**Engagement of UK Life Science Academics with the Scholarship of Teaching and Learning: Threshold Concepts in Academic Practice?**

Anne Tierney, School of Education, University of Durham, a.m.tierney@durham.ac.uk

**Abstract**

Engagement with the Scholarship of Teaching and Learning (SoTL) is increasingly becoming a requirement for UK academics. This engagement may take the form of a formal qualification in teaching in higher education, or may be a continuing professional development requirement (CPD). Academics have a range of opportunities to follow a teaching focused career path; notably for the increasing numbers of “Teaching-only” academics employed by UK institutions to cover undergraduate teaching and course administration, but also for those academics who find themselves increasingly drawn to pedagogic research. However, how these individuals engage with SoTL may be confusing, and present a number of challenges, in addition to those already present in the career of an academic. For Life Scientists in particular, engagement with SoTL may offer particular challenges as individuals tackle material out with their disciplinary expertise. Language, research methodology, confidence in data gathering, sense of identity, may present barriers to engagement with SoTL, to academics who are more comfortable within a positivist, quantitative paradigm. While Threshold Concepts (Meyer & Land, 2003) are generally associated with student learning within disciplines, if engagement with SoTL and CPD is viewed as Lifelong Learning, and the academic as student, we can explore how academics face the challenges of engagement with the field of Educational Research. Indeed, for academics considered to be expert in their field, taking on the role of student may be troublesome in itself, with the individual being required to acknowledge their lack of expertise in the area of educational research.

In this study, twenty-one UK Life Science academics were asked about their understanding of, and engagement with SoTL. Interviews revealed a range of attitudes towards engagement with SoTL, and a number of areas which could be considered to be Threshold Concepts. These areas of interest, and the extent to which they fulfil the criteria to become Threshold Concepts is explored in this study. The findings are significant in that they indicate the difficulties and challenges faced by academics attempting to engage with a paradigm out with their disciplinary expertise, the effort expended in successful engagement, and the transformations that occur, showing the development of engagement by reading literature, to actively carrying out research projects and writing papers. The study also points towards areas where support can be given to academics engaging in SoTL to help encourage this development.

**Engagement with the Scholarship of Teaching and Learning**

In the UK, it is estimated that around 25% of academics can be categorised as “Teaching-only” (Times Higher Education, 2008), with no signs of this trend reversing. Academics employed specifically to concentrate on teaching, as well as those who choose to concentrate on teaching and learning are emerging as a new academic identity: the Teaching-focused academic. In this paper, therefore, unless indicated otherwise, the term “Teaching-focused academic” will encompass both groups. In order to maintain the identity of “academic”, many of these individuals are obliged to engage with “The Scholarship of Teaching and Learning” (Boyer, 1990; Hutchings & Shulman, 1999), and universities develop “Teaching and Scholarship” career progression routes, as an alternative to more traditional “Research and Teaching” routes. However, while the Research and Teaching career path is clear, commonly understood and accepted, the Teaching and Scholarship career route is poorly defined, poorly understood and often exists without being enacted. In addition to this, the requirement for “scholarship” is also contentious, as the definition for SoTL is not clear (Boshier, 2009), and engagement with SoTL may present difficulties in terms of unknown paradigms. This is a particular challenge for positivist traditions, and Life Scientists may find themselves struggling with the concepts presented as SoTL. However, the contractual obligation to engage means that the obstacles to engagement have to be overcome.

**The challenges of new practices for experienced professionals**

The identification of Threshold Concepts (Meyer & Land, 2003) in learning is vital in developing student understanding. The characteristics of a Threshold Concept are that it should be transformative, irreversible, integrative, bounded, and that the knowledge is in some way troublesome. Initial encounters with the troublesome knowledge can induce a liminal state, in which individuals wrestle with Threshold Concepts, unable to progress. They may oscillate back and forth, coming to terms with the new knowledge, which in turn facilitates an ontological as well as conceptual transformation (Land, Meyer, & Baillie, 2010). Therefore, individuals that emerge from the liminal state have a transformed understanding of their identity in addition to new knowledge.

There is a wealth of work which has been done to identify Threshold Concepts within disciplines. For example, within Life Sciences, Threshold Concepts have been identified in first year courses (Smith, 2012) and to investigate student understanding of hypothesis generation (Taylor, Tzoumis, Meyer, & Ross, 2012). In addition, work has been done in the context of educational developers (Timmermans, 2013), as a way to initiate interest in the Scholarship of Teaching and Learning (SoTL) (McLean, 2009), and to develop scholarly teaching (Bunnell & Bernstein, 2012). However, there are few studies which have examined academics’ understanding of SoTL itself, with the exception of Webb’s (2014) study of mid-career academics taking part in a specific course on SoTL, finding evidence for both epistemological and ontological Threshold concepts.

For academic staff in the UK context, it is becoming increasingly common for engagement with SoTL (Boyer, 1990) to be a contractual obligation, and with an estimated one in four academic staff on a “teaching and scholarship” career path (Times Higher Education, 2008), identifying ways in which to support staff is both necessary and timely. The definition of SoTL is contested by scholars such as Boshier (2009), and there is a general lack of consensus as to what it constitutes. However, there are models of SoTL which serve as a useful guide, such as Glassick, Huber and Maeroff’s criteria for scholarship (1997), Kreber’s Reflective Practitioner (2002), Antman and Olsson’s two dimensional theory-practice matrix model (2007) and Trigwell, Martin, Benjamin and Prosser’s four dimensional model of scholarship (2000).

**Using narrative interviews to explore Threshold Concepts in SoTL**

Life Science academics at UK universities were invited to take part in interviews which explored their perceptions of SoTL, and life as a teaching-focused academic. Twenty one academics from Life Sciences departments in a range of UK universities were interviewed. Table 1. shows the composition of the sample by institution type, and highlights the number of individuals on Teaching only contracts and the number with engagement with SoTL written into their contracts.

Table 1. Composition of sample of participants

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Institution Type** | **Ancient** | **Red Brick** | **Plate Glass** | **Post 1992** |
| No. institutions | 1 | 6 | 2 | 3 |
| No. interviewees | 8 | 8 | 2 | 3 |
| No. on Teaching only contracts | 6 | 6 | 2 | 1 |
| SoTL in contract | 6 | 5 | 1 | 2 |

Interviews were fully transcribed, and the transcripts were analysed to determine the existence of Threshold Concepts, using the criteria *Transformative, Irreversible, Integrated*, *Troublesome* and *Bounded* (Meyer & Land, 2003). Trigwell, Martin, Benjamin and Prosser’s (2000) Model of Scholarship (Table 2) was used as an analytical framework, using the proposed dimensions (*Informed, Reflection, Communication, Conception*) to uncover potential Threshold Concepts.

Table. 2. Four dimensions of scholarship of teaching (Trigwell et al., 2000, p. 163)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Level | Informed (ID) | Reflection (RD) | Communication (ComD) | Conception (ConD) |
| 1 | Uses informal theories of teaching and learning | Effectively none, or unfocused reflection | none | Sees teaching in a teacher-focused way |
| 2 | Engages with the literature of teaching and learning generally |  | Communicates with departmental/faculty peers (tearoom conversations; departmental seminars) |  |
| 3 | Engages with the literature; particularly the discipline literature | Reflection-in-action | Reports work at local and national conferences |  |
| 4 | Conducts action research, has synoptic capacity and pedagogic content knowledge | Reflection focused on asking what do I need to know about x here, and how will I find out about it? | Publishes in international scholarly journals | sees teaching in a student-focused way |

Each transcript was analysed against the levels of engagement for each dimension described in Table 2, building up a picture of engagement with SoTL, and identifying areas where there was an impediment to progression through the stages. Each of the four dimensions was investigated, both in terms of individuals’ development within the dimension, and also for influence between the dimensions. The limitations of this study should be acknowledged, in that although the study covers a variety of UK institutions, there are only twenty-one participants, therefore any conclusions drawn from the findings should be treated with an appropriate measure of caution.

**Identification of Threshold Concepts**

The dimensions *Informed*, *Communication*, and *Conception* in Trigwell et al’s (2000) Model of Scholarship yielded potential Threshold Concepts, which will be discussed below. The *Reflection* dimension was apparent in all interviews, with individual academics able to articulate their thoughts regarding a variety of pertinent issues, and make suggestions for solutions. However, there were observable differences in how academics were able to articulate their reflections through the levels of the other three dimensions.

**Engagement with Pedagogic Literature**

There were a number of examples of potential Thresholds within the Informed dimension (ID). These occurred at all levels of engagement (see Table 1). Interviewees at Level 1(ID) articulated informal theories of learning with little or no understanding of pedagogic literature. Lack of engagement with the literature tended to be with late career academics who had not been introduced to SoTL as a concept earlier in their careers.

“*I’m not very methodical, so my lectures tend, I think, not to be very well structured, because I don’t because I don’t necessarily have a narrative, I just gather a collection of facts and put them all together in a lecture, and hope that the students get something out of it, so I would like to improve on that a bit.*” (late career academic)

“*Very pragmatic. I take notice of feedback from students, and I’m always willing to change things and occasionally I will try something new, but it’s not underpinned by any theory, it’s just try it and see how it works.*” (late career academic)

These comments by late career academics show an awareness of pedagogic literature, but a lack of engagement with it. They are in a pre-liminal state, and remain outside the threshold delineated by SoTL.

In contrast to late career academics, early career academics, through the influence of their Postgraduate Certificate in Higher Education (PGC) were able to articulate some knowledge and understanding of pedagogic literature. They discussed pedagogic literature in general terms, and had insight into their limitations compared to colleagues, indicating a movement towards the space between Levels 2 and 3(ID).

“*So I thought, I will go and I will read some papers, so I did and it changed my focus of what I was going to do for my PGCAP, so I would say, yeah, amazingly enough, never thought I’d say it about my PGCAP but literature informs what I do (laughs) in terms of teaching! I mean, it’s not, it’s definitely not the highbrow level, no, it’s at a level that is, you know, fairly basic, but it’s at a level!*” (early career academic)

There is a demonstration of an engagement with pedagogic literature, and some evidence of general integration of knowledge. There is also some transformation of understanding, whilst at the same time acknowledging that they are only glimpsing the potential strengths of engagement with pedagogic literature.

 In general, mid-career academics demonstrated engagement with discipline pedagogic literature (Level 3(ID)). They expressed an ease and familiarity with that literature, whilst simultaneously expressing a fear of general pedagogic literature. The rejection of general pedagogic literature contributed to the “bounded” nature of this Threshold Concept, holding back these interviewees from further development.

 “*things like Bioscience Education, fantastic, and I will sort of drop into that occasionally and have a look and pick up some good ideas. The more sort of heavy duty pedagogic literature, I find pretty heavy going myself.*”

“*probably only very recently that I’ve started to understand a little bit more of the different approaches but I still have a general horror of a lot of the literature and I’ve noticed it’s not just in learning and teaching but in other fields as well*.”

At this level in particular, there is a clear sense of liminality, and the troublesome nature of engaging with literature and theory which is outside the disciplinary domain. Academics at this level expressed fear of mainstream pedagogic literature, preferring to remain within their comfort zone. This, in turn, is an obstacle to their further development as practitioners.

Mid and early career academics engaged with pedagogic research (Level 4(ID)). This activity, especially for early career academics, was often facilitated as a capstone to their PGC, which most new academics are now required to complete as part of their probation.

“*I think deeply about hypothesis related research around trying to prove the impact of interventions on student engagement and student learning and that’s the kind of area that I think of, and if that’s an area of scholarship then, yeah, that’s what I do.*” (mid-career academic)

“*I take the same approach as I would do to any other research that I might be doing is looking at what research others have done and finding what’s good practice and what’s bad practice or what might work in particular situations.*” (early career academic)

What comes across strongly in both early and mid-career academics is that their disciplinary background plays a great part in informing how they carry out pedagogic research, and also highlights that academics may carry out action research projects during their PGC whilst simultaneously engaging with pedagogic literature in no more than general terms.

**Communication and Publication**

Communication is a vital part of the development of engagement with SoTL for the interviewees. A transformational experience for interviewees was to begin to talk to colleagues about pedagogy, often in the context of the Postgraduate Certificate of Higher Education, which was seen as one of the primary sources of support for early career academics (Level 2(ComD)).

“[PGC was] *eye-opening to some extent in that there is a whole field of academic research out there that I wasn’t aware of, and it was inspiring to be able to talk to people about different ways of teaching or different ways of approaching problems in teaching, because when I arrived and started my job it was sort of me in my office by myself going, oh shit, how do I do this job*?” (early career academic)

Being able to discuss teaching and learning was a way for new academics to gain confidence in their roles, which could sometimes be challenging. There is evidence here for liminality, both in terms of knowledge and identity, and that being able to talk about issues was a way to develop both.

Existence of potential Threshold Concepts in the Communication dimension (ComD) are also associated with the Informed dimension (ID). Interviewees, who may confine themselves to engaging with disciplinary pedagogic literature (Level 3(ID)), complement this with writing for discipline-based pedagogic journals. This is not strictly accommodated within Trigwell et al’s (2000) Model of Scholarship (Table 2), but is situated at Level 3a(ComD), between “conference presentations” and “international peer reviewed journals”.

“*I find the writing of some of these papers quite hard, they don’t come naturally to me, in a different way to how writing a research paper – that didn’t come naturally to me either but I guess I should, I guess I recognise that I need to do more reading around the subject area that I’m actually looking into, and I know that I can be a little bit lax when it comes to actually reading the literature*.” (mid-career academic)

It is possible, therefore, to publish in discipline-based pedagogic journals, using discipline-based pedagogic literature to underpin one’s findings. However, interviewees were enthusiastic about engaging with SoTL, and were aware of the troublesome nature of the language involved.

“*But I think I’m quite active in the scholarship, if that is scholarship, trying to get some publications, which is think is the hardest for, I don’t know if it’s fair to say for us, but it is for me. I think it’s a completely different language we need to get engaged with, isn’t it?*” (mid-career academic)

There was a lack of evidence of interviewees publishing in mainstream pedagogic journals. While some of the interviewees did publish in these journals, this was not normal practice across the sample, with individuals preferring to stick with discipline-based journals and conference proceedings. This reluctance to join the mainstream was for a variety of reasons; for example difficulties in engagement with the literature, or the language used within mainstream pedagogic discourse. However, there were also other barriers experienced by the interviewees, relating to research methods, data handling and a clash of identity between pedagogic researcher and scientist, encapsulating the troublesome nature of Threshold Concepts.

“*I think it was getting to grips with qualitative research, it was getting to grip with statistics so you could do with Likert scales, drawing out textual themes, it was, I mean, I can do it, but I don’t necessarily think that I find it easy. It’s not as something that comes as second nature, and part of me just thinks – gosh, you know, give me some enzyme graphs and I’m OK. So I have found it a struggle, I find that there’s a, I don’t know, it’s dressed up sometimes in a really impenetrable language, even more so than I think scientific research at times. I think that people use terms differently, whereas I think in science, a scientific term is what it is, and people in that discipline will use it in exactly the same way, whereas I don’t think that’s necessarily the same case for sort of teaching and scholarship language in that sense. There’s a lot of borrowed language which I find a little irritating from time to time, and I just don’t necessarily find the papers particularly readable.*” (mid-career academic)

As with the previous examples in the Informed dimension, there is evidence of liminality when engaging with pedagogic research and publishing, and hesitation in moving forward into the mainstream, which encompasses both epistemology and ontology.

**Conception of Learning**

The Conception dimension of teaching and learning is perhaps the most difficult to elucidate within the confines of this study. Although it is related to academics’ engagement with SoTL, in that an understanding of pedagogic literature (ID) and writing one’s own articles (ComD) leads to a more student-centred conceptual model of education, it is still possible to be student-centred early on in one’s career. There is, therefore, an ontological element to this dimension. The following examples from interviewees at different stages of their career, demonstrates the complexity of this dimension.

“*And if their teacher isn’t top of the notch research active, what value do they put upon it? I mean, I don’t like to blow my own trumpet in from of the students, but just occasionally I put a couple of my publications in front of classes and I’ve been disheartened by the fact that no-one bloody well reads them!*” (late career academic, little engagement with SoTL)

This late career academic displays a teacher-centred conception, placing importance on the subject knowledge of the teacher. However, the same academic later expresses a more student-centred approach to learning, expressing their pleasure at seeing student learning in a face-to-face situation.

“*I far prefer working with people, face to face, and I find an interaction with a student probably the most rewarding because the seeing of realisation in their faces or whatever is great.*” (late career academic, little engagement with SoTL)

Late career academics, with little engagement with SoTL, and focused on the discipline, may not be aware of the concepts of “student-centred” learning. As such, they place emphasis on traditional modes of learning. However, it is still interesting to see that at an intuitive level, they may still subscribe to notions of “student-centredness”.

There is evidence, however, of how mid-career academics’ conception of learning develops from teacher- to student-centred.

“*when I started teaching, I thought I was there to actually tell them stuff and tell them things that* they didn’t know or *couldn’t find out, anything other than me, and it took me a good few years to realise that I was there to help them to understand stuff and sort of curate knowledge for them in a way that made sense*… *I try to talk to staff, and tell them, this is, if I could give you one thing it would be that insight, into what your role as a teacher is. But I don’t think it’s possible, people kind of have to learn it themselves*.” (mid-career academic, active engagement with SoTL)

Similarly, this mid-career academic expresses the importance of knowing students as being crucial to effective learning.

“*I think the two things come together, because I don’t think that you can really teach effectively if you don’t know who your students are.*” (mid-career academic, active engagement with SoTL)

This early-career academic exemplifies a student-centred approach to learning, expressing how students can learn with the teacher as facilitator.

“*These guys can do amazing things without any of my influence at all. I just need to get them started and then they can surprise you. And that’s a really lovely feeling. I really like that.*” (early-career academic, new to SoTL)

Interviewees at all career stages expressed conceptions of “student-centredness” more subtly than the binary division conveyed in Trigwell et al’s (2000) Model of Scholarship. Many of them expressed it as an intuitive belief, while others articulated it as a consequence of engagement with SoTL, highlighting the complexity of this dimension.

**Threshold Concepts in SoTL**

Using Trigwell et al’s (2000) Model of Scholarship is a useful tool to investigate Threshold Concepts in SoTL. As has been demonstrated, there are developmental thresholds with regards to engagement with pedagogic literature, pedagogic research and publication, and conception of learning. Academics who contributed to this study revealed their struggles with engagement with SoTL, and highlighted the barriers to engagement. Liminality is first identified in the early stages of moving from personally held beliefs about learning and teaching to gaining initial knowledge of education theories. From the academics interviewed, engagement with the PGC, which is a normal requirement of academic probation in most universities, has facilitated these early engagements with literature and theory, improving early career academics first encounters with it. The experiences of mid-career academics highlight where the real bottlenecks occur, in terms of engaging both with pedagogic literature and publishing pedagogic research, and this is in the conceptual shift into the mainstream. Accomplished mid-career academics’ development appears to stall when confronted with mainstream pedagogic literature, and they confine themselves to publishing in discipline-specific pedagogic research journals. There is a sense that mainstream pedagogic literature, both in terms of understanding and production, is bounded and out of reach. The language used, the research paradigm, research methods and data analysis are all identified as being beyond the threshold, and troublesome in nature. Bound up with these barriers is the ontological transformation required for academics to become pedagogic researchers, and the oscillation between the identities of scientist and practitioner. The tension between the two identities is palpable, as mid-career academics struggle with letting go of their identity as a Life Scientist and what that means in terms of carrying out research within the discipline. As such, there is inconsistency in the Trigwell et al (2000) model of scholarship, in the *Informed* and *Communication* dimensions; for the former, action research is being carried out with only a general engagement with pedagogic literature, and for the latter, there is a step between presentations at national conferences and publication in international journals, in which academics publish in discipline-specific pedagogic journals.

**The Future of SoTL**

There is a lesson to be learned for the development of support for engagement with SoTL. Early career academics in this study have demonstrated that they can make progress via the support network offered by institutional PGCs. These academics have an early awareness of pedagogic literature and insight into the professional development they have yet to undertake. However, it is often the case that the support offered at PGC level does not continue post-award. A much needed development is to facilitate equivalent support of SoTL development for mid-career academics. This could be done in a variety of ways; through continuing professional development (CPD), through formal qualification such as a diploma (DipEd) or Masters (MEd) in Higher Education, or through networks such as Learning Communities or Learned Societies’ Education strands. Given than Teaching Focused academics are required to engage in all aspects of SoTL, and that they are also enthusiastic to do so, it would be wise for institutions to reflect on the need for such continuing support.

In conclusion, this group of Life Science Teaching-focused academics has shown their enthusiasm in engaging with SoTL at a number of levels. They have also expressed their desires to develop further. Many of the early Thresholds encountered by this group can be overcome by existing support mechanisms. However, the shift to mainstream pedagogy is one which remains a challenge for mid-career academics. There is an opportunity for development of longitudinal structured support, which in turn would benefit future students and their education.

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