Signification: unlocking threshold concepts in natural sciences with a key from the humanities?

David Green[a], **Jennifer Lewis**[b], **Jennifer Loertscher**[a], and **Vicky Minderhout**[a]
[a]Seattle University, USA; [b]University of South Florida, USA
Email: greend@seattleu.edu

Abstract

Early studies of threshold concepts mention "signification" as a potential threshold concept in literary and cultural studies (Meyer & Land, 2003; Perkins, 2006; later Wisker & Robinson, 2009). In its simplest terms, "signification" can refer to the relationship between a word and its meaning, and it can also refer to the process that produces that meaning (Selden & Widdowson, 1993). What can be troublesome about signification for learners is that it requires them to see language as fluid and ambiguous, when they may previously have seen it as fixed, knowable, and "true."

In this paper, we examine the use of this potential threshold concept from the humanities as an entrée into the field of threshold concepts for academics in the natural sciences. As part of a National Science Foundation-funded project on threshold concepts in biochemistry, we ran a two-day national workshop with US academics from biology, biochemistry, and chemistry. Using "signification" to introduce the topic led to unanticipated benefits that propelled the project and sharpened our own thinking as the study continued.

"Signification" firstly helped put leading academics from three cognate disciplines into the shoes of learners by exposing them, albeit superficially, to a new and alien concept. As the workshop proceeded, we returned to the principle of "signification" to verify – in a non-confrontational way – participants' understanding of disciplinary terms and to help them clarify their varying definitions. In other words, "signification" gave us licence to have straightforward conversations about something that is typically tacit in disciplinary discussions.

We speculate that "signification" may be especially useful when examining interdisciplinary fields, where the same terminology may have different connotations from those in related fields. As an example, the broad idea of "equilibrium" – already identified as a threshold concept in biology (Ross et al., 2009) – evokes a particular set of examples and situations in biochemistry. Such nuances present an additional hurdle not only for students, but also, we discovered, for the interdisciplinary group of academics who participated in the workshop.

From subsequent focus groups with students across the USA, we conclude that "signification" can play a further role in how we frame and explain natural sciences subjects in general. (The same may be true of disciplines outside natural sciences.) If we can help our students parse the various troublesome disciplinary meanings of the same terms, and ensure they are using terms with the correct localized meaning, they may grasp the key concepts of the discipline more easily, helping to overcome broader threshold concepts in the process. Such a shift in the use of disciplinary language can in turn lead to a shift in disciplinary identity (Meyer & Land, 2005), further aiding acculturation into the field.

During this session, conference participants will engage in a short activity on "signification," before moving on to consider its potential in a range of disciplines as a key to unlocking the thorny, near-universal issue of disciplinary terminology, an underlying barrier to uncovering threshold concepts.

References

Meyer, J. H. F., & Land, R. (2003). Threshold Concepts and Troublesome Knowledge: linkages to ways of thinking and practising within the disciplines. Occasional Report 4, Enhancing Teaching-Learning Environments project. Retrieved from http://www.etl.tla.ed.ac.uk//docs/ETLreport4.pdf

Meyer, J. H. F., & Land, R. (2003). Threshold concepts and troublesome knowledge (2): Epistemological considerations and a conceptual framework for teaching and learning. *Higher Education*, *49*, 373–388.

Perkins, D. (2006). Constructivism and troublesome knowledge. In J. H. F. Meyer & R. Land (Eds.), *Overcoming barriers to student understanding: Threshold concepts and troublesome knowledge* (pp. 33–47). Abingdon: Routledge.

Ross, P. M., Taylor, C. E., Hughes, C., Kofod, M., Whitaker, N., & Lutze-Mann, L. (2009). Threshold concepts: Challenging the culture of teaching and learning biology. In J. H. F. Meyer, R. Land, & C. Baillie (Eds.), *Threshold concepts: From theory to practice*. Sense Publishers.

Selden, R., & Widdowson, P. (1993). *A reader's guide to contemporary literary theory* (3rd Ed.). New York, NY: Harvester Wheatsheaf.

Wisker, G., & Robinson, G. (2009) Encouraging postgraduate students of literature and art to cross conceptual thresholds. *Innovations in Education and Teaching International*, *46*(3), 317–330.