Annotated Bibliography of Threshold Concepts

Introduction

In light of the ACRL Framework for Information Literacy for Higher Education, the ACRL Student Learning and Information Literacy Committee has compiled an annotated bibliography on threshold concepts (TC), one of the educational theories underpinning the document. The articles were chosen by members of the committee based on interest. The list represents a wide variety of disciplines around threshold concepts and serves as an introduction to threshold concepts in the literature of educational theory. There are several examples for how threshold concepts are determined, taught and assessed including case studies and evidence-based assessment.

Articles were chosen from the authoritative resource on threshold concepts:

Threshold Concepts: Undergraduate Teaching, Postgraduate Training and Professional Development - A short introduction and bibliography

http://www.ee.ucl.ac.uk/~mflanaga/thresholds.html


The authors of this study explored the issues related to student learning across two general education courses in writing and history at UC Santa Barbara. For their study, the authors interviewed the instructors of an American history survey course and interviewed the students in a Writing 2 course. They also surveyed the students in the American history course. Through the use of interviews, the authors discovered how history instructors identified and incorporated threshold concepts essential for historical study into their classes. They found that threshold concepts introduced in the American history survey course were inconsistently incorporated into the course. Students did not understand the threshold concepts from the history class were also relevant for their writing class. Students in the writing course were able to use threshold concepts in their writing assignments even though they were inconsistently applied by the instructors. The authors concluded that focusing on threshold concepts within general education courses will lead to their use in courses across the general education curriculum and disciplines.


These two scholars have discovered, in their application of threshold concepts to curriculum design of undergraduate health science courses, that this approach alone is not enough to develop students for success as practitioners. With an understanding of the current literature that defines and explains threshold concepts, they pose the question “Why do threshold concepts matter?”. As an answer, the authors propose that when applied as part of a holistic framework of learning combined with ways of thinking and practicing as well as liminality,
threshold concepts are an effective means for deconstructing a discipline in order to discover the best ways to teach and learn it. Their approach is well-situated within constructivism and values students’ ability to develop self-awareness and resilience in order to succeed in an uncertain world.


This paper situates curriculum designers in higher education as the “learners” of threshold concepts in the various disciplines for which they are creating learning modules. Based on the assumption that curriculum design is an area that brings its own set of troublesome knowledge, the authors illustrate the difficulties faced by curriculum designers in creating effective learning experiences. The troublesome nature of this work is apparent in the transfer of knowledge that occurs through the design process. Curriculum designers know the foundation of knowledge upon which they build learning experiences, but describing the exact methods used to transfer tacit knowledge to learners can prove challenging. Because curriculum designers must understand not only discipline-specific concepts, but also the wider environment in which the curriculum exists, applying the “big picture” approach of threshold concepts to their own understanding and practice makes sense. The project described in this paper applies the use of visual methods and the awareness of high-impact practices to facilitating curriculum designer’s learning of these threshold concepts.


Entwistle and Smith explain the way that threshold concepts support the notion that academic understanding is widely based on the structures that learners bring to bear in any particular situation and that learning in this context is mostly recursive. Upon mastering thresholds through these recursive processes of continually reconstructing their own knowledge, the authors argue, students will be able to enter into the dialogue of their discipline. A review of literature and research regarding the products and processes that lead students to this depth of learning is provided. While the authors support that the most important among students’ abilities to enter into dialogue with a discipline is understanding, they acknowledge it is something that has long troubled educators in that it is difficult to define and assess. The rest of the paper addresses the importance of practicing various educational strategies in order to establish a range of understanding for learners, that which acknowledges emotions, attitudes, and behaviors will be the most long-lasting. Librarians seeking to unpack the “dispositions” of the Framework will likely find these perspectives and methods enlightening.


Hassel, et al, focused on patriarchy, the threshold concept that is troublesome and transformative for students in women’s studies courses. Once understood, the threshold concept of patriarchy transforms student learning within the discipline. For this study, the authors used lesson study to assess student learning within the women’s studies courses. A learning lesson was created around a specifically defined goal. The purpose of both was to develop the students’ understanding of patriarchy in order for them to develop a deeper understanding of gender as a social construct. The authors had two iterations of the lesson study. The first iteration of the lesson was designed for a single class session. For the second
iteration, the lesson was spread out over two classes. The first iteration of the lesson was assessed using a pre-class quiz and a post-class homework assignment. For the second iteration of the lesson, the authors found short papers written by the students to be very insightful in helping them determine each student’s understanding of the concept patriarchy. Through their assessment of student work, the authors determined that this model of teaching and learning is beneficial to students in women’s studies. They found most students improved their understanding of patriarchy through a single lesson. Future research will focus on more formal assessment of student learning at the end of the course.


Horn focuses on the changes made in their department to offer majors in sociology and justice studies instead of sociology and criminal justice. The department identified four threshold concepts that students need to understand in order to think like majors in the program. The four threshold concepts were sociological imagination, victim-offender dyad, restorative justice, and self-authorship. Students in two cohorts of student learning communities (SLC) were qualitatively assessed during the 2010-2011 academic year to assess their understanding of the department’s threshold concepts, identify threshold concepts in their discipline, and use the threshold concepts in future learning. The assessment consisted of a pre-test, several written assignments, and a post-test. Students in the two cohorts were able to work through the threshold concepts which resulted in their ability to recognize, and use threshold concepts leading them to become integrated thinkers. The introduction of threshold concepts in the two cohorts proved to be beneficial for the students.


The authors of this study interviewed graduate student supervisors in six countries in order to determine what threshold concepts may be common to multiple disciplines at the doctoral level. The authors identified six potential concepts: argument, theorising, framework, knowledge creation, analysis and interpretation, and paradigm. Of particular note, they present data that may help to signal when learners have crossed a conceptual threshold.


The authors of this study argue that threshold concepts provide an opportunity to review how we teach and practice research by drawing our attention to the nature of student understanding. In particular, it emphasizes the importance of affective aspects for when emotions present themselves during the learning process, it could be an indicator that the student is approaching a threshold. The authors also describe how threshold concepts can be a catalyst for drawing together various fields of research.


This study used student interviews at the end of a semester to identify areas found to be troublesome and also attempted to determine any thresholds students may have crossed. The
course was a first year, freshman-level interdisciplinary course focused on knowledge divided into blocks, with each block taught by a different faculty member. Each of the interviews provided insight into specific areas students found troublesome, thresholds they crossed during the course, and in some cases their perspective on learning.


This report identifies factors in the ETL Project related to high-quality learning environments within 5 disciplinary contexts across a range of higher education institutions. Meyer’s notion of a threshold concept was introduced into project discussions on learning outcomes as a particular basis for differentiating between core learning outcomes that represent “seeing things in a new way” and those that do not.


Even though many curricula are built on a foundational assumption that students will transfer knowledge from one course to the next, faculty often struggle with teaching for transfer. This article introduces the design of courses for transfer as a threshold concept that is conceptually difficult and cognitively troublesome, yet potentially transformative for faculty. The article concludes with implications for faculty development, including strategies for remaining attentive to transfer goals.


Through an action research study, the author applied her awareness of threshold concepts to the design of an experimental curriculum for undergraduate students in a first year grammar course. The investigation identified several factors for student success, including motivation, active practice, and metareflection. This study focuses on student learning in the first year with the intention of implementing curricular change for those concepts that undergraduates find “troublesome.” Instead of approaching threshold concepts across an entire discipline, the author looks at issues that are common to learners in the first year, including full engagement in the research process in such a way that mirrors that of their lecturers.


The authors of this study focused on first-year university students understanding of the mathematical concept of function. Students in the study were followed for one academic year to determine if their knowledge of this mathematical concept improved. Over the course of the year, three questionnaires were distributed to students. The first two questionnaires required students to explain “what is a function?” and the third required them to determine if the graphs provided were examples of functions. The questionnaires were followed up with interviews on four different occasions. At the end of the academic year, the authors determined that two
students had a transformed understanding of the threshold concept of function, and two other students improved their understanding but was not deemed transformative. As a result of this study the authors determined a need to expand the use of mathematical vocabulary and to develop a balance of incorporating visual mediators and routines into their teaching of this concept.


This article discusses Ferrum College’s approach toward developing and delivering varied one-shot information literacy instruction sessions based on knowledge of millennial students’ information retrieval practices as well as literature regarding threshold concepts and teaching and learning theories.


This article is a meta-analysis of three studies that attempt to identify and understand threshold concepts in engineering students. Rather than outlining specific threshold concepts, this study describes six challenges to identifying concepts (goals, curricular context, participants’ experience, research tradition, researcher background, and context of study) and provides useful recommendations (and warnings) for improving future TC studies based on those findings. Of particular note, the authors found that developing a study that seeks to “identify” TCs in problematic and can quickly back researchers into a corner of “disciplinary essentialism and positivism.”


This study by Ross, et al, focused on identifying potential threshold concepts in Biology through an empirical study of students at three major universities in Australia. They focused on the concept of “adaptation” and the evolution of species. What the authors determined through their study was threshold concepts in biology are not difficult content but rather the abstract ideas that require students to think like biologists. For biology students they need to acquire not only the language of the discipline of biology but also its meaning within the context of the discipline. Acquiring the language without learning its meaning prevents students from understanding the threshold concepts of biology.


This study aims to explore engineering students’ understandings of two mathematical threshold concepts: limit and integral. The authors review a number of studies that detail the complexity and difficulty of these two concepts and describe why they should be considered threshold concepts for mathematics. Most helpfully, the authors provide illustrative examples of the contextualization and difficult nature of these concepts drawn from interviews with undergraduate students.

This paper focuses on two threshold concepts students need to cross in order to think like historians. The first threshold concept is the need to engage with the past on its own terms and the second requires students to interrogate sources of historical evidence. In order for students to cross the threshold concepts, history faculty must teach students to perform like historians and therefore, rather than rely on lectures, textbooks, and exams, instructors focus increasingly on the hands-on work of historians by requiring students to locate and use primary source materials. If students are to think as a historian, they need to understand how to place events within their historical context. Changing the activities used in class from lectures, textbooks, and tests to hands-on activities such as visiting archives, role-playing, and interviews, the students were better able to understand the identified two threshold concepts.


This was a narrative study focusing on one student in a pre-service elementary teacher cohort enrolled in an undergraduate education program. The focus of the study was to determine the student’s understanding of issues surrounding race and her identity as a teacher. The student was selected because she knew a lot about race and the way it can affect people’s chances in life. This student was reluctant to acknowledge some of the ways racial identity could benefit her because she perceived it would diminish her achievements. This narrative study provided the authors with the ability to understand how issues of race can be incorporated into the teaching of history/social studies. The use of threshold concepts will enable teacher educators to use the resistance of pre-service teacher to discuss racial identity issues as part of the transformative process.


Tan’s study focused on formative assessment as a way to enhance student learning. The author contends formative assessment provides students with feedback at a fixed point in time and is used primarily for short-term or immediate improvement to student learning. Tan proposes formative assessment should be used to improve a student’s ability to learn beyond their potential. In order to improve student learning the author proposes uses a combination of feedback, standards, and assessment design as a means of developing a dialog with the student to help them identify and surpass their threshold to learn.


Abstract: What do we teach when we teach information literacy in higher education? This paper describes a pedagogical approach to information literacy that helps instructors focus content around transformative learning thresholds. The threshold concept framework holds promise for librarians because it grounds the instructor in the big ideas and underlying concepts that make information literacy exciting and worth learning about. This paper looks at how this new idea relates to existing standards and posits several threshold concepts for information literacy.

Dr. Virginia Tucker of San Jose SLIS shares her PhD research on transformative learning experiences and how these shape search expertise. She discusses threshold concepts for online searching that have implications for how we teach searching and how information sources are developed. Dr. Tucker shares the background of her study, including the use of threshold concepts as a foundation for understanding transformative learning, and then moves into the methods and results of her study. This is a good discussion for anyone interested in applying threshold concepts as a theoretical construct for research as it supplies an excellent explanation of this model and how it was applied to Dr. Tucker’s grounded theory study.


The purpose of the study was to analyze the instructional materials used in the teaching of linear second-order ordinary differential equations, hyperbolic functions, and multiple integrals. Using a combination of quizzes and surveys the authors of the study were able to determine what materials students found difficult or troublesome in the course and to identify threshold concepts for the class. Through their study the authors were able to identify three threshold concepts for the course; ordinary differential equations, substitution, and multiple integration. Future courses can address the areas of troublesome knowledge identified in the study.

If you would like to make a suggestion for an addition to this annotated bibliography, please contact the current Chair of the ACRL Student Learning and Information Literacy Committee: http://www.ala.org/acrl/aboutacrl/directoryofleadership/committees/acr-center