Practice and Evidence of Scholarship of Teaching and Learning in Higher Education
Special Issue: Threshold Concepts and Conceptual Difficulty
Vol. 12, No.2 April 2017, pp. 125-156

Threshold Concepts and Authentic Assessment: Learning to Think Like an Occupational Therapist

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Abstract

Threshold concepts have been used to inform curriculum design in a number of disciplines including occupational therapy. Assessment is integral for effective learning within curricula, however, limited attention has focused on how assessment can be utilised to help students engage with threshold concepts.

This mixed methods research explored students' and academics' experiences of engagement with threshold concepts through assessment tasks. Authentic assessment activities were designed to engage students with the threshold concepts embedded within three consecutive pre-clinical child and youth courses of undergraduate and graduate entry masters occupational therapy curricula. All students completing these courses (n=224) were invited to participate in on-line surveys and focus groups. Academic staff (n=4) involved with the courses participated in an individual or group interview. These were transcribed and content analysed to establish emerging themes.

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ISSN 1750-8428 (online) www.community.dur.ac.uk/pestlhe.org.uk

Results indicated that all assessment activities provided opportunities for students to engage with the five identified threshold concepts. Two key themes emerged. First, "Pulling it all together" related to how students viewed assessment activities as facilitating integration of knowledge, and development of identity as therapists. Second, "Moving from stuck places" reflected the supports that assisted them at different stages of their learning journey. Authentic assessment activities enabled students to engage with troublesome knowledge and demonstrate threshold crossing. Facilitators and barriers to student engagement with these activities were identified that can inform the development of assessment to support learning within a threshold concepts informed curriculum.

Keywords: assessment for learning; threshold concepts; authentic assessment; occupational therapy curriculum; liminal space.

Introduction

As the array of threshold concepts and the range of disciplinary curricula within which they have been identified and adopted has expanded, attention has increasingly turned towards their implementation within these curricula. In particular, the issue of assessment of learning outcomes within curricula underpinned by threshold concepts has become a recent focus (Land & Meyer, 2010). Concurrently there has been a change in the direction of assessment within the higher education sector more generally (Boud & Associates, 2010). This change has heralded an emphasis on the centrality of assessment in course and program design as well as the role of assessment in enhancing student learning.

To develop the knowledge, skills and attitudes graduates require to 'think and act' as occupational therapists, antecedent curricula seek to develop students' understanding of and skills in the application of underlying theory as well as to develop professional competencies. In addition the curricula must meet international program accreditation requirements (World Federation of Occupational Therapists, 2002). Students are required to demonstrate mastery of concepts and skills to meet professional

competencies upon graduation, whilst academics need to design pedagogically sound curricula in the face of an increasing body of professional knowledge, within time and resource constrained educational environments. To meet these and other challenges, program reform, based on a detailed action learning process, was undertaken within the undergraduate (UG) and graduate entry masters (GEM) occupational therapy curricula at The University of Queensland (Rodger & Turpin, 2011). Threshold concepts underpinned these reformed curricula.

Based on thematic analysis of a list of troublesome knowledge identified by occupational therapy staff at The University of Queensland, five threshold concepts common to the whole of the occupational therapy curriculum were identified (Rodger & Turpin, 2011): purposeful and meaningful occupation, client centred practice, integral nature of occupational therapy theory and practice, identity as an occupational therapist, and thinking critically, reasoning and reflecting. The identified threshold concepts met the five features of threshold concepts identified at the time – they were troublesome, bounded, irreversible, transformative and integrative (Meyer & Land, 2003).

Implementation of new curricula across both the UG and GEM programs commenced in 2010, highlighting the challenges in developing and implementing assessment within a threshold concepts informed curriculum. Assessment was required to accommodate students' simultaneous negotiation of five threshold concepts in all occupational therapy courses throughout the program whilst meeting institutional and professional accreditation requirements.

Assessment and Threshold Concepts

At the time of implementation of this reformed curriculum there was limited research pertaining to whole of curriculum assessment approaches in the context of threshold concepts to guide the design of assessment tasks. Inconsistency between use of threshold concepts in curriculum design and in their use within assessment, particularly, the notion of assessment of outcomes and the recursive nature of students' understanding of threshold concepts had been identified (Land, Cousin, Meyer, & Davies, 2005). Students' difficulty visualising the concepts they were required to negotiate and were being assessed, variation in student learning, and the need to make ontological shifts visible so that they could be usefully assessed had also been

highlighted as challenges to implementing assessment at that time (Davies & Mangan, 2010; Land & Meyer, 2010).

Land and Meyer (2010) proposed a conceptual framework for assessment that included consideration of the interplay between three key features, “signification” or communication of the threshold concept, the “stimulus” or mechanism for elucidating ontological shifts, and the “protocol” within which the student performs the task in the design and implementation of assessment. Assessment design, and in particular, development of an appropriate stimulus, is reliant upon understanding how students acquire threshold concepts. Conceptual understanding is thought to result from engagement with troublesome knowledge through manipulation of conceptual material and its representation (Land et al., 2005). Understanding develops over time as students’ progress through a liminal or transitional space using a recursive process, often repeatedly entering and exiting blocked spaces where they encounter obstacles to transformed understanding.

Authentic problem-focused activities of increasing complexity with corresponding decrease in the provision of scaffolding over time appear to provide opportunities that are important in facilitating students’ progression through liminal space (Davies & Mangan, 2007). This process is optimised where activities; (1) highlight variations in phenomena, (2) provide exposure to the variation, and (3) allow integration of understanding through opportunities for re-working previously acquired concepts (Davies & Mangan, 2008). Further, these activities should enable the demonstration of discipline specific problem analysis and documentation of the emergence of conceptual mastery (Davies & Mangan, 2010). Thus, assessment activities require an appropriate level of complexity and should not direct students’ use of particular theories or concepts, requiring them to recognise theoretical differences and engage them in appropriate decision making. The recursive nature of this process is typically unsettling for students and hence support as they develop understanding is vital (Davies & Mangan, 2008). Provision of; (1) opportunities to collaborate with those at a similar level of conceptual development (peers), (2) support materials, and (3) the appropriate sequencing of assessment are considered important in this process (Land et al., 2005).

Assessment for Learning

Boud and Associates (2010) have emphasised the critical function of assessment in framing the scope and quality of student learning and achievement, with *assessment as learning* instrumental in developing emerging practitioners who are autonomous and reflexive learners and who are able to make informed judgements. Activities within such a participatory style of assessment include tasks with a high level of authenticity that allow: identification of critical aspects of a problem in context, working collaboratively with others and within the context and requirements of the discipline, opportunities to link knowledge to previous experience, and the giving and receipt of timely feedback (Boud & Falchikov, 2006). Features consistent with these elements also support the mastery of threshold concepts.

Authentic activities are consistent with the requirements for both assessment for learning (Boud & Associates, 2010) and the mastery of threshold concepts (Davies & Mangan, 2010). In order to meet the criteria of authenticity and provide opportunities to rehearse the challenges inherent in professional life, authentic assessment activities should contain several key elements. To be authentic, assessment activities should reflect the conditions under which performance would normally occur in the professional situation, with presentation of a professional product based on their acquired knowledge (Herrington & Herrington, 2006). Despite the relevance of authentic assessment to both assessment for learning and threshold concepts, to date their implementation across courses within a program or multiple threshold concepts, has not been investigated.

Aim:

The aim of the current study was to explore and evaluate assessment within three consecutive graduate entry masters (GEM) and undergraduate (UG) pre-clinical occupational therapy courses relating to children and youth within a threshold concepts informed curriculum. This study represents the initial phase of a larger action learning project.

Specifically, this study explored:

- How authentic assessment activities engaged students with threshold concepts within these courses,
- How authentic assessment activities supported mastery of threshold concepts, and
- Barriers that impeded and the supports that enhanced students' engagement with these assessment activities.

Method

Study Design

This study utilised a sequential integrated mixed methods approach that enabled exploration and description of students' and academic staff members' experiences of threshold concepts in the context of assessment (Creswell, 2014). Quantitative data collection preceded and informed qualitative data collection, however qualitative data were the dominant data source. Ethical approval was received from The University of Queensland Human Ethics Committee (No. 2009001668). Students and academic staff provided written informed consent prior to participation in groups and interviews, with completion of online questionnaires deemed to be consent.

Participants

All first year GEM (n=26) and first year (n=110) and second year (n=88) UG students enrolled in the child and youth courses in 2012 were invited to participate. The academic staff members involved in teaching and assessment within these courses (n=3) were invited to participate in a group interview. An additional academic staff member who marked the assessment activities was interviewed following completion of marking.

Procedure

A series of assessment activities aligned with course learning objectives were developed within each of the three courses of each program based on review of the

currently available literature pertaining to threshold concepts and assessment, and institutional assessment requirements (University of Queensland, 2012). Four authentic assessment activities were developed for each student cohort, these were analysed, and mapped against whole of program threshold concepts to ensure that opportunities were provided in each task to negotiate troublesome knowledge and address the threshold concepts.

Authentic assessment activities were reflective of tasks students would be required to complete as occupational therapists working with children and youth (See Table 1) and consistent with the requirements of an authentic activity (Herrington & Herrington, 2006). Rubrics, based upon the SOLO taxonomy (Biggs & Collis, 1982) were developed to accompany each of the activities and enable evaluation of student performance outcomes on multiple criteria at levels of proficient, functional, developing and of limited development.

Assessment activities were graded in terms of task complexity (amount, nature and complexity of information to be processed; decision making required; duration); scaffolding provided (e.g., structure for task completion; support for interpretation of information); and production of outcomes (e.g., written vs oral). Whilst UG and GEM students share lecture and tutorial content for two courses (II and III), additional components are included within the GEM assessment activities to meet the qualifications framework requirements for masters' level education (Australian Qualifications Framework Council, 2011).

Online questionnaires were created using the SurveyMonkey™ website and the link provided to students through their course learning management system (Blackboard). Questionnaires were made available to students for a one week period following completion of assessment activities within the semester. UG students were provided with the opportunity to complete one questionnaire. GEM students were provided with opportunities to complete questionnaires at the completion of Semester 1 and 2, 2012, to align responses more closely with completion of their multiple assessment activities. Students were also invited to participate in a focus group in the last teaching week of semester following completion of the questionnaire.

Measures

Four purpose designed student questionnaires including Likert rating scales, ranking questions and free-text response options were developed by the first and second authors based on the threshold concepts and assessment literature and their knowledge of the courses. Questionnaire items explored the students' perceptions of changes in their level of understanding of each of the five threshold concepts as a result of completing the assessment activity; the supports they used; interaction with peers; and the impact of assessment authenticity on their engagement, understanding, persistence, and confidence. Optional open-ended questions were also include to enable students to provide feedback on specific understanding that emerged as a result of completing the activities and supports they utilised in the process.

Based on the literature a semi-structured interview proforma was developed for the student and academic staff focus groups. Questions for the student focus groups enabled participants to describe their experience of each of the program threshold concepts when completing the assessment, their interaction with other students, and supports that aided their learning. Academic staff questions also related to each of the program threshold concepts and ways in which they perceived students would encounter these in completing the assessment.

Data Analysis

For ranked items, preferred learning style and supports used, a rating average was calculated (SurveyMonkey™, 2014) with the highest values representing the most frequently ranked items. All other raw data were analysed using Microsoft Excel. Students provided Likert scale responses on a scale of agreement from 1, strongly disagree, to 5, strongly agree, with 3 a neutral response. Likert scale items were collapsed into a 3 point scale (Agree, neutral and disagree). Frequency of student responses were calculated with subsequent visual analysis of the data.

Table1: Authentic assessment activities by course

Authentic Assessment Activity [a]	Activity name	Activity Description	Course (Student Cohort)	Semester	Time allocated for Completion of Assessment Activity	Assessable Outcomes	Assessment Activity Format	Contribution to Course marks
Activity A	Health Condition Case	Application of child's health condition to OT model	GEM I (GEM)	Summer Semester	4 weeks	Documentation of application of health condition to model	Individual	40%
		Administration of Knox Preschool Play Scale, Preparation of written report, (UG only) with peer review	UG I (UG 1)	Semester 2	9 weeks	Written report Documentation of application of health condition to model	Completed as pair	25%
Activity B	Developmental Assessment	Administration of developmental assessment with scoring and preparation of written report	GEM II (GEM)	Semester 1	4 weeks	Professional report (written)	Completed as group of 3	25%
			UG II (UG 2)	Semester 1	4 weeks	Professional report (written)	Completed as group of 3	25%
Activity C	Therapy Session Plan	Development of plan for occupational therapy session	GEM II (GEM)	Semester 1	10 weeks	Therapy session plan, Written report	Completed as pair	35%
			UG II (UG 2)	Semester 1	10 weeks	Therapy session plan, Written report	Completed as pair	30%
Activity D	Intervention Plan	Development of plan for series of therapy sessions with viva (GEM only) and Podcast (UG only)	GEM III (GEM)	Semester 2	10 weeks	Written plan for intervention Viva	Completed as pair, Individual Viva	45%
			UG III (UG 2)	Semester 2	10 weeks	Written plan for intervention Podcast	Completed as pair	40%

[a] Students are required to pass each assessment activity to progress to the next course.

Focus groups and interviews were recorded, transcribed verbatim, and de-identified. Thematic analysis according to the procedures described by Creswell (2014) was adopted for analysis of transcripts. Dependability of qualitative data was increased by triangulation with quantitative data, sustained engagement with participants in focus groups to establish trust and provision of interview summaries to participants for member checking (Teddlie & Tashakkori, 2009). Data from interviews, open ended questions and focus groups were organised and read several times to increase familiarity by two researchers (ES and a research assistant), and independently coded according to the procedure outlined by Tesch (1990). Codes were agreed upon by the researchers and used to identify themes and subthemes (Creswell, 2014).

Results

Participants' Characteristics

Five (19.23%) GEM and 26 (13.27%) UG students completed questionnaires and nine (34%) GEM and 18 (9.18%) UG students participated in focus groups (See Table 2). Incomplete responses were provided by three students (9.09% of respondents). Four female academics, all occupational therapists with between 5 and 31 years of experience (□=23.25 years) also participated.

Engagement with threshold concepts

Analysis of questionnaires and focus group responses from both students and academics indicated that all assessment activities across all courses provided opportunities for engagement with troublesome knowledge and threshold concepts. Inconsistencies were sometimes evident between the staff and students of the perceived relative emphasis of individual threshold concepts within each assessment activity. For example, with Activity B:

> *The integrated nature of theory and practice is right up front and centre through the treatment planning process (*Staff FG)
>
> *That was my biggest "Aha" for meaningful occupation – you just had to focus on purposeful and meaningful occupation, so that one thing I thought really focused me* (GEM FG1).

Table 2: Characteristics of participants

Student cohort	Questionnaire n (%)		Age (years)[a] n (%)		Gender [a] n (%)		Focus Group n (%)		Age (years) n		Gender n	
UG I (n=110)	UG Questionnaire 1	8 (7.3%)	18-20 21-30 > 30	5 (4.5%) 2 (1.8%) 0 (0.0%)	Female Male	3 (2.7%) 1 (0.9%)	UG FG1	5 (6.3%)	18-20 21-30 >30	3 (2.7%) 0 (0.0% 2 (1.8%)	Female Male	5 (4.5%) 0 (0.0%)
UG II (n=88)							UG FG2	3 (3.4%)	18-20 21-30 >30	3 (3.4%) 0 (0.0%) 0 (0.0%)	Female Male	3 0 (0.0%)
	UG Questionnaire 2	18 (20.45%)	18-20 21-30 > 30	14(15.9%) 0 (0.0%) 0 (0.0%)	Female Male	14 (15.9%) 0 (0.0%)	UG FG3	11 (12.5%)	18-20 21-30 > 30	14(15.9%) 0 (0.0%) 0 (0.0%)	Female Male	10 (11.1%) 1 (1.1%)
GEM I (n=26)	GEM Questionnaire 1	4 (15.4%)	18-20 21-30 > 30	0 (0.0%) 4 0 (0.0%)	Female Male	3 (11.5%) 1 (3.8%)	GEM FG1	4 (15.4%)	18-20 21-30 > 30	0 (0.0%) 4 (15.4%) 0 (0.0%)	Female Male	3 (11.5%) 1 (3.8%)
	GEM Questionnaire 2	2 (7.1%)	18-20 21-30 > 30	0 (0.0%) 2 (7.1%) 0 (0.0%)	Female* Male*	1 (3.8%) 0 (0.0%)	GEM FG2	12 (42.8%)	18-20 21-30 > 30	0 (0.0%) 12 (42.8%) 0 (0.0%)	Female Male	9 (34.5%) 3 (11.5%)

a Personal details were not provided by all participants

Differences in student understanding of threshold concepts was able to be perceived in relation to marks attained for the assessment items, as illustrated by this comment in relation to the threshold concept of client centred practice:

> *In terms of the way it came out in the assignment, only the students who got the higher marks actually had any evidence of incorporating family centred or client centred principles into the intervention plan…the ones that didn't get it, …they are able to list all of the principles in family centred practice, it's just their connection between what they're doing in the plan and that wasn't there* (Marker Interview).

Students themselves articulated processes or instances where they had experienced "Aha" moments or threshold crossings, as illustrated by the following comment in relation to the threshold concept of the integral nature of occupational therapy theory and practice:

> *Frames of reference - I didn't understand their purpose until the … assignment where I had to … select one to put into practise - this helped me realise what they were and how to implement them.* (UGQuestionnaire2)

The majority of UG students agreed that their understanding of all of the threshold concepts changed as a result of completion of each assessment activity (See Table 3). For GEM students, the majority identified a change in their understanding of threshold concepts following completion of all assessments for three of the threshold concepts only, identity as an occupational therapist, the integral nature of theory and practice and thinking critically, reasoning and reflecting (See Table 3).

Authentic Assessment

Students valued the authentic and interactive nature of the activities in facilitating their learning. The majority of UG students agreed that assessment activities A, C and D, (Activity A: *n*=5, 71.5%; Activity C *n*=9, 64.2%; and Activity D: *n*=10, 71.4% respectively) encouraged them to rethink their understanding of some threshold concepts. Similarly the majority agreed for all assessment activities that the assessment helped them to apply knowledge in a way they had not previously been able to (Activity A: *n*=7,100%; Activity B: *n*=12, 85.7%; Activity C: *n*=12, 85.7%; Activity D: *n*=12, 85.7%). The majority

of UG respondents also agreed all assessment activities developed conceptual understanding in a way they perceived they would not have been able to, through other course learning activities, such as lectures, tutorials or exams (Activity A: *n*=5, 71.4%; Activity B: *n*=11, 78.5%; Activity C: *n*=12, 85.7%; Activity D: *n*=12, 85.7%). The majority of GEM respondents identified only the Health Conditions Assignment (Activity A) (*n*=2, 66.7%) and Therapy Session (Activity C) (*n*=2; 66.7%) as stimulating them to rethink conceptual understanding and only the latter to help them apply knowledge in a new way (C: *n*=3; 75.0%).

UG students were asked to consider the impact of the authenticity of the assessment activities. The majority identified that for all activities the authentic nature of the task motivated them to engage with the activity (Activity A: *n*=7, 87.5%; Activity B: *n*=14, 87.5%; Activity C: *n*=12, 75.1%; Activity D: *n*=10, 52.6% respectively). Similarly students identified they were motivated by the authentic nature of activities to produce high quality work (Activity A: *n*=6, 75.0%; Activity B: *n*=15; 93.8%; Activity C: *n*=12, 75.1%; Activity D: *n*=11, 68.8%). The authentic nature of activities A, B and C only was identified by the majority of students as motivating them to persist when they encountered obstacles (Activity A: *n*=6, 75.0%; Activity B: *n*=12, 75.1%; Activity C: *n*=10; 62.5%). Only 40% (*n*=8) of students agreed the authentic nature of Activity D motivated them to persist when they encountered obstacles.

When identifying the impact of specific features of the authentic assessment activities, staff identified that the authentic manner in which case information was presented, would be important in influencing engagement with the threshold concepts:

> *Some extraneous information is there as well …figuring out which bits of information you can use and which bits of information you can appreciate from a personal context is quite important…it's not in dot points, it's narrative, contextualised.* (Staff FG)

Both staff and students could identify the impact of the way in which task outcomes were required to be presented on the way students engaged with the threshold concepts. Students' completion of authentic outcome requirements (e.g., the proforma for presenting the Therapy Session (Activity C) challenged students depending on their level of conceptual understanding:

Table 3. *Students' perception of change in understanding of threshold concepts as a result of completion of assessment activities* [a]

Course and Assessment Activity [b]	Identity as an occupational therapist			Client centred practice			Purposeful and meaningful occupation			Integral nature of occupational therapy theory and practice			Thinking critically, reasoning and reflecting		
	Disagree	Neutral	Agree	Disagree	Neutral	Agree	Disagree	Neutral	Agree	Disagree	Neutral	Agree	Disagree	Neutral	Agree
UG I Activity A	0.0%	62.5% (n=5)	37.5% (n=3)	12.5% (n=1)	37.5% (n=3))	50.0% (n=4)	0.0%	12.5% (n=1)	87.5% (n=7)	12.5% (n=1)	0.0%	87.5% (n=7)	0.0%	12.5% (n=1)	87.5% (n=7)
UG II Activity B	13.3% (n=2)	33.3% (n=5)	53.4% (n=8)	20.0% (n=3)	13.3% (n=2)	66.7% (n=10)	13.3% (n=2)	33.3% (n=5)	53.4% (n=8)	13.3% (n=2)	13.3% (n=2)	72.8% (n=11)	0.0%	26.7% (n=4)	72.8% (n=11))
UG II Activity C	13.3% (n=2)	20.0% (n=3)	66.7% (n=10)	13.3% (n=2)	26.7% (n=4)	60.0% (n=9)	0.0%	33.3% (n=5)	66.7% (n=10)	13.3% (n=2)	6.7% (n=1)	80.0% (n=12)	6.7% (n=1)	13.3% (n=2)	80.0% (n=12)
UG III Activity D	13.3% (n=2)	26.7% (n=4)	60.0% (n=9)	20.0% (n=3)	20.0% (n=3)	60.0% (n=9)	0.0%	33.3% (n=5)	66.7% (n=10)	13.3% (n=2)	40.0% (n=8)	66.7% (n=10)	6.7% (n=1)	26.7% (n=4)	66.7% (n=10)
GEM I Activity A	0.0%	66.7% (n=2)	33.3% (n=1)	0.0%	33.3% (n=1)	66.7% (n=2)	0.0%	0.0%	100.0% (n=3)	0.0%	0.0%	100.0% (n=3)	0.0%	33.3% (n=1)	66.7% (n=2)
GEM II Activity B	0.0%	50.0% (n=2)	50.0% (n=2)	25.0% (n=1)	50.0% (n=2)	25.0% (n=1)	25.0% (n=1)	50.0% (n=2)	25.0% (n=1)	0.0%	50.0% (n=2)	50.0% (n=2)	0.0%	25.0% (n=1)	75.0% (n=3)
GEM II Activity C	0.0%	50.0% (n=2)	50.0% (n=2)	0.0%	25.0% (n=1)	75.0% (n=3)	0.0%	0.0%	100.0% (n=4)	0.0%	25.0% (n=1)	75.0% (n=3)	0.0%	25.0% (n=1)	75.0% (n=3)
GEM III Activity D	0.0%	0.0%	100.0% (n=2)	50.0% (n=1)	0.0%	50.0% (n=1)	50.0% (n=1)	0.0%	50.0% (n=1)	50.0% (n=1)	50.0% (n=1)	0.0%	0.0%	0.0%	100.0% (n=2)

[a] Student response to the question: This assessment task helped me develop my understanding of ….

[b] Activity A – Health Condition; Activity B – Developmental Assessment; Activity C – Therapy Session; Activity D – Therapy Plan

> *they see the table and feel the need to fill it in – it triggers thinking in activity – thinking is dominated by the table … the ones who did better were able to use specific strategies within those and weren't so worried about what the title of the activity was* (Marker Interview)

Students themselves viewed the authenticity as important in integrating understanding, identifying aspects of the authentic assessment that involved "doing" (67.85% of comments; n=65), e.g., presenting a podcast, (as opposed to reviewing evidence), as those they perceived to contribute to their conceptual development.

> *My critical thinking, reasoning and reflection was developed by learning to convert observations to standardised scores and then using these to determine whether a child is typically developing*. (UGQuestionnaire2)

Similarly, all could identify aspects where the tasks did not appear entirely authentic,

> *The Blackboard discussion board made me feel less like an OT. That made us feel a really student base* (UG3FG)

Learning Environment

The majority of UG respondent students found the process of working in groups to complete these assessment activities helpful (Activity A: *n*=7; 100.0%; Activity B: *n*=17, 94.4%; Activity C: *n*=13, 72.2%; Activity D: *n*=13, 72.2%). An expressed preference for working in pairs was indicated for each assessment activity (Activity A: *n*=7, 100.0%; Activity B: *n*=10, 55.6%; Activity C: *n*=15, 83.3%; Activity D: *n*=12, 66.7%). GEM respondents indicated that they found groups helpful (Activity B, and D) (*n*=3, 75.0%; *n*=2, 100%), but indicated no clear preference for group size, except for Activity C, (*n*=3, 75.0%) which they would have preferred to complete individually.

Student cohorts ranked their preferred learning methods (See Table 4) with a preference for reading and studying information for exams. Students indicated use of a range of supports in completing assessment activities, with student, instructor generated and external resources utilised to support learning. Assessment activities were often only commenced 1-2 weeks prior to due dates (44.44% of students, n=15), with 38.29% (n=13) of students indicating they had not allowed enough time to complete the assessment to their usual standard. When asked to rank the factors that

determine how long they will spend on an activity, students were also able to identify how they prioritised time with notable differences between UG and GEM cohorts (See Table 4).

Analysis of interview transcripts and responses to open ended questions in the questionnaires revealed two key themes: "Pulling it all together" and "Moving from stuck places".

Pulling it all together

A consistent theme across all courses related to how the assessment activities helped students integrate knowledge and understanding within or across courses to facilitate threshold crossing, as illustrated by the following comment:

> *I think that the last part of the assignment (podcast)…kind of* ***pulled it all together*** *which I thought was quite applicable to being a professional and having to communicate your reasoning. (UG FG3)*

Staff and student comments identified a number of ways in which this integration of understanding was supported (See Table 5). These aspects identified within this theme are outlined below.

Assessment activities provided opportunities to experience troublesome knowledge and unfamiliarity. They perceived this challenge presented by the assessment activities helped them rethink their current understanding of the concepts. In rethinking their understanding the students used the opportunities inherent in the activities to apply and integrate information from a number of sources and courses (See Table 5). Students perceived this integrative process of "Pulling it Together" as varying across activities and threshold concepts. However, they could identify the way in which the assessment activities challenged them to master specific threshold concepts. The authentic nature of the activities was an important component in motivating this process.

Table 4. *Student ranking of preferred learning methods, learning supports and determinants of time spend on assessment activities*

Student cohort	Rank (Ranking average)	Preferred learning method	Rank (Ranking average)	Learning supports	Rank (Ranking average	Factors identified as determining time spent on assignment
UG I (n=7)	1 (5.57)	Reading information	1 (8.00)	FAQs on Blackboard [a]	1 (7.43)	Need to develop understanding of concepts in assignment for future assessment
	2 (4,57)	Studying information for exams	2 (7.43)	Google	2 (5.71)	Availability of information and resources to complete assignment
	3 (4.00)	Listening to explanations	3 (7.29)	Contact with Course Co-ordinator	3 (4.86)	Personal and work commitments
UG III (n=14)	1 (5.43)	Studying information for exams	1 (10.14)	Google	1 (6.93)	Need to develop understanding of concepts in assignment for future assessment
	2 (3.86)	Reading information	2 (8.57)	Facebook	2 (5.36)	Availability of information and resources to complete assignment
	3 (3.57)	Listening to explanations	3 (8.50)	Blog on Blackboard	3 (5.21)	Perceived relevance of assignment content to desired area of future practice
GEMS I (n=4)	1 (5.50)	Studying information for exams	1 (11.00)	Lectures and lecture notes	1 (8.00)	Due date of assessment for other courses
	2 (4.00)	Reading information	2 (8.75)	Tutorial activities	2 (7.00)	Complexity of task
	3 (3.50)	Discussing information with others	3 (7.75)	FAQs on Blackboard	3 (6.75)	Desired grade or mark

[a] Frequently Asked Questions (FAQs) on Course Learning Management System

Decision making was perceived as an important part of this process of rethinking conceptual understanding. Decision making occurred in the context of information relating to the activities themselves and in use of feedback in the peer review process in the report component of the UG Health Condition assignment:

> S*ome people...enjoyed it so much they're using it in other assessment …it gave us an idea what to look for...direction of what to do, how to do it, and then made you think yourself about your own assignment* (UG FG1)

A sub-theme of emerging identity as an occupational therapist was identified further highlighting the integrative nature identity within all of the assessment activities:

> W*e had to think like occupational therapists*, (UG FG3)

Y*ou take on a persona, what is going to be your professional persona, I did to a degree, analysing what they said and using what had been taught about how to react, I was sort of analysing how I would respond….* (GEM FG1)

Moving from stuck places

This theme *reflected* the strategies students employed to support their progress through liminal space. The nature of the authentic assessment activities and engagement with troublesome knowledge resulted in students often ending up in "stuck places" or disjunctions in learning. Whilst students did not verbalise in detail the areas in which they were "stuck" they frequently referred to supports required to move out of these spaces to complete the assessment activities. Students could also perceive the positive learning that came from being "stuck" and moving away from this position

> *I spent I think 2 days on trying to do sound integration and I read through the whole papers and there is no backing, so I had to pull it all out – I wasted days – ….(Facilitator) So what did you learn from that experience…. (Student) To look at the evidence…always read the abstract* (GEMS FG1)

Students used a range of supports to help them, with peer collaboration perceived the most important. Peer collaboration predominantly came from completing the assessment activities in groups. Benefits of working in a group identified by students

related to workload, being able to share ideas and perspectives that supported development of understanding, and collegial or peer support. (See Table 6).

Various scaffolds were valued in supporting progression including, course generated materials such as course notes and self-directed learning activities. Models demonstrating how a clinician would address aspects of the task or how a student has previously done so were also seen as useful. Web based supports, either student or course co-ordinator generated, e.g., blogs and discussions on Blackboard and Facebook were widely utilised. However, for some accessing these supports presented new challenges, identifying the discomfort they experienced when viewing questions posed by students at different learning levels and the impetus this provided to further rethink their conceptual understanding (See Table 6).

Discussion

The perspectives from students and academic staff in this study indicate that authentic assessment activities can be designed and implemented to successfully engage students concurrently with multiple threshold concepts, whilst meeting institutional assessment and professional accreditation requirements.

Authentic learning

Authentic assessment activities provided students with opportunities to experience troublesome knowledge, unfamiliarity, variation, and decision making in a format that they perceived as being motivating and relevant to their future clinical practice. Both students and staff indicated that this format provided for conceptual manipulation and integration of understanding through multiple opportunities for reworking of previously acquired concepts both within and across sequential assessment activities. Both students and staff perceived that these activities engaged students with all threshold concepts. Students further indicated development of understanding in a way that would not have occurred from other course learning activities. Consistent with research findings pertaining to allied health student engagement in experiential learning (Prout, Lin, Nattabi & Green, 2014), this latter outcome may reflect the transformative nature of learning experienced during assessment completion.

Table 5. *"Pulling it all Together": Aspects of theme 1 identified by students as supporting integration of knowledge and understanding to support threshold crossing*

Aspect of theme	Student and staff comments exemplifying this aspect of theme
Opportunity to experience troublesome knowledge and unfamiliarity	*"Just a really good assignment…the first time we were thrown in the deep end. We found out that client centred practice might not be what you think it should be or how it should run – you have to be very flexible." (UG Focus Group1)"* "*Having to use and justify the evaluation tools that we were going to use was useful. I don't think I would have considered the use or relevance of them prior to this assignment*" (UG Questionnaire 2) *"Gives us a chance at actually … learn information, rather than really random stuff to take in. It was hard but it was helpful" (GEM Focus Group 2)*
Opportunity for decision making	"H*ere is a situation to unpack…it does not lead them directly to the answers…it's information that a health professional would be concerned with for the purposes of figuring out what to do...it's appreciation of the situation and the person as a whole." (Staff Focus Group)* "I*t was good because we didn't get too much direction and there was different ways to go about it, so everyone got to choose whatever frame of reference they think."* (UG Focus Group 3)
Challenging nature of task	"*Knowing the amount of research and work that needs to go into a well-developed research plan. I don't think I fully understood that aspect of OT*." (GEM Questionnaire2) "*Aspects of the three assessment tasks that encourages us to reflect or critique, helped me to research more and understand what literature is saying and to be able to come up with my own …opinion on matters*." (UGQuestionnaire2). "*Needing to explain the rationales behind what we have chosen to do during intervention (case assignments) helped me to think about the link between what we say we do and what we actually do. Some of my preconceived ideas on how therapy should be like is changed when I thought about how practice should be influenced by core OT theories*" (UG Questionnaire 2).
Opportunity to apply and integrate information	"*It helped me think 'outside the square', which I think is highly required in OT practice. I'm not good at doing such but throughout the year, and in this assessment particularly, I found myself being able to grasp concepts from external sources and environments to complete this part of the assessment*" (UG Questionnaire 1). "P*utting all the theory into practice… all the knowledge that we had...You had to think of all the different theory you'd learnt over first and second year, and you had to angle your writing to … use all the models for OT"* (UG Focus Group 3).
Authentic nature of assessment activity	*"Overall writing specifically for a child, made me understand the importance of client centred practice." (UG Questionnaire 2)* "*made the assignment more "real life based". This made me engage more and learn more as it was evident that it was skills we would use in later years*." (UG Focus Group 1)

Table 6. *Moving from Stuck Places": Aspects of theme 2 reflecting supports used by students as they journeyed through liminal space*

Aspect of theme	Example
Peers -Sharing workload Collegial support	*Being able to ask each other questions and share the work load was beneficial*" "Y*ou didn't feel alone/scared when going out into the real world (wasn't as daunting) and you could discuss the child's behaviour…*" (UGQuestionnaire1) "*It just gave the feeling of encouragement and ensuring that our ideas were right*" (UGQuestionnaire2).
Peers - Sharing ideas	*"Taught me to approach the same assessment question in a different way, opened me to different ways of thinking.*" (UGQuestionnaire2) "*It was nice to be able to have someone to talk things through with. As soon as I was able to say things out loud to my partner the process and necessary next steps became easier to understand*." (UGQuestionnaire2)
Scaffolds - Models	"*The model assignment really helped me…seeing what other students had done really helped me write the assignment and see what they really wanted from us.* (Facilitator) *The expectations*. (Student) *Yeah*," (UGFG1)
Scaffolds - Course materials	"*I found the lecture slides really helpful, especially with frames of reference because L had done these tables that were like if you have this certain condition, these are the frames of reference. I found that really, really helpful that you could just look straight there and just get - it's almost getting feedback. If you were thinking along that line, seeing it from the lectures, it was really clear and helpful*." (UGFG3) "*The self-directed learning material was actually insanely helpful for that assignment and I'm really glad we had it because there was a lot of resources it provided. It had good tables of what you needed to do with the specific impediment that the person had. That's where we started with our assignment. It would have been a lot harder, I think, to start it without it*." (UGFG3)
Scaffolds - Web-based supports	"*I didn't actually write any blogs myself but I found it useful to read what everybody else had asked and what the responses were…" (UGFG3)* "*We really enjoyed using our Facebook page. It's really helpful because if we post a question, there's someone out there who probably wants to know the answer as well, …it allows us to all share our knowledge and guide each other" (UGFG3)* *"(Facebook) can also be a negative because you hear what other people are doing and you're like… I hadn't even thought of that...and it freaks you out. It stresses you a lot more than you have to stress…. Then you've got to rewrite the whole assignment …so it's ruins your confidence at the same time but it's also, I guess, a good thing because it does open your mind to a lot of different perspectives." (UGFG3)*

Ontological shifts were identified by both students themselves and in the outcomes of their assessment activities by the marker, supporting the contention that that the authentic assessment activities are an appropriate stimulus for evoking ontological shift as described by Land and Meyer (2010). Students appeared to have moved within and through the liminal states, using the task structure and supports to produce outcomes evidencing both basic and discipline threshold concepts (Davies & Mangan, 2010), e.g., being able to describe how family centred practice would be incorporated into a therapy session, as opposed to presenting a family centred therapy session. This variability in learning is not unexpected given the variation in the points at which students enter the liminal state (Land & Meyer, 2010). Similarly, students in this study were completing a series of pre-clinical courses at the beginning of their respective programs. The threshold concepts within these three courses are embedded within all courses in the two occupational therapy programs. It would not be expected that all students would demonstrate mastery of discipline threshold concepts in early courses.

Apprehension of the threshold is necessary for threshold crossing. The “doing” or experiential aspect of authentic activities within the assessment may also have contributed to both student apprehension of the threshold and their subsequent recognition of the role of the experiential activity as an integrative aspect in their learning. Engagement with variation inherent within the tasks would enable discernment of critical features of the threshold, facilitating their identification of a “path” to threshold crossing or signification as suggested by Land & Meyer (2010).

The ability to understand and construct the outcomes, (e.g., reports, therapy session plans), was challenging, and a focus for students. Reliance on models and structural supports was evident as students grappled with the process of understanding and applying the occupational therapy process. This protocol which determined the way they proceeded and formulated their responses, e.g., how to use results from a developmental assessment to write a professional report, also reflected the experiential aspect of the assessment. Students’ recognised its contribution to their conceptual development consistent with the transformative nature of negotiating protocols within other disciplines identified by Land & Meyer (2010).

The triad of engagement in authentic activity, development of professional identity and conceptual integration were highlighted by students. Engaging students to "think and act" like a professional or see themselves as "becoming a practitioner" are features of both threshold concepts (Meyer & Land, 2003) and assessment for learning (Boud and Associates, 2010). Barradell (2014) has also described this ontological dimension of engaging with threshold concepts as students evolve their professional identity as integrative. For students, active negotiation of troublesome knowledge, decision making and presentation of outcomes were clearly articulated as integrative aspects in forming both professional identity and conceptual mastery. This is also consistent with the experiences of academic staff in teaching within the reformed curriculum and the manner in which the students' "learn the talk" as their professional identity emerges in pre-clinical courses prior to block fieldwork in the latter years (Rodger, Turpin & O'Brien, 2015).

Task authenticity was an important element in design of assessment activities and students' perceived this authenticity to impact on their motivation and persistence. Clear associations between motivation and learning outcomes (Baeten, Dochy & Struyven, 2012; Liu et al, 2014) and learner perception of task authenticity (Bratt & MacEwan, 2009) have previously been demonstrated.

Learning Strategies and Supports

Students indicated that their journey through liminal space was often recursive, however, specific disjunctions in learning were only inferred by their reference to strategies and scaffolds they used to support movement from these disjunctions. No students discussed retreating from the difficulty by opting out of further learning as has been previously described (Land et al., 2005). Conversely, their comments indicated they continued their recursive course and could identify the positive aspects of having negotiated these difficult learning spaces. Their failure to retreat from disjunctions in learning may have been attributable to the highly motivating nature of the authentic activities, with students identifying that this motivated them to persist when they encountered obstacles, for all tasks except the most complex (Activity D).

Alternatively, students used a range of supports to help them progress through the assessment activities and these may have provided sufficient support for them to

progress with their learning rather than retreat. It is noteworthy that variation in student learning presented a barrier to their engagement with some of the provided learning supports, with students preferring not to use Blackboard etc., rather than being confronted with information that challenged their current level of understanding and risked them engaging in a renewed reconstitutive process. Given the value of this process in the liminal journey (Cousin, 2006), consideration should be given to ensuring students have opportunity to engage with these supports in a context that supports their uncertainty and reluctance to let go of established understanding.

Visual analysis of questionnaires from different student cohorts indicated some differences in use of preferred supports, however, response rates are insufficient to determine the significance of these differences and if they are attributable to the nature of the assessment activities involved or the cohort and their particular learning needs (UG vs GEMS). The importance of specific learning support for individual assessment activities and student cohorts warrants further investigation. Differences identified for Activity D where students were not motivated by the activity to persist in the face of obstacles, may have been attributable to the task not being sufficiently motivating as they did not perceive aspects such as the blog discussion to be authentic (Bratt & MacEwan, 2009). Alternatively, as this activity included the least scaffolding and greatest variability students may have encountered greater uncertainty and not perceived the supports as being sufficient.

Completion of activities in pairs or groups supported students' journey through liminal space. Social learning supported the learning process pragmatically (workload), through exposure to new knowledge, and verification of understanding. Discussion with others was a preferred learning strategy of GEMs and this may have enhanced the value they placed on this support. Their reliance on peers (Facebook) in preference to more experienced staff, is consistent with literature that recognises students as more comfortable learning with those at a similar level of conceptual understanding (Land et al., 2005).

Some students expressed a desire to work individually on assignments which may have been reflective of personal learning styles and difficulties expressed in finding time to co-ordinate meetings with other group members, indicating the overriding influence that

learning preferences and pragmatic issues may have. Australian occupational therapy students have demonstrated convergent and divergent learning styles in previous studies (Brown, Cosgriff & French, 2008), both of which are compatible with learning within an authentic assessment and threshold concepts framework. However, these are inconsistent with the preferred learning patterns identified by the students in the current study which are more consistent with a comprehending and remembering learning preference (Biggs & Collis, 1982) and the preference for working individually for some activities. These preferred learning patterns may make authentic activities more challenging for some students and should be considered in activity design.

Differences were noted between the GEM and UG cohorts on visual analysis of data on a number of aspects, including priorities for assigning time to the assessment activities and experience of conceptual change their completion. It could be hypothesized that GEM students are positioned differently on entering these activities and may be less likely to experience conceptual change as they may achieve threshold crossing at an earlier stage in their program than UG students. Similarly, it could be hypothesized that due to the intensive nature of the GEM program these students interaction with assessment activities is more determined by pragmatic aspects. However, small sample size precludes statistical analyses required for verification of hypothesized differences between cohorts.

Literature suggests that the recursive nature of the journey through liminal space means engagement with threshold concepts occurs over time and is consistent with the features of deep learning (Entwistle, 2000). Commencing activities immediately prior to due dates precludes this. Students approach assessment with different priorities and objectives. It appears to be a pragmatic decision, reflecting a range of features many not related to the nature of the activity or course content itself. These factors need to be considered in assessment design to facilitate maximum student engagement.
Results of this study have further informed understanding of the threshold concepts within the occupational therapy program. Student comments and engagement with the threshold concepts, indicate that the five concepts appear to be consistent with the additional characteristics of liminality, being reconstitutive and discursive (Flanagan & Smith, 2008; Land, Meyer & Baillie, 2010), that were not addressed at the time of their definition. The reconstitutive nature of their journey through liminal space and the

challenges they experienced in developing the discourse of the profession are clearly indicated by student comments.

Whilst exploratory in nature, outcomes of this research indicate that implementation of assessment within a threshold concepts informed curriculum needs to consider multiple factors. These can be most comprehensively addressed in consideration of knowledge base categories proposed initially by Shulman (1987). Within this context they translate to knowledge and understanding of: the discipline and learning context (professional and university requirements, i.e., assessment philosophy, principles and requirements); student values and characteristics (i.e., expectations, commitment, motivation; learning style and preference); and pedagogical research evidence relating to both assessment and threshold concepts.

Limitations and future directions

Whilst the feedback provided from these focus groups and questionnaires has been valuable in informing the student experience of assessment activities within the child and youth courses a number of limitations are noteworthy. Specifically, the limited response rate in completion of the questionnaires prevented statistical analyses and analysis in relation to individual activities. Some aspects of the student experience were not sufficiently addressed by either focus groups or the questionnaires, in particular, troublesome knowledge and “stuck places”. Identification of these would inform understanding of students’ current level of conceptual development and further assessment design.

Outcomes of this research study has enabled revision of all of the authentic assessment activities to ensure greater authenticity, student engagement with activities over longer periods, additional scaffolds, peer feedback, and inclusion of more interactive components including podcasts and standardised client interaction.

In terms of future research directions there is a need to further evaluate implementation of authentic assessment activities in relation to the threshold concepts within the child and youth courses. To date only limited analysis of student outcomes has been

undertaken. Investigation of student outcomes in relation to specific characteristics that have been identified as potentially impacting on the liminal journey including their pre-liminal state, learning styles and motivation is warranted. As the current study has focused on students at a particular point in their professional journey, a deeper understanding of the process student engage in as they proceed to threshold crossings would be gained through longitudinal study as they proceed through all three child and youth courses.

Conclusion

The centrality of assessment within the curriculum, and the compatibility of the key features of assessment for learning with those required for mastery of threshold concepts, reinforces the crucial role of assessment within threshold concepts informed curricula. The outcomes of this research indicate that from both students' and academics' perspectives, authentic assessment provides valuable learning activities to guide student mastery of threshold concepts that are central to learning to think and act as an occupational therapist.

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