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Towards an epistemically neutral curriculum model for vocational education: From competencies to threshold concepts and practices

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Abstract

Debate about the benefits and problems with competency-based training (CBT) has not paid sufficient attention to the fact that the model satisfies a unique, contemporary demand for cross-occupational curriculum. The adoption of CBT in the UK and Australia, along with at least some of its problems, can be understood in terms of this demand. We argue that a key problem with CBT is that as a cross-occupational curriculum model it impacts too strongly on the way particular occupations are known and represented. Following this line of argument, we propose that more effective models will be those that are ‘epistemically neutral’ and thus responsive to the inherent knowledge and practice structures of occupations. We explore the ‘threshold concepts’ approach as an alternative that can claim to be sensitive to occupational structures. This approach has proved effective for curriculum renewal in higher education. We indicate ways it contrasts with CBT but also note some difficulties with the approach for vocational education.

Key words: Competency-based training, threshold concepts, curriculum, occupations, vocational education

Introduction

The pervasiveness of competency-based training (CBT) in vocational education globally may be understood in terms of demand for cross-occupational curriculum models. This call for a model that can apply to a range of different occupations is a relatively recent phenomenon that coincides with the framing of vocational education within economic policy and accountability regimes. For example, CBT was implemented for multiple occupations covered by UK and Australian vocational education systems in the 1990s (Harris, Guthrie, Lundberg & Hobart, 1995), and since the 2000s, the international aviation industry has been implementing a competency-based model for constituent occupations in the interests of regulation (Kearns, Mavin & Hodge, 2016). But the very idea of a cross-occupational curriculum model presents peculiar challenges. Curriculum as we have known it is fundamentally concerned with the inherent knowledge and practical structures of those subjects, disciplines and occupations that are the focus of curriculum construction. To create curriculum is to be open and attuned to the subject matter itself and to be guided by what is there. Yet cross-occupational curriculum of the kind demanded by policy-makers and regulators cannot follow this logic. Rather, a standardised model is required that can not only guide teaching and assessment in diverse occupations, but is intelligible to and can be systematised by policy makers, regulators and others who do not know these occupations. In

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a sense, any model of cross-occupational curriculum must abrogate or amend the goal of remaining open to particular occupational subject matter to maintain enough flexibility to apply meaningfully to diverse subject matters.

It could be objected that CBT is not curriculum or a curriculum model and thus the goal of curriculum to be open to particular subject matter is not applicable. For some, the term ‘cross-occupational *curriculum*’ would be meaningless. This objection appears to be borne out by discussions such as we find in Harris et al. (1995) where ‘units of competency’ – templated documents that contain descriptions of competent work – are distinguished from curriculum proper, which is the program of study based on one or more units. This way of looking at curriculum and CBT is common among VET practitioners and stakeholders (Hodge, 2015). However, if ‘curriculum’ is about what is worthwhile to teach and learn (Eisner, 1982), then the practice of CBT indicates that it is indeed a curriculum model. Units of competency seek to represent occupational tasks and roles and the practice of CBT includes assessment of learning against what is inscribed in the units. From this perspective, units of competency are clearly about what should be taught and learned. Although teaching and learning might in principle address other material, the resource constraints of vocational education systems generally tend to keep teaching and assessment close to what is set out in the units. In the discussion to follow, then, CBT is regarded as a type of curriculum, that is, concerned to identify what, of all that could be taught and learned about an occupation, is important to teach and learn.

The widespread adoption of CBT and at least some criticism of it can be understood in terms of the demand for cross-occupational curriculum. We argue that as a cross-occupational model, CBT has an overly strong influence on what can be known and represented about occupations for teaching and learning. Such an *epistemic* impact may undermine the goal of vocational education if inherent structures of occupational knowledge and practice are neglected. We suggest that the goal for cross-occupational curriculum should therefore be epistemic *neutrality*, a framework that allows structures of concepts, techniques and values specific to occupations to determine curriculum. In an effort to promote conceptualisation of an epistemically neutral curriculum model, the idea of ‘threshold concepts’ is introduced and explored. This model has evolved in higher education settings and is characterised by a focus on learner difficulty and knowledge priorities within a discipline or profession. After clarifying our claims about the epistemic potency of CBT and introducing the threshold concepts approach, we contrast the two, highlighting possible advantages of the threshold concepts model for vocational education but also acknowledging some its difficulties.

Competency-based training and vocational education

A large part of the appeal of CBT for VET policy makers is that it can be construed as a cross-occupational curriculum model. The implementation of CBT in the UK and Australia in the 1990s bears out this interpretation. In the wake of the perceived failure of ‘welfare’ (Le Grand, 2003) or ‘embedded liberal’ (Harvey, 2007) economic policy, governments reformed systems and institutions to align their activities to liberal market ideals. Reform of vocational education systems in the UK and Australia followed this trend and CBT was the model

adopted in each country as the vehicle for change (Hodge, 2015). A range of benefits was claimed for CBT. Educators saw in it an opportunity to introduce learner-centred pedagogies in a sector that was perceived to be a haven of outmoded educational practices (Harris et al. 1995). Policy makers used CBT to reallocate responsibilities for curriculum design, allowing the activities of educators to be systematically oriented to the needs of employers who were put in charge of identifying learning outcomes for educators to realise (Hodge, 2015).

The new vision for vocational education depended for its success on a model of curriculum that could apply across the diverse occupations encompassed by the system, and it was accepted that CBT would serve this purpose. Using a template for representation adapted from behavioural objectives theory and a conceptualisation of modularity informed by task analysis theory, CBT appeared to be an effective and flexible way to capture competent work performance in standardised texts. Behavioural objectives theory posits that desired performances can be described in such a way that a representation of the performance in the mind of the objectives writer can be transmitted to the mind of the reader/educator without significant loss or distortion (Mager, 1962). If objectives writers describe the desired performance in a concrete way, as well as specify conditions of the performance and level or criterion of performance, then the text will be an effective vehicle for communicating educational outcomes. Coupled with this representational methodology, a task analysis approach was adopted for differentiating representations. Conceptualisation of work on the basis of identifying and describing tasks has been used since at least Frederick Taylor (1906) promulgated his 'Principles of Scientific Management'. Policy makers opted for variants of the DACUM model of task analysis which had its origins in Canadian career development programs (Joyner, 1995). This was a relatively rapid way of developing vocational curriculum which involved a group of occupational experts determining the roles and duties involved in a job. The lists produced by these expert groups would become the basis for differentiating 'units of competence'. More technical approaches to task analysis have also been refined within the instructional systems design paradigm, but they are slower, require special expertise and tend to generate complex representations (Kearns, Mavin & Hodge, 2016). The efficient DACUM technique and the relatively uncomplicated form of representation promoted by behavioural objectives theory combine to create the distinctive curriculum model of CBT used in the UK and Australia.

Although competency texts are structured according to behavioural principles, efforts have been made to introduce knowledge categories into the units. For example, until recently Australian units of competency included a statement of 'Required Knowledge'. It was thought possible to list concepts, principles and theories, and frameworks such as relevant legislation, that 'underpin' the performance specified in the behavioural parts of the units. But such statements of knowledge are conceived strictly in terms of support for particular behaviours. The focus remains on what is necessary to reproduce pre-specified performances, not on development of knowledge as such. Knowledge that may in fact be essential to an occupation will not be represented in units of competency unless there is a perceived connection with task behaviour. Again, the method for determining 'required knowledge' can be questioned. According to Norton (2004), a leading advocate of the DACUM technique,

practitioners are well placed to identify knowledge that underpins work tasks despite substantial research that challenges this premise (e.g. Clark, Feldon, van Merriënboer, Yates & Early, 2008). A question mark hangs over the assumption that underpinning knowledge can be simply identified, even by experts. Thus, even if units of competency contain some statement of knowledge, it is circumscribed with respect to the performance in question, and the links between the listed knowledge and performance may also be uncertain.

There is obvious common-sense appeal in the CBT model of curriculum for vocational education. A focus on tasks and behaviours seems natural for the occupations traditionally covered by vocational education systems. However, the task-behaviour focus of CBT carries epistemological assumptions – assumptions about knowledge and its valid representation – that were not necessarily subject to examination by policy makers. To restrict representation to description of performances, conditions and criteria means that knowledge and subtle dimensions of occupational practice – such as its social, political, ethical and intuitive determinants – cannot be addressed in a direct way. The assumptions built into the template of units of competency derive from the explicit epistemology of behavioural psychology (Watson, 1913). This theory has its concern with intangible determinants of behaviour as a distraction and that whatever the influence of such factors, close attention to behaviour is the most effective way to analyse and comprehend human action. Thus an explicit epistemology is conveyed into the curriculum model of CBT, accounting for a key assumption we have identified.

The task analysis approach carries the assumption that competent work can be decomposed into a series of task units. This assumption stems from Taylor's (1906) scientific management theory which holds that competent work can be comprehended by discerning the boundaries of component tasks and describing the elements and structure of the tasks. The message is that workers' knowledge can be lifted out of the work context and then 'scientifically' analysed, represented and managed from a distance. But to segment representations in this way means that any broader or holistic determinants of competence – processes, systems, conceptual structures, practice structures, problems, projects or vocations – cannot be addressed in a direct way. Thus another explicit epistemology – this one about the units comprising competent work and the possibility of capturing worker knowledge in this way – is conveyed by the CBT model.

We contend that these assumptions impact on vocational curriculum in unexpected ways. If such curriculum is primarily about giving learners opportunities to understand and master essential determinants of competent occupational practice, then it is crucial that curricular representation be attuned and open to these determinants. If these determinants include intangible knowledge and practice structures or cohere across multiple 'tasks', then there is the risk that the CBT model will not provide access to them. We suggest that some existing criticism of CBT can be viewed in this light. For example Wheelahan (2009) builds a case for the neglect of knowledge entailed by the CBT model of curriculum. Citing the example of community service work – an occupation that taps into disciplinary bodies of knowledge – she shows how CBT produces curriculum that actually obscures the knowledge required for competent practice. Other criticism highlights the limitations of inherent in the reduction of

competence to multiple units. As early as Broudy's (1972) critique of its use in teacher education, the CBT approach has been associated with a 'fragmented' representation of practice that could undermine a learner's ability to develop coherent understanding. These two kinds of criticism attest to a conflict between the assumptions of CBT and epistemic structures of occupations to which it is applied.

Another kind of problem with the epistemic impact of CBT on vocational curriculum can be postulated in the case of occupations that have not been subject to the kinds of analyses Wheelahan and Broudy draw on when they juxtapose CBT and curriculum of the kind attuned to the inherent structures of an occupation. If CBT is applied to occupations that have little in the way of prior curricular formalisation to reflect on (in contrast with Wheelahan's community workers and Broudy's teachers), then its assumptions might conflict with occupational structures without it being obvious. This could be the case in occupations that have not been regarded as academically interesting or prestigious, or emergent kinds of work that are too new to have been analysed in terms of underlying epistemic structures. Rose (2004) has highlighted the epistemological complexity of types of work that might otherwise be regarded as 'manual' or 'low-skilled' such as plumbing, hairdressing, welding and hospitality.

We argue, in effect, that CBT abrogates a primary function of curriculum – to be open to the epistemic structures of occupations – and as a corollary makes a strong epistemic impact on the representation and reproduction of occupations to which it is applied. We noted above that abrogation of this core function of curriculum can be understood as consistent with the requirements of a cross-occupational model of curriculum. But the corollary is potentially an unhelpful influence on vocational education, undermining the effectiveness of curriculum to really serve occupations. We conclude that to be effective, a cross-occupational curriculum model must be flexible – as CBT undoubtedly is – but not epistemologically supplantive – as CBT appears to be. Instead, *epistemic neutrality* should be sought in a cross-occupational curriculum model. A model that is effective for vocational education must allow the inherent knowledge and practical features of an occupation to guide teaching, learning and assessment.

With the criterion of epistemic neutrality in mind, we explore the potential of a new model of curriculum that has emerged in higher education. This model, the 'threshold concepts' approach (Meyer & Land, 2003), is characterised by sensitivity to the inherent structure of disciplines and professions to which it has been applied. It is concerned with learner difficulty and epistemological priorities within subjects, opening a fresh perspective on what it might be to learn in vocational education. It is notable, too, that it is considered by researchers to be an approach that contrasts with outcomes-based models of learning (such as CBT) (e.g. Cousin, 2009).

Threshold concepts in higher education

Jan Meyer and Ray Land developed the idea of threshold concepts in the context of interest among researchers and policy makers in understanding and improving teaching and learning

in higher education. The basic idea, formulated by Meyer, was that among outcomes that can be defined for learning in a discipline there are core outcomes that involve ‘seeing things in a new way’ (Meyer & Land, 2003, p. 412). They are concepts (or more generically, ‘objects’) within the field of study that have a special significance for learners. Learners typically get ‘stuck’ on these concepts because their prior learning and experience does not prepare them for the unique way of seeing associated with the concept. They have to struggle with themselves and unlearn old ways of seeing to be able to grasp the concept. Once learners have come to terms with the concept – pass the threshold represented by the difficulty – they not only ‘get’ the concept but find that related concepts are comprehended more easily. Meyer and Land (2003) describe these peculiar concepts as ‘portals’, paving the way to understanding whole sets of concepts. Examples of these ‘threshold concepts’ presented by Meyer and Land (2003) include ‘complex number’ and ‘limit’ (in mathematics), ‘signification’ (in literary and cultural studies), and ‘opportunity cost’ (in economics). A growing literature has proposed threshold concepts for a wide range of professional and disciplinary fields such as ‘critical flow’ in engineering (Knight, Callaghan, Baldock & Meyer, 2014), ‘function’ in mathematics (Pettersen, Stadler & Tambour, 2013), ‘malleability’ in legal studies (Weresh, 2014), and ‘recovery’ in mental health nursing (Stacey & Stickley, 2012). A database of papers and other resources is maintained by Mick Flanagan (<http://www.ee.ucl.ac.uk/~mflanaga/thresholds.html>) which documents a growing awareness of the value of the threshold concepts approach for curriculum renewal in higher education.

Meyer and Land (2003) distinguish key features of threshold concepts. Threshold concepts are ‘transformative’, in that they fundamentally alter the way a learner looks at the field of study and the world. Meyer and Land (2003, p. 415) explain that the concepts may even ‘lead to a transformation of personal identity, a reconstruction of subjectivity.’ The transformation may involve a shift in values, feelings or attitudes, and depending on the field of study may have a practical or ‘performative’ dimension (e.g. in Sport Science). Threshold concept acquisition may also be ‘irreversible’. Meyer and Land (2003, p. 4016) say that ‘the change of perspective occasioned by the acquisition of a threshold concept is unlikely to be forgotten, or will be unlearned only by considerable effort.’ They suggest by the way that this feature of threshold concepts may account for the difficulty experienced by subject experts in recalling how they themselves experienced the subject as a novice. Another characteristic – and a fundamental one at the ontological (learner) level – is ‘troublesomeness’. It appears that work by Perkins (1999) on troublesome knowledge was influential on the development of the threshold concept idea. Summarising Perkins’ contribution, Meyer and Land (2003, p. 417) explain that some knowledge encountered in learning stands out as ‘conceptually difficult, counter-intuitive or ‘alien’ (emanating from another culture or discourse), or incoherent (discrete aspects are unproblematic but there is no organising principle).’ Learners and teachers are often well aware of this kind of knowledge. But instead of treating such troublesomeness as something incidental or in deficit terms, Perkins, followed by Meyer and Land, recognise the importance of such knowledge for curriculum and pedagogy.

Three other characteristics of threshold concepts point to their epistemologically significant role in relation to the discipline or profession being learned. A threshold concept is ‘integrative’, that is, it ‘exposes the previously hidden interrelatedness of something’ (Meyer & Land, 2003, p. 416). While many concepts or practices encountered on the path to professional or disciplinary mastery may be troublesome and irreversibly transformative, a threshold concept in addition establishes the significances of and relationships between other concepts in a body of knowledge. Threshold concepts allow learners to consolidate their grasp of a whole interconnected segment of the discipline or profession in question. Although a swathe of professional or disciplinary knowledge may be integrated through a successful encounter with a threshold concept, the field thus opened remains ‘bounded’. According to Meyer and Land (2003, p. 416), threshold concepts are ‘[p]ossibly often (though not necessarily always) bounded in that any conceptual space will have terminal frontiers, bordering with thresholds into new conceptual areas.’ The integrative power of threshold concepts is limited and these limits are inherent in the structure of the body of knowledge under study. Boundedness points to a second epistemological feature of threshold concepts. Later, Meyer and Land (2005) added that threshold concepts have a ‘discursive’ dimension. Thus a third epistemological feature of threshold concepts emerges: that of facility with the language of the discipline or profession.

Although the label ‘threshold concepts’ is used by Meyer and Land and other researchers, it is clear that the evolving theory of these unique learning outcomes grapples with and conceptualises threshold objects that are not of a purely intellectual kind. Even in their seminal paper that introduces what appears to be an essentially theoretical phenomenon, Meyer and Land (2003) suggest the possibility that these thresholds may have performative, affective and practical dimensions or types. They entertain a connection between threshold concepts and an alternative conceptualisation of learning outcomes in higher education as ‘ways of thinking and practicing’ that may be more relevant to fields that are not characterised by strong consensus about what constitutes the body of knowledge. Here the focus is on action and practice rather than conceptual content. This nuancing of the focus of the threshold concept idea has continued. Discussing research into threshold concepts in a range of fields, Land, Meyer and Baillie (2010) concede that,

These ‘learning thresholds’ might not be strictly conceptual, but seem necessarily occasioned by significant learning and are more concerned with shifts in identity and subjectivity, *with procedural knowledge, or the ways of thinking and practising customary to a given disciplinary or professional community.* (2010, p. xxviii, emphasis added)

Gourlay (2009) captures this performative or practical type of learning threshold with the notion of ‘threshold practices’, distinguishing it from the more academically focused idea of ‘threshold concept’. Drawing on, but critical of, application of the communities of practice idea (Wenger, McDermott & Snyder, 2002) to learning academic writing in higher education, Gourlay argues for the relevance of the notion of ‘liminality’ as elaborated by researchers including Meyer and Land (2003), and proposes that there are fields of learning that are more

of the nature of a ‘practice’ (e.g. academic literacy) than a body of knowledge justifying the use of the term ‘threshold practices’:

While threshold *concepts* have been used to focus on the cognitive aspects of learning; by using the term *threshold practices*, this paper has sought to gain some theoretical purchase on the interplay between (i) the indeterminate, tacit nature of academic writing; (ii) the emotional and social dimension of the student transition; and (iii) the role of struggles around writing in identity formation. (2009, p. 189, emphasis in original)

For the purposes of the present exploration, the notion of threshold practices offers a theorisation that may accommodate the demands of curriculum areas that are not defined solely or predominantly by codified knowledge. Vocational curriculum may potentially be approached in terms of threshold practices, or a combination of these with threshold concepts.

Threshold concepts as a curriculum model in VET

In this section we consider the potential of threshold concepts as a model for curriculum in vocational education. To clarify this potential, reference is made to CBT to highlight a set of contrasts that can facilitate appraisal of the threshold concepts approach. A preliminary consideration in weighing up the value of the threshold concepts approach in vocational education is the fact that research to date suggests the approach can apply to diverse areas of study. The wide applicability of the threshold concepts idea can be conceptualised in terms of Bernstein’s (2000) distinction between ‘singulars’ and ‘regions’ which maps approximately to the difference between disciplinary and professional bodies of knowledge. Disciplinary bodies of knowledge like mathematics or history develop according to an internal logic of development and resist external guidance. They are ‘singulars’ because they are self-sufficient, pursuing their unique vision of truth without concern for questions of practical application. In contrast are those ‘regions’ of knowledge that are characterised by orientation to practical issues and external demands. In terms of knowledge, regions can import concepts and theories from singulars and also develop their own practice-specific bodies of knowledge and skills that can form traditions in their own right (Young & Muller, 2014). Medicine and engineering offer examples of regions. Threshold concepts research indicates that it is effective for curriculum development in both singulars and regions, from mathematics to engineering. Some accommodation of the diversity of bodies of knowledge is evident in the elaboration of the idea of ‘threshold practices’ as a variation on threshold concepts. So long as it is possible to speak of key learnings or ‘threshold objects’ that once mastered facilitate access to other parts of the field, the theory has potential as a model of curriculum. The generic applicability of the threshold concepts idea constitutes a point of comparison with the CBT approach. As argued earlier, CBT arguably owes much of its current appeal to the fact that it has been taken to be generically applicable. The threshold concepts approach can make a similar claim.

Another attraction of the threshold concepts approach is that it constitutes a learning-oriented curriculum model. This orientation is evident from the start of threshold concepts research program, which sprang from systematic efforts to understand and promote learning in higher education. Such a focus could produce advances of a pedagogical variety, but the strand of research initiated by Meyer and Land (2003) drew out a feature of the challenge of learning bodies of knowledge that has clear curricular significance. The threshold concepts idea emerges from inquiry at the interface of the learning process and knowledge structures, which gives it a constitutional attunement to learning and a distinctive curricular relationship to bodies of knowledge. The intrinsic orientation to learning of the threshold concepts approach contrasts with the CBT model. The latter seeks to identify and represent all relevant observable tasks comprising an occupation and, at least in the UK and Australia, it is expected that educators will ‘cover’ all units of competency listed for a qualification or qualification subset in a training program. The units are presented without indication of material which is more difficult to learn and certainly not those likely to serve in any way as a ‘portal’ to mastery of others. A possible benefit of adopting a threshold concepts approach to vocational curriculum is foregrounded here. The approach shifts attention from *coverage* of tasks to location of what is most important and difficult to grasp. It reintroduces a core concern of curriculum to determine that which is more important to *learn*. An incidental advantage of the approach may well be that in an era when commercial pressures are generating interest in shorter duration programs, a focus on what is most important to learn has potential to ameliorate the educational drawbacks associated with sheer coverage of material.

The threshold concepts approach presents a second potential benefit in its orientation to knowledge and practice. The theory highlights threshold concepts (especially in relation to disciplinary bodies of knowledge) and threshold practices (in relation to professional bodies of knowledge) that represent epistemologically and ontologically complex features. It is this inherent richness of threshold objects that creates the element of troublesomeness for learners at the same time as it constitutes the integrating aspect of this kind of knowledge with respect to other concepts and skills. The epistemological depth of threshold concepts draws attention to the fact that the threshold concepts approach does not shy away from complexity and difficulty. This approach and the complexity of threshold concepts as foci for curriculum stands in contrast with the CBT approach. The latter is methodologically concerned with performances rather than knowledge – an artefact of the influence of behavioural psychology. This curricular focus entails downplay or neglect of unobservable determinants of occupational expertise. It produces concern with surface learning as well as a coverage mentality. The ‘why’ of performances is left out of this picture of competence. In contrast, the threshold concepts approach is characterised by an overarching concern with knowledge, practice and the ‘why’. As a model of vocational curriculum it promises to reintroduce an emphasis on deep understanding of occupational performance.

Although the threshold concepts approach encourages identification and representation of complexity and richness in curriculum, it does not compel individual disciplines or professions – or occupations more broadly – to force knowledge and practices to conform to

a templated representation like a unit of competency. A threshold object – whether a practice, technique, concept or theory – can have whatever content and scope that the field of application determines is important to know for the field and practitioner. Disciplines and occupations possess epistemological structures and a materiality that are clearly distinguishable by practitioners and can serve as a basis for posing the question of what are threshold objects for learning in the field. The CBT approach presents a strong contrast here. Apart from the consequences of the coverage imperative (which seeks to include everything observable in curriculum), templates shaped by behavioural objectives theory (elements, performance criteria, etc.) force occupations to conceptualise or reconceptualise practices to fit the template. Because these templates come with epistemological assumptions, for example that observable performances should be the focus of representation or that discrete tasks should determine the boundaries of curriculum representations, dimensions of important learning relating to a practice may fall outside the scope of representation. The contrast between CBT and the threshold approaches here may be expressed in terms of epistemological flexibility. CBT imposes a strong epistemic form on representation. The relative ‘neutrality’ of the threshold approach here allows it to avoid the pitfalls of inflexible curriculum representation. Such epistemic neutrality implies that inherent epistemic structures of an occupational practice can play a more generative role in the formation of vocational curriculum.

As a curriculum model oriented to the interface between learning and knowledge, the threshold concepts approach is characterised by openness to issues of identity formation. This characteristic reveals another aspect of the potential of the model for vocational education. Learners who access vocational education not only acquire knowledge and skills related to an occupation, but are developing a vocation. The difference between vocation and occupation is clarified by Billett (2011) who explains that the locus of vocation is in the person of the learner, while it is social, historical and institutional conditions that form an occupation. ‘Vocational education’ may be conceptualised, then, as those arrangements by which an individual’s vocation is developed in the context of learning for an occupation. The upshot of this understanding of vocational education is that it always possesses a polarity and scope for tension between an individual’s requirement for a meaningful vocation and the demands of occupations. If vocational education is a field properly shaped by this polarity, then the question arises of the suitability of curriculum models to this fundamental feature. The threshold concepts approach promises to articulate with this structure. On the one hand, threshold concepts and practices can represent important features of occupations. On the other hand, they are defined in terms of their potential to shape or transform the identity of the learner, thus articulating with the ‘vocation’ pole of vocational education. The distinction elaborated in the theory of threshold concepts between ‘epistemological’ and ‘ontological’ threshold concepts highlights the significance of the concepts or practices for learner identity or their sense of vocation (Land et al., 2010). In contrast, CBT is fundamentally attuned to the occupation pole of vocational education. In terms of Billett’s (2011) account of vocational education CBT is a one-sided model, concerned exclusively with particular job roles. It leaves questions of career and identity to the learner to sort out, or assumes the ‘labour market’ to be the appropriate arena for the formation of an individual’s vocational trajectory.

Unlike the threshold concepts approach, the CBT model of curriculum is indifferent to problems of learner identity.

A final attraction of the threshold concepts approach as a model for vocational curriculum is its potential to facilitate movement of learners between vocational and higher education sectors. Whether particular disciplinary or professional bodies of knowledge are taught in higher education settings explicitly through a threshold concepts approach or not, research consistently reveals them to be amenable to the approach. More than this, teachers of these bodies of knowledge implicitly adopt the approach when they delineate ‘key concepts’ in curriculum and develop a sense of those among the concepts that pose the most difficulty to learners and require the most care with respect to initial exposure, elaboration and reinforcement. The upshot for VET curriculum in areas that articulate into pathways to higher education is that basing curriculum on threshold concepts could underwrite more successful transitions. VET curriculum based on threshold concepts and practices might be more likely to enhance the continuity of learning by concerning itself with the same basic challenges as curriculum in higher education faces. In contrast, VET curriculum based on the CBT model has relatively little scope to promote this kind of continuity. Because CBT is concerned with performances rather than underlying knowledge and practice and is governed by a coverage mentality, CBT has a fundamentally different focus to curriculum focused on the acquisition of bodies of knowledge.

Challenges of the threshold concepts approach for vocational curriculum

Alongside these potential benefits of the threshold concepts approach for the problem of vocational education curriculum, the model faces some distinctive challenges. Here we consider two broad problems. The first concerns the extent to which material is available in occupations for reflection on threshold objects. In the higher education setting the threshold concepts approach can rely on traditions of theorisation, allowing experts, educators and students alike to talk about, reflect on and formalise possible threshold objects. In the occupations served by VET, such traditions of theorisation may not have developed or may have been lost during decades of neglect sanctioned by the CBT model. New jobs are emerging, too, producing novel challenges to reflection on what may be threshold concepts and practices. A related problem for the threshold concepts approach in the vocational education setting is the importance of embodied and practical knowledge in many occupations. Recognition of the significance of embodied knowledge for our understanding of human experience (Merleau-Ponty, 2012), of ‘implicit knowledge’ in learning (Masters, 1992), and the ‘corporeal turn’ in general in social theory (Iveson, 2012), draw attention to the unique theoretical challenges of comprehending and representing skilled techniques and practices. This recognition underlines the difficulties of articulating embodied, practical or ‘tacit’ dimensions of occupational competence, although recent work on threshold concepts has started to grapple with embodied knowledge (Hokstad, Rødne, Braaten, Wellinger & Shetelig, 2016; Rowe & Martin, 2014). Any attempt to bring the threshold concepts approach to vocational education would have to contend with these basic challenges of access to and articulation of threshold objects in potentially undertheorised or difficult-to-theorise occupations.

A second challenge to the threshold concepts approach for vocational education is a problem that also arises in the higher education setting. The challenge concerns methodologies for identifying threshold concepts. While research in the threshold concepts paradigm has led to the discovery and characterisation of threshold concepts in a wide range of disciplinary and professional areas, it has been noted that there is significant variation in the methods employed (Barradell, 2013). On the one hand, researchers have variously employed criteria such as troublesomeness and transformation – criteria that focus on the learner – and on the other hand the centrality of particular concepts in bodies of knowledge. A key empirical issue here is that research that relies on learner experiences of troublesomeness and transformation does not necessarily highlight concepts that are integrative and intrinsically important to a body of knowledge (the learner simply does not know enough to provide guidance on this question), while experts may have a clear understanding of those concepts that are epistemologically fundamental to a body of knowledge, but not recall any trouble and transformation they experienced in relation to them. Barradell (2013) advocates the theory of ‘transactional curriculum inquiry’ (Cousin, 2008, 2009) as a model for threshold concept identification in professional areas. The approach draws on both the actors in the teaching and learning environment (teachers and students) and the wider professional community. A modification of Cousin’s methodology may be promising for the task of identification of threshold concepts/practices in the vocational education context. In this setting, occupational experts or ‘industry’ would play a part in determining threshold concepts/practices as well as learners and vocational educators. Such curriculum development input contrasts with the current emphasis of CBT on industry which gives learners no role and educators an unclear one.

Recent work in the threshold concepts community attempts to resolve the methodological difficulties highlighted by Barradell (2013). The ‘Integrated threshold concept knowledge’ (ITCK) framework presented by Meyer and Timmermans (2016) offers a research-based approach to identifying threshold concepts and their translation into ‘representations’ for use in curriculum design, teaching and assessment. Within the framework, representations of threshold concepts for educational use are produced through the combination of four types of knowledge (Meyer & Timmermans, 2016, p. 25). First, there is analysis for and of threshold concepts with a view to specifying their critical features. The process of transactional curriculum inquiry (Cousin, 2008, 2009; Barradell, 2013) introduced above can be construed as a way to generate this type of knowledge. The second source of knowledge in the ITCK framework is empirical evidence of how learners initially experience and deal with threshold concepts. Third, there is evidence of how threshold concepts are actually learned, including variations in learning, metacognitive features of this learning and assessment results. Finally, ITCK is constituted by interpretations of the ‘dynamics of apprehension and discernment’ that lead to learners getting ‘stuck’ in relation to threshold concepts, unable to progress. It is noteworthy that Meyer and Timmermans do not regard ITCK as a prescriptive, ‘one size fits all’ framework. Commenting on the framework in a recent summary of the threshold concepts approach, Meyer (2016) explains that ‘the conceptual architecture that accommodates these “types of knowledge”, and that binds them together, is largely content free and adaptable to other contexts’ (2016, p. 470). These features of the ITCK framework

resonate with our argument for an epistemically neutral curriculum model for vocational education, suggesting that both the idea of threshold concepts/practices and evolving methodologies for their identification and deployment present a way to move beyond the CBT approach in VET in a way that is epistemologically appropriate.

Conclusion: towards an epistemically neutral model of cross-occupational curriculum

We have analysed CBT as a response to a unique, contemporary demand for cross-occupational curriculum. The appeal – and some problems – of CBT can be understood in terms of this demand. The impact of CBT on the representation of particular occupations was a problem we examined. CBT accepts only certain kinds of information as valid for the communication of competence, specifically descriptions of that which can be observed. Furthermore, CBT parcels representations following reduction of competence to a series of discrete tasks. We argued that these basic features of CBT have an ‘epistemic’ impact on the curricular representation of occupations, obscuring and distorting determinants of competence that do not conform to the template. Following this argument, we propose that for a cross-occupational model to be effective, it would need to allow the inherent knowledge and practical structures of occupations to appear in curricular representations. An ‘epistemically neutral’ approach is required that can really serve the purpose of vocational education, allowing occupations to emerge in their uniqueness in curriculum.

The threshold concepts idea was explored as a model that might satisfy the criterion of epistemic neutrality. The threshold concepts approach focuses on learner difficulty, and expert and educator views on what concepts are most important to mastery of a field of study. Threshold concepts are important not only in terms of knowledge and practice specific to a subject, but are significant in the development of learner identity with respect to the subject area. Research on threshold concepts is relatively advanced in the higher education setting where it is contributing to curriculum renewal. The idea is also becoming more nuanced, addressing practical as well as knowledge dimensions. It is appropriate to speak in terms of threshold practices as well as threshold concepts. This evolution is germane for any proposal to extend the approach to vocational education which does not necessarily have traditions of theorisation and formalisation to draw on for curriculum building.

For a curriculum approach to serve as a cross-occupational model, some form of representation would be necessary. The CBT approach admirably fulfils this requirement, with thousands of units of competency documents produced since its introduction. Our analysis of the epistemologically supplantive tendency of CBT – the tendency, that is, to overwrite the inherent knowledge and practice structures of occupations with a one-size-fits-all template – indicates that the demand for documentation can exacerbate the consequences. The standard unit of competency text encodes the epistemological assumptions of CBT, ensuring these assumptions are constantly re-enacted in the practice of VET. The threshold concepts and practices approach would make lighter demands on the structure of documentation. With this model, threshold objects can be many or few, broad or narrow, and encapsulate a very wide range of ‘content’. The behavioural focus of units of competency would give way to a focus on whatever the occupation finds important. That could indeed be

performances if that is what curriculum inquiry finds, but other determinants of competence could be represented instead – knowledge, dispositions, sensitivities, reasoning, narratives, connoisseurship. The task focus of units of competency would also give way to structures that could be relatively narrow, but could be broad, too – processes, practices, projects, problems, vocations. From a bureaucratic perspective such representational diversity may be undesirable, but surely bureaucratic concerns should be secondary to effective learning in a vocational education system.

References

- Barradell, S. (2013). The identification of threshold concepts: a review of theoretical complexities and methodological challenges. *Higher Education*, 65, 265-276.
- Bernstein, B. (2000). *Pedagogy, Symbolic Control, and Identity: Theory, Research, Critique*. Lanham, MD: Rowman & Littlefield.
- Billett, S. (2011). *Vocational education: purposes, traditions and prospects*. Dordrecht: Springer.
- Broudy, H. (1972). *A critique of performance-based teacher education*. Washington, DC: American Association of Colleges for Teacher Education.
- Clark, R. E., Feldon, D. F., van Merriënboer, J. J. G., Yates, K. & Early, S. (2008). Cognitive task analysis. In J. M. Spector, M. D. Merrill, J. J. G. van Merriënboer & M. P. Driscoll (Eds.), *Handbook of research on educational communications and technology* (3rd Ed.) (577-593). New York: Routledge.
- Cousin, G. (2008). Threshold concepts: old wine in new bottles of a new form of transactional curriculum inquiry? In R. Land, J. H. F. Meyer & J. Smith (Eds.), *Threshold concepts within the disciplines* (261-272). Rotterdam: Sense Publishers.
- Cousin, G. (2009). *Researching learning in higher education*. New York: Routledge.
- Eisner, E. W. (1982). *Cognition and curriculum: A basis for deciding what to teach*. New York: Longman.
- Gourlay, L. (2009). Threshold practices: becoming a student through academic literacies. *London Review of Education*, 7(2), 181-192.
- Harris, R., Guthrie, H., Hobart, B. & Lundberg, D. (1995). *Competency based education and training: between a rock and a whirlpool*. South Melbourne: Macmillan Publishers Australia Pty. Ltd.
- Harvey, D. (2007). *A Brief History of Neoliberalism*. Oxford: Oxford University Press.
- Hodge, S. (2015). Alienating curriculum work in Australian vocational education and training. *Critical Studies in Education*, DOI: 10.1080/17508487.2015.1009842

- Hokstad, L. M., Rødne, G., Braaten, B. O., Wellinger, S. & Shetelig, F. (2016). Transformative Learning in Architectural Education: Re-Thinking Architecture and the Education of Architecture. In R. Land, J. H. F. Meyer & M. T. Flanagan (Eds.), *Threshold Concepts in Practice* (pp. 231-333). Rotterdam: Sense Publishers.
- Iveson, G. (2012). The body and pedagogy: beyond absent, moving bodies in pedagogic practice. *British Journal of Sociology of Education*, 33(4), 489-506.
- Joyner, C. W. (1995). The DACUM technique and competency-based education. In J. Dennison (Ed.), *Challenge and opportunity: Canada's community colleges at the crossroads* (243-255). Vancouver, BC: UBC Press.
- Kearns, S. K., Mavin, T. J. & Hodge, S. (2016). *Competency-based education in aviation: exploring alternate training pathways*. Farnham: Ashgate.
- Knight, D.B., Callaghan, D.C., Baldock, T. & Meyer, J.H.F. (2013). Identifying threshold concepts: case study of an open catchment hydraulics course. *European Journal of Engineering Education*, 39(2), 125-142.
- Land, R., Meyer, J. H. F., and Baillie, C. (2010). Editors' preface. Threshold concepts and transformational learning. In J. H. F. Meyer, R. Land and C. Baillie (Eds.), *Threshold Concepts and Transformational Learning* (ix-xlii). Rotterdam: Sense Publishers.
- Le Grand, J. (2003). *Motivation, agency, and public policy: of knights and naves, pawns and queens*. Oxford: Oxford University Press.
- Mager, R. F. (1962). *Preparing instructional objectives*. Belmont, CA: Fearon Publishers.
- Masters, R. S. (1992). Knowledge, knerves and know-how: The role of explicit versus implicit knowledge in the breakdown of a complex motor skill under pressure. *British Journal of Psychology*, 83(3), 343-358.
- Merleau-Ponty, M. (2012). *Phenomenology of perception*. London: Routledge.
- Meyer, J. H. F. & Land, R. (2003). Threshold concepts and troublesome knowledge: linkages to ways of thinking and practising within the disciplines. In C. Rust (Ed.), *Improving student learning theory and practice – 10 years on* (412-424). Oxford: The Oxford Centre for Staff & Learning Development.
- Meyer, J. H. F. & Land, R. (2005). Threshold concepts and troublesome knowledge (2): epistemological considerations and a conceptual framework for teaching and learning. *Higher Education*, 49, 373-388.
- Meyer, J. H. F., & Timmermans, J. A. (2016). Integrated threshold concept knowledge. In R. Land, J. H. F. Meyer & M. T. Flanagan (Eds.), *Threshold Concepts in Practice* (pp. 25-38). Rotterdam: Sense Publishers.

- Norton, R. E. (2004). The DACUM curriculum development process. *14th International Vocational Education & Training Association (IVETA) International TVET Conference*, Vienna, Austria, 25-27 August.
- Perkins, D. (1999). The many faces of constructivism. *Educational Leadership*, 57(3), 6-11.
- Pettersson, K., Stadler, E., & Tambour, T. (2013). Development of students' understanding of the threshold concept of function. In *Eighth Congress of European Research in Mathematics Education (CERME 8)*, Manavgat-Side, Antalya-Turkey, February.
- Rose, M. (2004). *The mind at work: Valuing the intelligence of the American Worker*. New York: Penguin Group.
- Rowe, N. & Martin, R. (2014). Dancing onto the page: Crossing an academic borderland. *Waikato Journal of Education*, 19(2), 25-36.
- Stacey, G., & Stickley, T. (2012). Recovery as a threshold concept in mental health nurse education. *Nurse education today*, 32(5), 534-539.
- Taylor, F.W. (1906). *The principles of scientific management*. New York: Harper.
- Watson, J.B. (1913). Psychology as the behaviorist views it. *Psychological Review*, 20, 158–177.
- Wenger, E., McDermott, R. & Snyder, W. (2002). *Cultivating communities of practice: a guide to managing knowledge*. Boston, MA: Harvard Business School Publishing.
- Wheelahan, L. (2009). *Why knowledge matters in curriculum. A social realist argument*. London: Routledge.
- Young, M. & Muller, J. (2014). From the sociology of professions to the sociology of professional knowledge. In M. Young & J. Muller (Eds.), *Knowledge, expertise and the professions* (pp. 3-17). Abingdon: Routledge.