

The importance of creativity: teaching for transformation in higher education

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Abstract

Creativity has emerged over the last decade as an important dimension of 21st Century professional practice (Florida, 2002), as a significant gap in the focus of school education (Robinson, 2000), and has been increasingly promoted as a graduate attribute in higher education (McWilliam & Dawson, 2008). The kinds of capabilities and behaviours that characterise creativity relate to other widely promoted graduate attributes such as independent learning, innovative problem-solving, interdisciplinarity and global citizenship. As creativity is increasingly understood as multi-faceted and contextualised, it may be usefully characterised as a 'threshold' concept or disposition (Meyer & Land, 2003). Examination of teaching creativity in 'creative' disciplines shows that creativity as an outcome is rarely explicit in curriculum documents, and that the teaching and assessment of creativity often relies upon the teacher's ability to model and guide creative practice through classroom interaction (Jackson & Shaw, 2006; Dineen, 2006). So how can the characteristics of a 'creative curriculum' be made explicit, and how can teachers in 'non-creative' disciplines conceptualise and actualise the teaching of creativity?

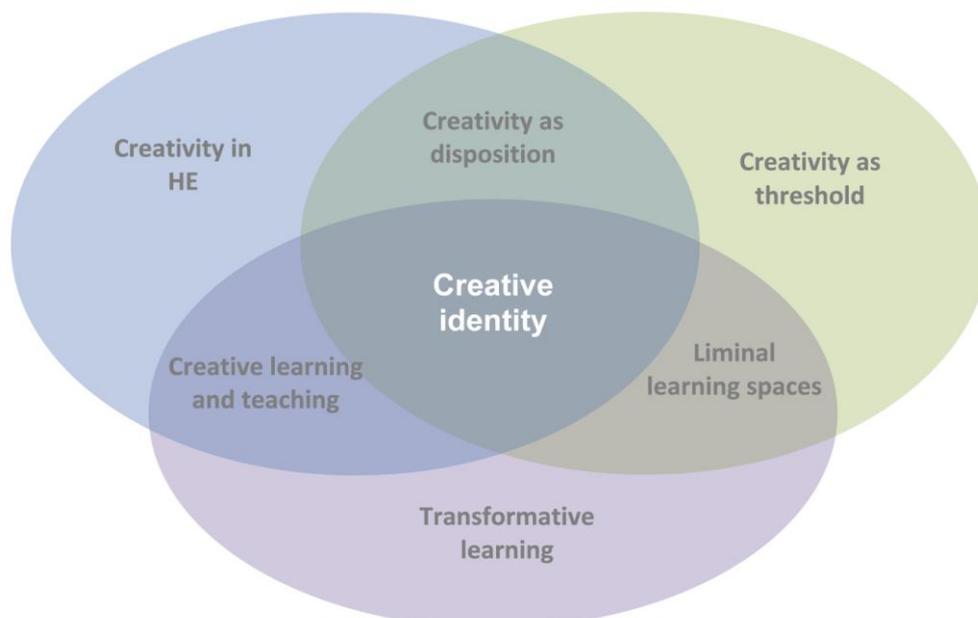
Mezirow's transformative learning theory (1978, 1997) has the potential to guide curriculum for the teaching of creativity and to support academics to transform their teaching into creative practice. Transformative learning theory builds on Kuhn's concept of learning paradigms (1962), Freire's social-critical notion of conscientization (1970) and Habermas's domains of learning (1972). The framework, which has an emancipatory aim, has evolved to incorporate affective and unconscious dimensions of learning. Central to this learning approach is critical reflection on personal, social and cultural assumptions.

This paper reviews the literature to explore the characteristics of creativity as a graduate capability, and how transformative learning theory could inform curriculum design and curriculum enactment for the development of creativity.

Key Words

Creativity, higher education, curriculum, graduate attributes, transformative learning.
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Defining creativity

Creativity is increasingly being seen as an important contributor to post-millennial societies and economies. Some argue that the development of creative abilities is imperative in order to address the complex social and environmental issues that have emerged in the 'developed' world. For example, educationalist and creativity expert Ken Robinson contends that "creativity now is as important in education as literacy, and we should treat it with the same status." (2006).

A frequent definition of creativity deems that a creative product should be original and functional. Mumford, in reviewing creativity research, finds a product-oriented focus, in that "creativity involves the production of novel, useful products" (Mumford, 2003, p. 110). Ken Robinson (2006), defines creativity as "The process of having original ideas that have value", emphasising the process of personal creativity, while psychologists have focused on personality traits that seem to be intrinsic to creative behaviour. Reid and Solomonides (2007) suggest that it may be "difficult to discern whether creativity is an attribute of a person, an object, a process or an idea." (p27).

Csikszentmihalyi (1996), in his study of eminent creative people, shows that their creativity develops and is recognised within a context, and that deep engagement with the discipline they are working in is essential for successful creators. He has proposed a systems view of creativity, recognising that all individuals have creative potential, but that creativity always has a cultural and social dimension. This resonates with a more recent interpretations of creativity as behaviour within a social and environmental context (Ivcevic, 2009).

Other emerging conceptions of creativity differentiate between first-generation and second-generation creativity, drawing on the contrast between little-c (personal, democratic) and big-C (high, universal) creativity defined by Csikszentmihalyi (1996), Robinson (2000), Craft (2001) and others. Second-generation understandings emphasise the social/cultural context, collaborative nature and cultivate-ability of creativity in contrast to traditional, first-generation, conceptions of creativity as mysterious, individual, and dependent on inspiration and aptitude (McWilliam & Dawson, 2008). In a study of award-winning Australian innovators in a range of creative fields including science and technology, Bridgstock, Dawson & Hearn (2011) found that innovation is a highly social process, and that social networking capability is a key indicator of successful creative innovation.

Creativity as disposition

Psychologists such as Torrance were focused on understanding personal aspects of creativity, and his tests were designed to measure aptitude or disposition towards originality, divergent thinking and other aspects of creative behavior (Torrance, 1988). Torrance strongly believed that all people have the capacity to develop creative abilities, and developed definitions for personal creativity. His 'survival' definition is focused on the ability to think on one's feet in an unfamiliar situation, and sees the identification of gaps, the problem definition, as a critical aspect (Shaughnessy, 1998). Csikszentmihalyi (1990, p193) also found that the ability to "discover a problem" seems intrinsic to creativity (cited in Reid & Solomonides, 2007). Torrance believed that:
"the truly creative is always that which cannot be taught. Yet creativity cannot come from the untaught. ... The elements of a creative solution can be taught, but the creativity itself must be self-discovered and self-disciplined." (1988, p58).

Torrance quotes Amabile (1988, p67): "extraordinary talent, personality and cognitive ability do not seem to be enough - it's the 'labor of love' aspect that determines creativity." Disposition is separate from personality, aptitude or skill - it is the inclination to behave in a certain way, for instance a drive towards self-discovery and self-discipline.

So, creativity has long been understood to be complex and multi-faceted, involving cognitive abilities and processes as well as personality dispositions (Ivcevic, 2009). But it is the dispositional aspects that enable the cognitive abilities and processes to occur, for example, McWilliam (2010) explores the role of cognitive playfulness as a learning disposition to develop creative capacities. Barnett (2004) proposes a capacity of "being-for-uncertainty", which focuses on the kind of dispositions essential for a creative response to future unpredictable challenges. Loads (2010) has

suggested that these qualities are no less important for teachers as for students, while Wheelahan (2007) proposes that “we must act even in the face of uncertainty, because certainty is not possible, and we need to develop the confidence and capacity to do so” (p.144). A disposition to respond confidently to uncertainty, and to perpetually learn and reflect on understandings, is at the heart of second-generation creativity.

Creativity in education

Over the last century educators including Dewey (1916) and Sternberg (1996) espoused holistic education, embracing human endeavour beyond literacy and numeracy, and specifically the cultivation of creativity, not as an arts-related addendum to school curricula, but as an educational approach in itself, expanding the cognitive dimensions of the educational experience to include emotional and psychological developmental aspects. The development of creative capacities through education has more recently been promoted by educationalists and cultural commentators such as Robinson (2000), Florida (2002) and Pink (2005) who propose that apart from any individual humanist benefit, new millennium economic imperatives demand the development of a greater capacity for creativity, among other dispositions such as empathy and collegiality.

Higher education has been paying attention to the development of 'creative' graduate capabilities such as innovative problem-solving, creative leadership and interdisciplinary practice in response to industry views that university graduates need a range of generic skills for professional success beyond discipline-based knowledge. A 2010 global study of CEOs found that creativity was believed to be the most crucial factor for a company's future success (IBM, 2010), and the Business Council of Australia (2006) identified the importance of creativity among other related capabilities, and cited employer concerns that graduate skills are lacking in these areas. Amabile (1998) has long suggested that industry would benefit by providing opportunities for employees to exercise their creativity, and suggests that the qualities required for creativity in business are expertise, creative thinking skills and motivation. Petocz, Reid and Taylor (2009) list several statements from higher education institutions which incorporate creativity and related attributes into proposed graduate outcomes. Creativity is now widely promoted as a graduate capability in higher education, so how can it be characterised in this context?

Creativity as a graduate capability

A second-generation definition emphasising a personal, practical and socially-oriented creativity fits with the vocational focus of graduate attribute and industry skill set statements. However, the affective dimensions of creativity, and its potential for personal growth and transformation should not be ignored, and conceiving of creativity as a disposition supports this holistic view. Barnett's “being-for-uncertainty” is characterised by “certain kinds of disposition. Among such dispositions are carefulness, thoughtfulness, humility, criticality, receptiveness, resilience, courage and stillness.” (Barnett, 2004, p.258). This resonates with some of the characteristics of creative behaviour identified by Tardif and Sternberg in their review of creativity research (Sternberg, 1988), which include such “being-for-uncertainty” capabilities as: articulate and fluent, good imagination, flexible and skilled decision-maker, copes well with novelty, and finds order in chaos. Such perspectives suggest that creativity as a graduate attribute is appropriately conceived as a disposition rather than a specific skillset.

Investigating both academic and student attitudes to creativity in higher education, Jackson et al (2006) came across a range of understandings and definitions that were complex and frequently contradictory. Some students and teachers maintain a lingering attachment to the romantic, individualist aspects of first-generation creativity, and are sceptical that it can be taught. However, both academics and students expressed some conception of creative teaching as enabling students to be creative in learning activities and outcomes. Students identified dialogic modes, where students current understandings or beliefs are addressed, as supportive of creativity, while they felt strongly that prevailing modes of assessment (such as examinations) were generally inhibitive for creativity. Students also expressed frustration at a perceived conflict between being creative and conforming to 'academic' expectations (Oliver et al, 2006). Many academics had least tacit understanding of creativity, and believed that development of creativity was important, yet

studies have found that it is rarely explicit in learning outcomes or assessment criteria (Jackson & Shaw, 2006), or discussed with students (Petocz, Reid and Taylor, 2009).

A confounding factor in defining creativity in this context is discipline-related differences in understanding. Reid and Petocz's study on conceptions of creativity in different academic domains found "huge variation in the way creativity is understood in different learning domains. ... creativity is not a stable idea but one that is constituted differently within different domains." (2004, p59). Jackson & Shaw (2006) found that there were some shared academic conceptions of how creativity is defined in a broad sense, with features such as: originality, use of imagination, exploration and risk-taking, making sense of complexity, and story-telling.

Creativity as a threshold

Threshold concepts are proving to be a useful way for academics to define 'core' discipline concepts that students must achieve before being able to progress. The knowledge involved may be 'troublesome', or the process may lead to troublesome knowledge space (Perkins, 2006). Threshold concepts have been described as transformational, in that grasping or traversing such a concept imparts an irreversible change of perspective on the discipline, opening up new vistas of hitherto unseen connections (Meyer & Land, 2003).

It has been suggested that creativity could be viewed as a threshold concept in disciplines where creativity is explicitly intended as a learning outcome - in design or visual art studies for instance (Reid & Solomonides, 2007; Osmond, Bull, & Tovey, 2009). Some of the characteristics of threshold concept (Meyer & Land, 2003) - transformative, probably irreversible, integrative, possibly bounded, potentially troublesome – seem quite applicable to conceptions of creativity as a generic disposition. One category of troublesome knowledge suggested by Meyer and Land is that of tacit knowledge. The difficulty experienced in defining, teaching and assessing creativity suggests that much of what is understood is indeed tacit. Accepting creativity as a threshold disposition with its inherent troublesome-ness, and embedded in a disciplinary context, perhaps sidesteps the difficulty of achieving a firm objective definition. The transformative nature of creativity as a threshold disposition encompasses subjectivity, by implicating the whole person in a perspective shift that changes their world-view.

David Perkins (2008, p14) has written on the threshold nature of disposition in the context of 'proactive knowledge' as a disposition for active learning, suggesting that this disposition is in itself threshold in nature:

"Educating for proactive knowledge calls for a threshold-like shift from a culture of demand to a culture of opportunity. In a culture of opportunity, what learners do ... becomes more open and ranges more widely." Educating for creativity calls for similar shifts, from identity as learner and consumer of knowledge to creator and active agent; from seeking problem solutions externally, to internal generation of not only solutions, but problems themselves. Studies of students within a design discipline have suggested that as students navigate threshold spaces and increasingly engage with their creative identity they achieve a "state of enlightenment or Sense of Being" (Reid & Solomonides, 2007, p34). This resonates with Csikszentmihalyi's (1990) notion of 'flow' as a transcendent state of creativity and mastery.

Transformative learning for creativity

Thresholds and transformation

Curriculum design most usually describes expected learning outcomes as knowledge or capabilities that can be demonstrated at various levels of achievement (eg. Biggs & Collis, 1982). The revised Bloom's Taxonomy (Anderson et al, 2001) places creativity as the highest level of learning outcome, however its focus on cognitive processes belies the multi-faceted nature of creativity, the difficulty of alignment to a spectrum of standards and its nature as a disposition rather than a capability.

Meyer and Land (2003) suggest that the process of mastery of a threshold concept involves the learner occupying a liminal space where the concept is not yet grasped but retreating is not

possible. Passing through this portal requires some time and effort, engaging with the unknown and the counter-intuitive, and the learner is likely to feel challenged, and uncomfortable. It has been noted that the disequilibrium and uncertainty of the liminal space is an essential element of creative activity and transformation (Reid & Solomonides, 2007). It reflects the creative process itself, where the risk of embarking on an original idea, design or action is likely to provoke discomfort and insecurity during the transformation of existing ideas, understandings and products into new representations. It also reflects the process of transformative learning explicated by Mezirow (1991; 1997), in which a disorienting dilemma followed by self-examination initiates a learning process involving critical reflection, and investigation of options for action. The learner engaging with the concept of creativity in their context and with their own developing creative identity may be the first troublesome step into the liminal space of creative transformation.

Transformation conceptions of creativity relate it to characteristics such as 'disorientation and encountering the unexpected', 'the desire and the ability to engage in change' and 'engagement in risk-taking' (Kleiman, 2008, p211). According to Kleiman, "creativity in learning and teaching is experienced as an engagement in a process that is transformative either in itself, or is undertaken with the intention (implicit or explicit) of being transformative." (2008, p214). Land, Meyer and Baillie (2010) have acknowledged the potential relationship between the liminal space of threshold concepts, and the transformative learning framework, and Reid and Solomonides (2007) have also related this to teaching and learning creativity.

So, a transformative learning approach seems appropriate for the development of attributes representing a creative disposition, providing a framework for personal transformation in the context of a learning process, and a method of managing the liminal space intrinsic to both learning thresholds and creative practice.

Transformative learning – some background

Transformative learning theory was developed by Mezirow (1991; 1978) and others (Cranton, 1994; Taylor, 1998) in response to adult learning needs, and an emerging awareness of the potential for personal transformation in adult learning. It draws largely on Freire's work on conscientization based on developing learners' critical awareness of how their learning is framed in social and political contexts (Freire, 1970), and Habermas' theory of communicative action framed around three domains of learning: the technical, practical and emancipatory (Habermas, 1972; 1984), and also relates to Kuhn's work on paradigms (Kuhn, 1962), and Schön's on reflective practice (Schön, 1983).

According to Mezirow (1998, p197): "Learning to think for oneself involves becoming critically reflective of assumptions and participating in discourse to validate beliefs, intentions, values and feelings." Mezirow views this as a "uniquely adult form of metacognitive reasoning. Reasoning is the process of advancing and assessing reasons, especially those that provide arguments supporting beliefs resulting in decisions to act." So is this applicable to higher education? And how can this ultimately rationalist agenda promote creative qualities? "Learning to think for oneself" could stand as a credo for the purpose of higher education, and is certainly a necessary basis for any kind of creative practice. A significant aspect of transformative learning, deriving essentially from Freire's critical pedagogy, is that it is personally reflective and socially situated, with learners dependent upon each other for the development of understanding and the revisioning of perspectives, and the resulting transformation having a social orientation based on a deep awareness of personal situation in social and cultural contexts.

Initially Mezirow listed several phases of the transformative learning process (Kitchenham, 2008). These have been rationalised by Cranton (2002, p66) as:

- An activating event that typically exposes a discrepancy between what a person has always assumed to be true and what has just been experienced, heard, or read
- Articulating assumptions, that is, recognizing underlying assumptions that have been uncritically assimilated and are largely unconscious
- Critical self-reflection, that is, questioning and examining assumptions in terms of where they came from, the consequences of holding them, and why they are important

- Being open to alternative viewpoints
- Engaging in discourse, where evidence is weighed, arguments assessed, alternative perspectives explored, and knowledge constructed by consensus
- Revising assumptions and perspectives to make them more open and better justified
- Acting on revisions, behaving, talking, and thinking in a way that is congruent with transformed assumptions or perspectives

These are not seen as linear stages, but parts of a process that is iterative, and clearly emphasise the centrality of critical self-reflection. This be seen to relate to conceptions of threshold learning in that several reflect the uncertainty of occupying a liminal learning space.

Mezirow related three types of learning (instrumental, dialogic and self-reflective) to three learning processes:

- learning within existing meaning schemes,
- by learning new meaning schemes, and
- through meaning transformation.

The last process occurs when an encountered problem cannot be resolved through existing or newly learned meaning schemes, and the problem needs to be redefined by the learner, resulting in perspective transformation. The overall conception as it developed from 1981-2006 is represented in Figure 1 (adapted from Kitchenham, 2008).

Mezirow's Transformative Learning Theory, 1981 - 2006 (adapted from Kitchenham, 2008)

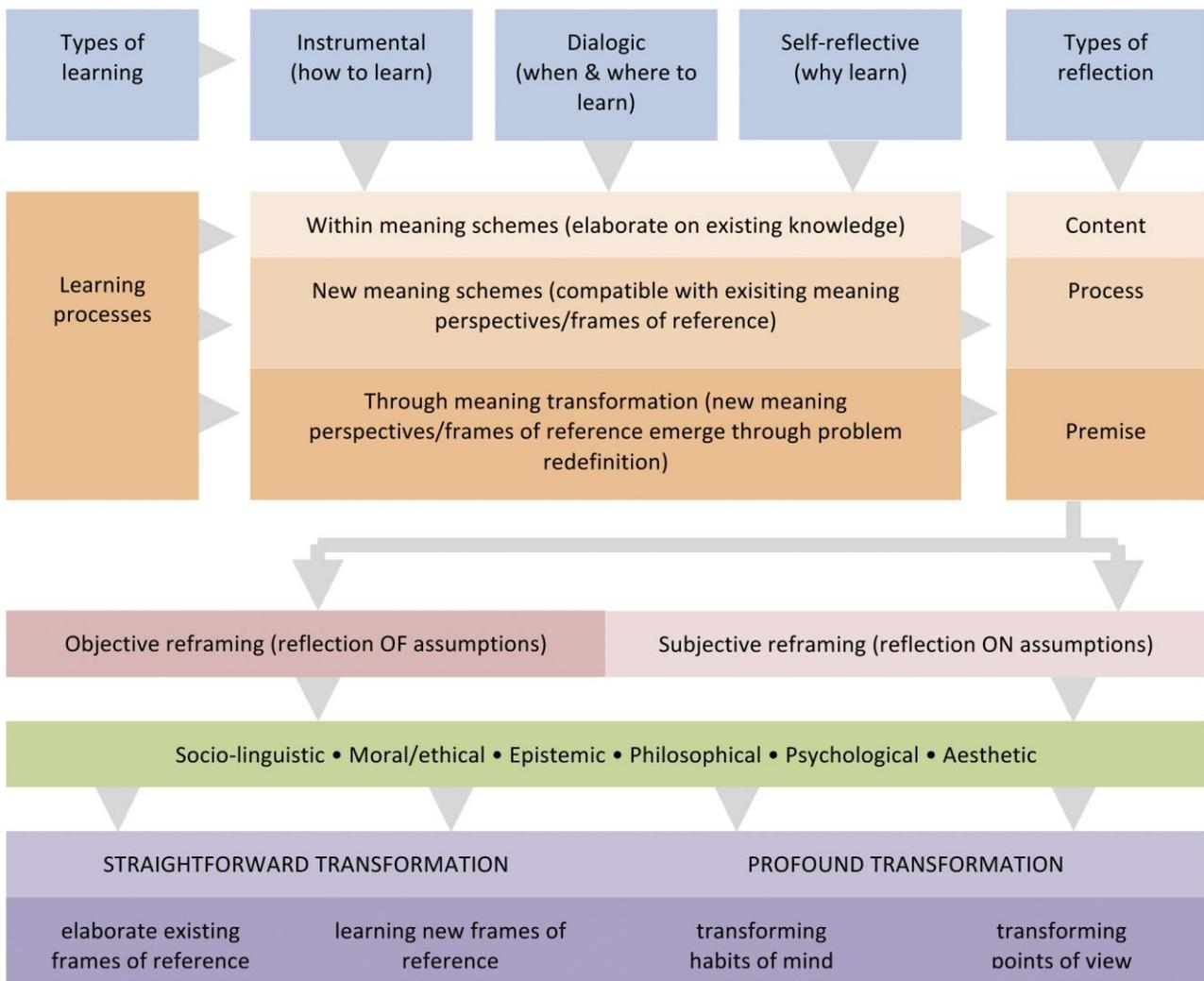


Figure 1

Mezirow's rational basis for critical reflection aroused criticisms that his representation of transformative learning does not accommodate the affective dimensions of intuition, feeling and other extra-rational influences (Taylor, 1998). Accordingly, broader and deeper conceptions of transformative learning have been defined, where subconscious, instinctive and emotional dimensions are accommodated:

"Transformative Learning is the expansion of consciousness through the transformation of world views and the specific capacities of the self" (Elias, 1997, cited in Dirkx, Mezirow & Cranton, 2006)

Mezirow more recently acknowledged that "most of the process of learning occurs outside of awareness and may include emotional, intuitive, symbolic, imaginistic, and/or contemplative modes of learning" (Dirkx et al, 2006, p124). Dirkx goes further than this, proposing that transformative learning is "soul work or inner work" (Dirkx, 1997). O'Sullivan also conceptualises transformative learning more broadly, stating that:

"Transformative learning involves experiencing a deep, structural shift in the basic premises of thought, feelings, and actions. It is a shift of consciousness that dramatically and irreversibly alters our way of being in the world. Such a shift involves our understanding of ourselves and our self-locations; our relationships with other humans and with the natural world; our understanding of relations of power in interlocking structures of class, race and gender; our body awarenesses, our visions of alternative approaches to living; and our sense of possibilities for social justice and peace and personal joy." (O'Sullivan, 2003, p327)

How this relates to creativity

These understandings of transformative learning relate to creativity in two ways. Firstly, creativity as a threshold disposition requires a perspective change in the learner in order to reconstruct their own persona as 'creative'. Dirkx's notion of 'inner work' is inseparable from the development of self-belief as a creative practitioner, and this perspective change is likely to be as much in the affective as in the rational dimension. Secondly, the notion of readiness for and commitment to perspective change is integral to creative behaviour. For instance, what distinguishes creative problem-solving (and problem-identification) from more mundane problem-solving approaches is the ability and readiness to not only accommodate different perspectives, but also to be willing to profoundly change one's own perspective, and to act on that change. If every act of learning causes change in the learner, every act of creativity causes profound change. This suggests a preparedness by the creative disposition to frequently inhabit liminal learning space.

This has deep implications for curriculum design. While higher education practice is gradually adopting constructivist conceptions of a more student-centred, active learning approach, this is largely focused on the transactional dimension. To take the example of teaching for problem-solving: problem-based learning design, while based on real-world problems, usually pre-defines the problem, provides the tools to guide learners in their approach to the activity, and often presents 'worked exemplars' to scaffold the activity. While this is very effective in promoting a dialogic activity that results in learning new meaning schemes, it is likely that only a small proportion of learners will naturally bring the creative approach required for perspective transformation. So how can curriculum and teaching methods align with the transformative approach?

Teaching and learning creativity

Teacher as transformative learner

The transformative learning framework described above makes clear the process for the learner. But how is a teacher to manage this? According to Cranton (2002, p66) "There are no particular teaching methods that guarantee transformative learning". She goes on to say:

"I think it is this environment of challenge that underlies teaching for transformation. Although this challenge must be combined with safety, support, and a sense of learner empowerment, it is, at the center, a challenge of our beliefs, assumptions, and perspectives that leads us to question ourselves."

Some specific suggestions as to how to create and facilitate this environment are framed around the transformative learning phases articulated above, and more details can be found in Cranton (2002).

Taylor (1998) suggests that teachers need to be committed to their own perspective transformation and engage in a professional development process to enable this - in other words to approach teaching as creative practice:

"most significant to the role of the educator seems to be not the various techniques and strategies that they employ, instead it is becoming a transformative learner themselves. This means as educators they 'must be adult learners continually striving to update, develop, expand and deepen their perspectives both on subject area and on their own goals and roles as educators' (Cranton, 1994, p228)". Taylor (1998, p57)

Teaching as creative practice

In some disciplines the teacher is likely to have a strongly developed creative identity as, for instance, a visual artist. However, teachers in higher education generally are unlikely to treat their teaching as creative practice. They may have a more familiar creative model in their research, where identifying gaps, critical reflection on assumptions (thinking for oneself), and developing novel and appropriate solutions or approaches, should be integral to their practice. Teaching, tending to be focused on the economically rational rather than the pedagogically adventurous, can be difficult to conceptualise as a creative act. Engaging with the creative aspects of their teaching provides an opportunity for teachers to forge deep personal engagement in the practice of teaching, and to collaborate with students on their transformational learning journey.

It has been suggested that the academic role has been changing, due to community and industry expectations of academic engagement and to greater expectations for accountability and efficiency in both research and teaching (Barnett, 2004). For academics, no less than the students they are teaching, creativity is a disposition that can be brought to bear on the uncertainties and ambiguities of the academic role and workplace. Universities increasingly rely on development programs for academics to develop capacities to enable them to function in a changing environment with competing priorities, and supporting teachers in higher education to take a more scholarly approach to their teaching through critical reflection is a well-entrenched strategy (Brookfield, 1995; Hicks, Smigiel, & Wilson, 2010). Using a transformative learning framework for teachers' professional development could promote the development of creative capacities in teaching, and model the enactment of this approach for academics' own teaching practice.

For instance, Loads (2010) reports on a development approach that uses artwork and reflection through metaphor to "provide a space where lecturers themselves can hold, examine and develop tolerance for uncertainty" (p409). This model not only develops teachers' own creative self-perception, but also provides a model for introducing their students to liminality and self-reflection.

Learning as creative practice

Students in the studies previously cited (Jackson et al, 2006; Petocz et al, 2009) frequently expressed the idea that learning creativity required the teacher to have a creative approach to teaching – that is to set diverse and unusual learning activities and assessment tasks that would provide the opportunity to practice creative thinking.

Edwards et al (2006) identified several strategies that academics believe will support and develop creativity, including: developing critical thinking, encouraging lateral thinking and problem-solving, moving between university and outside, giving space for group work, increasing student confidence and having fun. In the revised Bloom's taxonomy the Creativity outcome is described as: *"Putting elements together to form a coherent or functional whole; reorganizing elements into a new pattern or structure through generating, planning, or producing. Creating requires users to put parts together in a new way or synthesize parts into something new and different a new form or product."* (Anderson, Krathwohl, & Airasian, 2001)

Key verbs associated with this category are: designing, constructing, planning, producing, inventing, devising, making. While these ideas can sit within a transformative learning framework, they should be presented in a context of learner empowerment and self-critique – that is, the students should be engaged in developing their own learning goals and activities, identifying

opportunities for critical reflection, and participating in learning as a social process that empowers the group.

Creative transformation in learning

The transformation from learner to creator entails developing a creative identity. Creativity can be conceived of as a disposition towards particular behaviours in a context, but each learner must individually internalise what it means to be creative in their own (disciplinary, social, cultural) context and map their own pathway. This requires commitment to personal change and deep engagement in the domain of practice. The emancipatory focus of a transformative learning framework lends itself to the deal with the affective and subjective aspects of this transformation.

Applying a transformative learning framework to provoke ongoing critical reflection during the creation process is likely to promote the development of creative behaviours, but only if it is also associated with appropriate forms of assessment which empower the learner. The emancipatory agenda of transformative learning theory suggests that assessment processes be holistic in the dimensions that are addressed, and should not only involve, but be directed by the learners themselves in both devising and conducting assessment. Methods including self-assessment, peer assessment, group assessment and portfolio assessment come to mind.

Transformation for the future

Ken Robinson (2010) has suggested that:

“One of the real challenges is to innovate fundamentally in education. Innovation is hard because it means doing something that people don't find very easy for the most part. It means challenging what we take for granted, things that we think are obvious.”

The fundamental basis of transformative learning is the critique of assumptions, the unpicking and remaking of "common sense" in personal, social and cultural dimensions. If, as Einstein said, "to regard old problems from a new angle requires creative imagination", then critique of current understandings inform every such creative act. Transformative learning can provide the tools for learners (and their teachers) to develop a creative identity, and embed creativity into their practice in any domain, and has the potential to promote a wide range of graduate outcomes from ethical practice to global citizenship. However, this is for many reasons a problematic approach within higher education.

While corporate and political interests attempt to make-over higher education to suit their agendas, and academics go into defensive mode to protect their autonomy and territory, there is a need to reimagine the university as a "learning organisation" (Senge, 1990) as much as an organisation for learning. The institution itself may be in need of some transformative learning, to provide an environment that will support the creativity in learning and teaching that has been discussed. Some transformative learning theorists suggest that awareness of the complex social, economic and environmental challenges presented in the current global situation requires a radical critique of the form and function of education, which must urgently engender new creative visions based upon a cosmological framework (O'Sullivan, 1999; 2003; O'Sullivan, Morrell & O'Connor, 2002).

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The importance of creativity: teaching for transformation in higher education

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