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Do We Need to Close the Door on Threshold Concepts?

Megan E. L. Brown^a , Paul Whybrow^b, and Gabrielle M. Finn^{a,c} 

^aHealth Professions Education Unit, Hull York Medical School, University of York, York, UK; ^bAcademy for Primary Care, Hull York Medical School, University of Hull, Hull, UK; ^cDivision of Medical Education, School of Medical Sciences, Faculty of Biology, Medicine and Health, The University of Manchester, Manchester, UK

ABSTRACT

Issue: Threshold Concepts are increasingly used and researched within health professions education. First proposed by Meyer and Land in 2003, they can be defined as ways of knowing central to the mastery of a subject. They are framed as profoundly transformative, impacting the identity of those who encounter them through irreversible shifts in an individual's outlook. Although Threshold Concepts have been identified in a multitude of educational settings across the continuum of health professions education, there has been little critique of Threshold Concepts as a theory of health professions education. Within adjacent fields critical discourse is also underdeveloped, perhaps given the educational resonance of the theory, or the way in which the theory encourages subject specialists to discuss their area of interest in depth. This commentary critically examines how Threshold Concepts have been used and researched within health professions education, applying critiques from other educational fields, to assist scholars in thinking critically regarding their application. **Evidence:** Three significant critiques are outlined: 1) 'The floating signifier problem'; 2) 'The body of knowledge problem'; and 3) 'The professional identity problem.' Critique 1, the floating signifier problem, outlines how Threshold Concept theory lacks articulation and has been inconsistently operationalized. Critique 2, the body of knowledge problem, outlines the issues associated with attempting to identify a singular body of knowledge, particularly in regard to the reinforcement of entrenched power dynamics. Critique 3, the professional identity problem, argues that the way in which Threshold Concepts conceptualize identity formation is problematic, inadequately grounded in wider academic debate, and at odds with increasingly constructionist conceptualizations of identity within health professions education. **Implications:** These critiques have implications for both educators and researchers. Educators using Threshold Concepts theory must think carefully about the tacit messages their use communicates, consider how the use of Threshold Concepts could reinforce entrenched power dynamics, and reflect on how their use may make material less accessible to some learners. Further, given that Threshold Concept theory lacks articulation, using the theory to structure curricula or educational sessions is problematic. Threshold Concepts are not synonymous with course learning outcomes and so, While considering Threshold Concepts may enable pedagogical discussion, the theory cannot help educators decide which concepts it applies to; this requires careful planning which extends beyond the bounds of this theory. For researchers, there are issues too with power and inconsistent theoretical operationalization, but also with the way in which Threshold Concepts theory conceptualizes identity formation, which cast doubt on its use as a theory of identity development. On balance, we believe Threshold Concept theory suffers a number of fundamental flaws that necessitate a shift from the positioning of Threshold Concepts as a theory, toward the use of Threshold Concepts as a less prescriptive reflective prompt to stimulate pedagogical discussion.

KEYWORDS

Threshold concepts; medical education; liminality; professional identity; transformative

What are threshold concepts?

Threshold Concepts (TCs) were first proposed by Meyer and Land in 2003,¹ and their popularity has grown steadily since. Referred to as “jewels of the curriculum,” a framing proposed by the seminal authors^{2(p.195)} to highlight their educational relevance,³

the Open University highlighted TCs as one of 10 new pedagogies with the potential to provoke major shift within UK higher education in 2014.⁴ Publications regarding TCs have grown, and continued use is evident in both Science, Technology, Engineering, and Mathematics (STEM) disciplines³ and the humanities.⁵

CONTACT Megan E. L. Brown  Hymb2@hyms.ac.uk  Health Professions Education Unit, Hull York Medical School, University of York, York YO10 5DD, UK

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TCs are also gaining popularity within health professions education⁶ with one of TC's seminal authors, Professor Ray Land, delivering a keynote at the 'Association for Medical Education' (AMEE)'s conference in 2019,⁷ and health education publications increasingly evident within University College London's extensive online TC bibliography.⁸ As well as representing a research topic of interest within health professions education, TCs are increasingly operationalized within health professions education curricula, where they have been used to structure and plan educational content.⁹ Given their rising popularity and use, an examination and critique of how TCs are used and researched within health professions education is prudent to assist researchers and educators to think critically regarding their application.

TCs are described as ways of knowing central to the mastery of a subject¹⁰ that, once understood, change an individual's way of thinking about a topic.¹ They are proposed by Land as profoundly transformative; during acquisition of concept understanding, individuals enter an uncertain "liminal space" between encountering a new concept and comprehending it, where transformative, personal change occurs.¹¹ As individuals cross this threshold, they must envision and accept an alternative version of themselves that incorporates the new, originally "troublesome," knowledge they have encountered within any given TC.^{1,11,12}

Liminality is a concept applied by Land to TCs, but first proposed by van Gennep in 1960, and developed by Turner during the following decade.^{13–15} When used by its originators, liminality describes the subjective state of being "between two different existential positions."¹³ This is the state that any proposed TC must claim to bring individuals to. To be liminal involves work on one's identity, as this very experience throws an individual's "sense of self or place" within their social environment into disarray.^{16(p.31–32)} When individuals are confronted with a TC's "troublesome knowledge" that challenges their view of the world, they cross a threshold into a portal of liminality.¹⁷ It is within this liminal space that integration and discarding of knowledge occurs, ultimately leading to "epistemological" and "ontological shifts"^{17(p.11)}—shifts in how individuals conceptualize the nature of knowledge or the nature of reality.¹⁸ Epistemological and ontological shifts represent changes in how individuals view the world around them; within health professions education, professional identity development can be conceptualized as the internalization of the profession's values as "habits of mind and heart,"^{19(p.701)} causing individuals to "think, act and feel" like physicians^{20(p.718)}—i.e., the lens

through which they view the world has shifted. Subsequently, learners move into a post-liminal phase characterized by irreversible transformation and cumulating in an ontological shift.¹⁷

For something to be considered a TC, Meyer and Land outline criteria it should meet. TCs are described as bounded, discursive, integrative, irreversible, reconstitutive, transformative, troublesome, and liminal. A description of each of these domains, using quotes from Meyer and Land's various works on TCs,^{1,2,11,17,21–23} are outlined in Table 1.

Threshold concepts in health professions education

TCs have been identified in a multitude of health professions educational settings including among medical students,^{6,24–26} nursing students,^{27–30} physiotherapy students,³¹ and within dental education.^{9,32} At a post-graduate level, TCs have been identified among doctors,^{33–37} nurses,^{29,30} pharmacists,³⁸ and occupational therapists.^{39–41} Within these contexts, TCs have been referenced as knowledge one must acquire,^{40,42} skills,^{43,44} or as part of professional identity development.^{45,46} Specific TCs identified include, but are not limited to, "uncertainty within medicine,"^{22,45,46} "caring,"⁴⁷ "documentation as essential practice,"³⁴ "professional touch,"⁴⁸ "one concept [polarity] of electroencephalography,"⁴⁴ and "recovery."^{29,30} Some studies identify TCs in regard to their "transformative" and/or "troublesome" nature^{37,49–51} or other characteristics,^{34,44,52} but few have screened for all proposed components.⁵³ Meyer and Land themselves, when analyzing surgical education, only identified TCs on the basis of whether or not they were transformative,²² paying only "passing reference" to liminality and troublesome-ness.^{54(p.8)} Papers that do screen for all TC criteria often openly admit the concepts they identify do not qualify in every domain.^{24,46} Therefore, although TCs have been applied to numerous educational fields, little attention has been paid to consistent application of the characteristics identified by Meyer and Land.

Although variously operationalized, TCs are frequently framed as concepts affecting identity in some way.^{6,13,24} In fact, Randall et al. claim that TCs are *essential* in acquiring the professional identity of a doctor.⁵⁵ Given the importance of professional identity formation within healthcare students,⁵⁶ research has also focused on interventions to improve TC acquisition. For example, Levett-Jones et al. discuss the use of digital patient stories⁵⁷ and Hyde

Table 1. Summary of the characteristics of a threshold concept. Adapted from Reeping, 2019.³

Quality	Description
<i>Bounded</i>	<i>'Possibly often [though not necessarily always] bounded in that any conceptual space will have terminal frontiers.'</i> I.e., May only have a specific purpose in a discipline.
<i>Discursive</i>	<i>'We would argue further that as students acquire Threshold Concepts, and extend their use of langue in relation to these concepts, there also occurs a shift in the learner's subjectivity...'</i> I.e., Can involve an extended or enhanced use of language.
<i>Integrative</i>	<i>'They may be... integrative [exposing the previously hidden interrelatedness of something].'</i> I.e., May bring together several disparate concepts, perhaps in an unexpected way.
<i>Irreversible</i>	<i>'Probably irreversible.'</i> <i>'Unlikely to be forgotten, or only unlearned through considerable effort.'</i> I.e., A student's new way of thinking, or new perspective, is unlikely to revert to its prior state.
<i>Reconstitutive</i>	<i>'... the engagement by the learner with an unfamiliar knowledge terrain and the ensuing reconceptualization may involve a reconstitution of, or shift within, the learner's subjectivity, and perhaps identity.'</i> I.e., May cause a shift in the student's subjectivity
<i>Transformative</i>	<i>'They may be transformative [occasioning a significant shift in the perception of a subject].'</i> I.e., Potential changes to how a student sees/thinks about a discipline
<i>Troublesome</i>	<i>'Potentially, and possibly inherently, troublesome.'</i> <i>'[Threshold Concepts] may also be troublesome and/or they may lead to troublesome knowledge.'</i> I.e., Likely to be an issue for students to learn, may be counterintuitive
<i>Liminal</i>	<i>'Difficulty in understanding Threshold Concepts may leave the learner in a state of 'liminality', a suspended state of partial understanding, or 'stuck place', in which understanding approximates to a kind of 'mimicry'...'</i> I.e., TCs involve a state of 'in-betweenness' through which students oscillate between troublesome knowledge and understanding, trialing inauthentic behavior

et al comment on the value of reflective practice for TC acquisition.⁵² Khatri et al suggest that “explicit diagnostic reasoning” helps students acquire the “diagnosis in psychiatry” TC.²⁶ TCs have also been operationalized within curricula planning. Within dental education, Kobus mapped TCs within one dental curriculum as a possible model to inform curriculum design,⁹ while Kinchin et al. recommend structuring curricula around TCs.³² Few studies have appraised TC use within curricula; Barradell and Peseta's 2016 review of TC use within health sciences identified only one study that appraised TC's use in any way⁵⁴. Rodger et al.'s largely positive evaluation of TCs within one occupational therapy curriculum.⁴¹

A concept, theory, framework, or something else?

It is important to consider whether TCs represent an educational *concept*, an educational *theory*, or a *framework*. Definitions of ‘concept,’ ‘theory,’ ‘educational framework,’ and ‘research framework’ are provided in Table 2. Meyer and Land do not clearly indicate whether TCs represent an educational concept, theory, or framework,^{28,61} though Land has latterly described TCs as theory,⁶² as a framework,^{21,63} and recommended a shift away from discussions regarding the term ‘concept’ toward ‘learning thresholds’ as a practice.⁶⁴ Although Schwartzman questioned the theoretical foundation of TCs over ten years ago,⁵⁹ there has been little progress in this regard; Salwén posits that “it is noteworthy that leading advocates...have not addressed...definitional problems.”^{65(p.8)} The multitude of ways in which authors have referred to TCs—as a concept, theory, framework, etc.—demonstrates ongoing confusion regarding appropriate use. The term “framework” has sprung forth from the critique of TCs as a concept,^{65,66} and as a theory,^{42,65,67} yet there are also issues with TC's fit with the term “framework.” There seems to be no one way of positioning TCs that is wholly unproblematic. An overview of the main issues with positioning TCs as a concept, theory, educational or research framework is given in Table 2.

In practice, and as Barradell notes,⁶⁷ TCs have been treated most frequently as a theory, even if assigned another term. Land's most recent definition of TCs as “ways of doing” that may also be referred to as “learning thresholds” seems to position TCs as a theory which explains how learning and identity development occur through participation.⁶⁴ Given the ongoing debate regarding their status as a concept, theory, framework, or something else, this work will critique TCs on the basis of the way in which they have been most commonly employed. In our review, we found that TCs are most frequently used as a tool for *describing or developing* health curricula. This operationalization of TCs (which is sometimes used to generate specific educational frameworks, and sometimes not) stems from their framing as a middle-range theory (see Table 2) that makes explanatory claims about the relationship between education and identity change, an attractive outcome for those involved in curriculum planning to target. Davis and Green's 2020 study which explored the relevance of TCs in addressing the academic and personal needs of students within Widening Participation (WP) university programs highlights the use of TCs in this way.⁶⁸ Davis and Green seemed interested in TCs as a theory that may encourage the personal or identity

Table 2. Summary of theoretical terminology and critique of threshold concepts 'fit' with each of these terms.

Positioning	Definition	Key definitional references	Issues with threshold concepts when they adopt this position	Key critical references
Concept	Concepts are general ideas regarding how the world and empirical observations relate- they are the definitional terms (e.g. of 'mastery' or 'mentorship') that are the basis for theory-building.	Varpio L, Paradis E, Uijtdehaage S, Young M. The Distinctions Between Theory, Theoretical Framework, and Conceptual Framework. <i>Academic Medicine: Journal of the Association of American Medical Colleges</i> . 2019 Nov 12.	There are many criticisms of TCs when they are positioned as a concept. A full overview is beyond the scope of this paper. In sum, several scholars have noted that TCs do not fit a multitude of definitions of the term 'concept'; positivist scholars have lamented a lack of objective TC measurements, and confusion has been evident in how 'threshold' concepts differ from 'core' or 'basic' concepts within education.	Salwén H. Threshold concepts, obstacles or scientific dead ends? Teaching in Higher Education. 2019; 22:1-4. Rowbottom D. Demystifying threshold concepts. <i>Journal of Philosophy of Education</i> . 2007;41(2):263-70. O'Donnell R. Threshold concepts and their relevance to economics. ATEC 2009; 14th Annual Australasian Teaching Economics Conference [pp 190-200] Brisbane, Queensland: School of Economics and Finance, Queensland University of Technology. 2009. Nicola-Richmond K, Pépin G, Larkin H, Taylor C. Threshold concepts in higher education: a synthesis of the literature relating to measurement of threshold crossing. <i>Higher Education Research & Development</i> . 2018;37(1):101-14. Salwén H. Threshold concepts, obstacles or scientific dead ends? Teaching in Higher Education. 2019; 22:1-4. Mac Subhne S. Threshold concepts and teaching psychiatry: key to the kingdom or emperor's new clothes? <i>Ir J Psychol Med</i> 2012;29:132-4. Barradell S. The identification of threshold concepts: A review of theoretical complexities and methodological challenges. <i>Higher Education</i> . 2013;65(2):265-76.
Theory	Varpio et al. define theories as more specific "set[s] of propositions that are logically related [and] express... the relation[s] among several different constructs". Theories explain the relationships between concepts. Karl Popper famously argued that theories should be falsifiable, in the sense that they propose something that can be tested. As explanations of how things work, theories can be classified according to "explanatory power"- theory may be 'grand' i.e. when it attempts to explain a large social landscape, 'middle-range' i.e. when it seeks to connect high-level social theory to more specific aspects of human interaction, or "micro" when it concerns individual-level phenomena.	Varpio L, Paradis E, Uijtdehaage S, Young M. The Distinctions Between Theory, Theoretical Framework, and Conceptual Framework. <i>Academic Medicine: Journal of the Association of American Medical Colleges</i> . 2019 Nov 12.	Salwén notes that TCs possess poor explanatory power as there is no clarity regarding what patterns of behavior or perceptions correspond to the different definitional criteria (e.g. transformative, bounded etc.) of a TC. Mac Subhne criticizes the use of TCs within psychiatry education, highlighting a lack of conceptual clarity in defining and identifying TCs as a theory. Barradell notes this position is most populous within medical education but suggests treating TCs as a concept would be most true to source.	
Educational framework	Educational frameworks encompass educational goals against which trainee competence or progress is evaluated. According to Pangaro and ten Cate, "frameworks should enable educators to determine to what extent trainees are ready for advancement... [providing] a valid mental model of competence and also terms to describe successful performance". There are three sorts of educational frameworks- analytic, synthetic and developmental. Analytic frameworks conduct evaluation of trainee competence through "deconstruct[ing] competence into individual pieces". Synthetic frameworks view competence more holistically and undertake evaluation of "real-world activities". Developmental frameworks conceptualize learning as a trajectory and focus on "stages... or milestones in the progression towards competence". Although frameworks may overlap in nature, they tend to adopt one of these three perspectives most heavily.	Pangaro L, Ten Cate O. Frameworks for learner assessment in medicine: AMEE Guide No. 78. <i>Medical Teacher</i> . 2013 Jun 1;35(6):e1197-210.	The term 'framework' has sprung forth from the critique of TCs as a concept, and as a theory, yet there are also issues with TCs fit with the term 'framework'. Although some authors have used TCs to inform discipline-specific educational frameworks for curriculum redesign, this is not the way in which TCs have been most commonly discussed- indeed, Reeping et al note a distinct lack of literature concerning TC "curriculum renewal". Further, when TCs are used to restructure or revise curricula in a way more concordant with the purpose and use of educational frameworks, they are very rarely used to blueprint assessment, a key educational framework role. This may be due to the questions that surface regarding the appropriateness of treating the target for threshold concept transformation – identity- as an objective and measurable marker of competence.	Reeping D, McNair LD, Harrison SR, Knapp RB, Lester LF, Martin T, Patrick AY, Wisniewski M. How are Threshold Concepts Applied? A Review of the Literature. In: <i>Proceedings of the 2018 ASEE Annual Conference</i> 2017 (pp. 25-28). Quinlan KM, Male S, Baillie C, Stamboulis A, Fill J, Jaffer Z. Methodological challenges in researching threshold concepts: a comparative analysis of three projects. <i>Higher Education</i> . 2013; 1;66(5):585-601.
Research framework	A research framework is the structure guiding researchers in the selection and refinement of research questions, methods, and analysis. Within research, two sorts of frameworks are commonly discussed- conceptual frameworks and theoretical frameworks. Conceptual frameworks provide the justification for why a study is necessary- according to Varpio et al. they describe "the state of known knowledge", identify gaps in this knowledge, and outline the study's "methodological underpinnings". Theoretical frameworks are "logically developed and connected sets of concepts and premises- developed from one or more theories- that a researcher creates to scaffold a study".	Varpio L, Paradis E, Uijtdehaage S, Young M. The Distinctions Between Theory, Theoretical Framework, and Conceptual Framework. <i>Academic Medicine: Journal of the Association of American Medical Colleges</i> . 2019 Nov 12. Hughes S, Davis TE, Imenda SN. Demystifying Theoretical and Conceptual Frameworks: A Guide for Students and Advisors of Educational Research. <i>J Soc Sci</i> . 2019;58(1):34-35.	Where TCs are referred to as "conceptual frameworks", ⁵⁸ "theoretical frameworks", ⁵⁵ "analytical frameworks", ^{59,60} or "heuristic frameworks", ²⁴ within research, these terms are used in ways that diverge from their consensus definitions. As conceptual and theoretical frameworks are ultimately researcher constructions specific to an individual piece of research, and TCs are a more general approach to research, they fail to satisfy the above definitions for classification as a research framework.	A new critique borne of this research.

development of WP students. They concluded that TCs were adequate for encouraging content-based knowledge transformation, but not for “affective domain transformative experiences” that fostered identity development.^{68(p.11)} Although a negative outcome, TC theory was used in this instance to explore the impact of discussing TCs on identity development in academically marginalized students, and so employed as a middle-range explanatory theory to connect identity change with learning (though it failed to do so).

The issues with threshold concepts in health professions education

There has been little critique of TCs as a theory of health professions education. An exception is Mac Suibhne, who critiques the use of TCs within psychiatry education. He highlights a lack of conceptual clarity in defining and identifying TCs,⁴² resonating with points made by Crookes within nursing.⁶⁹ In response, Barradell suggested consensus methodologies (such as Delphi) to identify a discipline’s TCs.⁶⁷ However, there are issues with distilling discipline knowledge in such a reductionist way; as Mac Suibhne says, “assuming all students will find the same ideas...Threshold Concepts...is misleading.”^{42(p.134)} Despite his critique, Mac Suibhne ultimately argues in favor of TCs, suggesting they hold merit when “conceptualizing approaches to teaching” (though he is vague regarding what this may entail).^{42(p.134)} This is a commonly highlighted benefit of TC theory, and several health professions scholars echo this sentiment^{24,30,40,54} commenting on the value of TC theory in increasing educator recognition of “how and where students get stuck.”^{24(p.100)}

Perhaps given their educational resonance, or a popularity among academics resulting from the way TCs encourage subject specialists to discuss their area of interest in depth,⁷⁰ there is paucity of TC critiques within health professions education and elsewhere. This dearth likely means critical discourse is underdeveloped.⁷¹ The purpose of this commentary is to move critical discourse forward by summarizing three problems of TCs within health professions education: 1) ‘*The floating signifier problem*’; 2) ‘*The body of knowledge problem*’; and 3) ‘*The professional identity problem*’.

‘The floating signifier problem’

Words or concepts can act as floating signifiers if “they mean different things to different people,” if they could “mean whatever their interpreters want

them to mean.”^{72(p.29)} As discussed, there is no consensus regarding just what constitutes a TC in health professions education and how these should be identified. This lack of conceptual clarity is inherent in the hedging language Meyer and Land used to describe TCs, which Rowbottom, O’Donnell, and Salwén all refer to as “weak” in some way.^{65,66,73,74} Meyer and Land’s definition as “likely to be.... probably irreversible... possible often (though not necessarily) bounded... potentially (and possibly inherently) troublesome”^{1,21} have become defining theoretical characteristics. This indefinite language leaves considerable room for interpretation of what constitutes a TC and contributes to the inconsistent operationalization of the theory.

Unfortunately, this lack of conceptual clarity affects health professions education research,⁴² and confusion is evident.²⁶ Quinlan et al. note authors using TCs often do not justify why they have selected certain definitional criteria over others,⁷⁵ and this observation holds true within health professions publications. Further, it is difficult to comprehend how “one concept (polarity) of electroencephalograph,”⁴⁴ which is principally a matter of cognitive understanding, and “caring,”³⁹ understood within medical professional identity formation to be a high-level “ethic” that students develop over time to guide their moral reasoning,¹⁹ could have the same characteristics in regard to learning and student identity to both warrant classification as TCs. In an attempt to account for such differences, Reeping draws a distinction between TCs that are “rare as diamonds” and those that are “plentiful as cubic zirconia.”³ He suggests that plentiful TCs (arguably such as one concept (polarity) of electroencephalograph within the above example) are not the “jewels in the curriculum” Land et al. envisioned, which are rare high-level abstract concepts (arguably the concept of ‘caring’ from our previous example).³ While an interesting response to wanting conceptual clarity, identifying TCs which are “rare as diamonds” appears to be no clearer a process, and purely a matter of individual judgment. There is a risk with Reeping’s approach, that ‘rare as diamonds Threshold Concept’ will become a new floating signifier, affecting little real change in conceptual clarity as the characteristics used to define TCs remain as uncertain as ever. Given this ongoing lack of conceptual clarity, TC theory within health professions education continues to be used in a way consistent with a ‘floating signifier’ status, where TCs are highly variable in meaning.

It could be argued that a clearer definition of TC theory, particularly of what constitutes a TC, would overcome the issue of TCs being used as a ‘floating

signifier.’ This is a stance adopted by Hill, who distinguishes between “troublesome knowledge” which involves conceptual transformation, and TCs, which they claim involve both conceptual and ontological transformation.⁷⁶ Hill posits three TC criteria should be definitional: troublesomeness, integrativeness, and ontological transformation.⁷⁷ Chen and Rattray argue Baillie et al.’s Threshold Capability Integrated Theoretical Framework (TCITF) provides a clearer empirical link between TCs and how new professional capabilities develop (threshold capabilities),⁷⁶ while Thompson comments the TCITF offers a tangible way of analyzing theoretical learning.⁷⁸ Within the TCITF, threshold capabilities are facilitated through encountering variation in new, unfamiliar circumstances, and open the door to professional learning and TC acquisition.^{76,79} These definitions of TC theory have not been widely adopted within health professions education. Further, despite such efforts to advance thinking in the field, outlining a process of TC identification and operationalization leads to another issue: *‘the body of knowledge problem.’*

‘The body of knowledge problem’

Medicine as a field is broad, encompassing many ways of knowing.⁸⁰ There has been a recent move within health professions education to conceptualize understanding as something formed intersubjectively between individuals, a “dynamic web” in which “meaning-making” is “embedded in the experiential flux of the world.”^{81(p.2)} This shift in conceptualization parallels movement from the once-dominant scientific paradigm of positivism (which maintains the existence of an objective reality, promoting ‘understanding’ as a pursuit of definite truth) toward a paradigm of constructionism (in which it is held knowledge is formed subjectively through social interaction).⁸² If understanding and meaning-making are understood as inherently subjective, situated, and subject to change, can we really distill ‘what must be understood’ within a field into a set of TCs? As health professions education moves from essentialist notions of knowledge to focus on learning as an embodied, relational journey, does the idea of TCs lose explanatory value or usefulness?

O’Donnell in 2009⁷⁴ and, subsequently, Roessger in 2010⁸³ raise concerns about the ways in which TCs have been used and institutional power. O’Donnell argues that reducing a discipline to a set of TCs “typically reflects the view that a discipline has only one reputable school of thought.”^{74(p.9)} Other approaches to curricula design are less problematic. Structuring

curricula around Entrustable Professional Activities (EPAs)—defined as “a unit of professional practice that can be fully entrusted to a trainee, as soon as [they have] demonstrated the necessary competence to execute this unsupervised”^{84(p.1)}—for example, does not infer one way of knowing or one body of knowledge; it is more concerned with competency to practice, something determined in relevance to patient and societal needs, and which can shift.⁸⁵ As such, EPAs do not signpost the existence of a unified body of knowledge in the same way that TCs do when used within curricula.

Although some have argued TCs should not be reduced to a singular list of objectives to master,³ this arguably does not go far enough to address such issues of power. Roessger suggests “the very *nature* of Threshold Concepts impl[ies] a power imbalance... the status quo determining what constitutes essential knowledge.”^{83(p.287)} Put simply, so long as TCs are identified and implemented by those in positions of authority—researchers and educators—students are subjected to the power of the dominant educational class in deciding what is troublesome and what is not. This does not fit with a constructionist approach to ‘understanding’ as subjective and socially situated. Quinlan et al. highlight this point, commenting that identification of TCs is “ultimately unproductive...a form of disciplinary essentialism and positivism.”^{75(p.598)} Furthermore, such practice may perpetuate dominant social structures and stifle the disciplinary development that comes from student participation and engagement.

Although Meyer and Land suggest “in arriving at an agreed-upon definition [of a TC], the personal views associated with the concept by members of the discipline will have been jettisoned,”^{17(p.97)} from a social constructionist perspective it is not possible to remove the influence of an individual, or collective’s, experience from such definitions.⁸⁴ Playing devil’s advocate, it could be argued that the very identification and subsequent analysis of TCs can help to expose implicit power relations (e.g., around gender). In practice, however, it is more likely that the *language* of TCs naturalizes the status quo of a discipline and stifles opportunities for change as those “exploring new conceptual territory may find it difficult to challenge accepted [threshold] concepts.”^{86(p.20)} In short, the current framing and much of the use of TCs within health professions education normalizes power inequity between learners and educators, and could act to stifle progressions in thinking as to how a discipline could evolve and develop as society shifts in time.

We foresee two ways in which the issues of power regarding TCs we have outlined could be addressed. Both necessitate a change in the dominant way in which TCs have been used within health professions education. A shift is necessary away from applying TCs prescriptively to describe and develop health curricula, and toward the use of TCs as an approach to reflection, as a looser and more fluid starting point for pedagogical discussions with students and faculty that generate insight as to how to support students' learning.

Reframing TCs as an approach to reflection may mean empowering students to identify TCs themselves. Although Felton acknowledged the need for a "partnering" with students when it comes to TC identification over four years ago,⁸⁷ TC research within health professions education has only infrequently shifted focus to students.^{10,88} Khatri et al.'s recent study of TCs in psychiatry involved both educator interviews and student surveys to triangulate data on what constitutes a TC.²⁶ Although Khatri et al. recognize that students may identify different threshold concepts, they still suggest the three TCs they identify are transferable to other contexts.²⁶ There is a break in logic here: if, as Khatri et al. suggest, "there is interindividual variation in students' experiences of difficulties,"^{26(p.8)} such an approach is likely to produce a set of TCs unique to each individual, highlighting the subjective nature of understanding and restricting transferability. However, Khatri et al. are not alone in their logic; other scholars include students in the identification of TCs to verify TCs,⁴⁴ ensuring they are 'true.' This is problematic when knowledge is considered as subjective; there cannot be verification of a TC's 'truth,' only individual resonance.

Operationalization of TCs then becomes difficult and again invokes issues of power; which student's TCs will you apply, and which will you ignore? Used as a purely reflective activity, we envision student-led identification of TCs *could* hold merit in promoting critical evaluation of one's own learning and progress. Hyde et al. propose reflection as a tool to acquire TCs within dentistry curricula.⁵² However, they used a faculty-identified list of TCs to structure student reflections, which would likely still invoke power dynamics and send tacit cultural messages regarding the existence of one body of disciplinary knowledge. Shifting the focus to students, empowering them to identify their own TCs free from evaluation against external classifications, and scrutinizing the impact of such reflection is an unexplored area of TC research and, to the authors' best knowledge from examination of peer-reviewed descriptions of educational innovations, practice.

TCs may also be of value as a prompt for faculty reflection regarding their own beliefs as to the core concepts within a discipline and their experiences with students. Lucas and Mladenovic frame TCs as a "catalyst" that "demands and promotes forms of dialogue about educational research that might not otherwise be taking place."^{70(p.238)} This is an important consideration. If TCs are treated not as a theory but as a reflective prompt to enable reflexive educator discussions on how best to support students with difficult learning, we foresee they may have value as a catalyst for pedagogical discussion without reinforcing entrenched power dynamics. When TCs are not applied prescriptively within curricula design and delivery or research, and claims are not made as to which TCs it is necessary to acquire, power inequities between students and staff are likely reduced. If TCs are taken as a less prescriptive 'reflective prompt' within pedagogical discussions, they no longer imply an essentialist conceptualization of knowledge and can instead be used by educators within a constructivist approach to education as a tool to open up a dialogue between educators and students about difficult educational material or experiences. We believe this dialogue holds the potential to generate recommendations as to how student learning can best be supported.

In sum, if TCs are used to prescriptively describe and design curricula, power inequities between students and staff are likely heightened due to the way in which the use of TCs prescriptively implies the existence of one 'body of knowledge.' We call upon health professions educators to cease and desist the use of TCs in this way, considering them instead as a looser, non-prescriptive approach to reflective discussions with and between students and faculty. Reforming the use of TCs within health professions education in this way may preserve some of the pedagogical benefits of TCs, while circumventing the issues they raise in regard to essentialism and power.

'The professional identity problem'

Although no consensus definition of professional identity exists, as its conceptualization can change depending on an author's philosophical leanings, one popular social constructionist parcelling maintains that it is "who we are and who we are seen to be...it is something that one *does*."^{56(p.41)} Medical students, therefore, "construct... and co-construct..." their identities as they move through clinical and academic settings.^{56(p.41)} It is a dynamic process involving "the trying on of possible selves"^{89(p.425)} that is constantly shifting; as Scott summarizes: "we may think we know who we

are, but these ideas are constantly changing, shaped by our experiences, relationships, and interactions.”^{90(p.1)} Where, then, do TCs fit within this conceptualization of identity? Land proposes TCs affect identity change through transformation; a learner encounters troublesome knowledge that does not fit with what they already know, becomes liminal—a “betwixt and between” state, stuck in sort of academic limbo between confusion and understanding—then grasps the concept, passing into a brave new world of comprehension.^{1,17,21} Through this process, Meyer and Land suggest learners are fundamentally changed, different people now than once they were.¹ There are several issues with this conceptualization of identity.

First, the proposed impact of Meyer and Land’s TCs on student professional identity is fundamentally cognitive; a shift in knowledge in that student’s mind is enough to change “who they are” or “who they are seen to be.” Identity has been conceptualized this way in the past, and it is a popular framing within the field of cognitive psychology.⁸⁹ Why, then, could this conceptualization prove difficult for contemporary health education researchers? As the dominant paradigm of health professions education shifts toward constructionist understandings of the world, and of knowledge, this conceptualization of TCs no longer ‘fits.’ Researchers wishing to use TCs must make their understanding regarding the nature of knowledge clear or risk their use of TC theory seeming at odds with dominant discourse. Problem solved, one may think, yet even if one accepts TCs as operating within a cognitive conceptualization of identity and is satisfied in adopting this approach, there are issues with how TC theorists conceptualize identity cognitively. As previously demonstrated, the nature of identified TCs varies wildly; it is difficult to imagine a scenario in which a concept such as ‘hormone control’ could change a student’s conception or portrayal of “who they are.” It has been argued by Savin-Baden that operationalization of TCs in the form “generalisable concepts...embedded in curriculum structure... implies that Threshold Concepts are dislocated from learner identities.”^{91(p.75)} We agree; reducing student difficulties to a list of TCs removed from context and widely applied within curricula removes the possibility for these concepts to influence identity in any meaningful way. Savin-Baden subsequently suggests TCs may be better conceptualized as part of “transitional learning” or “liquid learning,” suggesting a move away from TC terminology.⁹¹ Yet this call remains unheeded, with Savin-Baden themselves subsequently manifesting their uncertainty by publishing work positively using TCs.¹²

Several scholars have noted the similarities between TC theory and Mezirow’s Transformative Learning. Illeris has recently sought to expand Mezirow’s theory, as it has become “too cognitively orientated”^{92(p.148)} suggesting the target of transformative learning, where individuals come to shift their worldview in response to “disorientating dilemmas,”⁹³ should be identity change.^{92,93} Although still a cognitive approach to identity conceptualization, Illeris’ theory is more firmly grounded in transformative learning literature than TC theory. It is unclear how Meyer and Land would differentiate TCs from theories of transformative learning, as they fail to earnestly investigate the similarities and differences. As Hodge states: “interestingly, the authors draw attention... to ‘correspondences’ between their theory and Mezirow’s, although they do not pursue parallels beyond an acknowledgment.”^{94(p.6)} There is a large scholarly base concerning transformative learning within higher education. If one is seeking a cognitive conception of identity formation, and finds the concept of transformation attractive, one is likely better served by aligning their research and practice with transformative learning as opposed to TCs, which lack clarity and grounding within wider discourse.

Conclusion

In this commentary, we have discussed the widely used Threshold Concept theory. Despite its popularity, the theory lacks articulation, has been inconsistently operationalized, and its use to describe and structure curricula invokes issues of power. We have outlined three key criticisms of the theory: 1) ‘*The floating signifier problem*’; 2) ‘*The body of knowledge problem*’; and 3) ‘*The professional identity problem*.’ As a middle-range theory, there are many issues with TCs that we do not believe can be easily addressed within our field. Given the issues outlined within this critique, one may ask what we should ‘do’ with TCs within health professions education. On balance, we believe issues with the definitional criteria of TCs and the way in which, when used prescriptively, they imply the existence of one body of knowledge, necessitate an urgent move away from the use of TCs as a tool to structure curricula. Further, we argue that TCs should not be considered a theory of identity change or development due to a lack of theoretical articulation as to how shifts in learner identity occur and how TCs differ from approaches to conceptualizing identity within the theory of transformative learning. Indeed, we do not believe that TCs should be considered a theory at all; theories are supposed to

explain the relationships between concepts⁹⁵ and, in outlining the lack of clarity inherent to TC source material and the issues they face in conceptualizing identity, we suggest that TCs are unable to fulfill this basic premise to warrant classification as a theory.

Yet, we do see a way forward for TCs that we believe preserves the benefits they can yield in regard to enabling pedagogical discussion. We join with Lucas and Mladenovic in advocating for the use of TCs as a 'catalyst' for discussion,⁷⁰ as a reflective prompt for students and educators. This negates definitional concerns and issues with power as TCs are not prescriptively applied, and it situates TCs as being concerned with learning, rather than with identity. This potential use of TCs is under-explored, and we encourage interested educators and researchers to shift their focus toward the investigation of TCs within reflective settings. Further, although we have outlined issues regarding TCs' classification as a theory and surmized they should not be afforded this label, we offer this with the proviso: they should not be afforded this label *currently*. Scrutiny of theoretical correspondences between TCs and established health professions theories (as scholars such as Hill have started to explore⁷⁷) may help develop TCs into a theory that can offer a unique contemporary perspective regarding identity development.

While these conversations occur, transformative learning theory may offer an alternative approach for those invested in this theory, though we recommend researchers shift their focus even further and explore student sense-making as co-constructed within social interactions, befitting the evolving constructionist conceptualization of identity within health professions education. The title of this paper asks whether we need to close the door on TCs. Our answer is yes, and no. Yes, we need to close the door on TCs as a prescriptive way of structuring curricula and in reference to them as a theory of identity development; but no, the door may stay open, so long as TCs are explored in a new way: as a reflective prompt to explore 'how and where students get stuck'.²⁴

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ORCID

Megan E. L. Brown  <http://orcid.org/0000-0002-9334-0922>
Gabrielle M. Finn  <http://orcid.org/0000-0002-0419-694X>

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