Extending our reach: Integrating librarians and library resources into Canvas

Beth Auten, MSLIS, MA, AHIP, https://orcid.org/0000-0002-9335-5315

Rebecca Croxton, MLIS, PhD, https://orcid.org/0000-0002-2045-5251

Catherine Tingelstad, MLIS, MHA, https://orcid.org/0000-0002-0699-0805

J. Murrey Atkins Library, University of North Carolina at Charlotte, Charlotte NC, U.S.A.

Beth Auten, beth.auten@uncc.edu, J. Murrey Atkins Library, UNC Charlotte, 9201 University City Blvd., Charlotte, NC 28223

Beth Auten, MSLIS, MA, AHIP, is the Health & Human Services Librarian at J. Murrey Atkins Library at UNC Charlotte, working with faculty and students in Kinesiology, Nursing, Public Health, and Social Work. She has an MA in Anthropology from the University of Florida, and an MS in Library and Information Studies from Florida State University. At UNC Charlotte, she works with a number of online-only and distance programs, and has a strong interest in integrating the library into the university's learning management system and providing other support for online learners.

Rebecca Croxton, MLIS, PhD, is the Head of Assessment for J. Murrey Atkins Library at the University of North Carolina at Charlotte. She earned a PhD in educational studies, a doctoral minor in educational research methods, and her MLIS degree from the University of North Carolina at Greensboro. She is an active researcher and has published numerous articles and presented nationally on a variety of topics including online learning, professional identity development, quantifying the value of the academic library, and information seeking needs, preferences, and motivation of undergraduate students.

Catherine Tingelstad, MLIS, MHA, is the Instruction & Curriculum Engagement Coordinator at J. Murrey Atkins Library at the University of North Carolina at Charlotte. She earned her Master of Library Science from North Carolina Central University and a Master of Healthcare Administration from Virginia Commonwealth University. Her research interests include embedded instruction, digital media literacy, curriculum development and integration, and instructional outreach and promotion.

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A team of librarians developed and implemented a plan to create coordinated library access for all students through the Canvas learning management system. Partnering with campus information technology services, librarians developed a specialized role in Canvas. Librarians also used Springshare's LibApps LTI (learning tools interoperability) to integrate research guides in Canvas, using course metadata to map guides to the appropriate subject or course. Evaluation of the impact of adding a librarian role and mapping research guides to the Canvas LMS is ongoing, and indicates these changes have affected the way students are accessing library resources.

Keywords: learning management systems; embedded librarianship; research guides; LTI

Introduction

At UNC Charlotte, librarians have implemented a plan to incorporate library resources and services into the university's learning management system, Canvas. The purpose of this article is to share the implementation process and to present usage data involving Canvas as an access point for students to connect with library information. This retrospective analysis focuses on faculty members' increased use of the librarian role and changes in the strategies students used to engage with the library's guides after the implementation of Springshare's LibApps LTI (learning tools interoperability). Usage data related to the librarian role and the LTI will be used to inform future efforts to build and customize the library's presence in Canvas.

Literature Review

Over the last two decades, librarians have collaborated with faculty and information technology administrators to embed library resources and services in learning management systems (LMS). The practice of embedding library resources in the LMS to promote information literacy began in

the early 2000s.[1] According to Burke and Tumbleson, "The movement of librarians into learning management systems (LMSs) has been a natural progression as higher education institutions embraced these tools for supporting teaching and learning."[2] Embedded librarians can connect with large numbers of students at their point of need and can promote the library's resources and services to faculty and students who may not have been aware of them. Read and Morasch explain, "...performance support elevates the visibility of the library, its importance to academic conversations, and its role in academic success."[3]

As strategies for embedding have changed over the years, the purposes for doing so remain much the same. Most importantly, embedding allows librarians to be available and accessible to students. Burke and Tumbleson state, "LMS embedded librarianship takes the … librarians' educational role into the virtual environment of the LMS."[2] They explain that "the librarian becomes a member of the course, with full access to assignments, course materials, discussion forums, and other resources provided by the instructor. This access gives the librarian insights into the course beyond what is typically available when planning a one-shot instruction session."[2] Phillips elaborates on that relationship stating, "Students are more aware of what resources and services are available, and they are more ready to seek assistance when they need it having established a relationship with the embedded librarian."[4] Beyond connecting students to the knowledge and skills of librarians, the embedded model brings library resources to the student point of need. Read and Morasch emphasize the importance of student access to library resources stating, "In addition to these vital library tools and services, resources also need to be placed at the exact moment of need in students' coursework. Research from corporate training points to the benefits of electronic performance support systems as point-of-need information

support."[3] As students spend more time in the learning management system and grow accustomed to finding essential information and resources there, it is important that the library maintains a presence in the system. "When instruction is not placed strategically at assignment level or the point of need, resources go unnoticed and unused."[3]

There are many specific examples of librarians using learning management systems such as Canvas to embed in courses, incorporate library resources into online coursework, and build learning modules focused on information literacy and library instruction. Librarians at Appalachian State University and UNC Greensboro created specialized programs and services tailored to the needs of graduate students in online and distance programs.[5] At UNC Greensboro, one of these developments was a specialized librarian role in Canvas created by a librarian working with the university's Information Technology Services unit. Librarians at Penn State University also created and refined a customized librarian role in Canvas, through collaboration with the university registrar and campus learning management system team.[6]

Since many libraries use Springshare's LibGuides to create customized portals to content, the development of an LTI (learning tools interoperability) that allowed a library's guides to be linked to courses in an LMS provided new opportunities for creating and maintaining a library presence in online courses.[7] Librarians at the University of Central Florida used the LTI to deliver content more efficiently to nursing and composition courses consistently to students across many course sections with many different instructors, through the Canvas LMS, using LibGuides and the automated course mapping feature.[8] Librarians at Penn State University used automatic guide association to connect guides to most courses using metadata,

but also used custom guide association to manually configure some associations between courses and guides.[9]

To evaluate the success of their efforts to embed in learning management systems, many libraries have implemented program assessments to determine their effectiveness. Assessment allows librarians to gather information which can be used to expand and solidify their presence in the learning management system. As is true with other attempts to measure library instruction outcomes, assessing the effectiveness of embedded librarians can be problematic. It may be difficult when assessing the impact of library resources, as the data available is largely correlational. Tumbleson, Burke, and Long suggest, "Although librarians intuit their instructional role as valued on campus, it has proven more difficult to demonstrate direct correlation and to quantify learning results."[1]

It is important to consider that embedded librarians may not be able to view information that an effective assessment would require. "The limited role of the librarian in the LMS course may reduce the types of analytics that the embedded librarian may access."[1] Tumbleson, Burke, and Long assert that "there are very few assessment studies focused on LMS embedded librarianship that can guide current practitioners. Existing LMS embedded librarianship studies have been more typically qualitative, based on self-reported student improvement and faculty feedback."[1] However, the qualitative information that exists often reveals that embedded library resources are being used and are perceived to be beneficial to student performance. In a study conducted at the Ohio State University, students who used embedded library research guides commented that they were useful in completing their course assignments.[10] Another survey of the embedded librarian program at Washington County Community College in Maine revealed that

most students had a "positive perception of the embedded librarian and [were] largely satisfied with the resources and services offered."[4]

There is substantial opportunity for growth in the assessment and expansion of embedded librarianship within learning management systems. Tumbleson, Burke, and Long propose, "This arena of library instruction has great potential for growth, especially as institutions expand their online course and degree offerings and faculty increase their use of learning management systems."[1] However, in order to accurately determine the impact of embedded librarianship, it is essential that further work be done to provide qualitative and quantitative evidence regarding its contributions to student learning.

Description of the Project

The University of North Carolina at Charlotte (UNC Charlotte) is a public research university, with a current total enrollment of over 29,000 undergraduate and graduate students, and nine colleges, including the Belk College of Business, Cato College of Education, College of Arts + Architecture, College of Computing & Informatics, College of Health & Human Services, College of Liberal Arts & Sciences, Honors College, University College, and William States Lee College of Engineering. The J. Murrey Atkins Library at UNC Charlotte serves the needs of the entire campus. The library's collections are curated with the intent of supporting the breadth of instruction, research, and scholarship at the university, and librarians in the Research & Instructional Services (RIS) department within the library liaise with the various colleges and departments to support the students, faculty, and staff in their designated units.

Beginning in summer 2016, the entire campus began the transition from the Moodle learning management system to Canvas, developed by Instructure. By the beginning of the fall semester in 2017, all courses previously supported by Moodle had been moved to Canvas.

In the past, Atkins Library had a list of static links to various library resources such as the library website, the study room reservation system, LibGuides, copyright resources, and other frequently-used resources that displayed in every Moodle course. When Springshare made their LTI available to LibGuides CMS customers in 2015, it allowed libraries to embed course-specific content into various learning management systems by linking relevant research guides and other content directly into courses in the LMS.[7] The further development of the LTI to allow for automatic mapping of guides to courses in the LMS using metadata made this a tool for linking library content into many more courses without a librarian being directly involved. Librarians at UNC Charlotte were in the process of implementing this when the transition to Canvas began. Setting up the LTI in Canvas (or any LMS) usually requires coordination with stakeholders and organizations on campus outside of the library. At UNC Charlotte, the Canvas administrator along with campus Information Technology Services and the Center for Teaching and Learning, the units that respectively provide support and training for using the LMS, make decisions about what features and outside tools to add to Canvas.

During the initial phases of implementing Canvas campus-wide, the Canvas administrator and units involved with support and training intentionally chose not to add many new features to Canvas. By the fall semester of 2017, when Canvas implementation was complete and, coincidentally, the authors of this paper joined the organization as new faculty, the Canvas

administrator and stakeholders outside the library were willing to discuss implementation of the Springshare LTI in Canvas.

Librarians at UNC Charlotte embedded in courses in the LMS in Moodle prior to the transition to Canvas, and embedded in Canvas after the transition in various course roles. During the initial setup, only existing roles for people in courses were available: Designer, Observer, Student, Teacher, and TA. Depending on the level of involvement a librarian had in a course, the faculty member teaching the course would add them in the most appropriate role; for example, a librarian adding assignments, manually linking to LibGuides, or other content could be added to a course in the Designer role, while a librarian involved with co-teaching and grading assignments would need to be added in either the Teacher or TA role.

In Fall 2017 and early 2018, several librarians who worked on LibGuides in the administrator role and had an interest in linking library content directly to Canvas courses began meeting among themselves to discuss potential goals and actionable steps. The goals for developing a library presence in Canvas included reaching students at the point of need, creating awareness of library services and resources, defining a librarian role in courses, and better serving online students. In particular, the university's College of Health & Human Services has a number of programs that are entirely online, that offer online-only versions of various courses, or that meet at the university's Center City campus, which does not house a physical library or library staff onsite. The Health & Human Services Librarian and the Instruction & Curriculum Engagement Coordinator both came from academic institutions that supported various online programs and courses, and identified a need to provide access to library resources to students who are always or usually off campus. After meeting with the Canvas administrator in January

2018, the librarian team decided on a tentative plan and timeline for integrating the library into Canvas.

The first step, based on input from the Canvas administrator, was planning a designated librarian course role in Canvas. A designated librarian role is something that has been used at other institutions to allow librarians to be added to courses to provide research support and instruction. The next step was to create the role in a test environment in Canvas before activating the feature in the live production environment. After the implementation of the librarian role, the team would need to choose from one of the various setup options for Springshare's "Automagic" LTI to map library research guides to appropriate courses. Then, with the support of the Canvas administrator, the team would test the LTI in the Canvas test environment before activating the feature in the live production environment. These were two of the methods of integrating librarians and library resources into the LMS other institutions had tried or were in the process of adopting.[5,6,8,9] After these initial two steps, the team planned to start creating library instruction modules for Canvas that could be used in various for-credit courses or potentially in a stand-alone information literacy course.

The development of the librarian role development began with the team looking at a detailed list of possible permissions available for existing course roles and deciding which ones were likely to be used by librarians embedded in Canvas courses. After becoming familiar with the available options, the team presented this information to their colleagues in RIS and elicited their input. The next step was asking the campus Canvas administrator to build an initial version of a customized role that could be tested in a training instance of the LMS. Based on this initial testing, some of the permissions needed to be modified. For example, while librarians wouldn't

be grading assignments in this role (and would instead be added to a course in the instructor role as a co-instructor,) they would need access to the gradebook in order to see student work and provide feedback and suggestions--something that embedded librarians often do. Once these modifications were made to the librarian role and it was tested again, it was activated in the live instance of Canvas and librarians were able to promote the new course role to teaching faculty in the units they work with, beginning in the Spring 2018 semester.

The team then turned its focus to setting up the LibApps LTI "Automagic" feature in order to automatically map library research guides to related courses in Canvas. One of the initial steps on the library side was deciding what should display in Canvas if there was no guide linked to a course by metadata input in existing guides. The team ultimately decided to build a generic "failover" guide that would display links to frequently-used databases, the library catalog, the library chat service, and other resources and services with wide applicability. The team, along with the Canvas administrator, then had to determine what course metadata would need to be used to map guides to courses, and whether a link to library resources should be default item in every course navigation menu. The librarians and administrator decided that a menu item called Library Resources would be an opt-out item in every Canvas course navigation menu, meaning that the course instructor would have to remove that option from their course navigation menu if they did not want it to display. As with the librarian role, initial testing was done in the Canvas test instance once metadata had been entered into some of the library's guides. One fortunate development from testing the LTI was that even courses that do not have a specific guide can use the course prefix to map to a more general subject guide; also, the mapping could be more specific, to the course section level, for course sections that had their own individual guides. The

team of librarians working on this project shared the process with the other librarians in their department in July of 2018 at a summer event held annually where all librarians with LibGuides are provided time and guidance to maintain and make updates to their guides. While adding metadata to existing guides was not mandatory, and some librarians chose not to do it initially, many did. The LTI linking LibGuides to Canvas was activated in Summer 2018, and was officially announced to faculty across campus in Fall 2018. Based on the data presented below, collected from the first year of implementation and compared with the previous academic year, another presentation was made to research and instruction librarians, and other librarians with LibGuides to encourage them to participate.

Methods and Results

Embedded librarian role in Canvas

In academic year 2018-2019, the Librarian role was adopted in 139 Canvas courses. The majority of these adoptions occurred in the Fall semester (70.5%, n=98), just over a quarter (28.1%, n=39) in the Spring semester, with very few adoptions (n=2) occurring in the Summer (see Figure 1). Adoption of the Librarian role in Canvas has continued through the Fall 2019 semester (Summer 2019, n=8, Fall 2019, n=37), though at a slower pace than in the prior year.

Figure 1: 2018-2019 Canvas Courses with Librarian Role
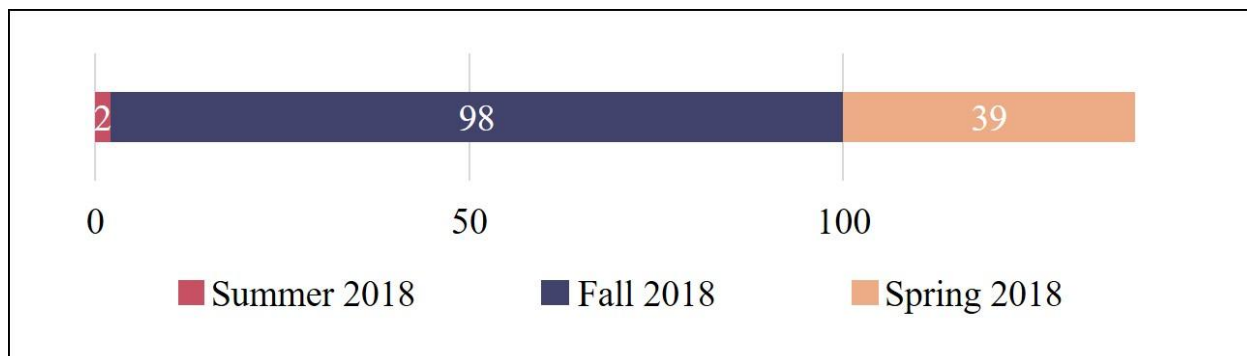
LibGuides Canvas LTI Integration

To assess whether there was a noteworthy change in course associated LibGuide usage between 2017-2018 and 2018-2019, particularly for guides for which Canvas LTI integration was initiated in 2018-2019, a simple comparison study was conducted. In all, 60 course LibGuides were selected for analysis; 30 that had Canvas LTI integration in 2018-2019 (Group 1) and 30 that did not (Group 2). For each academic year of interest (Fall and Spring semesters only), LibGuide landing page (e.g., homepage for a LibGuide) views and the page referral sources were the primary data of interest. The pool of LibGuides considered for selection for each group met the following criteria:

- Guide was associated with a specific course (not a general subject guide)

- 25 or more total guide views in both 2017-2018 and 2018-2019

- If the percent change in the number of LibGuide landing page views from 2017-2018 to 2018-2019 exceeded +/- 200% for a given guide, then it was considered an outlier and eliminated from the pool.

- There was no LTI integration in 2017-2018.

- Group 1 only: In 2018-2019, there were one or more referrals to the LibGuide landing page (e.g., homepage) initiated from an LTI launch in Canvas.

- Group 2 only: In 2018-2019, there were no referrals to the LibGuide landing page initiated from an LTI launch in Canvas.

In all, 165 course guides met the criteria outlined above:

- Group 1: 53 LibGuides for a specific course with Canvas LTI integration

- Group 2: 112 LibGuides for a specific course that did not have course-specific Canvas LTI integration

It was decided that a sample of 30 course guides would be randomly selected from each group. This would provide sample sizes large enough to conduct an independent samples t-test, a statistical test that compares the means of two independent groups in order to determine if there is a significant group difference between them. With the pool of guides that met the inclusion criteria, random numbers were assigned and then sorted low to high. The first 30 guides in the list for Group 1 and Group 2 were selected and used for the analysis for this study.

Using Springshare's LibGuides statistics, the sum totals of landing page views for both 2017-2018 and 2018-2019 were calculated, based upon whether a LibGuide had an LTI integration in Canvas (Group 1, n=30) or did not (Group 2, n=30). The percent change from 2017-2018 to 2018-2019 LibGuide landing page views was then calculated using these sums. Overall, there was a 19.9% increase from 2017-2018 to 2018-2019 in LibGuide landing page views for Group 1. Conversely, there was a 27.8% decline in the number of LibGuide landing page views from 2017-2018 to 2018-2019 for Group 2. These findings are illustrated in Table 1.

It should be noted that for each Canvas course that did not have a designated course- or subject-specific LibGuide, the default, "failover" guide (Atkins Library Research Help) would display in the course, unless the course instructor disabled the Library Resources option in the navigation menu. While the team did not track how many times students in courses that did not display a course or subject-specific guide accessed the generic research help guide, the numbers for access to that guide (11,048 views in Fall 2018 and Spring 2019 semesters) indicate it was used frequently throughout the academic year, particularly for a guide that is not accessible

through the library's website. Thus, while the overall numbers show a decrease in guide usage among Group 2, students may have been accessing the failover guide through Canvas.

Table 1: LibGuide Landing Page Views and Percent Change

	Total LibGuide Landing Page Views		% Change (2017-18 to 2018-19)
	2017 - 2018	2018-2019	
Group 1 (n=30)	6,797	8,588	19.9
Group 2 (n=30)	13,871	10,014	-27.8

The mean percent change in landing page views from 2017-2018 to 2018-2019 were then calculated and distributions reviewed to determine if these data met the assumption for normality required to conduct an independent samples t-test. For both Group 1 and Group 2, the mean percent change was non-normally distributed, with each having a moderate positive skew (Group 1 Skew=.758, SE = .427; Group 2 Skew = .601, SE = .427) (see Table 2). Because the assumptions of normality were violated, an independent samples t-test was not calculated.

Table 2: Percent Change in Landing Page Views - Descriptive Statistics

Group	N	Mean	SD	Min	Max	Skew (SE)
Group 1	30	34.2	58.72	-47.0	180.0	.758 (.427)
Group 2	30	18.1	59.3	-64.5	144.9	.601 (.427)

For Group 1 guides (Canvas LTI integration in 2018-2019 but not 2017-2018), the referral URLs for the landing pages for each of the two years were then categorized by the

researchers as outlined below. With these categorized data, the frequencies and percent totals were then calculated and compared between the two years.

- **Canvas LTI**: Initial LTI launch from Canvas

- **LibGuides access from the library's homepage**: Includes searches within the LibGuides interface that is accessible from the library homepage for a specific subject, guide owner, guide title, etc.

- **LibGuides click back from subpage**: If a person is on a secondary page of the LibGuide and then returns to the LibGuide's landing page, this is considered a "click back."

- **Search Engine:** Google, Bing, Yahoo, etc.

- **Other:** Includes searches from the university's website

- **No Referral URL**: This is the calculated difference between the total landing page views of a LibGuide and the total number of referrals. It was assumed by the researchers that this difference can be explained, at least in part, by instances in which a person directly accessed the LibGuide from their computer such as by clicking a link in a syllabus, having the guide electronically bookmarked, or clicking on a link in an email.

Most noteworthy, in 2017-2018, 58.2% (n=3,955) of the LibGuide referrals came from LibGuide access from the library's website. In other words, students accessed their specific course guides by going to the library's homepage, navigating to the LibGuides interface, and then browsing or searching for a particular guide. In 2018-2019, with the new Canvas LTI integration initiated for these same courses, 31.0% (n=2,660) of the total referral URLs came from Canvas, whereas only 35.5% came from LibGuide access from the library's website. (See Table 3 and

Figure 2.). Together, these findings suggest that the Canvas LTI integration is becoming an

increasingly popular and convenient way for students to access relevant library materials.

Table 3: Referral Sources for Group 1 Guides

	2017-2018		2018-2019	
	Frequency	% of Total	Frequency	% of Total
Canvas LTI	--	0.0	2,660	31.0
LibGuide access from Library Website	3,955	58.2	3,052	35.5
Click back to LibGuide landing pg from subpage	908	13.4	1,213	14.1
No Referral (Direct Access)	1,537	22.6	1,198	13.9
Search Engine	358	5.3	374	4.4
Other	39	0.6	91	1.1
Total Landing Page Views	6,797	100	8,588	100

Figure 2: LibGuide Referral Sources (2017-2018 and 2018-2019)
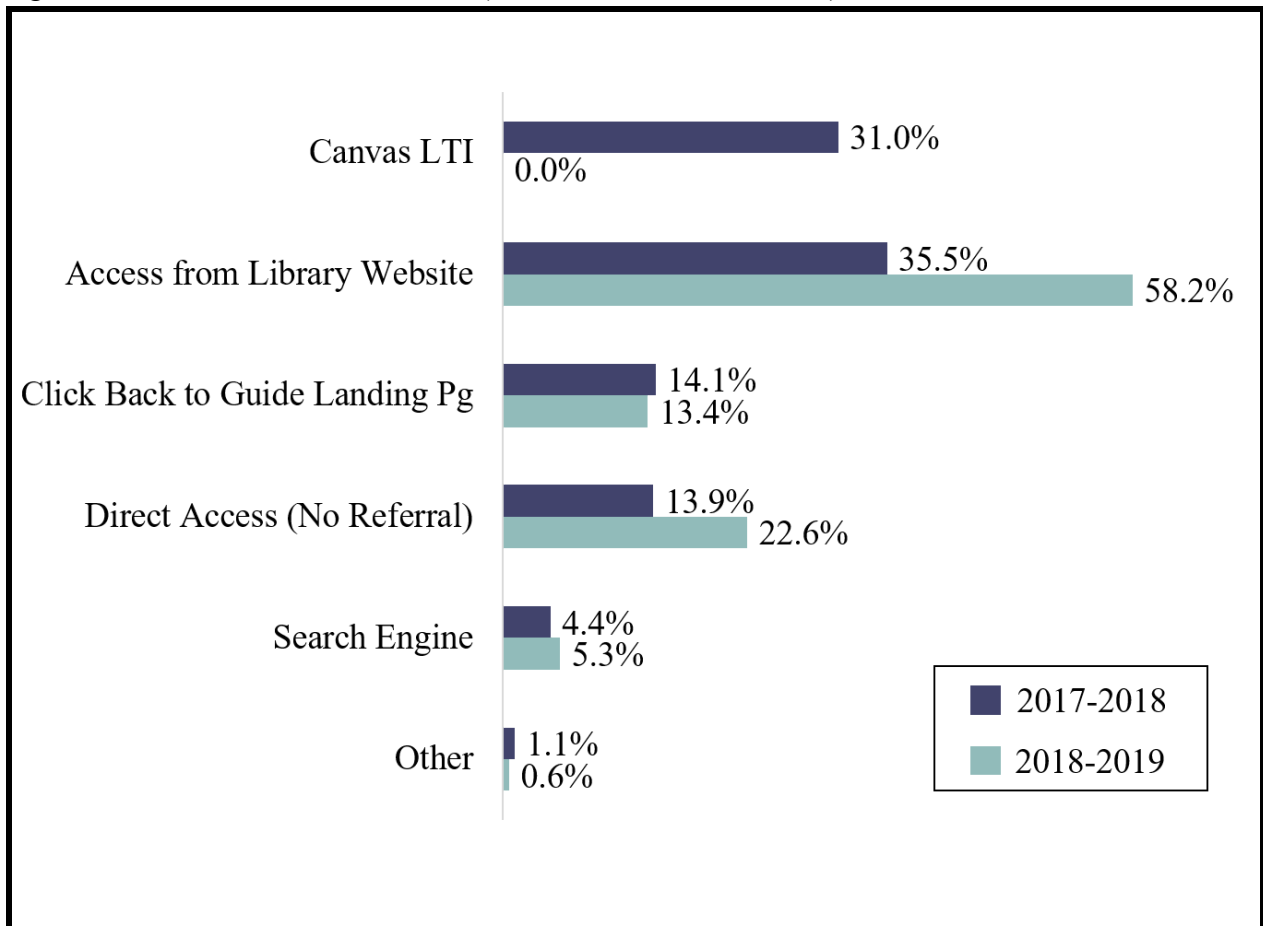
Discussion and Conclusion

Benefits and Barriers to Implementation

The consistent use of the librarian role in Canvas since its creation, and the differences in how and where LibGuides are being accessed after the LTI allowed them to be automatically linked to courses demonstrate that these initial steps toward integrating librarians and library resources into the LMS are changing the way the UNC Charlotte community, particularly students, are finding and accessing library resources and services. As with any change of this magnitude that

potentially affects the entire campus, there have been unforeseen barriers and unanticipated opportunities as well.

The uneven adoption of these initial changes was mentioned briefly in the description of the project. To summarize, the designated librarian role and the use of course metadata entered into LibGuides to enable automatic mapping to courses in Canvas were not initially adopted by all librarians. This has likely resulted in some of the differences between Groups 1 and 2 (discussed in the preceding Methods and Results section) in the analysis of where and how often library guides are accessed. While the librarian role was introduced to the research and instruction librarians before testing and implementation, and the LibApps LTI was presented to that larger group, along with instructions, there was some resistance to these options. Anecdotally, some librarians prefer to be embedded in courses in other course roles (instructor or designer) because they feel those roles better fit what they are doing. Some librarians have also mentioned that they do not like the smaller-scale, narrower guide view that displays within Canvas, and that they instruct students to access guides directly or through the library website.

As at other institutions, not all teaching faculty are receptive to adding a librarian to their courses, and do not always understand the potential benefits to them and their students. This is somewhat mitigated by the automatic inclusion of library content in all Canvas courses unless the course instructor takes action to opt out by removing the Library Resources link from their course navigation menu. However, without faculty members directing their students to use library resources for their coursework and mentioning the link in Canvas, students would have to take the initiative to click the link, follow it out to library resources, and incorporate them into their coursework. This is part of a larger conversation about the importance of librarian outreach

to teaching faculty, though in some cases, students may find and use library resources on their own, and a direct link to their courses provides an additional opportunity for them to do so.

The data indicate there has been an overall increase in the use of library research guides. Since students are the most likely consumers of information linked in Canvas courses, it is likely that they are the population using the library's guides more frequently. In addition, both the designated librarian course role and the LTI automatically incorporating customized library content into courses in Canvas have been generally well received by the teaching faculty across campus. Information about both the librarian role and the LTI have been shared in the RIS departmental newsletter, in webinars and in-person library training hosted by the university's Center for Teaching and Learning (https://teaching.uncc.edu/), and in direct communication between research and instruction librarians.

Next Steps and Future Directions

With the initial steps of extending the library's reach into courses across campus completed and initial assessment indicating that it has affected the way students access library resources, the librarians involved in this project are exploring other ways of linking library content to coursework.

One new way of doing this is using Kaltura, the media platform integrated with the university's Canvas instance, to create video tutorials and quizzes. Librarians or course instructors can use Kaltura within Canvas to transform existing library tutorials into quizzes. This feature has been promoted in the RIS departmental newsletter but not widely adopted yet. Further assessment is also being discussed, including the possibility of including a question about where students find information related to their coursework in the next student survey

distributed by the library. The ability to differentiate students who are in online programs would allow their needs to be considered. One other development external to this project that will also likely affect the way library research guides are accessed, and how faculty and students contact their subject librarian, is a new library website that will be released in early 2020.

Librarians will continue to examine and assess opportunities to make library services and resources visible and accessible to students, both on campus and in the far-reaching environment of the learning management system.

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