Understanding the Learner Experience:
Threshold Concepts and Curriculum Mapping

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Abstract

In order to programmatically improve our efforts at library instruction and outreach, we need to develop a richer understanding of the holistic learning and teaching experience that comprises our institutions. Threshold concepts are core ideas in a particular area or discipline that, once understood, transform perceptions of that subject. Curriculum mapping is a method of visualizing insight into the steps, requirements, and communities a learner negotiates as they engage with a particular learning experience or degree path. When understood and applied in tandem, these strategies provide a powerful means of developing actionable insight into the learner and faculty perspective and highlight pivotal points at which to provide library instruction, resources, and research support. This paper will explore theoretical and applied applications of threshold concepts and curriculum mapping as key to teaching and learning in libraries.

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Introduction

Driven by developing pedagogies, instructional formats, technologies, learning environments, and publishing platforms combined with widespread fiscal instability, every aspect of higher education is undergoing climatic shifts. As a result there are as many transformations occurring within academic libraries as in academia writ large. Despite this dynamic climate, it is important to remember that *learning* is still our collective imperative. In order for the pedagogical mission of libraries to be more effective, we need to develop a richer understanding of the holistic learning and teaching experience of our institutions. By developing our ability to understand and respond to the changing context of teaching and learning (rather than solely providing information access) we can ensure a more critical role in the developing future.

This process requires us to think more broadly about the knowledge-building and sense-making processes of higher education with an eye toward immersion and meaningful participation in our local communities of practice. There are a number of methodologies that can be used in a library setting to facilitate this deeper consideration of educational context and learning community. In this article we will highlight two specific methods:

1. *Threshold concepts* are core ideas in a particular area or discipline that, once understood, transform perceptions of that subject.
2. *Curriculum mapping* is a method of visualizing insight into the steps, requirements, and communities a learner negotiates as they engage with a particular learning experience or degree path.

By building comprehensive understanding of the learner experience and expanding beyond a narrow library-oriented view, we can examine our curricula and communities through the eyes of students and instructors in order to appreciate their perspective and better deploy local resources. Tapping into the learner experience enhances what we do, promotes more successful resource prioritization, and ultimately enables us to help accelerate learning and build stronger relationships. It is through this wide-angled lens that we are able to design new approaches that will help our organizations become (and be perceived as) more adaptive, strategic, valued, and entrepreneurial.

This perception shifting isn't new. In fact in recent history there has been a move toward the development of the Library Commons model, rethinking and repurposing physical space to meet

evolving needs of students and scholars. We want to augment that thrust by imagining a further direction for this type of environment that is more than just a café, computer lab, and comfortable group seating, but rather, is a feature-rich platform for the development and encountering of pedagogical experiences. Our position that this concept of the library as a "third place" isn't limited to a *physical form*, but that it can also be a *pedagogical perspective*. Libraries are becoming places where new forms of knowledge are created, and where new types of collaboration can be realized. External to the traditional student-teacher power dynamic, and full of publishing tools that can be used as springboards for making academic work available, open, and participatory (Montgomery & Miller, 2011; Bennet, 2009).

In this manner, the third place concept is transforming the way that librarians are viewed and the contexts in which we collaborative with students and faculty. We want to encourage the conversation beyond "getting good grades" or finishing an assignment, and embrace a different paradigm in which the library enables users to grow their ideas, feed their curiosity, tinker with their intellect, and share their insights. This vision builds on the argument that users are not successful because of what is inside library spaces, but rather, they are successful because of what is able to happen within physical and virtual environments.

By looking beyond established library support roles and surveying the larger learning process, we can attain a deeper appreciation for the efforts of our users and rethink the methods of support and interaction that we provide. In order to realize this agency, we need to think openly about the cognitive and structural dimensions of learning (Figure 1).

Figure 1 – Cognitive and Structural Approaches
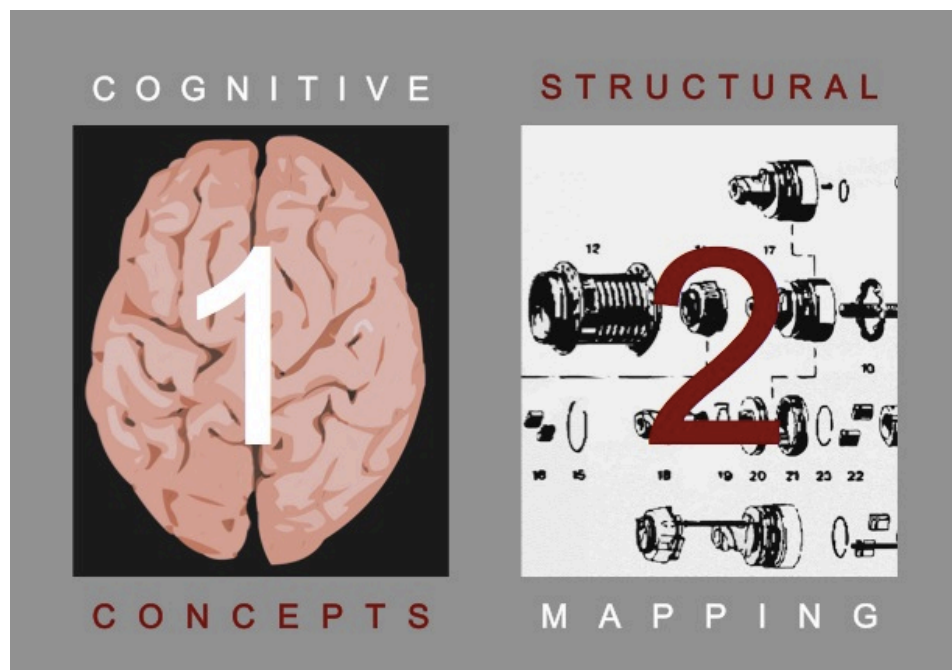
For the duration of this article we will explore two methods that empower us to gain this new vision: threshold concepts and curriculum mapping. The "big picture" view provided by these approaches equips librarians with the contextual insight that leads to authentic, meaningful integration, rather than one based on traditional library roles.

Threshold Concepts

Threshold concept theory is an approach to learning that emphasizes the incremental accumulation of disciplinary knowledge. It is a linear framework in which various skills, beliefs, content, and other related aspects are encountered gradually. This process often creates moments of intellectual or emotional difficulty, which are likened to passing through a conceptual threshold - once you make it through though, you are able to continue on the path to subject mastery. These various components, or concepts, are challenging to learn, and subsequently, challenging to teach. By viewing the learner/teacher experience along this epistemological progression, we as librarians are better suited for deeper subject engagement and the delivery of responsive instruction at opportune moments along this learning path.

Erik Meyer and Ray Land (2003) developed the threshold concept framework and provide a classic definition: "a threshold concept can be considered as akin to a portal, opening up a new and previously inaccessible way of thinking about something. It represents a transformed way of understanding, interpreting, or viewing something without which the learner cannot progress" (p. 1).

The groundwork for threshold concepts emerged from the United Kingdom's *Enhancing Teaching-Learning Project* that explored the characteristics of successful pedagogical environments and practices. The goal was to uncover insights that could be broadly applied to improve the overall quality of higher education. A key finding was that there are fundamental components within each discipline that most students struggled to understand. Furthermore, without the full comprehension of these foundational components, students struggled in future courses as well. Over time this accumulating deficiency of core knowledge is compounded; students are moving through curriculum without a clear grasp of essential material resulting in difficulty for both learners and instructors. This is the root of threshold concepts.

The framework has continued to evolve. While specific content varies between disciplines, the nature of what constitutes a threshold concept shares several unifying characteristics (Land, Meyer, and Smith, 2010):

- *Transformative:* it changes the way in which the student views the discipline.
- *Irreversible:* once learned, it is difficult to unlearn.
- *Integrative:* it brings together different aspects of the subject that previously did not appear to be related, and sets the foundation for future knowledge.
- *Bounded:* it delineates a particular conceptual space and serves to define the scope of a particular discipline, subject, or topic.
- *Troublesome:* it is difficult to understand, often seeming incoherent, counter-intuitive, or challenging to existing beliefs, attitudes, or abilities.

While the theoretical construct of *what is a threshold concept* is now firmly established, how this framework is applied at the disciplinary level is still being explored. Many scholars have attempted to map out the threshold concepts for their domains, and are working to establish best practices in terms of pedagogical approaches. Land, Meyer, and Smith highlight many of these efforts in *Threshold Concepts within the Disciplines* (2008). Here is a sample to illustrate the diversity across disciplines:

- Physics (heat transfer)
- Mathematics (*limit*)
- Cultural studies (*signification)*
- Literature (deconstruction)
- Economics (opportunity cost)
- Philosophy (*personhood*)

How does threshold concept theory apply to academic librarians? It can be argued that incorporating knowledge of threshold concepts into our instructional strategy enables us to be more effective and empathic – anticipating the challenges our learners face and intervening with insight into their disciplinary experience. This can impact not only *what* and *how* we teach, but also *when* is the right time to cover particular topics and skills. In short, it enables us to survey the entire learning landscape within a discipline and optimize the library's interaction. By understanding the common stumbling blocks, knowledge gaps, and frustration points within a given subject domain, as well as with particular courses and assignments, we can better position the library to become a strong instructional partner.

Threshold concepts can also improve our liaison relationships. By conversing with faculty and students about these core skills and information components, we enhance the perception of librarians as knowledge experts. Building on Karen Williams' vision for articulating new roles, threshold concepts can be a conduit for moving us beyond our traditional professional focus on scholarly *products* or outputs, and embed us closer to scholarly *processes* and practices (2009). As we strive to immerse the library more deeply into our local academic communities, it's imperative that we have a comprehension of core subject knowledge, but also core mindsets and challenges within the disciplines. In the long run, this enables us to better interact our campus constituency.

If learning is a metaphorical journey, then where does the library fit in? Traditionally this is a path shared by students and teachers, with the librarian serving as a stopover along the way. By focusing our attention on the critical teaching-learning moments and thresholds, we can advance from the service-provider identity and join the learning journey as partners, collaborators, facilitators, and guides.

Visualizing Curriculum in Libraries

Whereas threshold concepts provide a means of developing insight into cognitive aspects of the learner experience, curriculum mapping provides an equally powerful approach to understanding its structural and contextual dimensions. Curriculum mapping is typically referred to as a process of plotting out in a linear or grid format the sequence and related learning outcomes of curriculum in a given instructional context, a method developed in the late 1990s by Heidi Hayes Jacobs and used widely in primary and secondary education (Jacobs, 1997; 2004). In a variation on this process, the *visualization-based* approach to curriculum mapping described in the second half of this paper involves employing concept mapping software to depict the path and/or requirements of a major or degree program in an institution of higher learning, including local cultural and contextual details such as course availability, information literacy learning outcomes, faculty, and student organizations.

Concept mapping is described interchangeably as 'mind mapping' or 'knowledge mapping,' and is among the most customizable and lowest barrier to entry information visualization methods available. Anchored in the nested depiction and connection of related ideas, mapping a concept is as easily achieved via marker and whiteboard as with one of countless free and cost-based software options such as Mindomo (www.mindomo.com) or FreeMind (freemind.sourceforge.net). The concept mapping process is simple:

> a) select a purpose/outcome/idea for a given map
> b) identify its main idea or concept expressed as a central "node"
> c) branch component ideas in the form of additional topics off the central node
> d) and add sub-topics *ad infinitum* according to desired level of detail

In an academic library context, concept mapping can become a way to visualize the combinations of subjects and requirements that lead specific groups of learners from general prerequisites to a degree in hand, which in turn alerts an instruction or outreach-focused librarian to their most strategic points of intersection along the learner experience.

### *Case Study: Curriculum Visualization in Practice*

The Claremont Colleges Library (CCL) in Claremont, CA operates on a subject liaison model that matches its instruction and collections librarians to one or more disciplines. In a seven–college consortial environment, this creates a complexly overlapping disciplinary landscape; a major at each institution has a foundational core and path that may or may not be offered jointly, classes are frequently cross-listed between institutions, and degree requirements are diverse and liberally distributed. Delivering coordinated, programmatic information literacy instruction in this environment is a formidable challenge.

Curriculum visualization via concept mapping software is one strategy the CCL Instruction Services Department has developed to contend with this "stretched thin" scenario. We have found that building disciplinary and departmental curriculum maps is a reliable and low-intensity means of gaining insight into the diversity of student and faculty experiences, as well as identifying how our instruction, outreach, and collection development efforts can be best (re)directed.

The web-based tool Mindomo serves as CCL's mapping platform of choice. One of many concept mapping software options available, Mindomo is a versatile web-based "freemium" product with a range of features, including sharing, collaboration, customization, interactive web publication, multiple format exporting and importing, multimedia linking and document uploading, annotation, and accessible HTML versions of published maps. (see http://www.mindomo.com/about/mindomo_about.htm).

CCL curriculum maps are built by triangulating information from course catalogs, departmental websites, and direct communication with faculty, an immersively investigative process that compels the creator to closely examine the details of a given learning community. Mapping strategies at Claremont have varied in detail and complexity and grown increasingly sophisticated. Take, for example, two subsequent versions of a Geology curriculum map developed by Science Librarian Sean Stone in the summer of 2011:

Figure 2: Early Version of a Geology Curriculum Map by Sean Stone
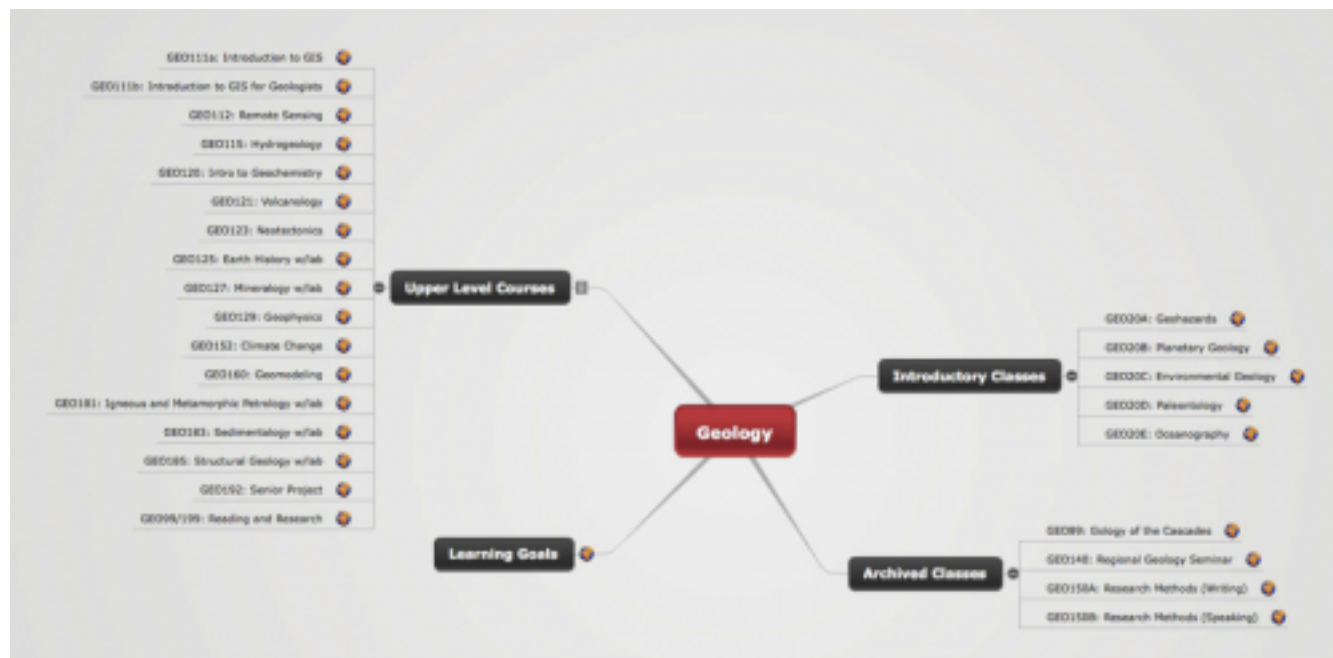
The above, best described as a course map, is a basic listing of introductory, archived, and upper level classes offered through the Geology Department at Pomona College. Each class is linked to its catalog description, and departmental learning goals are identified.

By contrast, the developed version of this map in Figure 3 is more accurately described as a curriculum map. Moving beyond a simple listing of classes, it examines the breadth and depth of the Geology program by detailing its degree tracks, course sequences, and requirements available to majors and minors, including notes and strategies highlighting appropriate research-intensive courses wherein Sean can target his instruction and outreach efforts.

**Figure 3: Developed Version of a Geology Curriculum Map by Sean Stone**

This approach of examining several aspects of a given department or subject area in a single map leverages the layering functionality that the concept visualization approach can provide, which also presents a more integrated view of a discipline reduces the risk of map proliferation.

Mapping for Instructional Integration

Curriculum visualization can be used to map a library instruction program's efforts to the learner experience. For example, Figure 4 represents a wide-angle view of a 2011-12 map created by Char Booth and Sean Stone, which facilitated a highly successful collaboration with the cross-colleges undergraduate Environmental Analysis (EA) program:

Figure 4: Claremont Colleges Library 2011-12 Environmental Analysis Curriculum Map
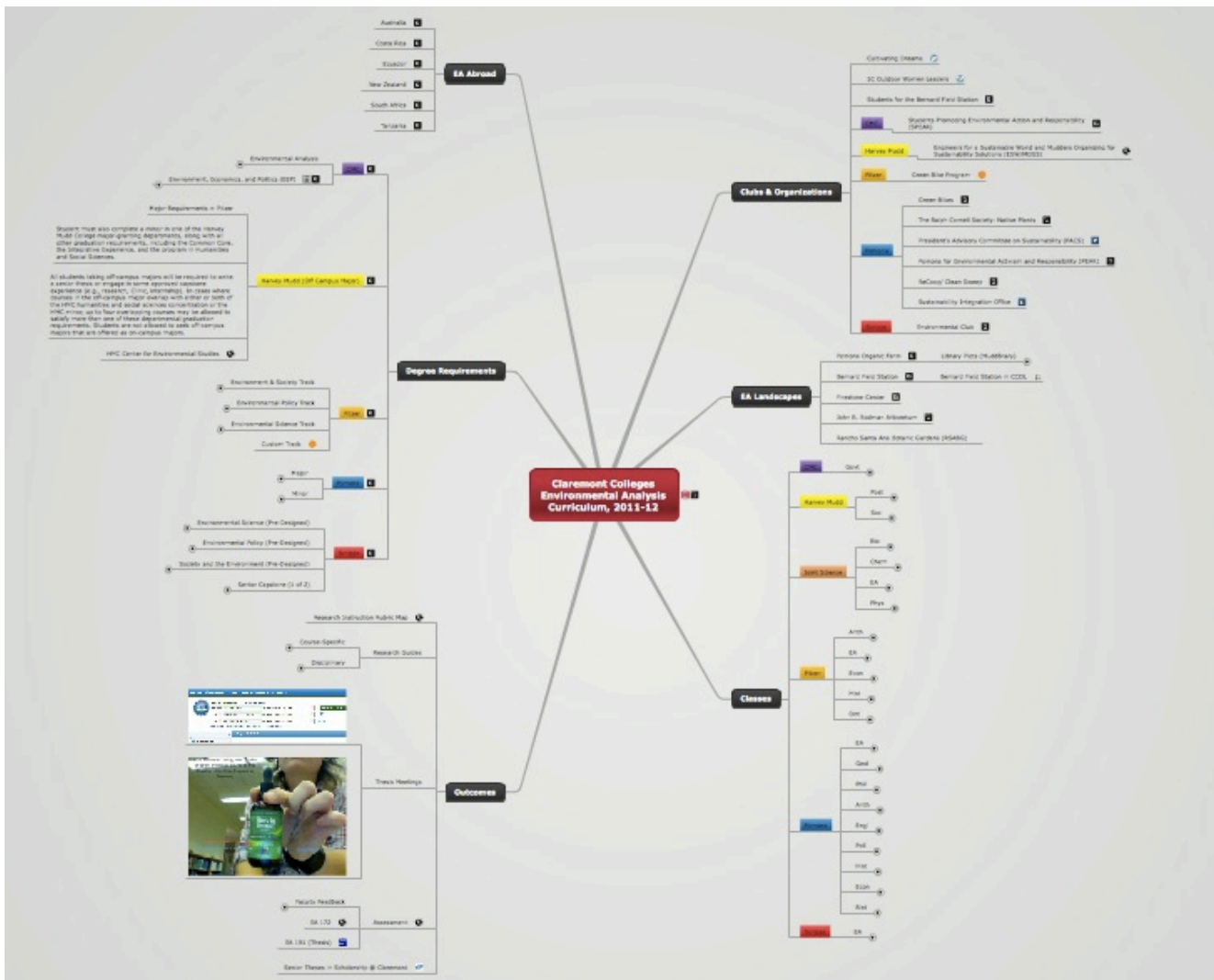
You can explore this interactive map at www.tinyurl.com/claremontlib-eamap. Its respective branches chart EA Classes, Degree Requirements, student Clubs & Organizations, Faculty, Study Abroad programs, and our own developing Outcomes of working with EA.

In the summer of 2011, this map provided Stone and Booth with a structural means of identifying a progressive and scalable library instruction plan to supplement IL skill-building through the core course sequence of EA majors, represented via a complementary map and rubric (see www.tinyurl.com/claremontlib-earubric). These maps served as the centerpiece of an instructional outreach presentation to a group of EA program faculty, who responded positively to the map and proposed instruction project and suggested targeted revisions that reflected nuances of their own program-based insight. In addition to this successful instructional integration outcome, the map provided faculty with a unique visual perspective on their program that extended beyond our initial expectations of the project, creating a value-added tool and broadening faculty understanding of the role and skillset of teaching librarians. To date, similar mapping-facilitated faculty collaborations have been pursued in the cross-colleges Theater and Women/Gender Studies departments.

Currently Claremont's Instruction Services department is expanding its pilot mapping project to a larger goal of engaging all subject liaisons in mapping their respective departments in the 2012-13 year. New disciplines will be developed, and existing curriculum maps will be resaved and updated ("versioned") on an annual basis in order to create a record of past efforts and preserving institutional memory, inform ongoing collaborations, reduce duplication of effort, and provide an iterative organizational learning and outreach strategy. Templating, project management, and concerted staff training is proving crucial to this process, in order to facilitate consistency of display and structure when mapping at an organizational level. In addition to training and communication around project goals and outcomes, we have made a mapping template available to our colleagues that provides a reliable structure with color, metadata, and annotation conventions to facilitate consistently comprehensive insight (see www.tinyurl.com/claremontlib-currmaptemplate).

It should be noted that if maps are to be kept current and representative they should be well described through notes and metadata, as well as reviewed and revised on a regular basis in order to motivate accuracy and ongoing knowledge-building.

Applications of Curriculum Mapping & Visualization
Significant personal insights and larger program outcomes have been derived from curriculum-based learning and other applications of concept mapping at CCL, including planning and organization (see www.tinyurl.com/claremontlib-firstyear2012 for an example of first-year instruction program management using concept mapping software). Beyond facilitating strategic insight among instruction/outreach/embedded librarians, mapping is strategically useful on several other levels:

- Exploring of the breadth of possibilities and tracks of specialization of a given academic institution

- Providing liaisons and others involved in collection development with the ability to identify subject specialties and areas of developing or declining need
- Capturing institutional contexts at moments in time in order to understand and preserve insight into changing institutional and curricular structure
- Gathering and demonstrating a holistic perspective on the academic breadth and trajectories of an organization in order to apportion collections and other resources accordingly

When employed in direct collaboration with faculty, curriculum visualization typically elicits a response of interest and mutual benefit – librarians at CCL are regularly invited by campuses faculty to give presentations on the project and/or workshops on the software and approach. Consistent with the Environmental Analysis example described above, our experience indicates that faculty and campuses staff continue to actively explore additional applications of the maps we have developed, whether for reviewing curriculum for purposes of revision, developing visual syllabi or other teaching materials, or sharing program information with current and prospective students. In short, visual mapping as a local knowledge- and strategy-building tool has unexpectedly developed into a valuable resource for our broader user community.

Conclusion

Much of the professional conversation in librarianship centers on new roles and directions that our organizations should take in order to continue to effectively serve our constituents. Traditional methods are not sufficient, and in order for us to evolve effectively we need to think differently about how we invest in our libraries' ability to engage. Part of this effort involves using tools and techniques to more effectively understand the learning processes, mental models, productivities, and conditions of our users. By observing the learning landscape in new ways we can better prepare and place the library to support scholarly needs.

Threshold concepts and curriculum mapping are two strategies that can be applied to develop powerful and actionable insight into the learner and faculty perspective in order to highlight pivotal points at which to integrate library instruction, resources, and research support. In the face of constantly evolving expectations and constraints, it is imperative that we leverage creative approaches such as these to optimize our efforts and affect the greatest impact on teaching and learning.

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