Action-Oriented Research Agenda on Library Contributions to Student Learning and Success: Initial Report

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Introduction

With growing federal and organizational pressures, academic libraries now must demonstrate their value more than ever.[1] The Association of College and Research Libraries (ACRL) is at the forefront in assessing these demonstrations and recognizes the need for more research on critical elements of the higher education sector such as student learning and success. An open and competitive request for proposals was issued by ACRL to investigate this area and a team, from OCLC Research and two doctoral candidates from Rutgers University, was selected to support this ongoing work. The project team will develop an action-oriented research agenda on library contributions to student learning and success.

This report draft provides an update of the team's work from the start of the project in mid-July to the beginning of November 2016. In this time period, the team has completed a content analysis of 357 documents from the library and information science (LIS) and higher education literature, specifically focusing on themes identified in the 2010 *VAL Report*.[2] In addition, the team has started to build a database that will be used for the visualization tool, which will be created to assist researcher-practitioners in identifying relevant literature and trends. Finally, the team also has completed an online focus group interview with academic library administrators, who are members of its Advisory Group, and a preliminary analysis of the interview transcript.

Background

One significant challenge in assessing academic library value is the lack of consensus on measures of student learning and success.[3] Often, determining these measures is left up to individual departments, which effectively isolates the assessment practices of library stakeholders from those within higher education. Due to this lack of synergy, libraries face difficulty in demonstrating their impact in a way that aligns with higher education stakeholder objectives. Perhaps for this reason, or as a result of it, librarians often are not included in discussions of value within a broader academic context, such as how they might contribute to accreditation standards and impact student retention and achievement.[4]

ACRL issued a request for proposals (RFP) in May 2016 to address these challenges by answering the following research questions:

RQ1. What are the ways that libraries align with and have impact on institutional effectiveness?

RQ2. How can libraries communicate their alignment with and impact on institutional effectiveness in a way that resonates with higher education stakeholders?[5]

Guided by the proposal directives, the project team will engage in the following stages to answer these research questions:

1. Overview current definitions of learning and success and identify higher education trends that affect academic librarians as well as their responses to these trends.
2. Collect individual semi-structured and focus group interview data from provosts and academic library administrators who are members of an Advisory Group for this project and, based on these data, identify extant programs and services that have evidenced effectiveness of or potential for contributing to student-centered outcomes.
3. Identify understudied research areas for newer practitioner-scholars by asking future-focused research questions and creating a dynamic visualization tool.

These stages, while initially linear, will become iterative as both the research findings and feedback from ACRL members inform and guide the project. This paper reports the team's initial findings from the first stage of the project, which consists of a content analysis of relevant literature and an analysis of a focus group interview with academic library administrators, who are members of the project advisory group. First, a brief literature review is provided to overview some of ACRL's work on the value of academic libraries and to describe how this work informed development of a codebook, which was then used to identify the themes of 357 relevant readings. Next, an overview of methods is provided, followed by a presentation and discussion of findings from content analysis of the readings and analysis of the focus group interview transcript. The paper concludes by outlining key takeaways from the work completed to date by the team.

Literature Review

Assessment and Evaluation Literature

Evaluation and assessment are two related concepts that are used to determine the value of academic library collections, spaces, and services. While exact definitions of each vary in LIS and other literature, evaluation tends to be more holistic,[6] occur on a larger scale, focus on more generalized end results, and be written for a wider audience. The past few decades of LIS literature on academic library value can be broken down by type of research. These types are differentiated based on their use of evaluation and/or assessment activities, and how these activities are reported.

The first type of value research includes library evaluations based on collection size or amount of other library resources. LIS research published prior to the 1980s tends to fall in this category, but this type of research continues to present day. These evaluations can look at whether library collections are a certain size or composition as recommended by national standards.[7] They also can include how a library compares to its peers in terms of resources, such as budgets or collection size.[8] The results of these evaluations usually are intended for other librarians or administrators rather than the staff, faculty, and students of an institution.

The second type of value research includes assessments and evaluations concerning how students, faculty, and staff in colleges and universities use library collections, spaces, and services. Findings from these activities often are framed in terms of value that only concern libraries. For example, the number of items checked out can be tracked year-to-year and included in an evaluative report as one indicator of the library's worth.[9] Librarians also can attempt to increase the number of checkouts through better marketing or buying materials that library users may be more interested in, and then assess those efforts to increase checkouts. These results can be and often are reported to librarians within or external to the institution. The reports often are shared with a wider internal audience that includes students, administrators, as well as an external group who may look at these numbers and believe that the library is valuable because it provides materials that people check out. However, these reports may not be as interesting or useful to those outside the library since they do not include user-centered goals or outcomes.

The third type of value research includes assessments and evaluations of how library collections, spaces, and services impact user-centered goals or outcomes. For instance, the number of checkouts for each student may be tracked year-to-year and then compared to the grade point averages (GPAs) of each student.[10] The results would frame the library's value in terms of how its collections impacted the student's GPA rather than the number of checkouts alone. An increasing amount of the literature is falling into this type of value research, and this trend mainly is the result of ACRL-sponsored research and activities.

Relevant ACRL Documents

The ACRL RFP specified several of its publications as key documents for review.[11] This literature review provided the team with several themes and factors that formed the basis of a two initial codebooks (see Appendix A for the codebooks). Some of these publications are summarized below to exemplify how these codes were selected.

ACRL's 2010 *Value of Academic Libraries* report provides an overview of how academic librarians articulate value to higher education stakeholders and identifies ten areas of library value. Areas informing the codebooks include: student enrollment, retention, and graduation; success; achievement; learning; and support of faculty teaching. Based on these identified areas, the report concludes with a series of

recommended next steps. The steps having most relevance to this project detail the importance of the academic library to not only establish student outcome measures, but also to document and communicate outcome attainment to higher education stakeholders, as well as to engage in higher education assessment initiatives.[12] While the determination and establishment of outcome measures must be made, there appears to be a significant need to link these outcomes to a broader higher education context beyond the library's walls.

Based on these recommendations, ACRL created an action-oriented project, *Assessment in Action* (AiA), which built a community of practice around assessment among more than seventy higher education institutions.[13] Findings from the shared assessment methodologies and tools informing the codebooks denote the effectiveness of library assessment when libraries collaborate with other campus units, assessment aligns with institutional goals, and mixed methods approaches are employed. Codebook values also incorporate findings that emphasize the contribution of library instruction and spaces, as well as collaborative instructional activities, instructional games, and multiple instruction sessions, to student outcome measures.[14]

To capture the broader, higher education context of assessment, ACRL also completed an environmental scan[15] and identified trends in higher education.[16] The *Environmental Scan* report indicates growth of interest among higher education stakeholders in linking the following areas to outcome measures: research data services, discovery services, and the library as a place for student success.[17] These areas are mirrored in the "2016 Top Trends in Academic Libraries" report, particularly the importance of the library in supporting digital scholarship. The report also explains how information literacy assessment has changed to include contributions to student and institutional-level outcomes – the third type of value research outlined in the previous section, "Assessment and Evaluation Literature."[18] As with the prior resources addressed in the literature review, these identified areas informed development of the initial codebooks.

Methods

Developing the Codebook

After completing the literature review, the team developed a list of proposed codes for two initial codebooks. These codes are divided among two schemes: 1) thematic codes and 2) factors of inquiry. Each coding scheme is now discussed in more detail.

Thematic codes indicate higher education trends to which libraries are responding. These codes were developed qualitatively. According to Charmaz, "Rather than relying on preconceived categories and standardized procedures, qualitative coding has its own distinctive structure, logic and purpose."[19] Given that this report focuses on higher education trends and library responses, the research team focused on these two areas when developing the codebook. A list of thematic codes under each category was developed deductively, taking "a 'provisional' list of codes from theoretical frameworks and extant research in the topic area."[20] This list was informed by a broad review of the assessment and evaluation literature, as well as focused review of the ACRL documents designated by the RFP.

Factors of inquiry codes capture the demographics of the literature and were collected to make the studies more accessible and findable when using the visualization tool the team will develop during a later project stage. Specifically, these factors can be queried against the higher education trends and library responses in the thematic coding scheme to provide both researcher-practitioners with an overview of the current state of research on assessment within a broader, higher education context. These codes were developed quantitatively as "preconceived, logically deduced codes into which the data are placed."[21] Coding follows Connaway and Radford's four basic guidelines for developing quantitative codes.[22] Three sets of coding categories were derived from the research questions to examine: 1) the institution (geographic location, type, sector affiliation, multiple institutions), 2) libraries (service, measurement), and 3) the methods by which libraries communicate effectiveness to institutions (outcomes, user measurement, analysis method). Each set contains an exhaustive list of categories with nominal values, established by first creating as many categories as possible and then combining and reducing them as coding progressed. In some cases, the category of "Other" is used and team members monitored any instances in which large percentages of observations fell into this category, refining the scheme as necessary. While categories within each set are mutually exclusive, in some coding categories more than one code can be applied, e.g., the study may use

multiple quantitative analysis methods. Finally, the development of categories was based on the team's knowledge of the assessment literature and research methods.

For both coding schemes, the team developed codebooks including the code, its definition, and an example (thematic) or its possible values (factors of inquiry). Appendix A depicts each codebook in full.

Content Analysis

The team searched in both higher education and LIS databases for literature that aligned with the themes identified in the literature review. Selected higher education databases were Academic Search Premier, Education Resources Information Center (ERIC), ProQuest Education Journals, and Teacher Reference Center. Selected LIS databases were Library and Information Science Abstracts (LISA), Library Literature & Information Science Full Text (H.W. Wilson), and Library, Information Science & Technology Abstracts (LISTA). In addition, the team members added relevant papers from the Association of Research Libraries (ARL) Library Assessment Conference (LAC) and Ithaka S+R reports. Search delimiters narrowed the results to studies conducted since 2010 addressing student outcomes and mentioning libraries.

The team then reviewed the retrieved documents in light of the project's key research outcomes and questions, adding and removing documents as necessary. It, therefore, should be noted that the content analysis does not represent an exhaustive review of all assessment and evaluation literature, but rather only literature pertaining to student outcomes, libraries, and higher education. A total of 357 documents were added to the report bibliography and designated as either a key thematic piece (n=53), key study (n=38), other thematic piece (n=113), or other study (n=153). The designations "key" and "other" were based on the alignment of each piece within the thematic coding scheme. Pieces coded as thematic identify a higher education trend or a library response to that trend where no research or study was conducted, e.g., literature review. For this reason, thematic pieces were only coded using the thematic scheme, while studies were coded using both the thematic and factors of inquiry schemes. Another way to think about the "thematic" and "study" categories is to envision them as "research" and "practice," respectively. In sum, all 357 documents were coded using the thematic scheme and 191 studies (key and other) were coded using the thematic and factors of inquiry schemes.

All documents were imported into NVivo, a qualitative analysis software program. Using the codebook, two members of the project team coded 20% of the documents (seventy-two for thematic scheme, thirty-nine for factors of inquiry scheme). For both coding schemes, codes were applied quantitatively, i.e., directly mentioned in the literature, and qualitatively, i.e., inductively derived from the literature.[23] This combination of coding methods allowed the team to align their analysis with the research questions, while also facilitating the addition of three additional coding categories to the thematic scheme (Inclusivity/Diversity, Collaboration, Communication) and a few additional values to some of the factors of inquiry coding categories. Thematic codes were applied as nodes within NVivo, while factors of inquiry codes were applied as attributes within an Excel sheet then imported into NVivo as a demographic master. This strategy allowed the team to keep both sets of codes conceptually distinct and facilitate cross-querying of one coding scheme against another, such as finding all documents discussing accreditation (thematic) that use qualitative methods (factors of inquiry). This cross-querying capability will later feed into the visualization portion of the project in facilitating more specific researcher-practitioner inquiries.

The team members then reviewed the codes, discussing any coding discrepancies and revising the codebook to reflect them, and achieved 95% agreement for the factors of inquiry scheme and 99% agreement for the thematic scheme. The two team members then compared coding with a third team member, again discussing any coding discrepancies and revising the codebook to reflect them. Following this discussion, the team attained 100% agreement for both coding schemes on 20% of the documents. To code the remainder of the documents, the team used NVivo's text query for an agreed-upon selection of words that would identify thematic factors for the studies and thematic pieces. Then a coder reviewed the entire document with the queried words identified to facilitate coding.

After codes were applied using both schemes, one member of the research team ran a series of matrix coding queries in NVivo, in which each row represented a document and each column a thematic code. These matrices were filtered by attributes of interest from the factors of inquiry coding scheme. Values

within each matrix were then converted into binary values, meaning that each document either had a code of "0" or "1" to indicate absence or presence of a code, respectively. This coding decision was made in light of the research questions, which indicated that a document represented an appropriate unit of analysis given that it indicates a distinct library response. The next section, which discusses findings, relies on descriptive and inferential analysis. Specifically, the total number of codes applied to all of the documents was calculated as well as the percentage of documents containing each code. In some instances, basic statistics were also calculated, e.g., mean, median, or standard deviation. Inferential statistics were used to test whether the number of codes in a specific thematic category were significantly different across two or more different groups as well as whether specific codes followed a linear trend over time.

Focus Group Interviews

To ensure that the findings from the content analysis resonate with practicing librarians and administrators in higher education, the team formed an Advisory Group consisting of academic library administrators at fourteen institutions that include community colleges, four-year colleges, and research universities from secular, non-secular, public, and private institutions representing the four geographical regions of the United States (see Appendix B for a list of the fourteen Advisory Group institutions). Advisory Group members will address the research questions via a variety of elicitation methods, including focus group and individual semi-structured interviews.

On Tuesday, October 11th from 1:00PM-2:30PM EST, the team held an online focus group interview with eleven advisory group members (the other three members have been asked to provide written responses to the focus group protocol; responses are forthcoming). The focus group interview was conducted virtually using WebEx conference software and audio from the meeting was recorded and transcribed. The purpose of a focus group interview is "to explore in depth the feelings and beliefs people hold and to learn how these feelings shape overt behavior,"[24] first by beginning with broad discussion and gradually winnowing down to the core research focus.[25] Focus group interviews can be used for multiple purposes; those most relevant to this project are to "examine known research questions from the participants' perspective"[26] and obtain "participants' interpretations of results from earlier studies," namely from the content analysis portion of the study.[27] Project lead, Connaway, moderated the focus group interview and ensured that participation was equitable, desired themes were addressed, and the session ended on time. While an interview schedule was developed for the focus group interview (see Appendix B), Connaway used the schedule as a guide to engender a free flow of discussion around core themes identified in the content analysis portion of the study.[28]

Interview audio was transcribed and imported into NVivo, where one member of the project team coded the transcript using the thematic coding scheme. Much like in the content analysis portion of the study, coding was both qualitative and quantitative. The unit of analysis was a participant response. If the participant gave more than one response, e.g., providing two examples of how the library communicated value to higher education stakeholders, then each response was coded separately. Based on what was inductively occurring within the transcript, the project team member added a few codes to the scheme. Specifically, two high-level categories from the factors of inquiry scheme (quantitative and qualitative methods) were coded given that participants engaged in a high-level discussion of methods for demonstrating value. In addition, a code for "Privacy" as related to data collection was added, as well as a code to identify "Juicy Quotes," which are particularly interesting or notable statements. Use of juicy quotes "brings the research to life and enables the reader to hear the participant's voice, which adds validity to the findings."[29] Another team member then reviewed the codes, amending them as necessary based on the codebooks.

Similar to the content analysis, a matrix coding query was then run in NVivo, where one row represented the focus group interview transcript and the columns indicated how many times each code was applied. Since the unit of analysis in this case was each participant's distinct response, rather than at the document level, these codes were not converted to binary values. In the next section, these values are presented descriptively and inferentially.

Findings

Content Analysis

The thematic coding scheme indicates the presence of higher education trends, e.g., Accreditation, Provision of technology, and the libraries' response to these trends, e.g., Service, Collection. All documents were coded for the presence of codebook themes with Figure 1 and Table 1 indicating how often the themes were discussed in the readings.

Figure 1: Word cloud of thematic codes for all readings (n=357). Sizes reflect the amount of documents in which each theme was present.

As indicated by Figure 1 and Table 1, it appeared that for all themes aside from Learning in College (n=185, 52%) and Service (n=238, 67%), each theme was coded in less than half of the documents and the majority of themes were discussed evenly across the documents. This observation also was confirmed by the central tendency statistics, in which the mean (n=130, 37%) and median (n=132, 37%) are close together.[30] Since the median is greater than the mean, the distribution is slightly skewed left, meaning that there are slightly more thematic codes applied to a greater number of documents than indicated by the mean. Codes least frequently applied include: Communication (n=91, 25%), Provision of technology (n=81, 23%), Inclusivity/Diversity (n=54, 15%), and Accreditation (n=40, 11%). While none of these codes are outliers, which may be defined as data points more than two standard deviations from the mean (s.d.=55, 16%), it can be observed that the codes Inclusivity/Diversity and Accreditation appeared to not be as frequently discussed in the literature as they are more than one standard deviation from the mean. Service (n=238, 67%) comes closest to being an outlier. It may be concluded that this theme is disproportionately addressed as a library response in the literature.

Table 1: Number of readings per thematic code (n=357)

Code	*n*	*%*
Accreditation	40	11%
Inclusivity/Diversity	54	15%
Provision of tech	81	23%
Communication	91	25%
Teaching support	115	32%
Success in college	128	36%
Assessment	132	37%
Space	134	38%
Collaboration	143	40%
Collection	164	46%
Research support	176	49%
Learning in college	185	52%
Service	238	67%

One question the team had after reviewing these results was whether application of codes might vary by type of document (study, thematic). In other words, the prevalence of each theme was being compared by how often it was discussed in literature supported by recommendations from prior research (thematic), versus how often it was discussed in literature applied in practice (studies). When comparing the number of thematic codes by document type, thematic readings tended to have more thematic codes than studies – approximately 11% more codes. A likely explanation for this observation is that thematic documents include genres such as literature reviews and lists, whereas studies empirically ground a phenomenon or phenomena observed among one or two themes. Even considering this explanation, there were four codes that had more than an 11% mean difference between thematic and study types: Assessment (31%), Communication (28%), Collaboration (14%), and Accreditation (12%).

A two proportion z-test was run to test for significant differences between the proportion of thematic codes in documents coded as thematic versus those coded as studies.[31] This test was chosen since each type of document represents an independent sample and has a non-normal, binomial distribution, given each document was coded with a binary value of "0" or "1" for absence or presence of each theme. P-values were then adjusted for false discovery rates using an approach by Benjamini and Hochberg.[32] Similar to the more rudimentary measurement of percent difference that exceeds the mean, the themes of Assessment, Communication, Accreditation, and Collaboration all exhibited statistically significant differences in their proportions among thematic documents as compared to study ones. Two additional statistically significant differences were found for the codes Provision of technology and Success in college. This findings suggest that these six themes are more often discussed in the context of what libraries *should* be focusing on, rather than what libraries *actually* focus on when demonstrating their value (see Figure 2 and Table 2).

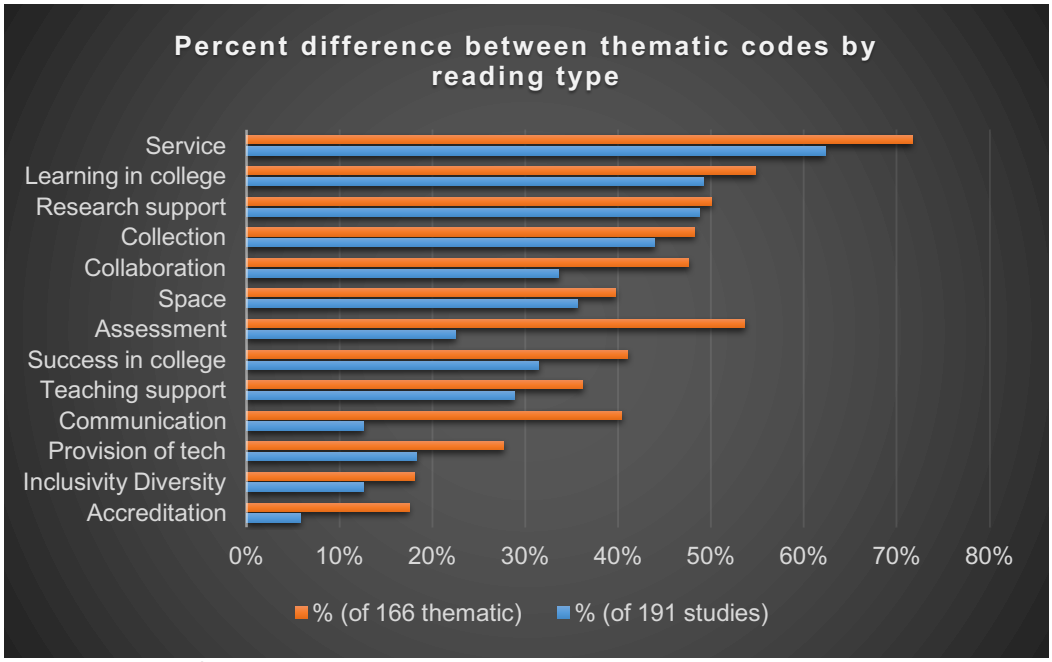

Figure 2: Percentage of documents with each thematic code, divided by whether each is designated as thematic (key, other) or study (key, other).

The team compared the differences in proportion of themes discussed in documents from the higher education literature versus the LIS literature. It should be noted that the search terms used for the database searches included the word "Library" and its derivatives. For this reason, this comparison is only able to inform of differences in the proportion of themes between what is being said about student learning outcomes *as related to libraries* within the higher education literature versus the LIS literature, not student learning outcomes in general.

Table 2. Significant differences between thematic codes by reading type (two proportion z-test)

	n1	*p1*	*n2*	*p2*	*z*	*p*
Assessment	43	0.23	89	0.54	-6.04	*
Communication	24	0.13	67	0.40	-5.83	**
Accreditation	11	0.06	29	0.17	-3.30	*
Collaboration	64	0.34	79	0.48	-2.69	*
Provision of tech	35	0.18	46	0.28	-2.25	*
Success in college	60	0.31	68	0.41	-1.97	*

*p<0.05, **p<0.01

n1=Studies, n2=Thematic

Documents labeled as higher education literature were those retrieved from higher education databases that were not indexed by LIS databases and reports from Ithaka S+R. There were n=18 documents designated as higher education literature (about 5% of the total documents). There were n=52 documents (15%) designated as both higher education and LIS literature since they were indexed by both databases. The remainder of the documents (n=284, 80%) were from LIS literature.

Figure 3 illustrates the percent difference between thematic code by whether a document is from the higher education literature, LIS literature, or higher education and LIS literature.

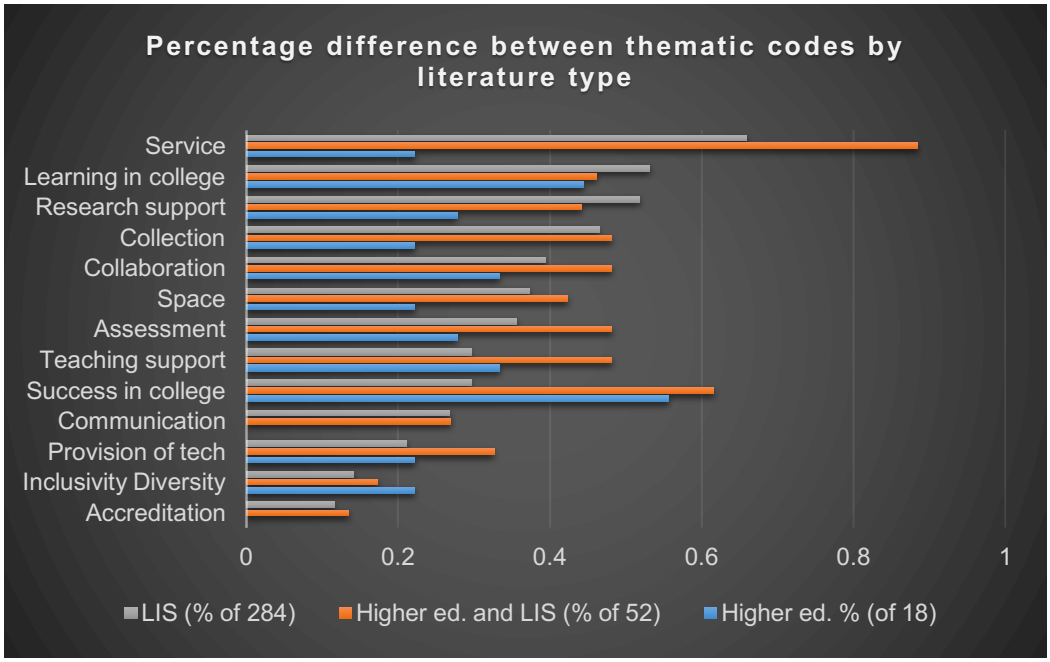

Figure 3: Percentage of documents with each thematic code, divided by whether each is designated as from higher education literature, LIS literature, or both.

Two proportion z-tests were run between the proportion of codes in higher education literature versus LIS literature, higher education literature versus higher education and LIS literature, and LIS literature versus higher education and LIS literature. P-values were adjusted for false positives. The results of the two proportion z-tests indicated that higher education literature demonstrates a statistically significant difference in the proportion of documents coded for Service as compared to LIS literature ($z=-3.76$, $p<0.01$) and higher education and LIS literature combined ($z=-5.32$, $p<0.01$). There also were statistically significant differences

between the proportion of documents coded for Service ($z= -4.45$, $p<0.01$) and Success in college ($z= -3.17$, $p<0.05$) in the LIS literature as compared to higher education and LIS literature.

Next, the team tested whether application of codes might vary by the year the document was published (2010-2016).[33] Most variations between the number of thematic codes by year appeared minor. Categories that appeared to trend in a specific direction over the course of more than two years include Collaboration (increasing in prevalence from 2013-2015), Inclusivity/Diversity (increasing in prevalence from 2014-2016), Learning in College (increasing in prevalence from 2013-2016), Research Support (decreasing in prevalence from 2013-2016), Teaching Support (increasing in prevalence from 2014-2016), and Service (decreasing in prevalence from 2013-2016). Regressions were run to determine how well the x variable, year, predicted the y variable, proportion of codes applied, with p-values used to determine whether the fit of the line was statistically significant. P-values were then adjusted for false discovery rates. Ultimately, none of the regression lines (see "Sparklines" column) depicted in Table 3 are significant, and therefore only descriptive observations can be made.

Table 3. Thematic coding changes over time

Themes by year	*2010*	*2011*	*2012*	*2013*	*2014*	*2015*	*2016*	*Sparklines*
	% (of 63)	*% (of 20)*	*% (of 77)*	*% (of 29)*	*% (of 109)*	*% (of 40)*	*% (of 18)*	
Collaboration	32%	25%	34%	34%	43%	63%	50%	
Communication	25%	30%	16%	38%	24%	35%	33%	
Accreditation	11%	20%	8%	17%	8%	18%	11%	
Assessment	40%	50%	35%	45%	27%	50%	44%	
Inclusivity Diversity	17%	15%	6%	21%	9%	28%	44%	
Learning in college	59%	50%	42%	41%	53%	60%	61%	
Provision of tech	25%	25%	19%	34%	17%	30%	22%	
Research support	54%	45%	56%	62%	44%	45%	28%	
Success in college	24%	30%	23%	66%	27%	73%	67%	
Teaching support	30%	30%	26%	52%	26%	38%	61%	
Collection	46%	50%	55%	62%	42%	28%	44%	
Service	62%	80%	68%	83%	69%	55%	56%	
Space	35%	15%	36%	48%	37%	48%	44%	

Since a significant proportion of the studies reviewed took place at multiple institutions, the team wanted to explore whether there were any differences in the proportion of themes present in studies at multiple institutions versus at one institution. The team cross-queried the thematic coding scheme with the factors of inquiry scheme to determine if differences existed, the results of which are depicted by Figure 4. Studies at multiple institutions tend to focus on the themes Collection (24% more, $z=2.94$, $p<0.01$) and Accreditation (11% more, $z=2.84$, $p<0.01$), and less on Learning in College (18% less, $z=-2.18$, $p<0.05$). Note that all values are significant at these levels after adjusting for false positives. It is also interesting to note that the proportion of studies occurring at multiple institutions declined from 2011-2014, with a slight uptick in 2015 (see Figure 5). It may be that the uptick in 2015 represents the efforts of participating institutions in ACRL's AiA program, which provided librarians with the skills and knowledge to conduct research and the opportunity to collaborate with librarians across institutions.

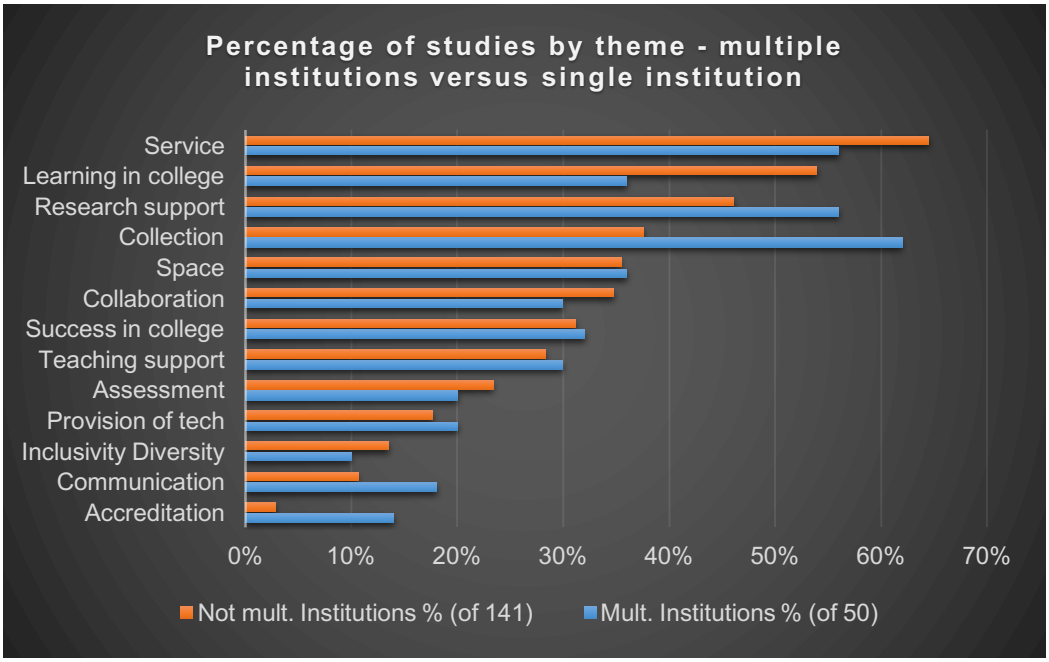

Figure 4: Percentage of studies by theme separated by multiple institutions versus single institution.

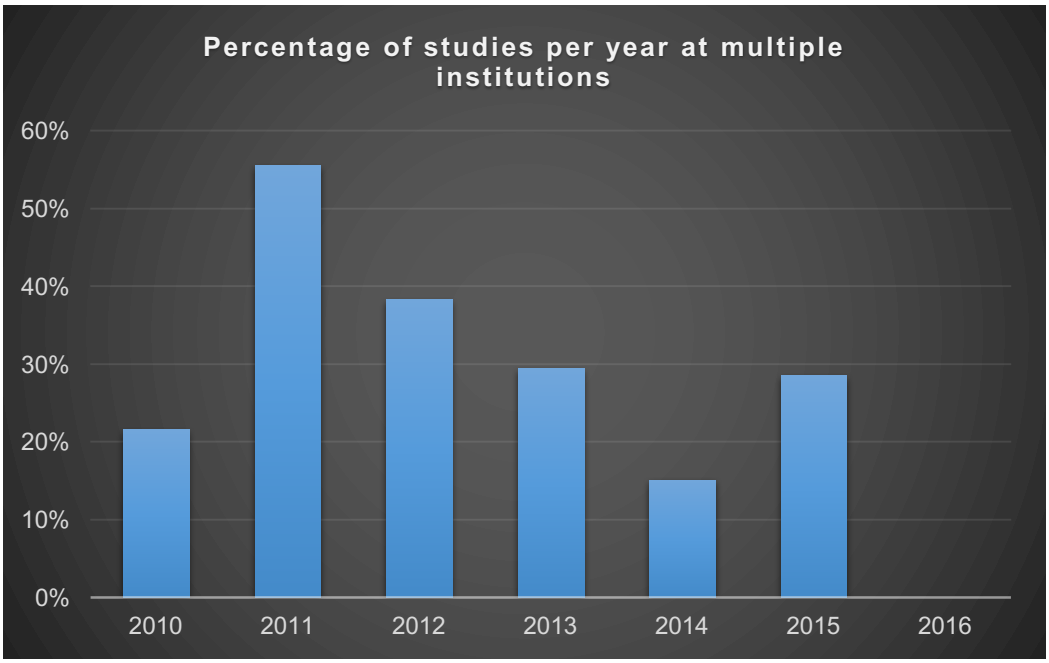

Figure 5: Percentage of studies at multiple institutions by year.

The team next looked into how studies articulated library value by examining measures and methods used. The majority of studies used quantitative methods (n=157, 82%), followed by qualitative methods (n=108, 57%), and then mixed methods (n=80, 42%). Before these categories are further explored, it should be noted that the percentages calculated are divided into the total number of studies (n=191), rather into the specific n pertaining to each category, in order to compare the proportion of codes among the different categories. Of the studies (n=191), the majority used quantitative data analysis (n=147, 77%) heavily relying on descriptive statistics as the primary mode of analysis (n=136, 71%), followed by correlation (n=25, 13%). Inferential methods, such as regression, ANOVA, and chi-square analysis comprised less than 10% of the

studies. Quantitative data collection methods (n=97, 51%) were most often comprised of surveys (n=48, 25%) and rubrics (n=20, 10%), with less than 10% of all studies using the following data collection methods: pre- or post-test, GPA, retention, and persistence. Qualitative analysis (n=96, 50%) was dominated by content analysis methods (n=93, 49%). Finally, qualitative data collection (n=74, 39%) consisted mostly of interviews (n=27, 14%). Figure 6 depicts the number of studies by method, divided by theme.

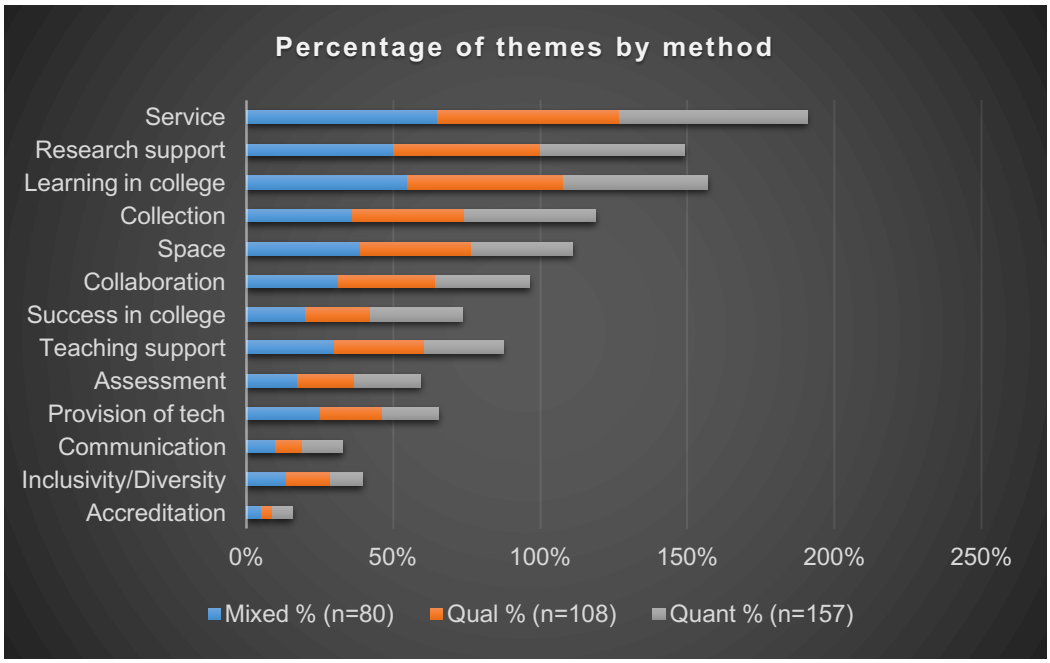

Figure 6: Percentage of studies by themes, divided by method.

Table 4. Number of focus group codes applied.

Theme	*n*	*%*
Accreditation	0	0%
Inclusivity/Diversity	4	2%
Success in college	4	2%
Teaching support	10	5%
Space	11	5%
Collection	11	5%
Learning in college	11	5%
Provision of tech	13	6%
Research support	14	7%
Assessment	21	10%
Collaboration	30	15%
Communication	38	19%
Service	38	19%

Focus Groups

As mentioned in the "Methods" section, the unit of analysis for the focus group interview coding was each response. However, given that there was no way in NVivo to indicate where one response began and another one ended, the resultant coding calculates proportions based on the total number of codes applied. As indicated by Table 3, focus group interview participants most often discussed Service (n=38, 19%), Communication (n=38, 19%), Collaboration (n=30, 15%), and Assessment (n=21, 10%). They less frequently mentioned the themes of Success in college (n=4, 2%), Inclusivity/Diversity (n=4, 2%), and Accreditation (n=0, 0%). When compared to the application of thematic codes to documents (see Figure 6), Service, Communication, and Collaboration were discussed more frequently by focus group interview participants (4%, 6%, and 13% more, respectively). Success in college, Learning in college, Collection, and Accreditation were brought up less frequently (6% less for Success and Learning in college, 4% less for Collection, and 2% less for Accreditation). As indicated by Table 5, all of these values are statistically significant when comparing the proportions of thematic codes using a two proportion z-test and adjusting for false discovery rates. Refer to Appendix B for a list of Advisory Group members that participated in the focus group.

On first pass, it may be surprising that the focus group interview participants did not discuss Student learning and Success, when these two themes are so frequently mentioned in the literature. However, as explained by one participant:

> "I think probably each of us would have some example of our shared strategic initiatives around enhancing students' success. And promoting innovation and teaching and learning. I think those are probably common across all of our institutions. I think what's underlying all of this is that all of us see our work as directly tied to the mission of the university. And it is what makes academic libraries unique in some ways, but also so successful that academic libraries, in my personal opinion, are those that are directly connected to the mission of their unique institution" (Advisory Group Member LM13).

As perceived by this participant and the many others who agreed with them, the library's role in enhancing student learning and success is perceived by librarians to be inherent to the mission of the academic library. However, many participants felt that solely being concerned with fulfilling library-oriented goals would detract from the impact they would be able to have at the university level. This observation may be explained by the fact that the participants are administrators in their academic libraries, therefore their focus is to be strategic and targeted on high-level library goals. It also likely accounts for why themes that implied making connections and establishing relationships outside of the library – Assessment, Collaboration, and Communication – were among those most frequently discussed.

Table 5. Two proportion z-test of thematic codes in documents versus focus groups

	p1	*p2*	*z-value*	*p-value*
Communication	0.05	0.19	-7.66	**
Collaboration	0.09	0.15	-2.75	**
Accreditation	0.02	0.00	2.04	*
Collection	0.10	0.05	2.31	*
Learning in college	0.11	0.05	2.66	**
Success in college	0.08	0.02	3.11	**

*p<0.05, **p<0.01

However, making such connections is not as simple as having a conversation with one specific group or implementing the same strategies to make connections across various ones. Rather the type of outreach beyond the library necessary for its success relates to recognizing and adapting to the unique "eco-system" of relationships within the specific institution (Advisory Group Member LM14). As stated by the following participant:

> "There's one other thing I was uh, when I was sitting here thinking about every, a lot of what's come out is that we're not islands, not that we ever were, but I think part of our success in reaching to students and faculty is the way we collaborate with others….one thing I will say is I think it needs to be sort of multi-level communication from the provost to those relationships you have with other units like the centers for teaching and learning to the academic units to the individual relationships that, that librarians and staff have with faculty and students. You know, all of those levels reinforce each other, and any alone doesn't quite work as well" (Advisory Group Member LM03).

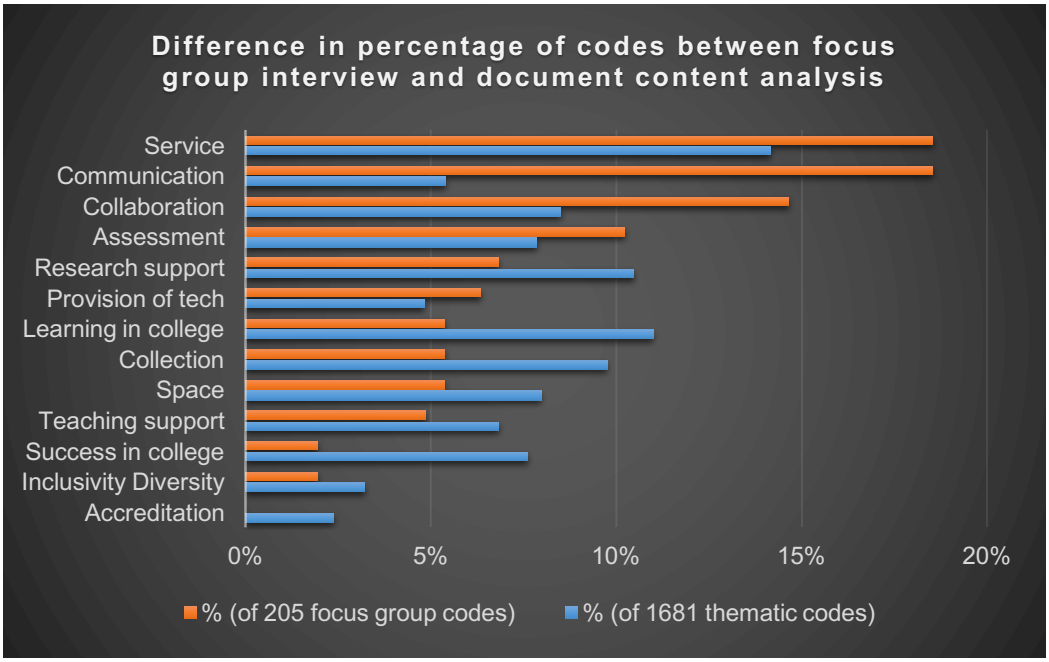

Figure 7: Percentage of times each thematic code was mentioned by focus group interview participants compared to the content analysis of the documents. Note that to make a direct comparison, the unit of analysis for each was the amount of codes applied total.

Establishing multi-level communication requires collaboration. Specifically, librarians must have the ability to recognize how the multiple stakeholders within their specific university ecosystem interrelate and leverage their relationships to attain "shared goals," rather than just library-oriented ones (Advisory Group Member LM07). Some examples of how focus group interview participants achieved successful collaborations that resulted in communicating value are:

- Partnering with departments to support university-required student research projects by offering instructional courses, publishing research in a student-run journal and institutional repository, and hosting relevant campus events, such as research competitions (Advisory Group Members LM06).
- Inviting campus meetings and gatherings to take place in the library building, which increases visibility of the library's space and services among administrators (Advisory Group Members LM08).
- Working with the student government association to advocate to the administration on the library's behalf (Advisory Group Member LM01).
- Partnering with faculty members to institute an embedded librarians program, which results in the former advocating on the latter's behalf (Advisory Group Member LM12).
- Establishing a marketing communication program that considers the best approaches to engage different user groups, e.g., using social media to market to students (Advisory Group Member LM09).
- Completing a two-year pilot study with grant funding to build use of special collections materials into course curriculum, using the feedback from faculty and staff to make a case to the provost to continue the program (Advisory Group Member LM01).
- Examining the learning goals and impacts articulated by other departments to see where potential synergies are present (Advisory Group Member LM07).
- Collaborating with the career office to articulate library impacts with student learning outcomes (Advisory Group Member LM07).

A common thread throughout these examples is that library assessment and communication of value not only pertain to the library, but also capture how the library is integrated within the larger university system. As stated by a focus group interview participant, when considering the library and librarians as "university citizens" (Advisory Group Member LM13), "it is easier to capture the senior leadership attention, because

what they see is the library as a partner in the academic enterprise, helping other units to achieve these goals that at the highest level have been identified" (Advisory Group Member LM07).

Participants discussed quantitative and qualitative methods equally (n=8, n=9, respectively). Participants may not have discussed methods frequently since the overarching themes discussed, i.e., Assessment, Collaboration, Communication, and Service, extend beyond measuring a specific student-centered outcome achieved by the library and, instead, are highly tailored to the specific institutional context.

Privacy only was mentioned once, but is considered by the project team to be an important area of exploration. This topic is particularly fraught in the areas of assessment and academic libraries since there is a lack of established best practices and standards addressing the methods and contexts that may threaten the privacy of students. For this reason, privacy, when broadly defined, can be viewed by librarians in some instances as less of an ethics issue and more of an impediment, as articulated by the following participant:

> "I think that in order to really truly be able to look at, and be able to tell those stories, and to come up with those snippets of information that will resonate with other leaders, we have to be willing to do types of data collection that libraries have shied away from in the past. And I think that involves tracking user behavior in a way that we've seen in a couple of the different studies that have looked at retention. But I think that there are ways of extrapolating and growing that out a little bit more so that we are dealing with large datasets, and we could...We could still keep it anonymous when we look at it in aggregate, right? I think that we have to be able to be willing to have conversations on campus about tracking user behavior in ways that libraries just haven't done" (Advisory Group Member LM14).

Discussion

The team's initial findings suggest several observations about the current state of library assessment research. As noted in the Literature Review, librarians experience difficulty articulating their value to higher education administrators and other stakeholders, and do not appear to be included in discussions related to higher education outcomes, such as accreditation.[34] A review of the current literature suggests that the Accreditation, Provision of technology, and Communication themes are among those least present in the readings. While the Inclusivity/Diversity theme was not prominently discussed in the required ACRL documents, findings from Table 3 denote Inclusivity/Diversity as an emerging means through which to demonstrate library value. The team has determined that this theme is a fruitful one to explore.

When comparing the application of thematic codes to thematic documents versus studies, it becomes clearer that Assessment and Communication are two topics deemed important as themes, but often are not empirically measured. Another topic that appears to be discussed more than it is empiricized is Learning in college. This finding may relate to Oakleaf's observation that librarians have trouble documenting non-quantitative outcomes.[35] Further, the team observed that there is not a variety of methods employed when assessing library inputs. Quantitative data analysis methods are overwhelmingly comprised of descriptive statistics, while collection methods mainly consist of surveys and rubrics. Qualitative methods are similarly homogeneous, consisting of content analysis, interviews, observations, and surveys. While an exercise of homogeneous methods could indicate their success in demonstrating value, focus group interview participants suggest otherwise, contending that the method selected needs to match the methods relevant to senior leadership:

> "…one of the most important things is that you are collecting, sharing, and disseminating that relevant data, quantitative or qualitative within the data environment that your senior leadership is using…And so if your senior leadership as mine is...If yours is focused on learning analytics and you have a data warehouse, and you have a dashboard, our data has historically been segregated. It's not on the dashboard, and therefore these people aren't seeing it. We need to make sure that the data we collect, whether it's quantitative or qualitative, is showing up not just in the library environment that we communicate out, but as a natural part of the evidence that senior leaders are routinely consulting, as they look at where investments across university have an impact" (Advisory Group Member LM14).

For this reason, the team suspects that a homogeneity in research methods may not be attributed to their evidenced effectiveness, but rather could demonstrate methods that librarians have been comfortable with using over time. Given the variety and high turnover of higher education leadership over time, it stands to reason that libraries need to be highly sensitive to their organizational context, including the needs and preferences of leadership. This sensitivity includes an awareness of what leadership regularly utilizes and consults with for decision making, and the methods necessary to communicate information that conforms to these expectations.

The smaller portion of studies employing mixed methods approaches also confirms findings from the literature review of required ACRL documents that few assessment-oriented studies include mixed methods. Given the richness of findings found in assessment studies using mixed methods,[36] their absence from empirical assessment work suggests an ongoing, problematic gap.

The team noticed that Collaboration was an emerging thematic code in the readings selected for content analysis, as well as in the focus group interview. The importance of collaboration between librarians and individuals external to the library, e.g., faculty, administration, also is addressed in the required ACRL documents. Focus group interview participants stressed the importance of envisioning collaboration and communication as intertwined. According to them, efficacy of the library's communication of value can be achieved successfully by being a part of the university eco-system, collaborating at the university's different levels. This finding suggests an implication for the crafting of possible inquiry questions. These questions cannot be insular, e.g., what is the impact of a specific service on a specific group, but rather must take into consideration the library's role as an active participant within a larger university system. Therefore, a more appropriate structure for an inquiry question would query the impact of a specific service, expertise, and resource on an identified student outcome *relative to the overarching mission, goals, and/or needs of the institution*, and look for the opportunities for collaboration and communication that will incorporate this mission. At first glance, this proposed addendum sounds rather obvious. After all, this report distinctly focuses on how library-generated impacts on student outcomes aligns with the institutional mission, needs, and/or goals. Yet the addition of this element into the structure of an inquiry question provides a distinct challenge in that it requires the team to consider some of the factors that structure an academic eco-system and the library's position within it.

There is a significant difference in the proportion of documents in the higher education literature and the LIS literature that were coded for Service and Success in college. Service was coded less in the higher education literature than the LIS literature, which is not surprising since librarians and libraries often are discussed in terms of service and services. The higher proportion of higher education documents coded with the theme Success in college may indicate that librarians should be considering how to better articulate and disseminate the impact of library resources and services on student success.

The team's ability to query across different coding schemes (thematic, factors of inquiry) depicts the building blocks for the visualization tool that will be built at a later stage of this project. As the team has been able to display the results for queries such as *How many studies measuring success in college use mixed methods?* library practitioners and researchers will be able to run their own queries to not only aid in discovery of relevant literature, but also to assist them in drawing their own conclusions and inferences about what should be done to address the current landscape of library assessment.

Conclusion

The preliminary analysis of the literature suggests that librarians are discussing, but not engaging in assessing, the issues of interest that prevalent in the thematic literature. These topics include outcomes such as Assessment, Communication, Accreditation, Collaboration, Provision of technology, and Success in college. These preliminary findings help to explain why librarians have difficulty articulating value to the academy – they do not seem to be focusing on the same topics deemed important within the context of what higher education administrators and decision makers want. One topic that may be easy for librarians to address is the Provision of technology. With the importance of data management and technology for teaching and learning, librarians could offer faculty, students, and researchers ways to integrate technology into their workflows and the library could offer the infrastructure. One of the Advisory Group members stated

that the allocation of funds for the library's renovation project was based on the library being the place for providing technology to the academic community. In addition, librarians do not seem to be focusing on communication, which is crucial when advocating for any cause, including the library.

Another interesting preliminary finding is the minimal amount of empirical methods associated with the study of Assessment and Communication in the literature. In order to articulate the value of services offered by the library to the academic community, both qualitative and quantitative data are needed to demonstrate this value. Yet, the analysis of the literature indicates a small number of assessment-oriented studies use mixed methods. This gap is something that LIS education and continuing education programs could address in course offerings. If librarians were educated to use mixed methods, they would feel more comfortable using them to articulate the value of their services to the academic community.

The minimal use of mixed methods is surprising since the library literature indicates a disproportionate number of papers addressing library service. Again, in order to measure the effectiveness of library services, it is critical to augment the discussion with data. Addressing the difference in the proportion of the themes of Service and Success in college in higher education and LIS literature may be a perfect opportunity for LIS professionals and researchers to integrate qualitative research methods with the quantitative methods most often used to measure success in college for a mixed methods approach.

Although there are gaps in the literature, there also are themes addressed that indicate that librarians are aware of some of the trends in higher education. These include Service, Learning in college, Research support, and Collection. All of these are important in higher education and on the librarians' radar. The inclusion in the literature of these themes indicates that librarians have identified areas where libraries can make a difference. Now they may need to focus on how to measure the effectiveness of these efforts in order to articulate the value they bring to the academic community.

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Appendix A: Theme Codebook

Identify the appropriate library response (Collection, Service, or Space) discussed that can be inferred based on the codebook definitions.

All trends and studies in this report deal with student outcomes. However, trends may involve other stakeholders as indicated below:

Yellow	Students
Green	Students/Faculty
Blue	Faculty
Red	Institution (administration)
White	Other

Higher education trend	Trend defined	Example of library responses to trend
Learning in College (and beyond)	Outcome was focused on the less objective concepts of learning, such as critical thinking. Usually not tied to a specific graded assignment or graduation.	Service: Library instruction Space: Collaborative working space for students Collections: Repository of online tutorials not linked to a specific class
Success in College (for multiple student groups)	Outcome was focused on the more objective indicators of learning, such as GPA or grades. Usually tied to a specific graded assignment or graduation.	Collections: Physical collections Collections: Digital collections Space: Study spaces Service: Library instruction Service: Collection discovery
Research Support	Outcome was tied to research outside of a class.	Collections: Physical Collections: Digital Service: Data storage Service: Consultation Service: Teach data management Service: Teach data mining methods Service: Collection discovery Space: Research (as opposed to learning) commons
Teaching Support	Outcome was viewed from an instructor perspective and it deals with a specific course.	Service: Library instruction Service: Help instructors manage pedagogical and curricular changes Collection: Online repository of syllabi Space: Faculty development center
Accreditation	Accreditation-related student outcomes	Service: Help institutions meet federal guidelines/requirements
Assessment (driven in part by affordability of higher education)	Institutionally identified student outcomes (can be co-coded with learning and success)	Service: Educate library and other employees Service: Align with institutional mission

Provision of Technology	Outcome dealt with hardware/software that affect student outcomes.	Service: Provide expertise for data management Space: Provide hardware and software in Makerspaces

Other thematic codes (does not have to align with library service, space, or collection).

Code name	Code definition	Example
Inclusivity	Marginalized groups in the context of the institution and/or larger society and culture.	First generation college students; People of color; Commuters; Distance learners; English as a second language; Lower socioeconomic level; Transfer students
Collaboration	Librarians work with other institutional departments to impact student outcomes or with other institutions.	Collaboration could be intra-institutional (e.g., with institutional planning unit; faculty) or inter-institutional (e.g., with multiple institutions)
Communication	Librarians communicate impact or other aspects of value with stakeholders.	Newsletters; Emails; Networking

Appendix A: Factors of Inquiry Codebook

Code name	Code definition	Values
Year	Year study was published.	2010 - 2016
Geographic location	Major geographic regions as defined by census at: http://www.census.gov/econ/census/help/geography/regions_and_divisions.html or outside of the US where the study was performed; Do not code if institutions were in different regions.	Northeast; Midwest; Outside the US; South; West
Type	Type of institution where the study was performed; Do not code if multiple institution types were studied.	College; Community college; University
Sector affiliation	Whether institution was public, private, secular, or non-secular; Do not code if multiple institutions are not the same.	Private; Public
Multiple institution	Code if study involved multiple institutions.	Multiple institutions
Outcomes	Specific student outcomes that are tied to a more objective qualitative or quantitative indicator of learning for a specific assignment, class, or graduation.	Enrollment; Graduation; Learning; Retention; Student engagement; Student success
Library service	Library service studied.	Collections; Discovery; Instruction; Reference; Space

		(physical or digital)
Library measurement	How the library service was measured.	Usage; Attendance
User measurement – Qualitative	How the user data were collected via qualitative methods. Interviews include individual and group interviews. Reference interviews are considered content analysis.*	Interviews; Surveys; Other
User measurement – Quantitative	How the user data were collected via quantitative methods. Interviews include individual and group interviews.	GPA; Persistence; Pre/post test; Retention; Survey; Rubric; Other
User measurement – Student type	Status of participants. Other includes faculty/staff.	Undergraduate; Graduate; Other
Analysis method – Qualitative	How the data were analyzed via qualitative methods.	Content analysis; Other
Analysis method - Quantitative	How the data were analyzed via quantitative methods.	ANOVA; Regression; X2; Descriptive statistics; Correlation; Other

*Note: When the researchers use a rubric to evaluate student work, the analysis method is considered only quantitative if they only discuss the numerical values assigned to student work. If they report qualitative findings (e.g., themes) from the student work, then the qualitative analysis method may also be used (e.g., content analysis).

Appendix B: Advisory Group Institutions

Code	University Type	Religious Status	Region
LM01	Four-year College	Secular	Northeast
LM02	Research University	Non-Secular	Midwest
LM03	Research University	Secular	Northeast
LM04	Research University	Secular	South
LM05	Community College	Secular	Northeast
LM06	Research University	Secular	Midwest
LM07	Research University	Secular	Northeast
LM08	Research University	Secular	West
LM09	Research University	Secular	South
LM10	Four-year College	Non-Secular	West
LM11	Research University	Secular	West
LM12	Community College	Secular	Northeast
LM13	Research University	Non-Secular	Midwest
LM14	Research University	Secular	South