Threshold Concepts in Practice
Ray Land, Jan H. F. Meyer and Michael T. Flanagan (Eds.)

Threshold Concepts in Practice brings together fifty researchers from sixteen countries and a wide variety of disciplines to analyse their teaching practice, and the learning experiences of their students, through the lens of the Threshold Concepts Framework.

In any discipline, there are certain concepts – the ‘jewels in the curriculum’ – whose acquisition is akin to passing through a portal. Learners enter new conceptual (and often affective) territory. Previously inaccessible ways of thinking or practising come into view, without which they cannot progress, and which offer a transformed internal view of subject landscape, or even world view.

These conceptual gateways are integrative, exposing the previously hidden interrelatedness of ideas, and are irreversible. However they frequently present troublesome knowledge and are often points at which students become stuck. Difficulty in understanding may leave the learner in a ‘liminal’ state of transition, a ‘betwixt and between’ space of knowing and not knowing, where understanding can approximate to a form of mimicry. Learners navigating such spaces report a sense of uncertainty, ambiguity, paradox, anxiety, even chaos. The liminal space may equally be one of awe and wonderment. Thresholds research identifies these spaces as key transformational points, crucial to the learner’s development but where they can oscillate and remain for considerable periods. These spaces require not only conceptual but ontological and discursive shifts.

This volume, the fourth in a tetralogy on Threshold Concepts, discusses student experiences, and the curriculum interventions of their teachers, in a range of disciplines and professional practices including medicine, law, engineering, architecture and military education.
Threshold Concepts in Practice
EDUCATIONAL FUTURES
RETHINKING THEORY AND PRACTICE

Volume 68

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Threshold Concepts in Practice

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*Glynis Cousin*

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Thresholds talk, good food and excellent company at the 5th International Biennial Threshold Concepts conference dinner in Durham Castle, England, June 2014.
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The editors of this volume, in their preface, remind us that threshold concepts were first launched as an idea some fourteen years ago. I recall that one participant at the founding threshold concepts conference at Strathclyde University, Glasgow reproached those of us who were exploring this idea as offering nothing new. He was right in that no idea is formulated on virgin soil but there is much that is distinctive about threshold concepts and the chapters in this book testify to this. They offer a particularly advanced set of explorations from both education researchers and subject specialists. Indeed, the reach of the threshold concept framework has been developed significantly in this book; this extends to the transdisciplinary, doctoral studies, the question of variation, elaborated approaches to liminality and to studenthood and refinements or extensions to the very notion of a threshold concept. There are also fresh excursions into postmodern concerns for uncertainty, stuckness, risk, positionality and ambiguity. This is not a framework that has congealed into an orthodoxy.

In the early days, threshold concept theory could have taken an objectivist and technicist path, offering fixed definitions of a subject’s constituents and purportedly aligned pedagogies. But the threshold concept framework has become so much more interesting than this. It has restored difficulty to learning. In particular, threshold concept proponents have always insisted that the cognitive and affective are enmeshed and the inquiry into how this may be so marks out this field as distinctive. Troublesome knowledge and liminality remain two of the most fruitful challenges to a simple cognitive framework or to the untroubled notion of learning outcomes. Meant originally to introduce transparency and clarity in curriculum design and delivery, the notion of outcomes and its siblings (performance criteria, learning aims and objectives) arguably generate a codified, contractual teacher-student relationship that inhibits a dialogic one.

In their preface, Land, Meyer and Flanagan propose threshold concepts as an alternative to the ‘student experience’ culture permeating many systems of higher education. In resisting the market call for ‘satisfaction surveys’, threshold concept researchers do not ask students ‘Did you like my teaching?’ Rather their question is more likely to be ‘What did you find difficult?’ They seek a conversation with students about mastery, which does not yield to a Likert scale survey but promises instead to build a mutually productive relationship. Indeed, a key strength of the threshold concept framework is that it draws in the interest and participation of subject experts, educationalists and students in transactional ways.

In proposing the value of subject-based threshold concepts fourteen years ago, Meyer and Land (2002) set a very important ball rolling. In matters of university pedagogy, they turned students and academic colleagues into producers rather than
consumers of educational theory and practice. They disturbed the expert posture of faculty or educational developers and the idea that pedagogy needs to be taught within bounded courses. They offered instead a sustained invitation to create research and development partnerships using seminars, laboratories, lectures etc. as sites of empirical inquiry. The array of disciplinary experts contributing to this volume show the extent to which this invitation has been accepted. Quite simply, Meyer, Land and Flanagan have built an impressive international, resource-rich R&D community.

To use the phrase of architects in Chapter 24, threshold concepts prompt a ‘big rethink’ about the structure of subjects, the cognitive and affective difficulties of mastery and how best to learn and teach a subject. Moreover, the chapters in this book, very different in many respects, all have in common a commitment to university education as transformative and to the view that a threshold concept approach offers a transformative curriculum. The reader will not find easy answers or prescriptions in the following chapters but they will find thoughtful, insightful, empirically grounded explorations to inspire the making of such a curriculum.

REFERENCE


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INTRODUCTION

‘In the middle of difficulty’, Albert Einstein is alleged to have once remarked, ‘lies opportunity’. We are now in a time when, in the higher education sectors of many countries, increasing marketisation and high tuition fees risk creating consumerist expectations that the student experience will be relatively comfortable, with the university operating much in the mode of a service provider. The Threshold Concepts Framework, on the other hand, assumes that significant learning will be transformational. It is worth recalling, in such a climate, that it is often through encounters with conceptual difficulty or troublesome knowledge that we are obliged to revise our prevailing conceptions, consider matters differently, think otherwise and see anew. This can be exhilarating, and liberating, but is just as often, or perhaps more likely, to prove unsettling and uncomfortable. Yet as even President Obama has recently commented ‘coddling’ students is ‘not the way we learn’ (Sherlock, 2015). Without a certain amount of anxiety and risk, Lee Shulman has argued, there’s a limit to how much learning occurs. ‘One must have something at stake. No emotional investment, no intellectual or formational yield’ (Shulman, 2005).

It is now fourteen years since Ray Land and Jan Meyer presented the first paper on threshold concepts at the 10th Improving Student Learning (ISL) conference held in Brussels in 2002 (subsequently published as Meyer and Land, 2003). In the time since there have been five international biennial conferences, in Glasgow, Kingston Ontario, Sydney, Dublin and Durham England. These have generated a now considerable corpus of research and scholarship from over 1045 scholars in 45 countries. This valuable collection of resources has been carefully and expertly garnered in the excellent archive established at University College London by Dr Michael Flanagan and has since become established as the definitive international resource on this area of research (Flanagan, 2016).

Earlier volumes (Meyer & Land, 2006; Land, Meyer, & Smith, 2008; Meyer, Land, & Baillie, 2010) have explained the characteristics of threshold concepts in some depth. For the reader unfamiliar with this earlier work, however, the analytic framework used in thresholds concepts research maintains that there are particular concepts in a given discipline which cannot easily be assimilated or accommodated within one’s existing meaning frame. Any aspect of the world, no matter how familiar, may, as Dewey noted (1991, p. 120), suddenly present an unexpected and incomprehensible problem. To accommodate such new and troubling knowledge will require not only a difficult reconceptualisation, but a reformulation of one’s meaning frame. Schwartzman (2010), in an earlier volume on threshold concepts,
has characterised a meaning frame as ‘an orienting frame of reference’ in and through which we are able to make meaning. It is ‘a structure of assumptions within which one’s past experience assimilates and transforms new experience, … a habitual set of expectations’ (p. 30). Such structures, she argues, ‘embody the categories and rules that order new experience, shaping how we classify our encounters with the world: what we take in and how we act. They also dictate what we notice and what we ignore by selectively determining the scope of our attention … informed by an horizon of possibility’ (ibid). Citing Mezirow (1991, pp. 49–50) she notes that in this fashion they function ‘as both lions at the gate of awareness and the building blocks of cognition’. Ironically our meaning frame is often the mechanism which brings the anomalous nature of a given phenomenon to light, but then proves inadequate to resolve the problems raised by its existence (Kuhn, 1996, p. 122) and must be reformulated.

The reformulation of such a powerful frame will clearly also effect a shift in the learner’s subjectivity (Meyer & Land, 2005). It gives rise to a state of uncertainty ‘in which the learner may oscillate between old and emergent understandings’ (Cousin, 2006, p. 4). Learning thresholds are often the points at which students experience difficulty and are often troublesome as they require a letting go of customary ways of seeing things, of prior familiar views. This entails an uncomfortable ontological shift, as, in many respects, we are what we know.

Hence the superordinate and non-negotiable characteristic of a threshold concept is its transformative capacity. Moreover such concepts seem to have an integrating function in the sense of bringing what formerly appeared to be disparate elements into a coherent relationship, much as the addition of a particular jigsaw piece may bring other pieces together to provide a new and meaningful perspective.

The uptake of the Threshold Concepts Framework across some 259 subject areas in over 45 countries to date (Flanagan, 2016) has been both dramatic and gratifying. We would speculate that why the framework has had such resonance and appeal might be owing to the following factors. Firstly it is predicated on Perkins’ (2000) idea of Action Poetry, the notion that for an idea to have traction it should have relatively straightforward main premises, it should be capable of translation into small-scale, low key research implementation quite quickly, and it should have both explanatory and actionable potential. In this regard it is likely to appeal to early career researchers. The framework, moreover, is strongly discipline-focused and hence taps into practitioners’ own interests and identities. Part of its broader appeal may also be owing to its conceptually eclectic nature. It can provide a fresh analytic discourse, and vocabulary to be applied to new contexts of practice. It also addresses mainstream pedagogical and curricular issues within higher education and hence is often included within programmes of professional development for academic staff. Nonetheless, As Professor Peter Felten, the keynote speaker at the 5th International Biennial Threshold Concepts Conference wisely observed, the common endeavour is more concerned ‘to provoke and suggest, not to prove and conclude’. There remains much work to be done.
The Flanagan archive vividly demonstrates how the study and analysis of threshold concepts has over the years become interwoven with that of cognate topics such as troublesome knowledge, liminality, transformational learning, conceptual difficulty, ‘stuckness’, students’ prior knowledge, ways of thinking and practising (WTP), ontological shift, capability, and disciplinarity. The papers in this collection reflect this wider web of associated topics, and draw on them in their specific identifications, incorporations and contextualisations of threshold concepts across different disciplines and professional practices. They also address what students bring to the learning situation, in processes of ‘transactional curriculum inquiry’ (Cousin, 2009) and curriculum redesign.

The chapters in the current volume had their first airing at the 5th International Biennial Conference held at Collingwood College in the University of Durham from 9th–11th July 2014. In the rare sunshine of a Northern English summer, against the towering silhouettes of Durham’s thousand year old Cathedral and Castle, 102 delegates from 18 countries presented their findings over an intensive three days in what, despite the troublesome nature of our deliberations, was a very happy social gathering. These selected chapters from the Durham conference add to the burgeoning collection of available resources in this field and seek to show how the Threshold Concepts Framework is now being used in contexts of practice – disciplinary, professional, pedagogical and curricular. They are organised in the pages that follow in relation to their contribution to new theoretical directions for thresholds research, or a specific concern with aspects of liminality, with the relation of threshold concepts to interdisciplinarity, to learning at doctoral level, and finally with aspects of thresholds in professional practice.

THEORETICAL DIRECTIONS

In his conference keynote Peter Felten (Chapter 1) reminds us that ‘scholars and teachers should take seriously the experiences and insights of students as learners’. Much of the early work on thresholds was from the perspective of teachers. Felten demonstrates what insights we might gain into threshold concepts if we partnered with students as co-enquirers and co-explorers into the nature of thresholds and learning in higher education. In a series of three seminars held at Bryn Mawr College, just west of Philadelphia, students were invited to explore the idea of thresholds in relation to their own learning experience. Questions about affect, liminality, confidence, and disciplinarity emerged in these gatherings as the students described their experience with troublesome knowledge, focusing as much on the person doing the learning as the thing being learned. Many of these knowledge encounters were emotionally charged. Felten identifies troublesome affect as a particularly important area for further investigation for scholars of threshold concepts. One Bryn Mawr student, Sarah Jenness, observes that ‘school militates against uncertainty’ and questions why students would ‘risk liminality in the classroom when certainty feels both personally and academically safer’. Students, it became clear, do not often
come to higher education looking for, or appreciating, liminality in the classroom. In this regard, as James Atherton (2012) pointed out in his paper at the 4th Threshold Concepts conference in Dublin, liminality can become a liability. To counter this, Felten concludes, ‘threshold concepts are not just about knowledge, they also are about confidence’. And to acquire threshold confidence, in order permanently to cross a threshold, the seminar students insisted, they needed to believe that they belonged ‘on the other side’.

But even as we rightly celebrate the valued partnership roles that students have increasingly been playing in higher education over the last decade, with the Bryn Mawr students an exemplary case, nonetheless the language of partnership can become blurred unhelpfully with the discourse of student satisfaction. As Ray Land (Chapter 2) argues, a discursive shift has occurred over the last three decades from a language of education to that of ‘the student experience’. This increasingly influential view sits uneasily with the idea that universities serve to offer programmes of a transformative nature. Universities are required simultaneously to produce satisfied consumers as well as develop graduates for the wider society who can act and exercise judgment in complex, uncertain, risk-laden and unpredictable environments. This shift has come about through a move to a marketised notion of higher education as principally a private good (and a primarily economic rather than educational transaction). A consumer logic of value for money, accountability and the need for increasingly rigorous protocols and standards of inspection then ensues, seeking certainty and ‘crystal clarity’ (Ecclestone, 2012). It can easily be deployed to put students and teaching staff in an oppositional stance, through the use, for example, of consumer satisfaction student surveys in which the student-as-consumer ‘rates’ the professor-as-service-provider. Learning gain is measured principally through measures of student satisfaction as opposed to learner transformation. Learning can come to be depicted within the organisation as an undertaking that has a high degree of certainty, is non-problematic, without any significant incurring of risk. It does not entail deep personal change or transformation, troublesome challenge or even, at times, engagement. Liminality becomes a liability (Atherton, 2012). Students, as organisational actors, need to be rendered differently, not as consumers, but as co-enquirers, co-creators, co-producers. In this way the discourse of thresholds is advocated as a counter-discourse to that of a neoliberal higher education, as a pedagogy of uncertainty.

A new theoretical direction for thresholds scholarship is offered by Jan Meyer and Julie Timmermans (Chapter 3) who propose the construction of Integrated Threshold Concept Knowledge (ITCK). The empirical and social construction of ITCK, they argue, lies at the ‘intersection’ of specific transformational (and related) subject content with associated different ‘types of knowledge’. Captured in ITCK is the dynamic interplay between different ‘types of knowledge’ arising primarily from analyses for, and of, threshold concepts. This includes consequent articulation of their ‘critical features’, knowledge of how these are experienced cognitively, affectively, and ontologically (in varying degrees) by students in the liminal state
and, finally, how a fusion of these different forms of knowledge translates into in situ ‘threshold concept representations’, contributing in effect to a repertoire of student-centred ‘responses’. The genesis of knowledge that is broadly of this form, they suggest, lies in the writings of Shulman and Marton in the mid- to late 1980s that were independently focused in that period on the need to develop a (subject) content-based amalgam of knowledge, -how, and -why, to drive reforms in school teacher education and classroom practice. Three decades later their analysis of these writings provides an historical analogy and a foundation for contemporary arguments within the Threshold Concepts Framework. ITCK they propose, develops a new, or enriches an existing, learning and teaching philosophy that is personal and discipline-based. It is personal in emphasising attitudes and values: sense of self in relation to students, individual differences in their learning, and their learning wellbeing. It is discipline-based in emphasising sense of self (academic identity, ‘being’) in relation to discipline; thinking and practising that reflects its ‘inner logic’, its characteristic modes of discourse, reasoning, analysis and explanation.

Whereas previous research on threshold concepts in the classroom has tended to focus on upper-level seminars for majors (Middendorf & Pace, 2004; Land, Meyer, & Baillie, 2010), and hence comparatively small group sizes, Susannah McGowan (Chapter 4) investigates the embedding of threshold concepts in a large-scale lecture programme (450 plus students). As a baseline qualitative study of one large lecture course in History at the University of California Santa Barbara, her study contributes to three areas of research in higher education: application of threshold concepts at the course level; the application of threshold concepts in the humanities (and how it possibly contributes to current conversations about the survival of the humanities in higher education); and research on graduate student development and pedagogy in large lecture courses. This empirical study employed classroom observations, online surveys, interviews with the lead professor, teaching assistants, and students. Her initial findings were that, firstly, conceptual threads reinforce conceptual development: According to surveys, an explicit emphasis on concepts discussed in the professor’s lecture and teaching assistant’s discussion section, means that concepts are reinforced and practised, thus establishing a conceptual thread for the student. A second finding was that emphasis on concepts bolsters levels of engagement in discussion. Emphasis on threshold actions or the work involved that leads to the understanding of a historical threshold concept provides an avenue of engagement in the discipline. When the professor delivered his lecture on how historians analyse sources, two teaching assistants (two of nine) consistently employed these strategies subsequently in their own discussions with students. Finally it was found that teaching assistants play a vital role in imparting threshold concepts. This was a finding that the course professor had not taken into account in earlier offerings of the course. Moreover, in explaining these concepts to students in class, the professor realised he also had to make his intentions explicit to his nine teaching assistants. This was an unexpected outcome of the study yet one crucial to the development of teaching assistants as future professors.
A recurrent concern within thresholds research has been the question of how to identify, validate, and address threshold concepts within an individual discipline (Meyer & Land, 2005). Within a disciplinary context, individual instructors often identify threshold concepts based on their knowledge of their students’ interaction with the content. Moreover, research methods for identifying threshold concepts vary widely to include interviews, case studies, Delphi techniques and other qualitative data (Meyer & Land, 2006; Davies, 2005). Hence Beth White, Taimi Olsen and David Schumann (Chapter 5) posed the question ‘What can an instructor gain from considering student viewpoints and the experiences of other faculty?’ They set out to test a method of disciplinary inquiry, using analysis of given circumstances, collecting data through multiple methods, and analysing results in a systematic approach. The study reported in their chapter focuses on one departmental sequence – a first semester composition and rhetoric course taught at a large research university in the Southern United States. (Future studies will expand to consider validity across disciplines). They discuss a method of identifying disciplinary threshold concepts within a course by using input from learners and instructors (surveys and interviews) as well as analysis of syllabi and instructional materials. They outline their research process, and present and analysis of their results that includes a comparison of student responses with instructor responses.

NEGOTIATING LIMINALITY

Since the 4th Threshold Concepts conference in Dublin there has been growing interest in the liminal dimension of the Threshold Concepts Framework and the number of papers at the 5th conference that drew attention to this topic merited a specific section within this volume.

We already know that not all learners experience threshold concepts in the same way and that the degree of troublesomeness associated with a particular threshold concept will vary between individual learners (Meyer & Land, 2006). The very willingness of learners to engage with the threshold concept itself and navigate the associated liminal space is equally varied (Meyer & Land, 2006). Some learners are willing, or even eager, to enter the liminal space in the hope of emerging transformed or coming to a new way of understanding whilst others pause at the entrance seemingly unable or unwilling to let go of their pre-existing understandings (Cousin, 2006). Julie Rattray (Chapter 6) points out that much of the work in this area has focused on intellectual or pedagogical explanations to explain the differential experiences of learners when they encounter troublesome knowledge (Flanagan, 2016). Her chapter explores another possible explanation for learners’ behaviour when they encounter thresholds and more particularly are required to engage with liminality. This is the extent to which affective and psychological characteristics of the learner, such as resilience, might explain why some students are able to cope with liminality and persist in the face of uncertainty whilst others appear to withdraw from it and remain in an untransformed state. She draws on the work of Luthans
et al.’s (2007) construct of Psychological Capital (PsyCap) as one measure of the affective dimension of learning. She explores firstly the potential relationship it has to academic performance before moving on to a consideration of any potential utility it might have as a means of explaining ‘why some learners remain trapped in, or fail to enter, the liminal space and others emerge from the space to inhabit a new place of being’. Moreover, from a pedagogical perspective, she argues that ‘the malleable nature of some psychological states render them meaningful in a learning and teaching context not only because of their explanatory function but as a potential source of intervention to support a positive learning experience’.

Liminality remains to some extent the ‘black box’ of thresholds research, given the evident intractability of attempting to access or represent this individual state in any reliable or accurate fashion. Much of the available data depends inevitably on self-reporting. Nevertheless Ahmad Thamrini F. Syed Mohamed, Ray Land and Julie Rattray, in their study of professional military education (Chapter 7) identify what they consider to be new possible responses to the liminal experience of transformation. Drawing on Homi Bhabha’s (1994) notions of ambivalence and hybridity in their analysis of their empirical data, they find that certain learners do not necessarily follow a prescribed path of transformation to an established ontology (in this case military states of ‘soldiership’ and ‘officership’) but are capable of conforming to expected communal practices whilst simultaneously feeling ‘empowered to intervene actively’ by ‘questioning and refashioning received ideas’ (McLeod, 2000, pp. 218–219). The outcome is a state of ontological ambivalence, in which contrary (and sometimes contradictory) allegiances may be retained, and maintained, leading to the formation of hybrid identities. They suggest that experience of ambivalence in liminal states and subsequent adoption of hybrid identities may well be found in other processes of professional transformation, and that these lenses may prove fruitful in future inquiry.

Virginia Tucker (Chapter 8) further explores the novice-expert liminal space to study the threshold concepts involved in learning to become an expert. The professional practice site for this study is ‘search expertise’, and the study explores knowledge that could transcend both the particulars of an individual search engine (features, commands, and the like) and, second, the subject area of the database content. The study focuses on the liminality between the highly proficient novice and the expert searcher. ‘Expert searchers’ in today’s information environment include reference librarians, information architects, university faculty who teach advanced search, and other professionals in a variety of information-intensive settings. Their experiences are characterized by a profound understanding of information concepts and content and they have an agile ability to apply this knowledge to both interacting with and having an impact on the information environment, often including having a role in the information experiences of others. The study closely examines novice-expert literature and considers practices relevant to the learning experiences of experts, such as how they structure knowledge, process ambiguous information, solve problems and use representations and reflection when learning. Emerging themes
provide evidence of four threshold concepts: information environment, information structures, information vocabularies and concept fusion – the integration of the other three threshold concepts further defined by additional properties. In addition to the threshold concepts were findings that are not concept-based, including praxes and traits of expert searchers. A model of search expertise is proposed with the four threshold concepts at its core that further encompasses these traits and praxes. This allows the research to present an integrated model of the novice-expert space for the practice site of search expertise. In addition, melding understandings from novice-expert research and threshold concept theory literature (Meyer & Land, 2003; Cousin, 2010), the study finds ontological shift to be a critical component of the model, in addition to critical changes in discourse (Flanagan & Smith, 2008).

When confronted with troublesome issues and threshold concepts, students are obliged to choose strategies when faced with the prospect of liminality. Terje Berg, Morten Erichsen and Leif Martin Hokstad (Chapter 9), researching in the context of a Norwegian Business School, undertake a quantitative study to investigate the experience of undergraduate students, and their potential strategies (or lack thereof) in the liminal stage of their learning trajectory. The researchers identify two main strategies for the learners, either a strategy of fight or one of flight (e.g. procrastination, postponement, giving up easily), two typical psychological responses to liminality, expressed in stuckness (Cannon, 1929; Meyer & Land, 2006; Nolan, 2005). They choose to focus in this chapter on the fight strategies, as insights gained from study of coping strategies in general, and fight strategies in particular, give lecturers knowledge about how to conduct these strategies back to new students. The researchers identify specific potential threshold concepts based on a triangulation of the available data sources; interviews, questionnaires and discussions, observations, exam statistics, and an external researcher. They then investigate a range of fight strategies adopted to gain mastery of these concepts, which include extracurricular efforts, students’ undertaking exercises by themselves, consulting the lecturer as an extra asset, joining a study group, consulting significant others and accessing the internet. Findings indicate that confidence is built from doing extracurricular efforts, doing exercises, and to some extent using the lecturer or the study group as extra assets. This self-confidence may give the student the necessary belief in how to overcome threshold concepts. Thus, next time the student is facing other threshold concepts, she has increased her ability to cope with these concepts. They suggest that what seems to be lacking in these students’ learning trajectory and the course design ‘is to facilitate the development of studenthood, how to become a student, which differs from being a pupil’. They point out, further, that components of a successful understanding on the learner’s behalf are cultural as well as ontological. ‘Parts of the underlying game lacking in many of the students’, they observe, ‘are the realisation of endurance, or the need for time on task, i.e. a slower, more meticulous learning process than experienced previously’. Or, in Cousin’s words, the ‘messy journeys’ back, forth and across conceptual terrain’ (Cousin, 2006).
As we increasingly find ourselves in an age of globalisation, uncertainty, risk and speed, the pressing scientific, social and economic problems of our times seem to demand more than one disciplinary lens to bring them more clearly into view, and to offer possibilities of resolution. As Roy (1979, p. 165) famously put it, ‘the real problems of society do not come in discipline-shaped blocks’. Hence there has been an increasing emphasis in our universities, and from our funding agencies on the issue of interdisciplinarity. Two of the chapters in this volume consider this issue in relation to threshold concepts. Jason Davies (Chapter 10) points to the ‘profound difficulties’ for students on interdisciplinary programmes (particularly postgraduates) who face conflicting epistemological claims and/or threshold concepts. ‘What do you do,’ he asks, ‘when your tutors or supervisors are literally arguing from different premises, with the implication that meaning-construction and intellectual reference points are as different as the physical buildings?’ Furthermore he points to the often likely consequence that ‘thinking outside the box’ – a frequent mantra associated with interdisciplinary approaches – will require ‘the immediate construction of a new box with a different design and a different set of understandings for what constitutes “success”’. Incommensurability, always anathema in interdisciplinarity, is, he argues, ‘emphatically predicted by threshold concepts’ given their: ‘transformative’, ‘irreversible’, ‘integrative’, ‘bounded’, and ‘troublesome’ nature. Much in the spirit of an ethnographer he examines the manner in which a discipline’s threshold concepts ‘feature in the building and maintenance of disciplinary integrity by “tribes” in academia’, and points to the practice of threshold guardianship, where, far from the deployment of threshold concepts as enabling ‘doorways’ they might rather be seen to serve as locked doors ‘to keep the disciplined in (or perhaps “safe”)’. He helpfully advocates a possible way out of these dilemmas through the promotion of a culture of disciplinary distinction (identifying characteristic aspects) rather than definition (identifying dividing lines and borders). What all disciplines have in common, he reminds us, is that, ‘for our heuristic purposes, they all operate with threshold concepts. These do not compete or invite competition, but are discrete: they are the site of incommensurability’. In this way, he proposes, threshold concepts are potentially a great leveller, ‘and their articulation at some point, whether deliberately or piecemeal, is usually a necessary part of collaboration’. Such frankness about our practices of threshold guardianship might offer ways, he wisely suggests, for different ‘tribes’ to ‘retain their integrity without impinging on others’.

Approaching interdisciplinary from a different perspective, Aminul Huq, Marcia Nichols and Bijaya Aryal (Chapter 11) consider threshold concepts in relation to interdisciplinary structures of learning. They undertook a retrospective quantitative examination of how a group of students approached and grappled with ambiguity and context in three courses: Introduction to Literature, Introduction to Physics, and
Calculus I. This would allow the researchers to determine if learning transfer is occurring across disciplinary lines and to provide a foundation for them ‘to more deliberately imbed curricular points of integration that would better promote the transfer of learning and understanding on the TCs’. They suggest that ‘ambiguity’ and ‘context’ are interdependent threshold concepts, that is, those that are not only salient in multiple disciplines but that also can but taught across disciplinary lines. In contrast, independent threshold concepts are ‘discrete concepts’ at a specific learning stage within a discipline that do not require the previous mastery of another threshold concept, such as the concept of ‘function’ in Calculus, ‘genre’ in Literature or ‘measurement uncertainty’ in Physics. Independent threshold concepts can be applied to other concepts, but the concept itself does not depend upon learning other threshold concepts in near simultaneity. Finally intradependent concepts are those that are still at a particular learning stage within a single discipline, but that are dependent upon other concepts within that same discipline, like Symbolism in Literature or Limit, which depends on the concept of Function. The study reveals surprising, even counterintuitive, correlations between Literature, Physics and Calculus, for example that students may be more comfortable with ambiguity in physics than in literature. On the other hand high performers were found to perform well across all three disciplinary boundaries, suggesting that, despite common assumptions that students who are good at Maths and Science are not good with words and vice versa, this is simply not true. In fact, good analytical skills are not only necessary for success in all disciplines, but were found to transfer from STEM to Humanities and back again.

THE DOCTORAL JOURNEY

The experience of undertaking doctoral level study has for some time been recognised as one that requires powerful conceptual and ontological shifts, and frequent encounters with troublesome knowledge. Two chapters in this volume investigate the experience of doctoral students further. Michelle Salmona, Dan Kaczynski and Leigh Wood (Chapter 12) were concerned that doctoral degree non-completion rates have remained consistently high for the past 50 years, with, for example, approximately only 50% of Humanities candidates and 56% of Social Sciences candidates successfully completing their doctoral degrees in the United States (Grasso, Barry, & Valentine, 2009). They consequently undertook a survey to investigate this vexed situation in the United States and Australia. Particular attention was paid to the challenges of research methodology which they consider represents a key ingredient for the doctoral candidate completing the dissertation. As straightforward as the apparently linear sequence of topic selection, framing of problem statement, clarifying purpose and focus, and crystallising research questions might appear, the doctoral candidate, they maintain, ‘is confronted with an overwhelming number of methodological decisions prior to implementing their research study which geometrically expand with each step taken’. They identify
threshold concepts as a means to deconstruct and restructure teaching and learning of research methodology concepts for doctoral candidates. After developing a survey instrument to identify potential threshold concepts in research methodology (from the perspective of doctoral faculty and supervisors), they targeted members in the International Doctoral Education Research Network (IDERN) and a representative sample of supervisors at the universities which the authors are affiliated with. The scope of their inquiry explored such themes as: building a logical cohesive scholarly argument; recognizing when to bring theory into the study; gaining critical value from the literature to the study; progressing from description to analysis; credible evidence-based analysis and interpretation, and contributing trustworthy high quality research. The dissertation phase of learning and the critical role of supervision are prominent in this study, which stresses the critically important need to improve instruction in research methodology and to increase successful completion rates for doctoral students. The study acknowledges the importance of scaffolding learning and teaching which supports student mastery of concept knowledge. Conclusions examine strategies which promote the modelling of concepts beyond the procedural aspects of research methodology.

An internationally recognised author on doctoral supervision, Gina Wisker (Chapter 13) builds on her earlier work to address how doctoral students identify and deal with three kinds of blockage in their work: grappling with finding the appropriate methodology and methods; undermining by the supervisor, and a struggle with articulation. Students report silencing, loss of confidence and paralysis in their work with each of these blockages. Her chapter then focuses specifically on ways in which doctoral students deal with such transitional and troublesome moments in their learning journeys, considering their awareness of how and when they identify and engage with transformational knowledge, challenges in the supervisory relationship and writing blocks. It focuses on their recognition of these troublesome, transitional moments, and the ways in which they take ownership and agency, cross conceptual thresholds, articulate their research projects and the contribution of their findings, often through the supportive work of supervisors, and sometimes through engagement with the research literature. Re-scrutiny of the data from three earlier projects (2007–2010, 2009, 2012) and new data gathered for this study – involving face-to-face and email interviews leading to two case studies – offers insights into the ways in which doctoral students identify, meet and cross these conceptual thresholds in their work. It indicates how they evidence and articulate their awareness of moving forward to the achievement of their doctoral learning journeys and identities as researchers and writers, through ownership, agency and articulation.

THRESHOLD CONCEPTS IN PROFESSIONAL PRACTICE

In recent years the insights gained from threshold concepts, liminality and troublesome knowledge have been increasingly applied in areas of professional education and
development. Nokia and Siemens Europe have used the idea in ‘serious games’ design for Management education, in the €9.4 million EU Cordis collaborative project. In the USA the Association of College and Research Libraries (ACRL) have established a new national American Libraries Association Framework for Information Literacy for Higher Education. This has replaced an earlier standards-based approach with one that employs threshold concept-derived ‘frames’. In Trondheim, Norway the innovative TRANSark project has adopted threshold concepts as one of its five informing principles for the future transformation of architectural education. In 2015 it received 1 million NOK from the Norwegian Government to further develop this programme. In Australia the Australian Council of Engineering Deans supported a national workshop series on TCs, one of the outcomes being the University of Western Australia (UWA) Faculty designing a new curriculum for engineering courses introduced in 2012. On the other side of the continent the University of Queensland’s Occupational Therapy Department identified five threshold concepts, designed their curricula around them and flagged their importance to students by describing them in their Student Guide. In the 2014 United Kingdom Research Excellence Framework (REF) an impact case study submitted by Durham University on the impact of threshold concepts on higher education pedagogical practice worldwide was rated equal first in the UK.

This tendency is reflected in many chapters of this volume. Reference has already been made to the professional education of military officers and that of information search specialists. Further chapters address the application of TCs to the practice of engineers, medics, nurses, computer scientists, lawyers, teachers and architects. Hence the acknowledgment of this strong emphasis in the title of this volume. Anthony Parker and Daniel McGill (Chapter 14) discuss the implementation of a fully module-based Engineering programme in an undergraduate degree at Macquarie University in Australia. The implementation of threshold concepts in the design of this modular format is discussed as a singularly important influence in this design. The innovation of threshold concept modules is introduced and considered as a potentially significant contribution to the practice of a threshold concepts approach to Engineering pedagogy. The innovation of these concept modules is intended to allow space within a unit for a module to provide the focus of a specific threshold concept to be developed. The anticipated advantage of this approach is to ensure clarity of overall outcomes and the particularly the significant threshold themes of the unit. The concept module requires that the development of the relevant threshold concept is covered appropriately and comprehended by all participants. It further ensures that all key concepts in a unit and program of study are covered within the curriculum and understood by both staff and students, and that they are presented with a clear focus on the process with minimum distractions. The intention is to workshop one core notion, the threshold concept, from a variety of contexts, hence providing students multiple views of the fundamental learning threshold, with all the contingencies, variabilities and structures of a professional Engineering project.
Also in Australia, a team based at Queensland University, Jan Meyer, David Knight, Tom Baldock, David Callaghan, Julie McCredden and Liza O’Moore (Chapter 15), investigated how ‘critical flow’ was identified as a threshold concept in a third-year civil engineering course on ‘open channel hydraulics’. The team also considered how responses to associated variation in student learning and metalearning led to the development of new forms of sustainable pedagogy. The methodology employed is transferable to other contexts, while the pedagogy targeting ‘structural complexity’ in student understanding is adaptable as appropriate to other threshold concepts. A starting position acknowledged the status of a threshold concept being of limited use in the absence of responsive pedagogy, and that such pedagogy in relation to that concept must proceed from knowledge of how students vary in their learning of it (Meyer, 2010). Thus emphasised, ‘variation in student learning’ is important for three reasons: First, conceptually discrete patterns of learning within such variation establish a basis for pedagogical responses including mechanisms for increasing students’ metalearning capacity in relation to that concept (Meyer et al., 2009). Second, these patterns partially explain why a particular threshold concept will be apprehended and experienced by students in varying degrees attributable to individual differences. And in doing so a basic premise is reinforced: the epistemological, epistemic, discursive, and ontological shifts associated with threshold concepts constitute dimensions of inter-individual variation, not conformity. Third, when exhibited in a professional development context (informally and collegially so in the present case) such variation is catalytic; it serves as a threshold concept in its own right in reconceptualising teaching practice (Meyer, 2012).

The threshold status of ‘critical flow’ emerged from a triangulation of three sources of evidence: (a) expert conceptual analysis, (b) students’ experiences and, (c) statistical analyses of students’ answers to past examination questions (Knight et al., 2013a). Also empirically determined, in accordance with theoretical expectations, was clear evidence of variation in students’ learning of, and capacity for metalearning engagement with, this concept (Meyer et al., 2012). ‘Quality’ in students’ understanding (in answers to examination questions involving ‘critical flow’) was interpreted as variation in ‘structural complexity’ after the work of Biggs and Collis (1982). With a precursor of metalearning activity focussed on ‘critical flow’, associated follow up pedagogy of the concept centred on activity to directly alter students’ learning behaviour by altering assessment practices and students’ perceptions of task demands. ‘Metacognitive assessment activities’ based on ‘critical flow’ have accordingly been developed and trialled with outcomes consistent with theoretical expectations, as evidenced in demonstrably improved student engagement, satisfaction, and performance (Knight et al., 2013b).

In Engineering the student is often confronted with ‘contrasting representations or models’ (Entwistle et al., 2005, p. 9), which Entwistle explores as ‘ways of thinking and practising’ (ibid). These contrasting representations might take the form, in electric circuits, of graphs, mathematical models, drawings of circuits or the real circuits. In their research in Electrical Engineering in Sweden Anna-Karin
Carstensen and Jonte Bernhard have found that exploring the relationships – links – between these different representations, in the theory/model domain as well as in the object/event domain (Tiberghien, 2002), is of the utmost importance. In their chapter (Chapter 16) they explore how the learning of two-terminal equivalents may be facilitated by integration of small practical tasks within a lecture setting. In a contribution to an earlier volume on threshold concepts the authors described how a tool developed for investigation of ‘the learning of a complex concept’ was employed to find critical aspects, which they called ‘key concepts’, in the sense of a key unlocking the portal of understanding of threshold concepts (Carstensen & Bernhard, 2008). In their chapter in this volume they explore these links further. In continuing their work on how students make links between the different ‘islands’ of single concepts, in order to make a whole of the complex concept, they have noted that the links between these islands are of different kinds. They discuss what kinds of relationships these links consist of, how they differ in the ways students might need to cope with them, and how teachers may notice and highlight these relationships in their instruction. By analysing video-recordings of students’ interactions during lab-work in accordance with Marton and Tsui’s (2004) Theory of Variation, the authors are now able to make a more detailed analysis of what the links are, and hence a further contribution to the understanding of the nature of a threshold concept.

Learning in the health professions is profoundly ontological – it is about ‘becoming’ a practitioner. As Andy Wearn, Anne O’Callaghan and Mark Barrow observe (Chapter 17) ‘In this process of “becoming”, students and trainees can often recall significant moments when they felt stuck, challenged or enlightened. At these times they may be compelled to think differently about their practice and themselves as practitioners’. This team of medical researchers from Auckland in New Zealand undertook a study of the transformation that doctors experience during their Palliative Care training. Anecdotally, registrars undertaking a Palliative Care attachment as part of their specialist training identify this as a transformative process – making them think differently about medical practice and themselves as doctors. Their role in this setting is significantly different from that of other specialist areas. Dealing with the patients and their family or whanau where death is expected provides a range of challenges that may not have previously been consciously addressed. These observations resonate with the framework of threshold concepts and troublesome knowledge. Comparatively little research on TCs has been conducted within medicine, although it has been applied in other health professional contexts. In this study the research team chose to collect data from the learners rather than the tutors or content experts. The aims were: to explore the palliative care training experiences of doctors, identifying the aspects that they found transformative and/or troublesome; to identify a series of TCs in the area of Palliative Care, from the perspective of the learner; to use these TCs to inform teaching and learning in Palliative Care and medical education more broadly. This was a theory-testing qualitative study using a deductive and then inductive
approach to coding. Purposive sampling was used to recruit medical registrars who had undertaken a six month Palliative Care run as part of their postgraduate training. Two focus group interviews (eight participants in total) were held using a semi-structured guide, and were audiotaped and transcribed verbatim. All defining features of the TCs framework were found repeatedly in the data. Eight tentative TCs were identified and stood up to comparison with the theoretical framework. The two which stood out most prominently were Recognising and managing strong emotions in self or others, and Reframing communication – ‘ask’ before ‘tell’.

Also within the Health Professions a narrative research study was undertaken in Scotland by Linda Martindale, Ray Land, Julie Rattray and Lorraine Anderson (Chapter 18) to investigate research learning in undergraduate nursing education using threshold concepts as a framework. Research skills and methods are an integral part of the undergraduate nursing curriculum, underpinning the use of research evidence in practice. Understanding the research process and research methods are thresholds which students need to pass through to support their development into evidence-based practitioners. However research evidence suggests that undergraduate nursing students find research skills and methods troublesome and this is a significant barrier to learning. Troublesome research knowledge can be readily aligned with existing understanding of troublesome knowledge, as identified by Perkins (1999). For example Ax and Kincade (2001) identified counter-intuitive knowledge in the term ‘research’ because of the everyday usage of research as being simply to find out about something. In the threshold concepts literature, aspects of research learning have been found to be troublesome in other disciplines, such as Taylor’s (2006) work on hypothesis development in biology and Kiley’s (2009) study of research learning in doctoral students. Seventeen nursing students were interviewed in depth about their experiences of learning about research. Learning narratives were gathered and these were analysed using a thematic narrative analysis, specifically focusing on difficulties encountered by students. The analysis identified troublesome knowledge through the way in which students conceptualised the terms research and evidence based practice, as well as how they used (or avoided) specific research terms and concepts. However other troublesome elements were also apparent: the learning environments; the perceptions about what research means to a nursing student; and the anticipation of research learning being difficult. These findings point to troublesome areas in threshold concepts which are not necessarily intrinsic to the subject or concept itself, but which are linked to the culture and environments in which the students are learning and to their perceptions of the topic. In nursing this seems to be particularly problematic because of the need to learn within a higher education institution as well as in a range of healthcare settings. Understanding the range of factors which may make a threshold concept troublesome can help to explain students’ challenges in learning. This understanding has the potential to influence curriculum design to address these problems more overtly.

An interesting debate has arisen within Computer Science in terms of approaches to the identification of threshold concepts within this discipline and the efficacy and
reliability of the methods used to attain this. In Ireland Dermot Shinners-Kennedy (Chapter 19), though acknowledging that devising an effective methodology for identifying threshold concepts ‘would represent an important milestone in the evolution of threshold concept scholarship’, nonetheless concludes that ‘For the most part the strategies deployed by researchers to date have yielded tentative proposals only and the uncertain nature of the outcomes has been a frustrating experience for investigators’. The retrospective nature of the methods employed come in for criticism. The author identifies what he sees as shortcomings inherent in the commonly-used approaches. Typically, he argues, the source of the evidence has been discipline experts and would-be discipline experts in the guise of learners. The belief is that experts can validate the inclusion of concepts in a classification because they ‘know’ their discipline and this knowledge provides them with the tools to dissect and analyse the body of knowledge to identify the appropriate concepts. A variant of this approach seeks empirical data gathered from students at various stages of completion of their programmes of study. Their lack of competence or gaps in their knowledge are viewed as sources of evidence to support or confirm the assignation of a particular status to a given concept. Both of these sources he considers unreliable. He identifies a list of shortcomings in prevailing methods that includes: the effects of basic level concepts; expert blind spot; hindsight bias; the illusion of memory; the influence of language and the effects of emotion. These issues, he argues, ‘actually militate against the discovery of the type of data that is sought by investigators’.

A team of computer scientists from the Netherlands, Bert Zwaneveld, Jacob Perrenet, and Roel Bloo (Chapter 20), are not convinced by Shinners-Kennedy’s reasoning. Hindsight bias, they contend, refers to prediction of events in the past with known outcome and overestimating its probability. Impaired memory, they point out, because of emotional load, refers to severely traumatic experiences. Moreover their own research into Computer Science threshold concepts ‘obtained interesting and opposite results to those of Shinners-Kennedy and Fincher’ (2013). Their approach was to involve students (about 60) as well as their teachers (about 20) from Computer Science. The student task, digital paper-and-pencil, was presented at the end of the BSc programme as a compulsory reflection assignment. The threshold concept was explained, including the characteristics drawn from Meyer and Land’s (2006) original characterisation and with some non-Computer-Science examples. Students were asked for examples from their experience and to indicate the applicability of the characteristics. Preliminary results were that almost all students explained 1 to 3 concepts and declared the characteristics applicable most of the times. So, at least, in the view of these authors, the threshold concept has proved to be fruitful to stimulate reflection by students. They used the list of 27 computer science threshold concepts from Shinners-Kennedy and Fincher (2013) for comparison. Their results showed much more variety compared to this list. Only 50% of the time concepts were mentioned that were on Shinners-Kennedy and Fincher’s list, with ‘object orientation’ most frequent (15%). Outside the latter list ‘logics’ was
The Dutch team state that they will seek an explanation by analysing the differences between Computer Science curricula. Another aspect for further investigation is the variation in specificity level in the threshold examples. They also plan to show the teachers the student task and ask them for concepts they think the students mentioned. This team also eschew Shinner and Fincher’s expressed preference for the use of Shulman’s pedagogical content knowledge (PCK) to construct individual teacher’s concept representations (CoRe’s). PCK is defined by Shulman (1986) as that expertise that allows experienced teachers to effectively represent the subject to their students; it is the special amalgam between general and specific pedagogical knowledge and content knowledge. The Dutch team, however, point out that their experience with PCK and construction of CoRe’s with groups of teachers (Saeli et al., 2012) leads them to the conclusion that this is an interesting research method, uncovering many aspects of teaching within a discipline, but time-consuming if only directed at the threshold phenomenon. Moreover, focusing on teachers as a source gives only indirect information.

In the practice of Law Marianne Dickie and Ilona Van Galen (Chapter 21) sought to redesign their existing programme of legal education into an online mode that would involve new ways of teaching which moved beyond the lecture room and tutorial to asynchronous discussion forums and podcasts. Though they had carefully sought to provide a space for a community of learning based on the community of inquiry model (Garrison et al., 2001), they had not anticipated the prevailing perceptions and expectations that their law students entertained in relation to studying online. Assumptions were held that online study was informal, would be self-paced, and equalled a small time commitment. Students expected that they would not need to participate regularly and interpreted ‘asynchronous’ learning as meaning that teachers were always available. It was expected, further, that normal university policy and rules would not apply, and that online study could not include a practical component. Because of these perceptions students found it hard to engage with complex legal theoretical and practical work within the required time constraints. Whilst the providing team attempted to rectify any impediments to engagement, they initially believed the problem was predominantly one-sided, with feedback indicating that students did not ‘consider themselves to be postgraduate law students’. This consideration inevitably impacted on their ability to grasp essential concepts needed to complete the course successfully. A review of the team’s approach, however, found that what they had considered to be a threshold concept for students was in fact caught up in a threshold problem they were facing themselves as both designers and academics. ‘We realised that in order to create an online learning community, we needed to embrace aspects of traditional campus life and infuse these into the course design. This ground breaking realisation radically altered our site design and curriculum. The very nature of online learning required us to become architects of the environment in which our students learnt’. They subsequently transformed their thinking, utilising architectural and communication principles to reinvent physical spaces in a virtual world, and treating the electronic interface as both a campus and a
workplace that students must enter and navigate in order to engage with their learning experience. The way students ‘see and understand their learning environment’ is now one of the central pillars of their curriculum design. The team were brought to the McLuhanesque realisation that ‘Ultimately our commitment to achieving positive student outcomes led us to the troubling, transformative, integrative and irreversible realisation that, for online study, the medium also matters’.

The Scholarship of Teaching and Learning (SoTL) is an important international movement, which contributes to the quality of teaching and learning in higher education, as well as to a growing body of educational literature (Hubball, Pearson, & Clarke, 2013). With a focus on student learning in diverse educational contexts, SoTL encompasses a broad set of practices that engage educational leaders in examining curriculum and pedagogy in a methodical and rigorous way (Hutchings, Huber, & Ciccone, 2011). In Chapter 22 Andrea Webb argues that by providing a literature-informed, peer-reviewed justification for programme and policy changes, SoTL offers ‘a practical and complementary undergirding for research in teaching and learning’. However, she adds, many institutions lack internal SoTL expertise to effectively develop and evaluate curriculum and pedagogical practices and consequently there is a need for better and more integrated theoretical work in designing SoTL programs (Kandlbinder & Peseta, 2009). Recent studies illustrate that threshold concepts have proved useful for initiating cross-disciplinary discourses (Carmichael, 2010); acting as a starting place for curriculum making (Carmichael, 2012). The ultimate purpose of her chapter is to identify the threshold concepts in SoTL in order to facilitate the adoption and widespread use of SoTL by faculty members in diverse contexts. She draws on the theorisation in threshold concepts in the seminal Meyer and Land papers (2003; 2005; 2006) ‘as a lens with which to investigate SoTL and as a frame to consider curriculum for SoTL programs’. Focusing on the ‘stuck places’ in SoTL programs, her research considers the experience of faculty members previously and currently enrolled in a SoTL program at a research-intensive university in Canada. Semi-structured responsive interviews were conducted with 14 current SoTL program members and 20 past graduates to explore their experience of learning the ways of thinking and practising SoTL. These interviews revealed a variety of troublesome concepts and coping strategies to navigate the liminal space. Participants noted the challenging epistemic shift required when designing and conducting SoTL research in an educational frame. Most of the interviewees expressed that participation in the SoTL programme transformed their understanding of teaching and learning in higher education. She concludes that given the potential institutional benefits afforded by the adoption of SoTL for pedagogical and curricular investigations, an understanding of SoTL that includes threshold concepts will help to facilitate the requisite cultural shift within departments and institutions. ‘The troublesome nature of threshold concepts in SoTL provokes the uncomfortable, liminal spaces that are a necessary feature of learning to do SoTL. It will push the educational research in higher education into a new place for both faculty and students’.
Also within the practice of teaching, David Moroney, Eugene McKendry and Ann Devitt (Chapter 23) present a study of pre-service and practising language teachers in the Republic of Ireland, within the Threshold Concepts Framework (Land et al., 2010), to explore the core but troublesome knowledge and practices of language teaching and the conditions that facilitate the integration and implementation of these concepts over a teaching career. Their project draws on previous work on threshold concepts in teacher education (Devitt et al., 2014) and considers the interplay of knowledge, belief and practice at initial teacher education, and beyond, for language teachers. The Threshold Concepts Framework, they suggest, holds the promise of providing a new lens through which to explore the notion of teacher cognition, defined by Borg (2006, p. 1) as “what teachers think, know and believe”. The potential of threshold concepts as catalysts in the restructuring of not only learners’ knowledge systems but also their beliefs and even identity, they argue, resonates with a model of teacher knowledge which encompasses dimensions of thought from experiential to theoretical knowledge and personal belief to objective ‘truths’ (Woods & Çakir, 2011). This qualitative case study had an initial exploratory phase with eight practising language teachers in Ireland to identify threshold concepts underlying good language teaching. A follow-on study consulted pre-service language teachers to explore their experience of identified TCs as part of their initial teacher education programme.

Phase 1 found, from the perspective of professionals in the field, that facilitating meaningful language use in the classroom and fostering learner autonomy are the key elements underlying good language teaching. This essential knowledge is often expressed as a belief system, one which is in place since initial teacher education or participants’ language learning history. However, the degree to which teachers can teach in accordance with these beliefs is expressed as contingent upon local and broader policy contextual factors. Preliminary analysis of the blogs suggest that while the student teachers are primarily focused on more technical aspects of teaching, such as planning and classroom management, these aspects are oriented towards core principles of language teaching, such as bringing real language use into the classroom by using the target language. Participants also expressed a tension between knowledge and beliefs about teaching and their ability to teach in accordance with these beliefs, through a lack of skills in this case rather than contextual factors. This tension appears to contribute to a sense of impostorship (Brookfield, 2006) where they report that they do not feel like a teacher as their practice is behind their state of knowledge and their beliefs.

Architecture is a highly interdisciplinary field. At its base is the need to deal with complexity; to oscillate between details and ‘the big picture’, and to move across discipline borders in search of patterns and intersections. In the concluding chapter of this volume (Chapter 24) a research team from Trondheim in Norway, Leif Martin Hokstad, Gro Rodne, Bjørn Otto Braaten, Steffen Wellinger and Fredrik Shetelig, discuss the TRANSark project, a proposal to rethink architecture with a threshold concept-centred methodology for curriculum (re)design for the education
of architects. In architecture leading voices have called for a ‘big rethink’ to develop new ways of thinking and practising in the discipline, and also in the education of future architects (Buchanan, 2012). Among the challenges for the education of architects is now to prepare students for multiple frameworks and competing values, ill-defined problems and open-ended situations (Barnett, 2000). Architecture is a knowledge domain where aesthetic, tactile experience is crucial, and creative practice is a way of thinking and a way of understanding. These perspectives align well with the Threshold Concepts Framework, and it has been suggested that architecture engages with liminality, being the threshold between ‘old’ paradigms and values and the ‘new’ which are as yet not clear (Meyer & Land, 2005). It requires a period of indeterminacy prior to the crossing of the threshold (Cousin, 2006).

The educational trajectory of TRANSark is organised into four components. Making is Thinking acknowledges that architecture belongs to the ‘making disciplines’ (Pallasmaa, 2009) and the connection between mind and body. Students undergo an embodied experience by working in full scale from the very beginning of their study. Live Studios, a PBL-based methodology, is designed to challenge the students, bring them out of the academy into real-world situations that enable them to gain insights, skills and understandings that cannot easily be academically ‘taught’. Complexity and Change assumes that the overall context of design and building processes is continually changing and developing into ever higher levels of complexity. The Integral Approach provides a possible map and a method (Integral Methodological Pluralism) that can be used as a tool of orientation in complex matters (Wilber, 2007).

The components listed above challenge the learners considerably and position them in a daunting liminal phase that is necessary to grasp the ‘underlying game’ (Perkins, 2006). TRANSark frames these challenges of redesign within the lens of the fourth component, the Threshold Concepts Framework, and focuses on how liminality is expressed and experienced among students, how patterns and integration may be made possible for them, and how ‘the underlying game’ can be rendered accessible.

CONCLUSION

As with previous volumes in this series on threshold concepts, we sincerely hope that the chapters that follow will convey something of the commitment, passion and engagement that characterised our time together at the Durham conference, where colleagues from around the world first presented these ideas and opened them to debate and critique. It is encouraging to see the uptake of the Threshold Concepts Framework in many areas of practice, and in an increasing number of institutions and countries. The continually burgeoning repository of material in the splendid Flanagan archive (Flanagan, 2016) closely monitors migration into new sectors and fields. We owe a debt of gratitude, as always, to the many authors included in this volume, and to the generosity of their colleagues and students in contributing their time, thoughts and feelings to an exploration of learning thresholds in a common endeavour to gain better insights into student learning and conceptual difficulty.
As we go to press with this volume plans are already well under way for a sixth international Thresholds Concepts conference, entitled *Thresholds on the Edge*, to be held at Dalhousie University in Halifax, Nova Scotia from June 15–17, 2016. We look forward with great anticipation to further engagement around this continually intriguing theme, to renewing discussions with old friends and embarking on future explorations with new ones.

**NOTES**

1 Einstein, A. cited by Wheeler, J.A., interviewed in *Cosmic Search*, Vol. 1, No. 4 (Fall 1979). (Wheeler does not indicate in the interview whether he is quoting Einstein verbatim, or offering his own description of how Einstein worked).


4 American Libraries Association (ALA) Framework for Information Literacy for Higher Education http://www.ala.org/acrl/standards/ilframework

5 TRANSark (Transforming Architecture), Norway. http://www.ntnu.edu/transark


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PART 1
THEORETICAL DIRECTIONS
1. ON THE THRESHOLD WITH STUDENTS

INTRODUCTION

The idea of threshold concepts emerged from and has evolved through communities of scholarly teachers and researchers talking with each other about disciplinary learning. In this chapter, I will approach thresholds from a different angle. Drawing on threshold concept seminars that I conducted with undergraduate students at three US colleges, this chapter considers what we might understand about threshold concepts if we partnered with students to explore the nature of thresholds and learning in higher education.

PARTNERING WITH STUDENTS

While the literature on threshold concepts has mushroomed over the past decade, undergraduate student voices have largely been absent from this conversation. Questions about student learning, of course, are at the heart of the threshold concept framework. However, students are much more likely to appear as objects of study than as partners in these inquiries.

In 2012–2013, I co-facilitated a pair of semester-long seminars on threshold concepts with undergraduate students at Bryn Mawr and Haverford Colleges, two highly selective liberal arts institutions in suburban Philadelphia, Pennsylvania. The following year, I co-facilitated a similar seminar at Elon University, a mid-sized liberal arts institution in North Carolina. Each seminar included between eight and fifteen undergraduate students. The seminar began with students reading foundational literature such as Meyer and Land’s (2006a) chapter ‘Threshold concepts and troublesome knowledge: An introduction’. After thoroughly discussing this literature, students spent the remainder of the seminar’s meetings reflecting on their own experiences with threshold concepts in higher education. For instance, students wrote about times when they had encountered particularly troublesome knowledge, and how the threshold concepts literature did (or did not) help them understand their own learning experiences. These reflections prompted spirited discussions about the nature of troublesome knowledge, threshold concepts, and learning in higher education. Questions about affect, liminality, confidence, and disciplinarity emerged in all three seminars, and this chapter will reflect on these four themes.
My analysis here represents a synthesis of my experience with students in these seminars. I am able to cite some of the seminar students because a handful have written about their perspectives for a special issue of the journal Teaching and Learning Together in Higher Education (Felten, 2013). The remainder of my claims here are based on my own notes from the seminars, which unfortunately do not allow me to credit individual students by name. Because my reflections emerge from seminar discussions and writings, I cannot make grand claims about either undergraduate learning or threshold concepts. Everything I offer here is provisional. I hope to provoke and suggest, not to prove and conclude. And I am deeply grateful to the students and colleagues, particularly Alison Cook-Sather of Bryn Mawr and Jessie Moore and Greg Honan of Elon, who joined me in these seminars.

TROUBLESOME AFFECT

From the beginning, David Perkins’ framework of ‘troublesome knowledge’ has been a central facet of threshold concepts theory (Meyer & Land, 2003). According to Perkins, knowledge can be troublesome because it is conceptually difficult, alien, inert, tacit, or ritual (2006). Some scholars have raised questions about this framework, such as McCormick’s commentary on how ‘students’ everyday worlds’ intersect with disciplinary concepts (2008, p. 55), and Meyer and Land’s reflections on the variation in student experiences with troublesome knowledge in the academy (Meyer & Land, 2006a). Still, Perkins’ definition of troublesome knowledge is a defining feature of threshold concepts.

Students’ reflections on troublesome knowledge, however, suggest that this framework is missing at least one essential element. When seminar students wrote about their own experiences with threshold concepts, they universally described their learning as troublesome, but some of the most frequent words they used did not fit neatly into Perkins’ categories. Students often described their own learning process as ‘stressful,’ ‘debilitating,’ ‘frustrating,’ and ‘intensely emotional’. They reported that they were ‘shocked,’ ‘upset,’ ‘hopeless,’ and ‘very anxious’. Sophia Abbot, a Bryn Mawr undergraduate, captured this common sentiment when she reflected on a pivotal moment in her learning: ‘After class, I was not sure whether I wanted to cry or scream. I did not know how to face the privileged existence I have had, and I felt utterly helpless in terms of how to move forward’ (2013). In fact, students in all three seminars consistently used at least some emotional language to explain their encounter with troublesome knowledge.

The difference between scholars and students in this case seems to be one of perspective. Perkins and other researchers focus on characteristics of the knowledge itself that is troublesome. In other words, certain knowledge is alien or tacit, making it challenging to learn no matter who is doing the learning. Students in the seminars, on the other hand, describe their experience with the knowledge, focusing as much on the person doing the learning as the thing being learned. In this way, students echoed the analysis of Blackie, Case, and Jawitz:
If we are to take the idea of the person of the student seriously, we need to begin to pay attention to the emotional side of education. Knowledge may be emotionally neutral. There is no obvious emotional content to the concept of chemical bonding, for example. However, the manner in which an individual interacts with knowledge is emotionally charged. (2010, p. 641)

Questions of ‘troublesome affect’ seem to be a particularly important area for further investigation for scholars of threshold concepts. A few researchers already have begun to open this door. For instance, Leah Shopkow’s study of threshold concepts in the discipline of history suggests that ‘affective issues’ such as ‘maintaining emotional distance’ and ‘dealing with ambiguity’ are frequent bottlenecks for student learning (2010, p. 328). Exploring this emotional terrain would return threshold concepts to an early claim by its founders that too often higher education scholars and teachers tend ‘towards the disembodiment and genericisation of the learner, and an assumed lack of an affective and social dimension to their subjectivity’ (Meyer & Land, 2006b, p. 31). As the seminar students remind us, we would be wise to recognise that both knowledge and affect can be troublesome.

LOCATING LIMINALITY

As the word ‘threshold’ suggests, this framework presumes learning is a dynamic experience that moves a student from one state to another. During this passage, the student is in a liminal position that exists ‘betwixt and between’ established categories, such as novice or expert (Turner, 1964). While a student is in this ‘liquid space’ the potential for learning, experimentation, and growth are maximized; Meyer and Land call liminality a ‘transformational state’ (Meyer & Land, 2005, p. 380).

Students in the seminars resonated with the concept of liminality. Many of them described their own powerful learning experiences as rites of passage as they moved, often awkwardly and unexpectedly, from ‘before’ to ‘after’ a threshold. Yet the stories of these transitions rarely centred on a discipline or a classroom. The undergraduate curriculum, students insisted, privileges having the correct answers and demonstrating competency, rather than asking questions and exploring ambiguity. In the words of Bryn Mawr student Sarah Jenness, ‘student anxiety is raised in [the classroom], though, because it is not only about knowing the right answer, but also wondering what the professor expects and what students need to know to do well in the class. In other words…school militates against uncertainty’ (2013).

This common student perspective presents a significant barrier to considering the classroom a liminal space. Not only is nearly any threshold concept affectively and cognitively troublesome, which may lead students (and other humans) to approach it cautiously, but the classroom as a site of liminality may seem to be contrary to what school is all about. Throughout their schooling students have been trained to look for answers and have been rewarded for being right. Why risk liminality in the classroom when certainty feels both personally and academically safer?
Scholars of threshold concepts should confront that question directly. Students may be deliberately not crossing thresholds in a classroom or a discipline because their prior educational experiences have taught them to value being correct and concrete. To persuade students to willingly enter a liminal space, they need to understand the value of doing so – not only in an abstract way (‘This uncertainty is essential for you to learn something important’) but also in a pragmatic way (‘Stepping into this liminal space will be rewarding for you academically’). Students often do not come to higher education looking for or appreciating liminality in the classroom.

THRESHOLD CONFIDENCE

After hearing a number of peers recount stories of their own encounters with threshold concepts, one student seminar participant observed: ‘One thing that I have noticed is that threshold concepts are not just about knowledge, they also are about confidence’.

Reflecting on their own encounters with threshold concepts, many seminar students noted that their learning could not be disentangled from their sense of confidence related to that learning. Because threshold concepts are difficult to master, because they are troublesome, the learning process is characterised by struggle and difficulty. Haverford College professor Laura McGrane describes her students’ narratives of threshold concepts as an experience with ‘punctuated equilibrium – we climb, we plateau, we slip, we plateau, we climb again’ (2013). McGrane’s student Ryan Rebel wrote:

I’ve often felt like I’ve been faking a certain discipline until that mysterious ethereal retrospective moment when I realise I have crossed the threshold and am actually doing it. But is there any threshold after all? Is there only a continuous scale of less and less and less faking until you’re the person in the world who is faking the least and so nobody can call you on it anymore? That’s kind of depressing. Or liberating, maybe. (quoted in McGrane, 2013)

Repeatedly in the seminar, students (like Rebel) emphasised that crossing a threshold involved both mastering the concept and also feeling comfortable in their new knowledge. This common student perspective echoes research by Terrell Strayhorn on the importance of an undergraduate ‘sense of belonging’ for learning in college (2012). Strayhorn defines belonging as ‘the experience of mattering or feeling cared about, accepted, respected, valued by, and important to the group’ (2012, p. 3). To permanently cross a threshold, seminar students insisted, they needed to believe that they belonged on the other side.

DISCIPLINING THRESHOLDS

Meyer and Land take as a given that threshold concepts are disciplinary. Many seminar students, however, expressed a more capacious view. Esteniolla Maitre, for instance, initially found the Meyer and Land framework appealing, but as she
and her peers talked further, she ‘began to dislike the definition – not because of its inaccuracy but because of its limitation. It became clear that while threshold concepts were explored in the classroom, the crossing of such thresholds seemed confined to and rooted in the classroom as well’ (2013).

In all three seminars, students expanded the definition of threshold concepts to including learning that reached across or beyond academic disciplines. One student perceptively noted that faculty may locate thresholds within particular disciplines because, as experts, they are deeply embedded within a field:

Something I noticed about how the conversation ended up was that a lot of the professors ended up going back to their own discipline. That felt different [from what students in this seminar are saying]. We all do have our own majors and interests but I don’t think we bring disciplines up to the extent that they do. It’s probably because they’ve spent years in their discipline and we are still discovering our own and still very much in an inter-disciplinary mindset. So it’s interesting to see that they think threshold concepts are different by discipline. (personal notes, 2013)

Students, as seminar participant Hannah Bahn wrote, wanted to explore ‘what threshold concepts could be’ (2013). This nearly always involved using the threshold concept framework as a tool, a heuristic, to consider learning that reached beyond individual disciplines – what one student called ‘non-academic learning’. Indeed, students in the seminars found the threshold concepts so useful as a tool for reflecting on their own learning that they resisted bounding it within disciplines. Esteniolla Maitre argued that ‘Failure to account for a more holistic definition of a threshold concept—and, ultimately, learning—threatens to perpetuate a classroom environment where there are discrepancies among students because of their failure to understand versus a failure to understand them’ (2013).

ON THE THRESHOLD WITH STUDENTS

The perspectives of students in three seminars likely will not (and should not) reframe the literature on threshold concepts. Still, scholars and teachers should take seriously the experiences and insights of students as learners (Cook-Sather et al., 2014; Healey et al., 2014).

My experiences with student seminars on threshold concepts suggest that higher education teachers and scholars would do well to more carefully attend to:

- the affective experiences of learning;
- the classroom and curriculum as troublesome sites for liminality;
- the sense of confidence and belonging necessary for crossing thresholds;
- the disciplinary and the trans-disciplinary nature of thresholds in learning.

Inviting students to partner with us in our research and practice would be a major step toward enhancing our understanding and teaching of threshold concepts. As a
student told me in an interview nearly a decade ago, ‘Faculty…are so focused on getting stuff done that they don’t pay attention to their students, who I think are the most valuable assets [in a classroom]’ (Mihans et al., 2008, p. 8).

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Peter Felten
Elon University
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2. TOIL AND TROUBLE

Threshold Concepts as a Pedagogy of Uncertainty

Break on through to the other side.

(Jim Morrison)

INTRODUCTION

A powerful discursive shift has occurred within higher education globally over the last three decades in which higher education teaching is rendered as the facilitation of ‘the student learning experience’, and as a primarily economic rather than educational transaction (Apple, 2000). This corporatist, consumer discourse has arisen from intensified global competitiveness, and is creating tensions within traditional modes of organisation of teaching and learning. In this pervasive discourse the learner is constructed as a consumer of services, ‘a situation in which the learner has certain needs and where it is the business of the educator to meet these needs’ (Biesta, 2005).

Yet this increasingly influential view sits uneasily with the idea that universities serve to offer programmes of a transformative nature. Universities are required simultaneously to produce satisfied consumers as well as develop graduates for the wider society who can act and exercise judgment in complex, uncertain, risk-laden and unpredictable environments. The latter entail radically different forms of curriculum, student-staff relationships and student encounters. The former Director of the Carnegie Center for Teaching and Learning, Lee Shulman, emphasised this point when characterising the education of professionals:

it’s … insufficient to claim that a combination of theory, practice, and ethics defines a professional’s work; it is also characterized by conditions of inherent and unavoidable uncertainty. Professionals rarely can employ simple algorithms or protocols of practice in performing their services. How then does a professional adapt to new and uncertain circumstances? She exercises judgment. One might therefore say that professional education is about developing pedagogies to link ideas, practices, and values under conditions of inherent uncertainty that necessitate not only judgment in order to act, but also cognizance of the consequences of one’s action. In the presence of uncertainty, one is obligated to learn from experience. (Shulman, 2005, p. 1)
Shulman is concerned with the complexity of professional practice, as is much of this volume. The Threshold Concepts Framework – with its emphasis on transformation through troublesome knowledge and shifts in subjectivity ‘under conditions of inherent uncertainty’ – shares many of the characteristics of what Shulman terms ‘pedagogies of uncertainty’. It will be argued here, further, that the Threshold Concepts Framework can also serve as a counter-discourse to the commodification of learning.

LEARNING AS CONSUMPTION

The discursive shift under discussion has come about through a range of factors including the erosion of welfarism, and a move to a marketised notion of higher education as principally a private good. Learning increasingly gains prominence in policy documents as a far more individualistic activity (Field, 2000). To ensure consumer satisfaction, a consumer logic of value for money, accountability and the need for increasingly rigorous protocols and standards of inspection then ensues. The discourse of ‘the student experience’ becomes to a great extent an empty signifier which is difficult to argue against. It can, however, easily be deployed to place students and teaching staff in an oppositional stance, through the use, for example, of consumer satisfaction student surveys and module evaluation scores in which the student-as-consumer ‘rates’ the professor-as-service-provider. In public and marketing documentation the discourse becomes interwoven with narratives of excellence, images of graduate success and student happiness, a sense of student entitlement and the friendliness and helpfulness of (providing) staff. In its strongest rendition this representation can depict learning within the organisation as an undertaking that is non-problematic, without any significant incurring of risk. It does not entail deep personal change or transformation, troublesome challenge or even, at times, engagement.

In this way teaching to satisfaction ratings sets different parameters for what counts as education, and as quality. The discourse is antithetical to critical or transformative notions of pedagogy. In such climates, teaching, worryingly, can become risk-averse, formulaic and comfortable. Worst of all, learning is depicted as easy, non-problematic, without risk, requiring minimal commitment. As Jenkins and Barnes (2014) argue, students’ pedagogic entitlement to transformation, hard work and challenge, confusion even – where liminality and uncertainty trigger different ways of thinking, different modes of knowledge and deep personal change – are curtailed. Teaching in higher education is increasingly rendered as the ‘delivery’ of learning opportunities or experiences (Barber et al., 2011). A ‘student experience’, however defined – socially, culturally, aesthetically, as a particular lifestyle, or more prosaically perhaps in terms of services, quality of accommodation, technological environment and even catering – is more easily rendered as a commodity, and more open to marketisation. In a search for satisfaction and certainty, and in a flight to security, the language of transformation and innovation may be lost.
Interestingly, in a response to a report from the consumer magazine *Which?* that had investigated universities’ compliance with consumer law, the Chief Executive of Universities UK (UUK) pointed out that ‘In relation to consumer protection law, it is important to recognise that the relationship that exists between a student and their university is a distinctive relationship to do with learning and teaching, rather than a standard consumer contract’ (UUK, 2015) [Author italics].

This form of response from higher education sector representatives (of all persuasions) is often a positioning statement for negotiating with government, reminding the latter of their limited governance of the sector and the autonomous nature of universities. However, it points to a lack of clarity in, and the unresolved nature of, the contractual nature of what students might reasonably expect and be entitled to when entering a university programme of study. The high trust of the market inherent within a consumer model of learning will place emphasis on the satisfaction of the individual (student) consumer. The sector generally, however, appears uneasy with the idea of a straight seller-consumer relationship. Granted, it is clearly beneficial to have an easily understandable, straight-forward way of knowing what redress is available (under consumer law if necessary) when things go obviously wrong. For example, a specific course might be advertised as guaranteeing entry to an accelerated postgraduate course at a subsequent stage, and turn out not to. A doctoral programme might guarantee access to training facilities or teaching opportunities that, in the event, do not materialise. A module advertised at the time of enrolment may subsequently be withdrawn.

Since students started paying for their tuition increased attention has been paid to satisfying student expectation in relation to quite reasonable assumptions, through mechanisms such as the National Student Survey (NSS). This might monitor the extent of receiving useful feedback on coursework, reliably and on time, though practice in these respects remains still far from exemplary. The current UK government, like an increasing number of other similarly inclined educational administrations around the globe, is clearly interested in the value proposition of what higher education offers for substantial student tuition fees. This might be expressed through possible metrics such as contact hours, access to learning resources, availability of staff, staff-student ratios, retention and employability rates. Metrics are currently under consideration to measure ‘learning gain’ and ‘value for money’. This value proposition is to be instated formally through legislation currently before the UK Parliament to establish a Teaching Excellence Framework which will monitor, quantify and measure educational quality. It will subsequently rank institutions as excellent, in return for proportional institutional eligibility to raise tuition fees in line with inflation. The legislation also includes measures to deregulate higher education and to intensify market competition through the accelerated entry of private ‘new providers’.

The debate takes us directly to the heart of what we are attempting to achieve in university study. Is it entry to disciplinary or scientific communities? Skilled
employees? Critical citizens? Fulfilled self-actualising individuals? Somewhat glib analogies occasionally surface contrasting gym membership with hotel service to emphasise the client-centred nature of higher education, and client obligation in regard to commitment, effort and engagement. Others see Argyris’ (1960) notion of a ‘psychological work contract’ – existing as a tacit entity outside formal market relations unlike a legal consumer contract – as a more generative idea for higher education. Analogies take us so far, but the experience of higher education seems to remain resolutely multi-faceted, complex and individualised, difficult to reduce to contractual aspects. It would seem, rather, to be *sui generis*. A proper entity – itself, and not really like anything else. But whatever constitutes that entity, it would seem to involve transformation – distinctive alchemy that takes what students are, what they aspire to become, what transforming experiences the academy can offer, and infuses these elements into a process that remains difficult to define and which is not fully manifest until many years and experiences later.

**LEARNING AS TRANSFORMATION**

In contradistinction to the consumerist sentiment, the notion of learning as transformation offers a powerful alternative discourse. According to Mezirow, (1997, pp. 5–12) transformative learning is the learning that affirms autonomous thinking and helps us understand our experience. Freire (cited in Wolf, 2014, p. 1) reminds us that ‘No one is born fully-formed’ and that ‘it is through self-experience in the world that we become what we are’. Proust (1900/1987) argues that the only real voyage of discovery consists not in seeing new landscapes, but ‘in having new eyes, in seeing the universe with the eyes of another’. But as the now sizeable research literature on threshold concepts in many disciplines indicates (Flanagan, 2015), such transformation frequently entails difficulty. Dewey (1933/1986) points to the difficulty entailed in such transformation. ‘The path of least resistance and least trouble is a mental rut already made. It requires troublesome work to undertake the alteration of old beliefs’. The renowned economist Keynes (1936/1973, pp. xxiii) suggests that this difficulty lies in the letting go of prevailing belief: ‘The difficulty lies, not in the new ideas, but in escaping from the old ones, which ramify … into every corner of our minds’. And the novelist Pam Barker reminds us (Barker, 1991, p. 184) that the process of transformation consists ‘almost entirely of decay’. The process of transformation is often triggered through encountering dissonance. The cognitive psychological and biological literature suggests ‘to promote development, phenomena must somehow be troublesome enough, inharmonious enough for existing structures, to disturb balance and lead the organism to actively respond’ (Timmermans, 2010, p. 10). Of course this can be uncomfortable for both the student and the teacher. As bell hooks (1994, p. 206) observed in regard to her own teaching:

Students do not always enjoy studying with me. Often they find my courses challenge them in ways that are deeply unsettling. This was particularly
disturbing to me at the beginning of my teaching career because I wanted to be liked and admired. It took time and experience for me to understand that the rewards of engaged pedagogy might not emerge during a course.

When education is presented as personal *transformation* it becomes more difficult, indeed probably impossible, to commodify. Transformation is not consumed; it is undergone. It lends itself less easily to prediction, standardised outcome, pricing, comparison, monitoring and control. Moreover, as Julie Rattray points out (Chapter 6 this volume) transformative learning has a strong affective dimension. Shulman (2005, p. 1) observed that ‘without a certain amount of anxiety and risk, there’s a limit to how much learning occurs. One must have something at stake. No emotional investment, no intellectual or formational yield’. We see an example of this in the response of a Norwegian architecture student encountering challenging understandings of what architectural practice might become:

In the beginning we were thrown into something completely new and unknown that has been difficult to deal with. The feeling of not being clever enough, and not having control of what you are doing, have resulted in a lot of frustration and stress, and this has influenced the process to the extent that I have become exhausted and depressed, and I wanted to quit. (Hokstad et al., this volume)

At a later stage in the programme of learning this difficulty, frustration and stress have changed to a sense of new insight, exhilaration and meaningfulness as the student undergoes further transformation towards thinking and feeling as an architect.

Eventually it became clear that the project was about examining the edge/ridge, the exciting state of mind where meaningful and many faceted places may emerge. The architecture here on the edge/ridge is rich on senses, a delicate point of balance. It *is* senses. (ibid.)

In the following example a music student describes the awkward ontological shifts entailed in attempting to balance the demands of studying both anthropology and musical composition as ‘a mental battle’:

It was a sort of a mental battle between the side of me that is a slightly bigoted composer, a composer of art, that says: ‘well this isn’t art, this is how the composition world works’, it’s about taste, it’s about subjectivity, and that’s completely different from how anthropological research works. Of course I had a flavour of that from ethnomusicology, but actually being immersed in that it was the biggest mental battle for me... so it was a kind of split personality thing... I was treated as an anthropologist, being detached from my preconceptions and then I go back to composition and immediately you have to switch on your subjectivity.
The superordinate and non-negotiable characteristic of a threshold concept is its transformative capacity. The Threshold Concepts Framework represents a way of thinking about curricula where specific elements that are challenging for students to understand have a transformational impact on their learning once they are understood. The integrative nature of threshold concepts represents the antithesis of the transmission and retention of large content volume, the ‘stuffed curriculum’ (Cousin, 2006). It is, rather, the relationships between aspects of knowledge that are seen as transformative, in opening up new ways of seeing. ‘The power and value of the threshold concept can only be recognised by a student if they can see how it is able to act in an integrative way’ (Davies, 2003, p. 6).

PEDAGOGIES OF UNCERTAINTY

Consumerist models of learning tend to stress certainty, clarity, straightforwardness and control. This fosters a sense of security and comfortableness that is likely to produce the satisfaction (of the paying customer) that is the aim of every course. However the social and professional world that the student will enter will not be so clear cut nor so manageable. And the nature of transformative learning rarely provides such comfort or security. It will present a continuing need for inquiry, for personal adaptation and further development. As Freire (1970, p. 21) emphasises:

For apart from inquiry, apart from the praxis, individuals cannot be truly human. Knowledge emerges only through invention and re-invention, through the restless, impatient, continuing, hopeful inquiry human beings pursue in the world, with the world, and with each other.

Characterising consumerist pedagogy as the ‘banking’ concept of education, he points out that:

Whereas banking education anesthetizes and inhibits creative power, problem-posing education involves a constant unveiling of reality. The former attempts to maintain the submersion of consciousness; the latter strives for the emergence of consciousness and critical intervention in reality. (Freire, 1970, p. 68)

Barnett (2004) argues that it would be irrational and self-defeating to assume that we can prepare a new generation of students to cope with uncertainty by establishing a new kind of certainty in the curriculum. Pedagogies of uncertainty, he suggest, cannot be technological in nature (i.e. framed tightly in terms of learning objectives and outcomes). They are framed rather through a transformation of human being – through ontological shift(s). In a four frame model of student development for future society (Barnett, 2004) he distinguishes between the acquisition of generic skills or graduate attributes for a world of no risk, where fixed ontologies are offered as a preparation for an unknown world, compared with a world of high risk where personal transformation will require open ontologies for an unknown world. This
is the serpent’s apple offered in Eden, heralding an unknown future self, heralding reinvention.

Through observations such as these we come to see what a pedagogy of uncertainty entails, and it seems to be characterised by the kind of ‘ontological insecurity’ that Giddens (1991) identified as a mark of late modernity.

Amid supercomplexity, the educational task is primarily an ontological task. It is the task of enabling individuals to prosper amid supercomplexity, amid a situation in which here are no stable descriptions of the world, no concepts that can be seized upon with any assuredness, and no value systems that can claim one’s allegiance with any unrivalled authority. (Barnett, 2015, p. 224)

Within the curriculum and within pedagogy he maintains, concepts such as fragility, uncertainty and instability are also ontological states. A pedagogy of uncertainty comes to mean that learning for uncertainty means learning to live with uncertainty. Similarly, such pedagogies cannot dispel anxiety, but seek to provide students with perspectives that will enable them to live with anxiety. As Barnett puts it:

The ice is perpetually slippery but this says nothing about the individuals on the ice, only about the conditions of epistemological insecurity in which they now find themselves. But this epistemological slipperiness generates, in turn, ontological destabilisation. For if the world is radically unknowable then, by extension, ‘I’ am radically unknowable. (pp. 224–225)

This is a far cry from the sureties demanded within a consumer model. Here like the serpent’s subversive entry into the stable and seeming-safe Eden, learning becomes ‘subversive in the sense of subverting the student’s taken-for-granted world’. Far from providing clarity and certainty, this, Barnett believes, will persuade students that, no matter how much effort are put in, ‘there are no final answers’ (Barnett, 1999, p. 155). Understanding comes to be seen as an iterative practice as opposed to an isolated process with a clear beginning and end point.

The practical considerations for these contrasting pedagogies are considerable. Whereas consumer models have an intrinsic orientation towards meeting the needs of the individual, within pedagogies of uncertainty this individualisation is destabilised. This is confirmed by Hay (2010, p. 264) who reports that from a dialogic position, learners do not come to understand things in isolation, but meanings are shaped through the inter-animation of the different voices (or texts) of others, as students learn to see things from other perspectives. Here, it is an increasing inclusion of difference that leads towards more encompassing understanding.

Similarly, consumer models of learning imply acquisition and accumulation. By studying students’ approaches to learning researchers have shed light on the different conceptions of learning that students hold. Dahlgren (1984, p. 31) found that deep
approaches to learning, aimed at conceptual and theoretical understanding, were symptomatic of transformative conceptions, where learning ‘is not a self-contained entity but one which has the potential of enabling individuals to consider afresh some part or aspect of the world around them’. Surface approaches, on the other hand, were associated accumulative conceptions of learning, with knowledge retained for short-term strategic purposes of meeting the requirements of assignments and examinations.

Consumer models place considerable emphasis on the need for timely formative feedback. But even here we find that feedback can trigger an emotional response and if misread, it can reinforce feelings of failure and incompetence (Brookhart, 2006). Feedback arguably can demotivate as well as motivate. Higgins, Hartley and Skelton (2001, p. 274) characterise feedback as a ‘problematic’ form of communication involving relationships of power. Teachers use a particular academic discourse, which may not be understood by students who in turn lack the confidence to seek clarification, preventing them from making the most effective use of feedback.

LIMINAL EXPERIENCE

Disciplines give access to powerful knowledge (Young, 2008) but not just through epistemic access but through ontological shift. For powerful knowledge is frequently ‘troublesome knowledge’. Threshold Concepts research (Flanagan, 2015) has drawn extensively on the notion of troublesomeness in the liminal space. Liminality is viewed as a transformative state in the process of learning in which there is a reformulation of the learner’s meaning frame (Schwartzman, 2010) and an accompanying shift in the learner’s subjectivity (Meyer & Land, 2005). Standard anthropological definitions of liminality – as a rite of passage in which the novitiate lacks social status, remains anonymous, has to demonstrate obedience, with intimations of humility, and perhaps humiliation – do not accord easily with the notion of the paramount influence of the consumer. The liminal state entails an envisaging (and ultimate accepting) of an alternative version of self, contemplated through the threshold space. Blackie et al. (2010) portray this as the learner’s ‘emergent being’. Ross (2011) speaks of a ‘re-authoring’ of self, or ‘undoing the script’. The American Buddhist nun, Pema Chodron recalling her most influential teachers, concluded that:

My models were the people who stepped outside of the conventional mind and who could actually stop my mind and completely open it up and free it, even for a moment, from a conventional, habitual way of looking at things …If you are really preparing for groundlessness, preparing for the reality of human existence, you are living on the razor’s edge, and you must become used to the fact that things shift and change. Things are not certain and they do not last and you do not know what is going to happen. My teachers have always pushed me over the cliff … (Chodron cited in hooks, 1994, p. 206)
Clearly such a transformative approach to learning sits uneasily with a neoliberal rendering of the learner as consumer of educational services. It is argued here that The Threshold Concepts Framework – with its emphasis on transformation through troublesome knowledge and shifts in subjectivity – can be considered as a counter-discourse to the commodification of learning. The obligation and commitment to be provoked into liminal states of learning, to experience troublesome knowledge, to undergo ontological shifts which can lead to different ways of thinking, different modes of knowledge and deep personal change are presented here – in keeping with the work of Jenkins and Barnes (2014) discussed earlier – not as consumer rights (satisfaction and entitlement) but as students’ ‘pedagogic rights’, which offer alternative and, in our view, more valid effective notions of quality in higher education. As Barnett has observed: ‘The student is perforce required to venture into new places, strange places, anxiety-provoking places. This is part of the point of higher education. If there was no anxiety, it is difficult to believe that we could be in the presence of a higher education’ (Barnett, 2007, p. 147).

The notion of pedagogic rights originates in the work of Bernstein (2000) who envisioned learners as deserving a different kind of (threefold) entitlement: to enhancement, inclusion and participation. This, in turn, would give them access to confidence, group involvement and action at civic level:

*The learner’s pedagogic rights (Bernstein, cited in Mclean, Abbas, & Ashwin, 2011)*

<table>
<thead>
<tr>
<th>Enhancement</th>
<th>Individual</th>
<th>‘The right to the means of critical understanding and to new possibilities.’ (Bernstein, 2000, p. xx)</th>
<th>Confidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inclusion</td>
<td>Social</td>
<td>‘The right to be included socially, intellectually, culturally and personally [including] the right [to be] autonomous.’ (ibid., p. xx)</td>
<td>‘Communitas’ Belonging in group(s)</td>
</tr>
<tr>
<td>Participation</td>
<td>Political</td>
<td>‘The right to participate in discourse and practices that have outcomes: to participate in the construction, maintenance and transformation of social order.’ (ibid., p. xxi)</td>
<td>Civic discussion and action</td>
</tr>
</tbody>
</table>

So this offers an alternative discourse, a view of learning as an educational transaction that is concerned not simply with the student’s acquisition of knowledge or consumption of services as with their ‘coming into presence’ (Biesta, 2005). This entails ‘being challenged by otherness and difference’, what Derrida terms a ‘transcendental violence’ (Derrida, 1978) that is persistent, presenting difficult
demands and situations. In this mode the learner is not in a position to identify and state their learning needs, which are emergent and contingent. It requires an altered relation of trust with their teachers and fellow learners. Students, as organisational actors, are rendered differently, are transformed, as co-enquirers, co-creators, co-producers (Neary & Amsler, 2013). In this discourse, teachers, in turn, have to assume a different form of responsibility, operating within risk and uncertainty, which cannot be predicated on the assumed certainties of a conventional accountability protocol. It rests on mutual trust.

**EINSTELLUNG EFFECT**

One problem remains in regard to transformative learning. The serpent, bearer of troublesome knowledge, who engenders the process of transformation, can also carry a sting in its tail.

A successful transformative learning experience can lead, as has been discussed earlier, to acquisition of powerful knowledge and to significant shifts in ontology and identity. But there can be unintended consequences of successful transformation in that it can produce a state of what psychologists have termed ‘functional fixedness’, ‘design fixation’ or ‘paradigm blindness’. This is a cognitive bias which restricts a person to using and perceiving an object only in the way it is traditionally used and perceived. The generally accepted formal term is taken from the German – the *Einstellung Effect*. The German term has a range of meanings, ranging from simply ‘attitude’, to the position of a needle on a dial, as in a radio receiver, to the idea of a precise ‘focus’. However, in its psychological use, it means being caught within a particular way of seeing a problem, or design or solution. The effect tends to occur as a result of a previously successful resolution of an issue or coming to a clear understanding of something that had proved difficult. The problem arises when there is a need to resolve a subsequent issue of further complexity or of a different nature. What happens is that the previously successful approach, taken under one set of conditions, tends to be adopted again under different circumstances, as it has become a powerful and ingrained way of seeing and thinking. It becomes a case of ‘thinking inside the box’. Our previous experience starts a self-fulfilling circle which begins with information consistent with the already activated schema being more likely to be picked up. Consequently the belief that the schema is the right one to deal with the situation is confirmed and alternatives are less likely to be considered (Keren, 1984).

The individual thinks that they are considering the evidence in an open-minded way, not realising that their attention is being selectively directed to only certain aspects of the problem or issue under consideration. Those things that they notice do indeed fit in with the activated schema and so confirm the view that the way they are dealing with the situation is the correct one. Things that do not fit in are either not noticed, or if they are, they are not integrated because they do not fit the activated schema.
Experts in any field, be they medical doctors, scientists, managers, chess players, airline pilots, designers, military strategists, tend not to make errors. When they do, however, the research suggests (Singley & Anderson, 1989; Reason, 1990) that one reason is because they recognise the situation as a familiar one, when it is not. Hence they apply their usual, but now inappropriate, methods to find a solution. The doctor misrecognises the subtly different symptoms in a new patient and prescribes a remedy that has been effective in earlier, seemingly similar cases. The military general assumes the conflict to be entered can be effectively approached through the use of tactics similar to the previous one. A chess player having reached checkmate successfully through a particularly elegant board play, assumes similar moves will be the appropriate solution in the next game. Chess players who had solved a particular chess challenge in five moves, when told it could actually be achieved in three, were found to be eyeing the same board squares as in their earlier successful approach. Chess players who had not previously engaged in the challenge and were unaware of how many moves constituted the optimal solution, were more likely to achieve the result in three moves than the previous group whose eye movements suggested they were still thinking in terms of the solution they had employed previously.

We show, by measuring players’ eye movements, that the mechanism by which the first idea prevents a better idea coming to mind can be demonstrated. Crucially, we find that players believed that they were actively searching for better solutions when in fact they continued to look at aspects of the problem related to the first idea they considered.

The Einstellung effect is doubly pernicious. Firstly it arises from an experience of success, or a positive sense of achievement in an earlier task, which imbues the original (and, on that occasion, effective) mode of framing and analysing the problem, and the subsequent design or problem-solving methods with positive connotations and affective associations. Secondly, as with the chess players in the research study, the actors involved do not realise that it is influencing their thoughts and feelings (Bilalic et al., 2008). Research undertaken into the causes of Einstellung, or ‘design fixation’, suggest interesting affinities with aspects of transformation that are found within the Threshold Concepts research. For example, Crilly (2015) identifies a strong ‘commitment to initial ideas’ and ‘sticking to a restricted set of solutions that are known to work’ as dominant factors in Einstellung, which corresponds closely with the difficulty in letting go of prevailing beliefs in the liminal state which has been identified as barrier to the need to ‘see differently’ and integrate novel elements when crossing thresholds. This is linked to ‘project constraints that prevent exploration’ and ‘organisational cultures that give people ownership of their ideas, which gives them the incentive to defend them’. This would align with notions of the ‘defended learner’ identified early in the Thresholds research literature as a contributing factor in troublesome knowledge. It also points to the dimension of subjectivity that operates within functional fixedness, as it does within the liminal state, and the necessity for this to change if performance is to be improved. The idea
of functional fixedness derives originally from Gestalt psychology, which places emphasis on holistic processing. This corresponds well with the need to reformulate one’s ‘meaning frame’, or even experience a ‘rupture in knowing’ as reported in the Thresholds research (Schwartzman, 2010, pp. 30–33).

So the powerful nature of experiencing transformation, changed perspective and ontological shift that often occurs as a result of liminal experience in learning may in the same process lead to successful threshold crossing and entry into new conceptual and ontological territory whilst at the same time introducing a new constraint that may impede or even prevent future threshold crossing. In effect, as Bilalic et al. (2008, p. 1) put it, ‘good thoughts block better ones’. Writers on the Einstellung effect suggest potential strategies for combating functional fixedness or design fixation. These include the use of diverse teams, practical making and testing of models, the facilitation of learning or problem-solving sessions by tutors familiar with fixation risks. Learners themselves are encouraged to explore and reflect on the possibility of fixation (in themselves and/or in those they collaborate with) and to examine episodes of paradigm blindness (Crilly, 2015). Bringing ‘strangers to the tribe’, to challenge, extend and render existing perspectives ‘strange’ would be another strategy. These approaches may well merit further exploration as we seek effective pedagogies and curriculum designs to enhance our students’ understanding of threshold concepts and their transformation as knowers.

CODA

The cover of this volume contains an image of the forbidden fruit from Lucas Cranach the Elder’s painting of Eve offering the apple to Adam in the Garden of Eden and the serpent (c.1520–25). This chapter, and writing and presentations elsewhere on threshold concepts (e.g. Meyer & Land, 2006, p. xiv), have made use of the Eden story and its imagery to conjure notions of troublesome knowledge and the idea of teaching as transgressive. It is important to remember that the purpose of such trouble and discomfort is to help our students to move on, to find new spaces and possibilities, and new freedoms. No-one has expressed this better than bell hooks.

The academy is not paradise. But learning is a place where paradise can be created. The classroom, with all its limitations, remains a location of possibility. In that field of possibility we have the opportunity to labour for freedom, to demand of ourselves and our comrades, an openness of mind and heart that allows us to face reality even as we collectively imagine ways to move beyond boundaries, to transgress. This is education as the practice of freedom.

NOTES

1 *Break On Through (To the Other Side)* is a song by Jim Morrison and The Doors released in the USA on Elektra Records, January 1, 1967.
2 Private communication with the author.
REFERENCES


