarters rather than full semesters, and where students also work fulltime, this difficulty is significant. Teaching and learning strategies must account for time-poor students who often bring with them extensive prior knowledge. Therefore, a teaching strategy built on disciplinary TCs will actively encourage the integration of new knowledge with existing knowledge and experience.

## Threshold concepts

Threshold concept theory (TCT) offers an approach to teaching and learning that explicitly assists students to integrate new, technical learning with their existing knowledge (Davies, 2003).

Threshold concepts, combined with a practice-theory-practice cycle, provided a framework assisting students to move through their initial liminal zone to become more confident and informed practitioners (Davies & Mangan, 2008). The lecturer's aim in this Business Economics course was that students would leave equipped with tools to continually extend their knowledge and understanding of their business environment and its impact on their professional practice to achieve their corporate and personal goals. This article presents a case study of how this aim was achieved in a compulsory economics course within an MBA programme.

## Methodology

### The approach

An economics course, informed by literature in the field, was the context used to explore the practicalities of embedding TCs (Davies, 2012; Davies & Mangan, 2007; Shanahan, Foster & Meyer, 2006; Staffordshire University, 2008). The Economics Network's *Handbook for Economics Lecturers* includes a section on TCs that clearly explains both different types of conceptual change and examples of specific economics TCs related to this change (Economics Network, 2013). Table 1 outlines examples of TCs and the kinds of changes needed for conceptual understanding:

**Table 1. Definition and exemplification of three types of conceptual change**

Type of conceptual change	Type of transformation and integration	Examples in economics
1. Basic	Newly met concepts some of which transform understanding of everyday experience through integration of personal experience with ideas from the discipline.	Distinctions between price/cost; income/wealth (stocks/flows); nominal/real values; investment/saving. Real money balances, natural rate of unemployment.
2. Discipline threshold concepts	Understanding of subject discipline ideas (including other TCs) integrated and transformed through acquisition of theoretical perspective.	Marginality, opportunity cost, incentives (in particular the role and limitations of the price mechanism), partial equilibrium, interaction between markets, cumulative causation (as for instance in the multiplier).
3. Procedural: Modelling concepts	An understanding of the subject's modelling procedures that enable the construction of discipline specific narratives and arguments (ways of practising).	Comparative statics (equilibrium, <i>ceteris paribus</i> ), time (short-term, long-term, expectations), elasticity.

Adapted from Davies and Mangan (2007)

While conceptual change appears hierarchical in the above table, students can acquire competence in each of these concepts at different times and not necessarily sequentially. For example, a student who comes from a different discipline with a strong mathematical or modelling background (e.g., engineering) may quickly master procedural concepts but take longer with basic and economics discipline TCs. All of the above Table 1 examples were covered in the course but not necessarily in the online discussion—the subject of this case study. For example, comparative statics (basic) and the interaction between markets (discipline) were TCs required for the first assignment but were not used as the basis of a discussion question. Similarly, cumulative causation, a part of the second assignment, was not explicitly covered in online discussion questions. The course's TCs did not change over the period of this case study.

There is some debate regarding the degree of overlap between basic concepts and TCs. Davies (2003) explains that basic concepts may divorce understanding from experience, whereas TCs integrate understanding with experience. Based on this separation, the possibility that a basic concept may also be a threshold concept forces attention back to the teaching and learning strategies.

The first two weeks were a classic example of this overlap. The content included basic building blocks (e.g., opportunity cost) to develop capabilities in language and procedural techniques. It was deliberately taught and assessed to make students explicitly link concepts to existing knowledge and experience, providing the foundation upon which the rest of the course was built as illustrated below in Table 2<sup>i</sup>. As the course progressed, students had to regularly use these concepts in new contexts and across different problems, thus embedding an economics way of thinking and approaching problems.

<sup>i</sup> Please note that weeks 7–9 are not labelled in Table 2 as these three weeks could change order depending on the availability of the guest lecturers used in this block. From a pedagogical point of view, the order did not matter.

**Table 2. Course structure and integrated framework**

Implications & strategies of Market Power (Week 4)	Integrating Case Study (Week 5)	Integrated economy (Week 10)		
Market Power & Theories of the firm (Week 3)		AD/AS, Government Fiscal Policy	Money, financial markets and Monetary policy	International trade & balance of payments
		Macro Variables & Models (Week 6)		
Foundation Micro Models (Week 2)				
Basic Concepts (Week 1)				

## Participants

This case study course was taught 18 times over 3.5 years. While each class was potentially a separate case study, they are presented as a single case incorporating the learning and development of this course over time (Simons, 1980).

The course, using the same material each time and across three campuses, was taught either face-to-face or fully online between six students (fully online) to 47 students face-to-face, totalling 446 students across the two versions and the 3.5 years. Of the 446 students, 438 passed the course.

## Data

Course evaluations were completed by 16 of the 18 classes with a 90% response rate. While course evaluations did not ask specifically about the online discussion forum, it did ask, “What was most helpful for your learning?” Respondents most frequently cited the discussion forum with almost half (163 of the 361 total) referring to it in some way, and this is one source of the textual feedback used in this study. Other data included statements made within the online postings plus other assessment items.

## Assessment

All students were required to make postings to an online discussion forum, primarily as a learning tool to reflect on their learning. It also helped to integrate the theoretical/abstract content into their work and personal lives, chronicling their journey through the 10-week course. It was hoped that when students reviewed their early postings they would realise how far they had come and how much their disciplinary language and worldview had developed. This concept of journey also conceptually fitted the TC framework as students moved from a liminal zone through a portal to a new understanding (Davies & Mangan, 2005).

Each week a topical question centred on the application of the TCs covered that week, was posted on the University’s virtual learning environment (named CECIL). In the early part of the course these questions were straightforward and asked students to provide examples from their experience that reflected the relevant TC. This was done for two reasons: to integrate new with existing knowledge, and assist in reframing existing knowledge with new language and frame of reference. By the latter half of the course questions became more challenging, were open-ended and potentially controversial to stimulate debate. Students were no longer provided with clear direction as to how to approach the question or which TCs were relevant. This change in the nature of the questions reflected students’ growing capability in using newly learned economics. They could test the ideas in relation to familiar contexts, providing answers based on life experiences and work contexts (Davies, 2003), resulting in a wide range of contributions.

In assessing these contributions, markers had to account for the relevant context as well as the students' demonstrated understanding of the TC. This assessment approach combined with the tight focus of the posed questions highlighted the bounded nature of TCs (Davies, 2003). The questions, deliberately narrow and usually focussed on a single TC, meant that students' thinking focussed tightly on the topic and its economic aspects as well as thinking about applications in *their* daily lives. The question structure provided clear stepping stones to assist students to integrate material on a weekly basis and make explicit connections between theory and applications relevant to each individual. The boundaries of learning new ways of thinking (Reimann, 2004) were more sharply defined by personalising the assessment item for each student and is consistent with literature on engagement. Newmann (1992, p. 3) describes engagement as when "students make a psychological investment in learning. They try hard to learn what school offers. They take pride not simply in earning the formal indicators of success (grades), but in understanding the material and incorporating or internalizing it in their lives".

Given that the purpose of the online forum was the learning opportunity it engendered, it was important that all students participated and received appropriate and timely feedback. Although the online postings could have been used for formative assessment, given the high pressure jobs many of these students have and the severe time constraints they are faced with, it seemed likely that any formative assessment would be the first thing omitted from their schedule (Salmon, 2001), therefore some form of summative mark contribution was required in order to ensure motivation and participation (Rowntree, 1987). Research suggests (Cameron, 2010) that even a small mark<sup>ii</sup> per week provides a strong incentive to complete the postings regularly and that regular contribution is critical to the intended learning outcomes. The corollary of this is that students must also receive frequent and appropriate feedback—a point discussed shortly.

Requiring students to provide examples from their own lives in response to each week's question meant a single concept was applied in up to eighty different contexts. A flow-on benefit was that these student responses also provided a raft of new and topical business applications relevant to local communities (Bond & Paterson, 2005).

The interpretation and marking of each posting were straightforward since each posting was worth one mark allocated as follows: half a mark for a posting and half a mark for its quality—either an appropriate application or good argument. There was one exception to this broad marking frame. If a student's posting was totally off the topic, no mark was awarded. On the rare occasions that this occurred (on average less than once per quarter over the 3.5 year period) students received a personal email explaining the problem and suggesting a range of specific remedies.

Feedback to students was provided via a general response sent through CECIL by the end of the day when the posting was closed and before the next question was posted. Feedback included identifying and correcting any common errors in understanding. The default position was that a student's posting received a full mark if it was without errors, but half a mark with errors. In addition, a sample of selected quality postings was made available. Students could compare their own posting to these.

One of the requirements for online discussion forums to meet its learning objectives is that students receive frequent and constructive feedback (Birney, 1964). This was critical to ensure momentum was maintained throughout the quarter and that correct understanding was reinforced (or that misunderstanding was corrected early) through the assessment tool. At week five, an interim mark out of five, was posted.

All postings had to discuss ideas in economics terms so students practised a new frame and language for thinking about problems. Through integrating new learning with existing knowledge, the process students underwent resembled the four steps of subsequent language acquisition: silent period, formulaic speech, experimental phase and fluency (Canale & Swain, 1980; Hedges, 2008; Lightbown & Spada, 1993). Measuring improved understanding of the TCs and movement from liminal zones to disciplinary understanding was a different issue. This is considered in the next section.

---

<sup>ii</sup> One mark across 10 postings adds up to a maximum of two grade points (10%). This was always pointed out to students but still only approximately one third of any class managed to make all ten postings. All students made some postings though, with the majority making at least eight.



## Results

The initial goal of this course redesign, based on TCs and a theory-practice-theory cycle, was to improve the learning outcomes for students. These outcomes involved the mastery and application of a few concepts to a wide range of problems. However, in terms of embedding TCs, there was some measurable success as well. A difficulty arises in measuring the impact or achievement on TCs as distinct from more general learning objectives for the course (Nurick, 2010; O'Donnell, *in press*; Tang & Robinson, 2010). This problem has not been solved in this study but a number of issues raised are addressed. By using the key characteristics of TCs as the framework, proxy measures and evidence from the case study are presented to demonstrate how this online discussion enabled students to achieve some level of mastery of the TCs taught in this economics course.

The first benefit came from the range of different examples and applications that each class was exposed to for each TC covered. Most students made postings each week. When there were simultaneous classes per quarter, students were able to see other classes' postings. Very small classes (6–20 students) thus benefited from the wider range of examples contributed by the larger classes. Generally it has been found that when students struggle with topics or concepts they find it difficult to separate the concept from the specific examples used in class or a text (Davies & Mangan, 2005). However, these students were able to read up to 80 different applications of each concept and this made it much easier for them to clearly identify the concept as distinct from the applications. In other words, the questions and the variety of posted examples provided stepping-stones for integrating the concept with existing knowledge and experience, moving individuals between the concrete (examples and applications) and the abstract (theory). Identifying whether students achieved this integration or not was the role of the wider integrated assessment programme designed to measure depth and quality and a student's ability to re-apply the TCs in novel contexts.

This integration occurred at two levels. Firstly, students had to integrate economic ways of thinking and analysis with what they already knew. This included renaming ideas they already had, relating each TC to their business or personal life and taking an inductive approach to the relevance of their ideas. Secondly, the students were able to see more easily the wide applicability of each concept taught rather than a single or a few examples. The local relevance of the examples also helped. Students knew that the examples provided by their peers were real and current examples as opposed to the hypothetical, international examples in textbooks.

Later, students inverted this process and took their economic ideas and 'new' concepts to their business. Several students each quarter posted comments about how they had changed something at work in response to their new knowledge. The strongest example of this was a student<sup>iii</sup> who, once the course had finished, emailed to say that he had to put together a business case for pricing changes within his company, combining several ideas he learnt in this course. It took a totally different approach from what he had been initially planning. The proposal was praised by his bosses for being well researched and justified with supporting empirical evidence.

On the course evaluation forms some (37) students commented that the online postings helped them develop their confidence to express their opinions (Cabiria, 2009) in wider contexts. One student explained in her course feedback form that she frequently went to business breakfasts and inevitably the conversation would, at some point, turn to the state of the economy. This was normally her cue to get another cup of coffee to avoid participating in the discussion. By the end of the course she not only remained at the table but actively participated in such discussions. She realised that she had something positive to contribute and often knew as much or more than those with whom she was talking. Thus, posting to the online forum enabled her to participate more fully in her business environment. Comments by students included how the frequent feedback and their ability to see others' postings built their confidence in their own understanding. Some students explained that this enabled them to better identify "where their colleagues were coming from" and enhanced their ability to debate wider

---

<sup>iii</sup> All comments from students have been left unattributed to either protect the student's identity or, in cases where the comments were taken from course evaluation forms, because it was not possible to identify the student.

issues with confidence. This suggests a movement from an initial liminal zone toward conceptual understanding.

The weekly online discussion TC questions were also usually embedded in current events, particularly in the second half of the course focused on the macro-economy. What was assessed was not the opinion but the economic argument that students used to support their opinion, demonstrating their understanding and application of the underlying TC. Examples included a debate on the desirability of an increase in government spending versus a decrease in taxes from a fiscal policy point of view. This question was used during an election year and mirrored the differing stances taken by the two major political parties. The students had to focus only on the economics behind the standpoints, leading to a number of students (17 out of the 59 enrolled that trimester) commenting within the forum on their enhanced interest in the political campaigns and their ability to evaluate their position more critically because they could understand opposing views.

Multiple levels of engagement were achieved through discussion forums that are not covered here (see Hedges, 2012) such as: within the cohort group; within wider work groups (e.g. business breakfast); between groups of students (e.g. continual updating); between faculties; within wider society as informed voters and in providing feedback on policy changes. These served to both further embed the concepts and enable their integration into their daily lives, transforming their thinking on issues.

Generally, transformation in students' thinking is a less emphasised aspect of our teaching, and standard evaluations tend to be poor at picking up this type of impact (Edmundson, 1997). No explicit evaluation to measure this was undertaken in the course either. Transformation in TC terms is about students changing their world view. It is a conceptual change *not* just an enrichment of existing ideas (Davies & Mangan, 2005). Often it is not until later that we understand how transformative some aspects of a course may have been. One indicator of ontological transformation is if it repositions the individual in relation to their communities. There is evidence in this case study that this did occur, obviously more for some students than others. One student included this comment in the evaluation, "I watched a finance debate last night with 'different eyes' to what I would have prior to sitting the course". (Note: The student did not specify how it was different.) This is indicative of the role the discussion forum played in helping students to integrate their new knowledge.

A further example of students repositioning themselves in relation to their community occurred when there was a debate over the deletion of the New Zealand five cent piece. The discussion question on monetary policy that week asked students to consider the implications of this proposed change in currency and this linked authentically to the Reserve Bank of New Zealand's (RBNZ) encouragement of public participation in the debate via their website. This discussion topic and the ensuing exchange among students prompted some to post their discussion postings onto the RBNZ website as well (three students said they had done this), and occurred after receiving the lecturer's feedback in the discussion forum—they felt confident in their comments. This demonstrated a repositioning of these students in relation to their wider community. Students also commented that they did not know about the RBNZ requesting public feedback on the proposal before the course and it inspired them to pay more attention to these debates and be prepared to contribute when they could. They no longer saw contributions like this as the preserve of elite. Unfortunately, there is no evidence available as to whether this interest continued beyond the course.

Within the constraints of this study, it is not possible to know whether this transformation was irreversible but it seems likely given the unsolicited feedback and the examples already discussed. If something has been transformative, by definition it is irreversible: it is possible to undergo further transformation but it is not possible to go backwards. Something transformative cannot be forgotten or, as one student described it, it needs to be 'sticky':

At first I thought the weekly discussion would be a drag, but it is a great idea! The weekly routine meant that I had to revise the lectures notes and reading material and then apply what I had learnt. I also got to see the 'answers' from other students' perspectives. It made the theory sticky.

There is difficulty in measuring this 'stickiness' objectively within a ten-week course. However, one proxy measure is a change or fluency in using new vocabulary. The final open-book exam provided some measure of such change. Having access to the text does not really help students answer the

questions for several reasons: firstly, if students rely on their book, they will not complete the exam in the allotted time; secondly, the questions are all embedded in current events within the previous 2–3 months and will not be in text books; thirdly, the questions draw on their ability to translate from articles written for the general public into specific economic language. While some formulaic phrases may be helpful and gain some marks they are insufficient to pass the course because the exams are explicitly written to prevent this. For example, a five-mark question may enable formulaic language, such as definitions, to gain two marks, but the rest of the answer requires interpretation and analysis.

Another characteristic that can be more directly measured is that of the troublesome nature of TCs and this comes back to the idea of a ‘journey’ described earlier. As a background to this, it should be stated that many students find economics a more difficult subject than many others. Some reasons for this were touched on earlier but largely it is due to the abstract nature of the material. However, the students’ postings became significant personal records of their progress in overcoming these difficulties. Students often wanted to re-do their early answers. Retaining their personal record of their journey and seeing how and why they would like to change earlier postings actually assists them in their approach to the next ideas and greater complexity. An example of this by one student is, “Economics was a paper I felt I needed to do, but was dreading ... you made the whole experience quite painless ... and now I can talk with opinion about economic issues ... genius!”

## Discussion

Consistent with other work on TCs, implementing them in the classroom is sometimes challenging. In many disciplines ‘identifying’ TCs is the first hurdle. An economics project formed the foundation of much of the early work done in establishing the theory of TCs (Meyer & Land, 2003). It is therefore a discipline where there is reasonably wide acceptance of introductory TCs, and these same concepts formed the basis for the overall design of this course. The online discussion forum was one way to embed the concepts, but it still took a number of iterations to develop a structure that worked in practice across time and a range of student cohorts.

This study highlights two common difficulties with implementing a TCs approach. Firstly, how do you separate out the benefits of this approach from the benefits of quality course design? Secondly, the very process of a student crossing from the liminal zone across the threshold to understanding is an agent-dependent problem that the lecturer cannot control (O’Donnell, in press).

I see these as major difficulties and confess to incorporating many constructive alignment ideas in structuring the overarching design of this course. The assessment programme fitted this design. The week-by-week content, however, was founded on the introductory economics TCs identified and developed from the early 2000s (See Davies & Mangan, 2009; Staffordshire University, 2008 and Economics Network, 2013 for further details.) This combination makes it very difficult to separate out different impacts. I have reported on examples of the concepts being transformative, irreversible, integrative, bounded and troublesome. However, this approach is more like applying a template *ex post* as a measure. It does not diminish the evidence provided but it does not prove that the TCs approach caused these transformative changes in student learning or was solely responsible for it.

The second issue is related to the agent dependence of these measured outcomes. It is only the student who can move from a liminal zone across a threshold, and may cross with more or less difficulty than others, if at all. This individual variation became evident when it came to selecting the postings to be used as exemplars each week. Different TCs were more or less difficult for different students depending on their backgrounds, starting point and engagement with the topic. Even the very good students, who tended to make postings of a consistently high standard, usually had at least one ‘off week’. There is no way to identify whether this was because that concept was particularly troubling to them or whether other things were occurring in their lives, such as a deadline at work, that made their postings or commitment a lower priority.

This agent dependence issue also means it is no longer a case of just measuring the grasp of the TC through assessment but it becomes necessary to know the experiences of the students. Their experiences are not known in this case study although some of the student comments on the online

postings suggest experiential learning had taken place and the discussion forum was a key part of this. The hierarchy of listed examples below indicates their increasing levels of learning and experience:

- Kept me on task.
- Helped me to understand the ideas.
- Helped me apply the ideas and see how they were relevant to both my daily life and work.
- Very helpful as students were allowed/encouraged to think outside the square.
- A good way of pulling in all thoughts from fellow students and encouraging learning and contribution.
- I actually enjoy reading the business section now to decipher the lies from the fact, so well done!
- From the start the lecturer stated that at the end of this course you should be able to quite confidently join in discussions on economic conditions about New Zealand. At the end I am quite confident to debate economic issues with people. To do this shows that the content of the course, and the lecturer's ability to get us able to do this, is of a high standard.

This list also highlights that alternative theories, such as Perry's (1985) cognitive levels of learning, could account for these responses.

Thus, mastery of TCs is dependent on specific subjective effects experienced by the learner. No curriculum or instructor is able to manage or determine this. All that is possible is to create an environment where these types of learning opportunities are maximised. Even having created such an environment it is difficult, if not impossible, to separate out the role of TCs in the achievement of these learning outcomes. However, every insight and theory that contributes to better designed curriculum, greater student engagement and explicitly enables students to link their learning with their own world can only improve learning. Across all of these measures the online discussion forum embedded into this course was a success.

## References

- Association of MBAs. (2014). *Criteria and accreditation of MBAs*. London, England: AMBA.
- Birney, R. C. (1964). The effects of grades on students. *Journal of Higher Education*, 35(2), 96–98. doi:10.2307/1979785
- Bond, R., & Paterson, L. (2005). Coming down from the ivory tower? Academics' civic and economic engagement with the community. *Oxford Review of Education*, 31(3), 331–351.
- Cabiria, J. (2009, July). *Online social communities: Re-constructing lives*. Paper presented at the meeting of XVIIIth International Congress on Personal Construct Psychology, Venice, Italy.
- Cameron, M. (2010, June). *'Economics with training wheels': Using weblogs in teaching and assessing introductory economics*. Paper presented at the meeting of XVth Australasian Teaching Economics Conference Hamilton, New Zealand.
- Canale, M., & Swain, M. (1980). Theoretical bases of communicative approaches to second language teaching and testing. *Applied Linguistics*, 1(1), 1–47.
- Davies, P. (2003). Threshold concepts: How can we recognise them? In J. H. F. Meyer & R. Land (Eds.), *Overcoming barriers to student understanding: Threshold concepts and troublesome knowledge* (pp. 70–84). London, England: Routledge.
- Davies, P. (2012). Threshold concepts in economics. In G. M. Hoyt & K. McGoldrick (Eds.), *The international handbook on teaching and learning economics* (pp. 250–256). Aldershot, England: Edward Elgar.
- Davies P. (Ed.). (2013). *The handbook for economics lecturers*. Bristol, England: Economics Network. Retrieved from <http://www.economicsnetwork.ac.uk/handbook>
- Davies, P., & Mangan, J. (2005, August). *Recognising threshold concepts: An exploration of different approaches*. Paper presented at the meeting of European Association in Learning and Instruction Conference, Nicosia, Cyprus.
- Davies, P., & Mangan, J. (2007). Threshold concepts and the integration of understanding in economics. *Studies in Higher Education*, 32(6), 711–726. doi:10.1080/03075070701685148

- Davies, P., & Mangan, J. (2008). Embedding threshold concepts: From theory to pedagogical principles to learning activities. In R. Land, J. H. F. Meyer, & J. Smith (Eds.), *Threshold concepts within the discipline* (pp. 37–50). Rotterdam, The Netherlands: Sense.
- Davies, P., & Mangan, J. (2009). Threshold concepts in economics. In P. Davies, (Ed.), *Handbook for economics lecturers*. Bristol, England: Economics Network.
- Economics Network. (2013). *The handbook for economics lecturers*. Retrieved from <http://www.economicsnetwork.ac.uk/handbook>
- Edmundson, M. (1997). On the uses of a liberal education. *Harper's Magazine*, September, 39–49
- Hedges, M. R. (2008). Learning styles and introductory economics: A matter of translation. *Australasian Journal of Economics Education*, 5(1&2), 1–16.
- Hedges, M. R. (2012). *Using online journals to increase engagement and promote citizenship*. Auckland, New Zealand: University of Auckland.
- Land, R., Cousin, G., Meyer, J. H. F., & Davies, P. (2005). Threshold concepts and troublesome knowledge: Implications for course design and evaluation. In C. Rust (Ed.), *Improving student learning diversity and inclusivity*. Oxford, England: Oxford Centre for Staff Learning and Development.
- Lightbown, P., & Spada, N. (1993). *How languages are learned*. Oxford, England: Oxford University Press.
- Meyer, J. H. F., & Land, R. (2003). Threshold concepts and troublesome knowledge: Linkages to ways of thinking and practising within the disciplines. [Occasional Report 4]. Edinburgh, Scotland: ETL Project, University of Edinburgh. Retrieved from <http://www.colorado.edu/ftpe/documents/ETLreport4-1.pdf>
- Morris, H. (2000). The origins, forms and effects of modularisation and semestrisation in ten UK-based business schools. *Higher Education Quarterly*, 54(3), 239–258.
- Newmann, F. (1992). *Student engagement and achievement in American secondary schools*. New York, NY: Teachers College Press. Retrieved from [eric.ed.gov/?id=ED371047](http://eric.ed.gov/?id=ED371047)
- Nurick, R. (2010, July). *Threshold concepts and economics: A critique of the approach for enhancing student teaching and learning*. Paper presented at the meeting of 3rd Biennial Threshold Concepts Symposium, Sydney, Australia.
- O'Donnell, R. (In press). A critique of the threshold concept hypothesis and its application to opportunity cost in economics. *Australasian Journal of Economics Education*.
- Perry, W. G. (1985). Different worlds in the same classroom: Student's evolution in their vision for knowledge and their expectations of teachers. *On Teaching and Learning*, 1(1), 1–17.
- Reimann, M. (2004). First-year teaching and learning environments in economics. *International Review of Economic Education*, 3(1), pp. 9–38. Retrieved from <http://www.economicsnetwork.ac.uk/iree/i3/reimann.htm>
- Rowntree, D. (1987). *Assessing students: How shall we know them?* London, England: Kogan Page.
- Salmon, G. (2001). *e-Moderating: The key to teaching and learning online*. London, England: Kogan Page
- Shanahan, M., Foster, G., & Meyer, J. H. (2006). Operationalising a threshold concept in economics: A pilot study using multiple choice questions on opportunity cost. *International Review of Economic Education*, 5(2), 29–57.
- Simons, H. (Ed.). (1980). *Towards a science of the singular: Essays about case study in educational research and evaluation* (Vol. 10). Norwich, England: Centre for Applied Research in Education University of East Anglia, England.
- Staffordshire University. (2008). Embedding threshold concepts. Staffordshire, England: Author. Retrieved from <http://www.staffs.ac.uk/schools/business/iepr/etc/index.htm>
- Tang, T., & Robinson, T. (2010, July). *Threshold concepts and academic performance in economics*. Paper presented at the meeting of 3rd Biennial Threshold Concepts Symposium, Sydney, Australia. <http://www.thresholdconcepts2010.unsw.edu.au/Abstracts/TangT.pdf>
- University of Auckland. (2010). *The University of Auckland 2011 Calendar*. Auckland, New Zealand: Author.