

RAY LAND

2. TOIL AND TROUBLE

Threshold Concepts as a Pedagogy of Uncertainty

Break on through to the other side.

(Jim Morrison)¹

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)

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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.

EDUCATION AS CONTRACT

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, p. 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.²

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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 there 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 novice 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)

PEDAGOGIC RIGHTS

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)

Enhancement	Individual	‘The right to the means of critical understanding and to new possibilities.’ (Bernstein, 2000, p. xx)	Confidence
Inclusion	Social	‘The right to be included socially, intellectually, culturally and personally [including] the right [to be] autonomous.’ (ibid., p. xx)	‘Communitas’ Belonging in group(s)
Participation	Political	‘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)	Civic discussion and action

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

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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.

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