

Curriculum Mapping in Academic Libraries

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Buchanan, H., Webb, K.K., Houk, A.H. & Tingelstad, C. (2015). Curriculum Mapping in Academic Libraries. *New Review of Academic Librarianship*, 21(1), 94-111. doi: 10.1080/13614533.2014.1001413

This is an Accepted Manuscript of an article published by Taylor & Francis in *New Review of Academic Librarianship* on 07 Jan 2015, available online:

<http://www.tandfonline.com/10.1080/13614533.2014.1001413>.

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Abstract:

Librarians at four different academic institutions concurrently completed curriculum mapping projects using varying methods to analyze their information literacy instruction. Curriculum mapping is a process for systematically evaluating components of an instructional program for cohesiveness, proper sequencing, and goal achievement. There is a dearth of documentation of how this process has applied to an information literacy curriculum; however, the benefits of an organized examination of course progression is clear. The librarians explored curriculum mapping using different methodologies and approaches in order to formulate a more strategic approach to teaching students information literacy skills.

Keywords: information literacy | university libraries | students | evaluation

Article:

INTRODUCTION

If librarians were to analyze their effectiveness in teaching students about the information literacy requirements in their majors, would we find that we could better prepare students for their chosen disciplines? In order to assess their programs of information literacy instruction, librarians at four academic institutions analyzed their instructional offerings through the process of curriculum mapping. The primary objective of this case study was to determine whether curriculum mapping could be used to evaluate academic library information literacy programs. If this proved to be the case, a further objective was to identify how different approaches to curriculum mapping could proactively integrate library information literacy instruction into the academic curriculum. Pilot projects were completed concurrently by the four librarians as part of a leadership institute sponsored by a state library association. The librarians who participated in

the case studies work in institutions with diverse Carnegie classifications: one Doctoral/Research University, one Research University (high research activity), one Master's College and University (larger programs), and one Community College. Each librarian took a different approach to curriculum mapping to offer a distinct perspective to the project. This article presents the methods and initial results of four curriculum mapping projects; it also addresses the limitations encountered and the next steps for each project.

LITERATURE REVIEW

What is Curriculum Mapping?

Curriculum mapping is a process for evaluating the various components of a curriculum for cohesiveness, proper sequencing, and goal achievement. According to Jacobs (2004), curriculum mapping answers the following questions: “Who is doing what?; How does our work align with our goals?; and Are we operating efficiently and effectively?” (v). Teachers and administrators in elementary and secondary schools have used curriculum mapping for decades (English 1980; Jacobs 2004; Hale 2008), and higher education instructors and administrators have also used the process to evaluate academic programs ranging from information systems to medicine (Veltri et al. 2011; Abate et al. 2003; Harden 2001; Delgaty 2009). The process of curriculum mapping, according to Cuevas, Matveev, and Feit (2009), typically involves the charting of courses against a program's learning objectives and allows participants “to identify important components of program curricula, place them in relation to each other in a visual format, and capture an overarching curricular structure to support cognitive scaffolding for further analysis” (24). A curriculum map may look like a grid, a matrix, or a concept map.

There are various types of information that might be included in a curriculum map. The important components of a curriculum map, according to Harden (2001), include “what is taught (the content, the areas of expertise addressed, and the learning outcomes), how it is taught (the learning resources, the learning opportunities), when it is taught (the timetable, the curriculum sequence) and the measures used to determine whether the student has achieved the expected learning outcomes (assessment)” (123).

Data may be gathered from a variety of sources including course catalogs, program, and course learning outcome statements (Cuevas, Matveev, and Feit 2009); curriculum sequences and course syllabi (Veltri et al. 2011), and “ student portfolios and work samples” (Ewell and Jones 1996). Weiss, Corso, and Kelly (2005) collected information from faculty surveys as well as course syllabi from specific courses. Each artifact provides information about the “intended” structure and content of the curriculum as well as its actual composition (Veltri, et al. 2011, 34–35).

Benefits of Curriculum Mapping

The curriculum mapping process is used for a variety of purposes including curriculum or program assessment and reorganization. A major benefit to curriculum mapping is that it provides transparency in the curriculum. Participants in the mapping process are able to examine the curriculum in its entirety. Mapping provides a basis for communication about a program's content, structure, and assessment. Participants in the process are able to “identify gaps, redundancies, and misalignments in the curriculum and instructional program” (Jacobs 2004, vi).

The process of curriculum mapping can lead to a transparent, well-integrated, and linear learning experience for the student (Cuevas, Matveev, and Feit 2009). The need for an aligned curriculum is substantiated in the findings of Salisbury and Sheridan (2011), who discovered that students experience frustration when skills instruction is repeated in different courses or when skill demands are presented out of order of difficulty. Furthermore, curriculum mapping is a valuable tool for connecting course content with learning outcomes and student assessment (Harden 2001). Curriculum mapping allows educators to determine standards adherence and evaluate whether program standards and learning outcomes are being met (Harden 2001).

Curriculum Mapping and Information Literacy

The literature on academic librarians' use of curriculum mapping is limited. Though libraries have a direct role in supporting the curriculum, they do not have ownership of the curriculum as academic programs do—unless they offer for-credit courses. Therefore, curriculum mapping efforts in libraries must evaluate how library instruction is mapped to existing curricula. Salisbury and Sheridan (2011) recommended several steps for mapping information literacy to the curriculum. Their report recommended performing an “environmental scan” of the university libraries' current practices, a review of practices at other universities, and a “SWOT analysis” of proposed curriculum mapping models (189–91). They also suggested sharing the proposed curriculum redesign strategy with librarians and faculty for their review (Salisbury and Sheridan 2011).

In another example, Lowe et al. (2013), used a concept mapping software (Mindomo, www.mindomo.com) to design a rich curriculum map that has high visual impact. This project examined the entire student experience for a specific program and included details about organizations, clubs, and the faculty of the program. The researchers even used word cloud software (Wordle, www.wordle.net) to “mine” faculty publications and display themes in order to highlight the faculty research interests (Lowe et al., 2013, Paper 18). The researchers used symbols to indicate areas where library support already existed. The resulting document has high visual impact and allows librarians, students, and faculty to clearly identify where the library is active and where more outreach is needed.

While literature on the curriculum mapping process by academic librarians is not plentiful, there are many published articles that address the need for integrating information literacy instruction and information literacy objectives into the curricula of academic courses (Macklin and

Fosmire 2004; McGuinness 2007). It has become generally accepted that librarians must move beyond offering general library orientation sessions and to “delivering instructional services directly related to course content and directly supporting student learning objectives” (Shumaker 2011, 17). Collaboration between library and university administrators to set institutional goals for integrating information literacy into the curriculum has produced comprehensive and widespread results (Lindstrom and Shonrock 2006). Integrating information literacy instruction into the academic curriculum addresses many of the limitations of single-session library instruction. Salisbury and Sheridan (2011) found that the demand for individual instruction sessions was not “sustainable or scalable” to reach all undergraduate students (185). Academic librarians are investigating curriculum integration models in order to incorporate the components of information literacy at the students’ points of need within the curriculum and to provide a more strategic sequence to their instructional offerings (Holliday and Fagerheim 2006; Wang 2011). The process of curriculum mapping would greatly assist academic librarians’ efforts to strategically and intentionally identify appropriate curriculum access points for information literacy instruction because the process allows participants to clearly articulate their intended outcomes and visually evaluate how those outcomes fit into the student experience. It also allows librarians to see how their intentions match with reality and to plan for the future. If the effectiveness of the curriculum mapping process by academic libraries is to be accurately assessed, more research in this area is needed.

Project Methodology

If librarians used curriculum mapping to evaluate their information literacy offerings, what would they learn? Could they use curriculum mapping to plan information literacy instruction throughout the curriculum? The primary objectives of the four case studies were: 1) to evaluate current practices in information literacy integration; and 2) to pilot the curriculum mapping process in academic libraries. In order to accomplish this, each researcher chose a specific focus and approach based on the needs of their institution. Throughout the process, the four librarians communicated frequently to compare progress and to discuss results.

Case Study Descriptions

The following are descriptions of the process and initial results of each curriculum mapping project from the four individual academic libraries.

CASE STUDY 1: MASTER’S COLLEGE AND UNIVERSITY

Description and Process

Research & Instructional Services librarians at this institution teach many information literacy instruction sessions each year, generally as requested by course instructors. In order to move from this scattered approach to a more integrated model of information literacy instruction, the librarians focused on 1) identifying opportunities to sequence information literacy instruction in

order to build upon skills and concepts throughout a student's academic career; and 2) evaluating prior library instruction sessions to identify gaps and redundancies in information literacy instruction offered to courses in a particular academic program.

Ideally, the curriculum mapping process for library programs is conducted with course instructors in the departments. However, librarians and course instructors have many responsibilities, and these efforts are often delayed. This pilot project created a process for librarians to reflect on their library instruction at their own pace in order to understand the way they currently integrate information literacy instruction into the academic curriculum. The curriculum for the university's English program was used for the pilot study.

For this self-paced approach, the librarian gathered the following information:

- A list of all the library instruction sessions offered for courses in the program for a specific period of time (at least two semesters, but three to five years is preferable).
- Information about the program's curriculum (including all of its different concentrations), a list of courses that all majors are required to take, and the main learning outcomes for those programs.

Step One:

For the pilot test, the first step was to make a list of all the library instruction offered to English courses over the past five years. For each course, the librarian answered the following questions and entered the answers into an Excel spreadsheet:

1. Is there an articulated research skills component/information literacy component for this course?

For the purposes of this exercise, the librarian defined “Articulated Research Skills Component” narrowly. Most English courses require some sort of research-related project or incorporate information literacy skills such as finding and evaluating information. To provide focus, the librarian looked for courses that had research skills explicitly stated in the course title, description, or overall outcome statement listed in the course catalog.

2. Is this course required for all majors?
3. Is a library session offered every time the course is offered?

Follow-up: Does the instructor of this course vary from year to year?

Often librarians form partnerships with specific faculty. If the instructors change for a course, the library offerings may change as well.

4. Does the library provide any alternative or supplemental instructional support such as a research guide, presence in online course management system, or online tutorial?

5. In the department's recommended four-year plan, during which year of their academic career (first, second, third, fourth) will students take this course?

Step Two:

The next step was to examine the list of required courses for the program to determine whether there were any required courses that did not have library instruction in the past five years. These courses were added to the Excel spreadsheet (and marked by a different background color), and the librarian answered all of the aforementioned questions for each course.

Initial Results

Figure 1 shows an excerpt from the spreadsheet. The librarian was able to identify that she was providing consistent library instructional support to the required courses that had an articulated research skills component. The mapping process also revealed distinct requirements for the different concentrations in the major (such as literature or professional writing). In terms of looking at the student experience—as it is recommended by the four-year plan—the curriculum map revealed that much of the library instruction occurred during a typical English major's sophomore year. Unfortunately, the map did not reveal a straightforward solution to the fact that some English majors may have library instruction several times in one semester while other English majors may not have had any subject-specific library instruction before they take an elective in the major. On a more positive note, the resulting map illustrated several openings for conversations with English faculty in order to more effectively build upon the core 200-level course in additional library instruction sessions. If the English department decides to integrate library instruction more consistently into the core courses, the librarian will be able to offer library instruction more strategically. The librarian will also be able to cut back on instruction sessions for some of the courses that do not emphasize research skills as explicitly.

Courses	Stated Research Skills Component?	Required for all majors?	Regular Library Instruction?	Same instructor each semester?	Alternative Instruction (LibGuide, Blackboard)?	Recommended Sequence
English 200	N	Y	Y	Y	no	Sophomore
English 210	N	N	N	Y	yes	Sophomore
English 240	Y	Y 2/3 tracks	Y	N	yes	Sophomore
English 241	N	Y (literature track)	N	N/A	no	Sophomore
English 350	N	N	Y	N	yes	none
English 367	N	N	Y	N	no	none

FIGURE 1 Mapping current library instruction.

CASE STUDY 2: DOCTORAL/RESEARCH UNIVERSITY

Description and Process

The Instructional Design librarian conducted a curriculum mapping pilot including a SWOT analysis with three departments: Communications, Engineering, and Hospitality Leadership—designated growth areas in the university. Her objective was to examine the specific relationships the library had with each department. The researcher began the process of mapping library curriculum and information literacy concepts in these majors by performing an environmental scan. She conducted the environmental scan by:

- Gathering existing data, including statistics from the information literacy instruction program and research consultations.
- Counting and analyzing the content of LibGuides and Google Documents folders to find any existing tutorials, assignments, or lesson plans.
- Locating and analyzing the undergraduate catalog to identify pertinent information regarding the structure of the programs.
- Interviewing the library's instruction liaison for the Communications and Engineering departments; this librarian assisted with the SWOT analysis and provided contact information for faculty who were in charge of relevant undergraduate curricula.
- Interviewing collection development librarians and library staff to gain insight into the library's involvement with the programs.

The Instructional Design Librarian then contacted the associate deans of the three departments, asking for a meeting with a department member who was deeply involved with the curriculum of the program and aware of the needs of the students. This proved to be the most difficult step in

the process because she was forced to rely on responses from professors with very busy schedules. Only two of the departments responded, Communications and Engineering. Though the department had not responded, the librarian had worked with the Hospitality Leadership department on a previous project and collected much of the information needed including syllabi. The librarian interviewed curriculum coordinators for the Communications and Engineering departments and gathered relevant materials such as documentation for the Engineering department's five concentrations, including a matrix for each that outlines the program outcomes to their particular courses.

After she gathered information, the Instructional Design Librarian completed a SWOT analysis for each of the departments in the pilot. She considered information provided by librarians, the information gathered from professors from the departments, as well as the structure of the degree programs. She examined the implications of each of these strengths, weaknesses, opportunities, and threats and considered suggestions for improving the library's interaction with the program. She then listed learning outcomes and mapped them to introductory concepts for core courses and advanced concepts needed in a capstone course. This was done in a simple table format using colored blocks to indicate where an outcome would be satisfied (see Figure 2).

Students will be able to...	Basic Module	Advanced Module
Find ways to get help from a librarian		
Find and retrieve an article and book		
Construct a search using AND/OR		
Identify characteristics of popular and scholarly articles		
Provide examples of unintentional and intentional plagiarism		
Locate career resources	Vary slightly for issues paper	Vary slightly for jobseekers
Identify and correctly produce the correct citation style for their major		
Locate newspaper articles		
Evaluate online materials		
Identify ways of locating non-traditional research materials and evaluate the source		
Evaluate copyright and ethical use of information		

FIGURE 2 Mapping learning outcomes to modules.

Initial Results

The librarian discovered three basic types of relationships with departments at this university; to a certain extent, this is indicative of the type of work librarians do with these departments.

The first type of relationship is an organized relationship. The organized model will not need much modification. The collaborating department of an organized model has specific times when the library is invited to take part in planned activities. In the case of this pilot, the Engineering department has an organized relationship with the library. The faculty invite the library to take part in their orientation, then a core course, ENGR 1000, and then later in the capstone courses. There are few requests made by instructors outside of this progression. This is truly a model for library instruction departments and their collaborators; though not all departments follow such a prescribed plan of study. Course programs fitting this model may appear in instructional statistics as a steady and predictable stream of in-person information literacy courses and research consultations.

The next type of relationship is the traditional one-shot model. In this model, the professors assign a paper, and they reach out to the library to offer a single library instruction session. The Communications department represents this model in the pilot. Some students taking coursework in the Communications department may see the librarian three times in the same semester, whereas other students might not have had library instruction at all during their time in the program. This is because the courses are scheduled on an as-needed basis, and there are certain faculty who decide to include the library and others who do not. Programs fitting this model can be observed in the instructional session statistics because there are sessions for a large number of classes that change each semester. For instance, one professor's name may show up often in a review of instruction statistics for the program, whereas others do not at all. There may be multiple instances of classes that have come in the spring semester one year and then do not appear in the next spring.

The last type of model is the underrepresented model. This model represents groups who traditionally do not have a strong relationship with the library. This can be due to the fact that they have had bad experiences with library instruction, they do not see the value of library instruction, or they do not have traditional information needs that are an easy tie to library services. In the pilot, the Hospitality Leadership department fit this model. Although this department relies on trade journal material as well as statistical information, the faculty and students may not see the library as the source for finding this material. The underrepresented model is characterized by a lack of instructional data and a weak online curricular presence in a particular subject field.

CASE STUDY 3: RESEARCH UNIVERSITY

Description and Process

At this institution, the Information Literacy Program Coordinator, noticing an increase in the number of instruction sessions over time and a decrease in the number of librarians and staff available to teach them, decided to track the student learning outcomes taught in classes throughout various majors. This process was simplified by the fact that the librarians had adopted a shared list of learning outcomes which were documented for each instruction session. The objectives for the curriculum mapping project were 1) to determine if students are being taught the same skills repeatedly in different courses, and 2) to identify sources of possible duplication to reduce the number of classes taught in a specific program.

Process

As a pilot project, the Information Literacy Program Coordinator chose two departments for curriculum mapping: Communication Studies and Religious Studies. She used statistics to determine which courses in those majors receive information literacy instruction on a regular basis (since Summer 2012). Using a combination of statistics, class research guides, and consultations with liaison librarians, she determined which learning outcomes were taught in each class in the fall semester of 2012. She then used the university's course catalog to identify any required prerequisites to enter these majors, as well as any required upper-level classes in the major and other upper-level electives. General education courses were excluded because students can choose from a large variety of classes, creating countless ways to complete these requirements. The Information Literacy Program Coordinator created a spreadsheet with the student learning outcomes across the top and the courses taught down the left side (see Figure 3). She then completed the spreadsheets by filling in the learning outcomes taught in each session.

Class	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	1.10	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	2.10
CST 105			■	■															
CST 300			■	■												■			■
CST 341												■		■					
CST 408												■		■		■			■
ENG 101			■		■	■				■									
ENG 105			■		■														
ENG 109			■	■			■							■					
ENG 303				■										■	■				■

FIGURE 3 Mapping courses to student learning outcomes

Initial Results

As expected, in both disciplines mapped in this pilot project, some learning outcomes were taught to students in multiple classes. Unsurprisingly, choosing appropriate keywords and databases was a skill taught in multiple classes in both disciplines. Otherwise, it appears that the

100-level classes that are required prerequisites for these disciplines are providing baseline information literacy skills, as they were designed to do.

CASE STUDY 4: COMMUNITY COLLEGE

Description and Process

The community college library's instruction program has traditionally offered the college's faculty and students 50-minute, one-shot sessions of library instruction. As educational delivery methods evolve and more courses are offered online, instruction librarians are working to modify instructional delivery so that students can access information when and where they need it. In an effort to approach library instruction strategically, librarians chose to use the curriculum mapping process. By mapping each department's curriculum to the Information Literacy Competency Standards for Higher Education established by the Association of College and Research Libraries (ACRL), the college's librarians are developing plans for targeted information instruction. The curriculum mapping process allows librarians to identify classes with assignments requiring students to use information literacy skills and to find appropriate information resources.

Initial efforts in curriculum mapping focused on the college's Social Sciences department, which offers the college's history, political science, psychology, and religion courses. Prior to the creation of the curriculum map, an instruction librarian met with the Social Sciences Department chair and a history faculty member to discuss the project. As a result of the meeting, the librarian obtained a complete set of course syllabi, copies of assignments, and class book lists. Working with an active, interested member of the faculty contributes immensely to the success of any curriculum mapping project.

The department's syllabi and course assignments were then evaluated to determine which classes required students to use information literacy skills and identify library resources providing relevant information and research material. Each assignment was assessed for opportunities for students to demonstrate the Information Literacy Competency Standards for Higher Education created by the ACRL. This information was charted on a spreadsheet aligning class assignments with corresponding competency standards and performance indicators as shown in Figure 4.

	Traditional class	Customized LibGuide	Customized LibGuide	Traditional class	Traditional class	Instructional Sheet	Customized LibGuide
Information Literacy Performance Indicators (The information literate student ...)	HIS 112 World Civilizations II (Hiltz)	HIS 131 American History I (Daune)	HIS 131 American History II (Bishop)	SOC 210 Introduction to Sociology (Gingras)	SOC 213 Sociology of the Family (Gingras)	SOC 213 Sociology of the Family (Marline)	POL 120 American National Government
Standard One: Determines the nature and extent of the information needed.							
Defines and articulates the need for information.	movie review	book review	book review	fact sheet/ PSA	fact sheet/ PSA	article review	research paper
Identifies a variety of types and formats of potential sources for information.	movie review			fact sheet/ PSA	fact sheet/ PSA		research paper
Considers the costs and benefits of acquiring the needed information.	movie review	book review	book review	fact sheet/ PSA	fact sheet/ PSA		research paper
Reevaluates the nature and extent of the information need.	movie review			fact sheet/ PSA	fact sheet/ PSA		research paper
Standard Two: Accesses needed information effectively and efficiently.							
Selects the most appropriate investigative methods or information retrieval systems for accessing the needed information.	movie review			fact sheet/ PSA	fact sheet/ PSA		research paper
Constructs and implements effectively-designed search strategies.	movie review			fact sheet/ PSA	fact sheet/ PSA	article review	research paper
Retrieves information online or in person using a variety of methods.	movie review			fact sheet/ PSA	fact sheet/ PSA	article review	research paper
Refines the search strategy if necessary.	movie review			fact sheet/ PSA	fact sheet/ PSA	article review	research paper
Extracts, records, and manages the information and its sources.	movie review			fact sheet/ PSA	fact sheet/ PSA	article review	research paper
Standard Three: Evaluates information and its sources critically and incorporates selected information into his or her knowledge base and value system.							
Summarizes the main ideas to be extracted from the information gathered.	movie review	book review	book review	fact sheet/ PSA	fact sheet/ PSA	article review	research paper
Articulates and applies initial criteria for evaluating both the information and its sources.	movie review			fact sheet/ PSA	fact sheet/ PSA		research paper
Synthesizes main ideas to construct new concepts.	movie review			fact sheet/ PSA	fact sheet/ PSA	article review	research paper
Compares new knowledge with prior knowledge to determine the value added, contradictions, or other unique characteristics of the information.	movie review			fact sheet/ PSA	fact sheet/ PSA	article review	research paper
Determines whether the new knowledge has an impact on the individual's value system and takes steps to reconcile differences.	movie review			fact sheet/ PSA	fact sheet/ PSA		research paper
Validates understanding and interpretation of the information through discourse with other individuals, subject-area experts, and/or practitioners.				fact sheet/ PSA	fact sheet/ PSA		research paper

FIGURE 4 Curriculum map: Social sciences department.

Initial Results

Based on the information in the curriculum map, librarians developed a plan to introduce library instruction at critical points in the courses to enhance the learning process. They worked to

develop the best combination of information resources and instructional delivery methods for each course and assignment. Essentially, the curriculum mapping process allowed librarians to identify those classes in which students would benefit from instruction and to implement the instructional approach that would be most appropriate.

The curriculum map became the basis for the librarians' instructional planning in the Social Sciences department. Through the mapping process, the librarians identified points at which they could most effectively add value to the students' learning. Based on the specific ACRL standards that were identified, along with the number of performance indicators required of students for a particular class assignment, the librarians proposed a plan of action for each class. In most instances, their initial step was to create a customized research guide to give course instructors an idea of the library resources and services available to their students. Then, if a library instructional component was requested by a faculty member, the librarians and instructor worked to create a tailored strategy for delivering that instruction. Strategies included the creation of video tutorials, targeted research guides, informational quizzes, and assignments embedded in the college's course management system.

GENERAL RESULTS: LIMITATIONS AND NEXT STEPS

In conducting these projects, the authors discovered several limitations to the curriculum mapping process including inconsistency in course sequence, varied levels of cooperation and communication with departmental faculty, and librarians' lack of authority in curriculum development, both within the library and university-wide. The librarians in each case study also identified steps for continuing curriculum mapping at their libraries.

Limitations

Inconsistency in Course Sequence

It is difficult to determine a consistent student progression through an academic program. Case Study 1 revealed that though there are clear suggestions for course sequence in a program, many courses are electives, and the required courses are not necessarily pre-requisites for other courses. Also, as was discovered in Case Study 3, students often take courses out of order, so they may not learn the skills taught in a required class for their major until they have taken many other courses in the major. This can result in discrepancies in students' exposure to essential information and knowledge. The lack of consistent sequencing makes it difficult for a librarian to "scaffold" information literacy within the existing structure.

Varied Cooperation and Communication with Departmental Faculty

In the case studies that involved input from departmental faculty (Case Study 2 and Case Study 4), the success of the project depended heavily on support and communication from the instructors. In Case Study 2, there was a lack of this support and communication. The librarian

found that the emails sent to gather feedback were long and detailed and much of the information that was requested could have been found in the undergraduate catalog. The librarian also had to interview each curriculum coordinator in person in order to gather more information; those meetings were difficult to schedule. In Case Study 4, although the history instructor was fully engaged in the process, the librarian found that this was an exception to the rule. Interaction and communication with faculty members are essential to ensuring the viability and success of a curriculum mapping program.

Limited Authority to Make Changes

Librarians may not have the authority to make major changes based on what they have discovered through the curriculum mapping. In Case Study 2, the purview of the Instructional Design Librarian is not to make changes in the face-to-face library curriculum; instead, her area of focus is instructional modules and LibGuides. This limited her ability to change the current instructional model for in-person courses. She was able to share the results with the librarians with the authority to effect curriculum modification and will be able to assist in library-wide changes.

Librarians may also have little authority over the changing academic curriculum. In Case Study 2, the university made changes in the curriculum process that resulted in an out-of-date methodology for the librarian's project. The positive aspect of these changes is that the new initiative requires each department to make its curriculum more transparent which will make curriculum mapping easier for the librarian. All four case studies depended heavily on clear communication from the academic departments on required courses and learning outcomes for their students. The librarians noted that they will revisit the curriculum mapping process on a regular basis to keep up with changes in the curriculum.

Next Steps

Expand the Project

Each librarian has decided to adapt the curriculum mapping process to other academic areas and to use it for information literacy program evaluation. The librarian in Case Study 1 is currently working with the library liaisons in Chemistry, Nursing, and Education to develop curriculum maps for their areas. The librarian in Case Study 4 plans to continue the process in the English and Humanities department; additionally, she has identified two English courses that prove suitable for an embedded librarian strategy, a new opportunity for connecting with the college's students.

Use Maps to Facilitate Conversations with Faculty and Fellow Librarians

One key strength of the curriculum mapping process is that it clearly illustrates both problems and opportunities in regard to integrating information literacy skills into the curriculum. All of

the librarians in this study plan to present the maps to course instructors, curriculum committees, and administrators in order to facilitate conversation and change. For example, the librarian in Case Study 1 can use the map to discuss redundancies in library instruction during a student's sophomore year and to strategize solutions for building upon skills and concepts throughout the student's academic career. The librarian in Case Study 2 also plans to share the results with professors of upper-level classes who request basic instruction that students are likely to have already received, thereby encouraging them to focus on more complex skills appropriate to students' prior knowledge. Librarians may also use the curriculum maps to facilitate conversations within the library. Curriculum maps will allow librarians to identify whether their actions are corresponding with their goals and whether they are operating efficiently and effectively.

Target Library Instruction

The curriculum mapping process also allows librarians to identify areas to target their instruction. This allows the librarian to be more proactive and approach faculty in core courses, rather than waiting for the faculty member to request library services. In Case Study 1, the librarian identified a required course with a heavy research component for which several library instruction sessions would be helpful. In Case Study 4, by viewing the curriculum map, librarians were able to identify a research-intensive political science course, an excellent prospect for targeted instruction. In the past, students in the political science class had not been directed to use specific library resources for their research assignments. In conjunction with the course instructor, a librarian created a research guide including video tutorials for this course. Feedback from the political science instructor was positive, and librarians observed an increase in the number of students using library resources to find research materials for these assignments.

Rework Existing Research Guides and Learning Objects

Because the curriculum mapping process involves identifying learning outcomes for courses, as well as identifying gaps in the curriculum, the librarians identified the need to adjust online tutorials and guides accordingly. The librarian in Case Study 1 found that some courses needed a research guide, but did not necessarily require face-to-face instruction because many students had similar library instruction in the same semester. The librarian in Case Study 2 decided to create a two-tiered model for library research modules: one for more basic skills and concepts, and the other for more advanced information literacy topics. The librarian in Case Study 3 plans to create more class-specific library tutorials to embed in course research guides. In Case Study 4, librarians and instructors have determined that highly customized research guides are often appropriate resources for serving the needs of students.

Make Changes to the Mapping Process

Through the process of curriculum mapping, librarians were able to identify opportunities for improvement in future mapping efforts. The librarian in Case Study 1 discovered that her software choice, Excel, limited the qualitative information she could display in her map. Going forward, she will use concept mapping software and research guides to better illustrate learning outcomes for each course. The librarian in Case Study 3 plans to add a question to the library's instruction statistics form so that liaisons can enter the student learning outcomes addressed in each library instruction session they teach. This will make expanding the curriculum mapping project to other disciplines a much simpler task.

CONCLUSION

Curriculum mapping is a valuable process for librarians. It presents a visual representation of the library's information literacy instructional outreach which can be used to evaluate relationships between current practices, the academic curriculum and intended learning outcomes. These case studies demonstrate that curriculum mapping can be conducted in a variety of ways and can be conducted through manageable pilot projects. Curriculum mapping can be self-paced and conducted internally, or it can involve external constituents. Librarians may use existing data such as library instruction session statistics, research guides and modules, and information from course catalogs and state learning outcomes. Librarians may identify additional data to contribute to the maps including SWOT analyses and interviews with course instructors. The resulting curriculum maps are likely to illustrate both challenges and opportunities. Ideally, curriculum maps will inspire conversations and collaborations with colleagues, teaching faculty, and administrators to strategically integrate information literacy instruction into the academic curriculum.

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