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Crossing the threshold: when transition becomes troublesome for A-level students

Undertaking A-level study is a notoriously troubling time for many pupils. Reasons for the difficulty students experience at this transition point are complex but include an increase in workload and the need for more developed analytical skills (Scott, 2012), whilst external sources of stress are prevalent, as reported previously in this journal (Harris, 2001). Significant increases in the difficulty of concepts also contribute to making A-levels a considerable step up from GCSEs, with the most recent iteration of examinations reportedly causing significant emotional and mental distress for many students (Simnaz & Riley, 2018).

The purpose of this paper is to present an original approach to considering some of the challenges of acclimatising to A-level study from the perspective of students, through the theoretical lens of the Threshold Concept Framework (Meyer & Land, 2003). I argue that focusing on threshold concepts in A-level specifications provides unique insight into some of the causes of students' cognitive and affective emotional difficulties. Furthermore, this approach provides a structure through which teachers can explore ways of designing effective pedagogical approaches to supporting students through this troublesome journey whilst maximising their academic progress.

Drawing on doctoral research employing an original use of Interpretative Phenomenological Analysis (IPA) within a longitudinal design frame, the empirical study on which this paper is based explored the lived experiences of six secondary school students throughout their first eighteen months of A-level study. This detailed and personal exploration into students' journeys uncovered tensions between their expectations and the reality of A-level study, along with insights into how they coped with this major life experience. Findings suggest that students' encounters with threshold concepts further exacerbated the strain of transition, presenting a heightened level of cognitive and affective challenge. This article presents a small selection of findings from the larger study.

Threshold Concepts

The notion of threshold concepts (TCs) emerged from a national research project involving academics from universities across the UK and has now developed into a substantial international body of literature in TCs across a range of disciplines in higher education (Flanagan, 2019). A relatively small number of studies have migrated into secondary education around the world, in the USA (Wolf and Akkaraju, 2014), Brunei (Haji Bungsu, 2014), Hong Kong (Pang and Meyer, 2010), Ireland (Sheehan, 2010) and the UK (Renshaw and Wood, 2011; Ashwin, 2008; Chandler-Grevatt, 2015). However, whilst these latter studies are situated in the comparable context of the UK education system, there is a noticeable gap in literature exploring students' transitions from GCSE to A level study.

A subject discipline is commonly presented as comprising of units of knowledge, often referred to as 'core concepts', or 'key concepts' (Davies and Mangan, 2007, p.713). Meyer and Land (2003) presented Threshold Concepts (TCs) from a qualitatively different perspective, suggesting that mastery of a TC acts as a metaphorical portal, where passing through opens up a 'previously occluded and integrated' (Meyer, 2016, p.463), view of the subject landscape.

Subsequently, the epistemological shift that the learner experiences means that they are likely to undergo transformation in their disciplinary perspective, and potentially their identity through their journey to becoming part of a disciplinary community of practice (Wenger, 1999), for example through becoming a scientist. In their first paper, Meyer and Land (Meyer & Land, 2003, p.374) defined a TC as being:

- *transformative* – bringing about a '...significant shift in the perception of a subject...' which '...may lead to a transformation of personal identity...' and is '...likely to involve...a shift in values, feeling or attitude';
- probably *irreversible* - such that the subsequent change of view is '...unlikely to be forgotten, or unlearned only through considerable effort';
- *integrative* - with respect that it 'exposes the previously hidden interrelatedness of something';
- 'possibly often (though not necessarily always) *bounded*', in that each concept has boundaries which border other areas of conceptual space; and
- 'potentially (and possibly inherently) *troublesome*'

In a subsequent paper this definition was extended to suggest that TCs are *discursive,* such that 'as students acquire threshold concepts, and extend their use of language in relation to these concepts, there occurs also a shift in the learner's subjectivity, a repositioning of the self' (Meyer & Land, 2005, p.374); and *reconstitutive,* a characteristic which highlights 'the inter-relatedness of the learner's identity with thinking and language'.

It has been argued that emotional capital plays a key role in the learning journey that students undertake (Cousin, 2006). Despite compelling suggestions of the existence of a strong affective dimension, much of the research into TCs has focused on the cognitive aspects of students' experiences and the pedagogical or curriculum influences impacting on their understanding. Several authors have identified the value of further research into the affective dimension (Shopkow, 2010; Rattray, 2016; Macintosh Edwards, 2013; Land, 2014; Felten, 2016), although none have explored this in the comparable context of secondary advanced level education. The research presented in this article contributes to this perceived gap in the literature, presenting evidence of the affective impact of A-level learning through the lens of the TCF, thus illuminating the following research questions:

- How do students make sense of the transition from GCSE to A-level study?
- How is the affective dimension of TCs represented in students' experiences?

Research design and methods

The design frame for this research drew from Interpretative Phenomenological Analysis (IPA), a qualitative research approach originating in the field of healthcare psychology. IPA demonstrates a commitment to exploring in detail how people make sense of their personal and social world, particularly where something significant has taken place in their lives. Located predominantly in health psychology, the largest body of literature employing IPA explores an understanding of illness as a major life experience (Smith, 2011), but IPA researchers also commonly look at major *transitions* in people's lives, such as having a child or leaving home (Smith, et al., 2009, p.3). Whilst moving from GCSE to A-level study may not be considered a major life transition in the same manner as those exemplified above, when coupled with encounters with TCs, I argue that this transition has the potential to be a significant life experience.

The study took place in an 11-18 secondary comprehensive school in the East Midlands. Students were selected purposively and all six students within the biology teaching group were offered, and took, the opportunity to engage with the project. Informed consent was obtained from all participants and the right to withdraw without consequence was clearly explained from the outset. In-depth, semi-structured interviews with individuals are commonly used in IPA (Smith, 2004), due to the need for a medium that allows for a two-way idiographic dialogue. This involves an open-ended interview maintaining a careful balance between guiding and being led (Hefferon & Gil-Rodriguez, 2011, p.757). Interviews were conducted with students in the first term, and then throughout the year, triggered by issues noted in reflective diaries which were issued to students with structured prompts to encourage reflection on aspects of the

TCF. The diaries were completed after each week's learning. Data from interviews were analysed using IPA techniques, before emergent themes were identified and refined through subsequent recursive analysis against the TCF characteristics.

Findings

Throughout the study, the intensity of feelings which surfaced as a result of the increased workload and pressure caused students to feel out of their depth, offering further evidence to support the existence of a strong affective dimension. What is apparent from the accounts of these six students is that the transition from GCSE to A-level raised both cognitive and emotional issues, resulting in high levels of stress and anxiety, as Anna highlights in her recollection of the impact that stress had on her self-efficacy.

> *When I get stressed I get really stressed and…that's why I have to keep on top of my work, because when I stress I don't do, like, any work because I am so stressed with thinking about all of the things I have got to do I don't actually get anything done […] To be honest I get more stressed about being stressed [laughs]…than anything else.* (Anna, 3rd interview)

Self-critique was a common affective feature of students' reflections on their journey, and all reported questioning their ability or suitability for A-level study at some point. Grappling with TCs and troublesome knowledge also caused issues for students throughout the year, resulting in frustration and significant emotional impact.

> I was getting frustrated with myself because [at GCSE] I would always understand it, or if I didn't understand it I would be able to go home and understand it and do it that way, whereas now […] I am trying my best and I am trying to understand it and it just doesn't go in…which…really frustrates me…it really stresses me out. (Anna, 1st interview)

All of the students were affected by the transition to A-level study in one way or another, as illustrated by the range of affective terms used by students shown in Table 1 (see Appendix). However, none were affected so significantly as Erin. Towards the end of the first year of A-level study, she reflected on the difference between her GCSE years compared with her recent experiences of the previous 10 months as being 'insane, absolutely insane…it's…it's a ridiculous jump…it's an absolutely ridiculous jump'. (Erin, interview 3). As Erin was talking there was a sense of urgency and amazement as she described her journey. Erin described her transition as a major life experience that affected her both physically and mentally, to such an extent that she sought medical intervention:

After my exams I got diagnosed with anxiety and depression […] and that is mainly due to the stress of my A-levels. Not all of it, but the jump from GCSE to A-level, I have experienced first-hand how that can be a really bad thing. (Erin, interview 2)

Erin attributes much of her resulting illness to her troublesome transitional experience, which exacerbated personal issues she was having at around the same time. She goes on to describe the point in time when she realised the effect that the struggle with her studies was having on her, and that she could not carry on without changing something:

> *I went…I went to the doctors the day after my 17th birthday, because…basically I woke up one day and sobbed…broken…said I can't do it…can't do it anymore. I actually, physically can't do this anymore; I have to stop.* (Erin, interview 2)

One of the consistent themes to emerge was students' realisation that their previous learning at GCSE level was presented as a simplified version upon which they now had to expand in terms of specifics at a granular level, particularly when learning TCs, such as cell structures, which was identified as a TC from the analysis of findings:

> *At GCSE it was just like, there's a xylem and a phloem in the stem…but there is vascular tissue and all sorts of other stuff as well which I found hard. GCSE is very simplified compared to A-level.* (Liam, 1st interview)

Cell structures emerged as troublesome and strongly integrative for all students and was one of a number of TCs identified by students (see Table 2 Appendix) either through the specification analysis, or through analysis of interview responses. Scale was another TC to emerge from the study that appeared to have a big impact on students, not just from the perspective of finding it troublesome to master, but due to the strong feelings that it evoked in some. Although scale is not taught as an explicit topic, it is so embedded within the biology curriculum that students encountered issues involving scale through a number of different concepts and areas of study. Throughout the interviews, students highlighted scale-related

issues, but for many this related to increased levels of complexity at A-level compared to GCSE study which is presented in a more simplified way, as Yasmin explained when recounting her experience of learning about cell cycles:

> *I found the cell cycles quite hard to understand…what goes on inside cells, like respiration and…again we were just told like, we were just given an equation and that was it [at GCSE]. But now it's like a massively complicated process that goes on inside a mitochondria and in a cell, it's quite…I find it hard to believe how this stuff happens and it's just complicated.* (Yasmin, 1st interview)

Yasmin came across as feeling very uncomfortable with accepting something on such a small scale that she has been told is happening. Scale caused issues for students in respect of both micro- and macro-spatial extremes, but also with respect of temporal extremes of scale, for example through concepts such as evolution and biodiversity (macro-temporal) and the cardiac cycle (micro-temporal). Interplay between the two extremes of scale caused further issues for students, as Erin's account demonstrates here:

> *The different scales link together so, like, we studied transmission of disease and how you prevent that, we had to learn about how they were transmitted and cured which was sort of microscopic level, but then there was the huge side of it which was like epidemiology, as in how these things spread around the world. So really it was a bit of both ends of it combined which made it really…yeah…really hard.* (Erin, 2nd interview).

Discussion

The emotional and personal dimension of participants' learning experiences were evident throughout the research process. The research design based on IPA philosophies and practices elicited a range of affective phrases, summarised in Table 1. These provide evidence of the strong feelings generated throughout the transitional process and through encounters with TCs, building on previous work in HE which surfaced the use of emotive terms by student participants (Felten, 2016; MacIntosh Edwards, 2013), although in these studies this aspect emerged as part of the research findings rather than being sought by design.

The interplay between the increased workload and stress of transition and encounters with TCs caused major issues for some of the students, resulting in medical advice and treatment being sought in one case. These difficulties ultimately led to half of the group of participants deciding to change programs of study and restart the year, and one of these also changed schools. Whilst there are inevitably other factors involved, these findings suggest that the increase in workload, the difficulty of work and encounters with TCs were the major contributing factors to these decisions. Letting go of prior knowledge and dealing with misconceptions also led to considerable emotional difficulty for students, in such that students persevered with existing misconceptions or previous knowledge from GCSE to reduce the uncomfortable feeling of uncertainty they were experiencing. This perseverance emerged as a coping strategy on the surface, but also illuminated one of the causal factors inherent in reconstitutive nature of TCs, that of oscillation between old and new understandings (Cousin, 2006, p.4).

Felten (2016, p.6) referred to what he called 'troublesome affect', noting that students described their experiences of engaging with TCs, often emotively, rather than focusing on characteristics of the knowledge that made them difficult. Commentary on engagement with TCs was evident in my study, and students were also able to pinpoint specific concepts and the aspects of these that made them troublesome and integrative. I argue that this was enabled by the longitudinal approach to data collection, where students were interviewed throughout the year, and shortly after their troublesome learning experience, rather than at the end of the course. This meant that students were closer to the event and more attuned to recall key features of encounters with TCs, demonstrating a worthy development to methodological approaches previously taken and thus a valuable contribution to knowledge about ways of exploring the affective dimension of TCs. These findings also support my argument that difficulties with transition are exacerbated by encounters with TCs.

Whilst this small selection of findings may have presented a negatively biased picture of students' experiences, the full findings also surfaced evidence of positive emotional impact, from experiencing success and increased confidence, to feelings of awe and wonder at scientific awakening. Whilst the singular term 'affective dimension' is used throughout the TC literature, there is certainly some indication that there are multiple dimensions to the affective

nature of TCs, which teachers and academics should be encouraged by and which are worthy of further investigation.

Conclusion

This article has highlighted the potential of the TCF as a theoretical framework through which to explore the difficulties and transformations that students experience in their transition from GCSE to A-level. I have argued that focusing on students' encounters with TCs provides valuable insight into the cognitive and affective dimensions of these difficulties, whilst also providing a pedagogically productive structure for educators to identify areas of the curriculum which act as barriers (or enablers) to student learning and progress. Further projects are currently underway involving teams of secondary science teachers and also trainee science teachers, aimed at producing approaches to teaching the latest A-level specifications through a focus on threshold concepts.

References

Ashwin, A. (2008). What do students' examination answers reveal about threshold concept acquisition in the 14-19 age groups? In R. Land, J.H.F. Meyer & J. Smith (Eds.), *Threshold concepts within the disciplines* (pp. 173-184). Rotterdam: Sense.

Chandler-Grevatt, A. (2015). Challenging concepts in chemistry. Royal Society of Chemistry, EducationInChemistry. 21st December 2015. Retrieved February 17 2018, from: http://www.rsc.org/eic/2015/12/challenging-concepts-chemistry-education

Cousin, G. (2006). Threshold concepts, troublesome knowledge and and emotional capital: an exploraton into learning about others. In J.H.F. Meyer & R. Land (Eds.), *Overcoming Barriers to Student Understanding: Threshold concepts and troublesome knowledge* (pp. 134-147). London: Routledge.

Davies, P., & Mangan, J. (2007). Threshold concepts and the integration of understanding in economics. *Studies in Higher Education, 32*(6), 711-726.

Felten, P. (2016). On the Threshold with Students. In R. Land, J.H.F. Meyer & M.T. Flanagan (Eds.), *Threshold Concepts in Practice* (pp. 3-9). Rotterdam: Sense.

Flanagan, M. (2019). Threshold concepts: undergraduate teaching, postgraduate training, professional development and school education. Retrieved February 17 2018, from: http://www.ee.ucl.ac.uk/~mflanaga/thresholds.html

Haji Bungsu, H. J. (2014). Investigating Threshold Concepts in the learning of agriculture: Gearing towards quality and relevant curriculum innovation. (D. Ed. thesis). Retrieved February 17 2018, from: https://theses.ncl.ac.uk/dspace/handle/10443/2761

Harris, B. (2001). A profile of Year 13: An examination of the most common sources of stress during the main A-level year. *Education and Health 19*(4), 67-68. Retrieved February 17 2018, from: https://sheu.org.uk/sheux/EH/eh194bh.pdf

Hefferon, K., & Gil-Rodriguez, E. (2011). Reflecting on the rise in popularity of Interpretive Phenomenological Analysis. *The Psychologist*, *24*(10), 756-759.

Land, R. (2014, July). *Toil and trouble: Threshold concepts as a pedagogy of uncertainty*. Plenary presentation at the Fifth Biennial International Threshold Concepts Conference: Threshold Concepts in Practice. Durham, UK.

MacIntosh Edwards, R. (2013). *Opening the door on student learning: using artefacts to explore pharmacy students' learning practices* (Ed.D. thesis). Retrieved February 17 2018, from: https://dspace.stir.ac.uk/handle/1893/16412#.WG-Ad6OcZsM.

Meyer, J. H. F. (2016). Threshold concepts and pedagogic representation. *Education + Training, 58*(5), 463-475.

Meyer, J. H. F., & Land, R. (2003). *ETL Project occasional report 4 - Threshold concepts and troublesome knowledge: Linkages to ways of thinking and practising within the disciplines.* Edinburgh: University of Edinburgh. Retrieved February 17 2018, from: http://www.etl.tla.ed.ac.uk/docs/ETLreport4.pdf

Meyer, J. H. F., & Land, R. (2005). Threshold concepts and troublesome knowledge (2): Epistemological considerations and a conceptual framework for teaching and learning. *Higher Education*, *49*(3), 373-388.

Pang, M. & Meyer, J. (2010). Modes of variation in pupils' apprehension of a threshold concept in economics. In R. Land, J.H.F. Meyer & C. Baillie (Eds.), *Threshold concepts and transformational learning* (pp. 365-381). Rotterdam: Sense.

Rattray, J. (2016). Affective dimensions of liminality. In R. Land, J.H.F. Meyer & M.T. Flanagan (Eds.), *Threshold concepts in practice* (pp. 67-76). Rotterdam: Sense.

Renshaw, S., & Wood, P. (2011). Holistic understanding in geography education (HUGE) - an alternative approach to curriculum development and learning at Key Stage 3. *The Curriculum Journal, 22*(3), 365-379.

Scott, L. (2012, August 23). How big is the jump from GCSE to A-level? *The Guardian.* Retrieved February 17 2018, from: http://www.theguardian.com/education/mortarboard/2012/aug/23/jump-from-gcse-to-alevel

Sheehan, M. (2010). *Identification of difficult topics in the teaching and learning of Chemistry in Irish schools and the development of an intervention programme to target some of these difficulties* (PhD thesis). Retrieved February 17 2018, from: http://ulir.ul.ie/bitstream/10344/432/3/MSpthesis.pdf

Shopkow, L. (2010). What decoding the disciplines can offer threshold concepts. In R. Land, J.H.F. Meyer & C. Baillie (Eds.), *Threshold concepts and transformational learning*. (pp. 317-331). Rotterdam: Sense.

Simnaz, E. & Riley, E. (2018, June 11). Pupils reduced to tears by the tough new GCSE and A-level papers. *Daily Mail Online.* Retrieved February 17 2018, from: https://www.dailymail.co.uk/news/article-5828077

Smith, J.A. (2004). Reflecting on the development of interpretative phenomenological analysis and its contribution to qualitative psychology. *Qualitative Research in Psychology, 1*, 39–54.

Smith, J.A. (2011). Evaluating the contribution of Interpretative Phenomenological Analysis. *Health Psychology Review, 5*(1), 9–27.Wenger, E. (1999). *Communities of practice: Learning, meaning and identity*. Cambridge: Cambridge University Press.

Smith, J.A., Flowers, P., & Larkin, M. (2009). *Interpretative Phenomenological Analysis: Theory, method, research*. London: Sage.

Wolf, A., & Akkaraju, S. (2014). Teaching evolution: From SMART objectives to threshold experience, *The Journal of Effective Teaching, 14*(2), 35-48. Retrieved February 17 2018, from: http://uncw.edu/cte/et/articles/Vol14_2/Wolf.pdf

Appendix

Table 1 - The affective dimension of participants' lived experiences.

Yasmin	Yasmin (cont.)	Anna	Erin	Gemma	Liam	Ivy
amazed	shock	angry	I am horrible	annoyed	Panic	anxious
angry	silly	annoyed	went mental	disappointed	shock	can’t do it
annoyed	self-esteem	aspiration	excitement	enjoyment	struggle	heart not in it
arrogant	struggling	bombarded	amazement	frustration	overwhelming	Intimidated
commitment	stunned	challenged	anger	nervous	baffled	matured
confidence	surprise	confidence	anxiety	pressure	confusion	not a nice feeling
determination	trepidation	confused	feeling cheated	self-efficacy	confidence	out of depth
dread	trust	coping	confidence	Stressed	disappointment	panic
empathy	uncertainty	disappointment	coping	confusing	scared	relief
frustration	upset	emotional	depression	Not happy	surprise	worried
getting upset	shock	frustrated	disappointed	self-efficacy	enjoyment	
guilt	silly	grown up	drained	uncomfortable	flustered	
hated doing it	self-esteem	head fuzzled	feeling clever	undecided	frustration	
self-esteem		leap of faith	frustration	Frustration	Intensity	
inferior		maturing	highly strung	regret	lack of control	
intolerant		motivation	isolation	Stressful	nervous	
irate		panic	just die	Unsure	reflection	
self-confidence		upset	lost	wishing		
low self-esteem		pressure	overconfidence			
optimistic		realisation	panic			
panic		resilience	pressure			
pressure		self esteem	self-confidence			
relief		stressed	stress			
scary		struggling	terrified			

Table 2 - Potential threshold concepts identified by students

Yasmin	Ivy	Anna	Erin	Gemma	Liam
Biochemistry	Biochemistry	Biochemistry	Biochemistry	Biochemistry	Cell structure/function
Cell cycles	Troublesome language	Cell structures	Carbaminohemoglobin	Lipids and enzymes	Cells - Cytoskeleton
Troublesome language	Specificity and keywords	Fluid mosaic model	Cell structure	Gaseous exchange	Biochemistry
Cell structure	Scale	Haemoglobin	Hydrogen bonding	Specificity	Blood tissue fluid/lymph
Interpreting traces		Specificity	photosynthesis	The heart	Interpret drawings
Quadrats		structure of molecules	Troublesome language	Fluid mosaic model	Troublesome language
Respiration		Plant transport systems	Plants	Cell membranes	Diffusion and osmosis
Scale		Troublesome language	Scale	Troublesome language	Keywords and specificity
Stages of mytosis		The heart	The human heart		Electrophilic addition
The heart					Gaseous exchange
specificity					Nucleophilic substitution
					Xylem and phloem
					Fluid mosaic model
					Scale

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