Student bibliographies: charting research skills over time

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Abstract

Purpose: The purpose of this study is to compare two bibliography assignments completed after one-shot library instruction to determine which research skills first-year students retain over the course of a semester.

Design/Methodology/Approach: A rubric was developed for citation analysis of student annotated bibliographies and final bibliographies. Each assignment was scored on a three-point scale, and four criteria were assessed: the quality of sources used, variety of sources used, quality of annotations (for first assignment only), and citation accuracy.

Findings: Students scored highest on the quality of sources used in both assignments, although there was a statistically significant decline in overall scores from the first assignment to the second. Students had the most difficulty with writing annotations, followed closely by citation accuracy. Students primarily cited journal articles in their annotated bibliographies and reference sources in their final bibliographies. Website use increased notably from one assignment to the other.

Originality/Value: This research is unique in its analysis of two separate bibliography assignments completed by first-year students over the course of a semester. It is of interest to librarians teaching one-shot library instruction or any librarian interested in assessing the research skills of first-year students.

Keywords: instruction, citation behavior, first-year students, rubrics, bibliographies, assessment, information literacy

Paper Type: Research Paper

Introduction

For many students, the required first-year English composition course is often the site where they encounter and grapple with academic library research for the first time. Librarians generally teach one or two information literacy sessions for these courses, aimed to ease students into the complexities of effectively finding "appropriate" sources. Typically they introduce students to concepts such as scholarly versus popular articles, narrowing topics, identifying keywords, searching databases, and evaluating results, although it is often difficult to teach all of these skills adequately given the short amount of time allotted for library instruction. Along with pedagogical decisions based on time limitations, librarians also need to decide on assessment methods, given the importance of such data. Librarians have responded to this increased pressure in academia to demonstrate a tangible impact on student learning and success by devoting increased resources to investigating best practices for assessing curriculum-based instruction at the undergraduate level.

The bibliography of a research paper is one tangible product that librarians have often used as a key indicator of student research proficiency. In many cases, students prepare a preliminary annotated bibliography early in the semester, in addition to a final bibliography at semester's

end allowing for interesting comparisons. By comparing multiple criteria of students' annotated bibliographies completed towards the beginning of the semester closely following library instruction sessions, to final bibliographies focusing on the same topics and completed at the end of the semester, the research team sought to discover how students' citation behaviors changed over the course of a semester, as well as whether library instruction had an enduring impact on these behaviors over time. Researchers assessed quality of sources, variety of source types included, and citation accuracy for both assignments. Furthermore, researchers coded source types chosen for both assignments, as well as the overall number of sources included to chart trends. The in-depth analysis of each assignment and the comparisons between the two reveal detailed insights into which research skills students initially demonstrate and which skills they maintain over time.

Literature Review
Many studies of student bibliographies exist in the library literature. Cooke and Rosenthal (2011) studied eight composition classes, comparing the bibliographic citations of students with and without library instruction, finding that students who received instruction were more likely to utilize a greater number of sources and a wider variety of source types than those who did not. Rafferty (2013) found similar results, noting that students often cite sources specifically highlighted during library instruction. Rosenblatt (2010) reviewed student bibliographies and papers of upper division students and found that 90 percent of students cited more scholarly sources than non-scholarly sources, most students met the requirement of five scholarly sources regardless of instruction, and that 80 percent of the sources cited were relevant to the paper topic. Rosenblatt's study also found that only 50 percent of students were able to integrate the scholarly sources into their paper arguments.

Previous studies have also compared student work over time. Researchers Knight-Davis and Sung (2008) analyzed undergraduate writing portfolios including four different papers from the same student at different points in their college career. They grouped citations by year, type, library ownership, and scholarly/non-scholarly to study collections and instruction. They found that student citation behavior improved over time, that students used more scholarly articles than non-scholarly sources, and that almost 50 percent of the papers only used one source type. This study did not indicate how much library instruction students received throughout their four years of college.

Multiple researchers have developed and applied rubrics to assess student bibliographies (Gilbert, 2009; Knight-Davis and Sung, 2008; Mill, 2008; Young and Ackerson, 1995). Oakleaf (2008, 2009a, 2009b) has written extensively on rubrics, and delineates some of their benefits as: "agreed upon values, reliable scoring of student work, detailed results data, a focus on standards-based education, evaluation of student learning across time or multiple programs, and cost" (2008, p. 245). Rubrics are useful for authentic assessments and can be adapted to fit many different types of assignments (Rinto, 2013).

Increasingly, librarians are turning to rubrics in their studies of information literacy, but they are time-consuming to create, largely due to the complexity of achieving interrater reliability. Knight (2006) discusses creating a rubric for student bibliographies and stresses the importance of keeping learning objectives and possible outcomes at the forefront, as well as choosing performance standards that correlate with each outcome. Rinto (2013) adapted Mertler's (2001) model of rubric development, which includes seven steps, beginning with learning outcomes and ending with revision and reflection. Jastram et. al (2014) note in their study that because of the extensive revising of their rubric, it not only became a stronger assessment instrument, but also helped them to "refine [their] articulation of meaningful information literacy goals" (p. 171). Indeed, a strong rubric is of paramount importance when assessing student work.

The present research contributes to the literature by providing a case study of rubric use to analyze student citation patterns in two assignments over the course of one semester. This study is unique in that it looks at both annotated and final bibliographies of first year students, using a rubric to compare student research behaviors in these two assignments at different points of the semester. With the results of the study, librarians will learn the benefits of such assessment, and consider potential instructional interventions to ensure students retain key principles of library instruction over time.

Background
This study was conducted at a large, urban, public research institution with a diverse undergraduate student population of 17,000, many of whom are commuter students. In 2014, the university prioritized undergraduate student success, implementing a campus-wide plan to increase undergraduate student retention, especially in the first year. Spurred by this campus initiative, a team of instruction librarians undertook a project to study the research activities of first-year students. Focusing on students enrolled in a common first-year composition course, librarians embarked on an expansive mixed-methods study analyzing two types of student work products: student bibliographies and research journals, as well as transcripts of student interviews conducted at the end of the semester. This portion of the study focuses solely on the data collected from the student bibliographies (both annotated and final) and presents the results of in-depth citation analysis for both assignments.

First-year composition is a required course in which individual writing assignments culminate in a final academic research paper. For over ten years, the English Department has required that all composition instructors bring their students to the library for either one or two library instruction sessions; thus, teaming with an instructor of first-year composition was a natural fit for a study exploring student research behaviors and the impact of library instruction. Furthermore, the substantial investment of library resources in first-year writing --in a typical year the library provides upwards of 250 instruction sessions to the first-year writing program-- argues for the importance of performing in-depth assessment of student research behavior in relation to this course.

The research team obtained approval from the Institutional Review Board and began the study

during the fall semester of 2014. Library instruction sessions were scheduled for the third week of class, much sooner than many other first-year composition sections, but appropriate given the annotated bibliography assignment was due in week five. The classes met twice a week for 75 minutes, and the instructor brought his students in for library instruction for two sessions during week three. Two librarians from the research team each taught two of the course sections. Prior to the library sessions, the librarians visited the instructor's classroom to explain the study and answer any student questions. The librarians also gave all students the opportunity to opt out of the study.

The researchers opted to team with an instructor who taught multiple sections of the same topic for this study. This allowed researchers to obtain a large pool of student participants, and ensure continuity in the delivery of library instruction as well as in the teaching pedagogy and evaluation criteria applied by the English instructor outside of the library sessions. All first-year composition courses are thematically based, and this particular course involved writing analytically and historically about philosophy. Student readings and assignments focused on discourse relating to various philosophical topics, such as the mind/body problem, free will, and questions of faith and reason.

The librarians taught the sections as they had in previous years, with emphasis on brainstorming keywords, constructing effective search strategies, recognizing the differences between scholarly and popular articles, and using library databases. The first session concentrated on background materials and books, while the second session emphasized finding scholarly articles. The two instruction sessions were conducted in a classroom with student computers. Students followed along as the librarians demonstrated resources and strategies. Students also engaged in an active learning exercise, developing keywords for their topics and searching for relevant scholarly articles. The librarians taught from a LibGuide that was created specifically for the course; the course instructor also requested that certain reference sources be included in this guide. Citation format and the importance of consistent format were referenced often but librarians did not directly instruct students on how to format citations.

Methodology
Citation analysis is a commonly-practiced method of library research which has been used to evaluate collections and research skills, to identify use patterns among specific groups, and to study preference for resource type (Belanger, Bliquez and Mondal, 2012; Cooke and Rosenthal, 2011; Davis, 2003; Knight-Davis and Sung, 2008; Rosenblatt, 2010). Bibliographies "provide a flexible, non-invasive, time-efficient assessment forum for the documentation of student library use" (Hovde, 2000, p. 5), making this type of research attractive to instruction librarians. Bibliographies are also beneficial as a form of authentic, summative assessment, providing librarians with a tangible measure of student learning.

The researchers created a rubric (See Appendix) to analyze both the annotated bibliography and the bibliography submitted with the students' final papers. After consulting several rubrics such as the American Association of College and Universities (AAC&U) Valid Assessment of

Learning in Undergraduate Education (VALUE) Information Literacy Rubric, its many revisions, and others on the Rubric Assessment of Information Literacy Skills (RAILS) website (http://railsontrack.info/rubrics.aspx), and reading literature on rubrics (Knight, 2006; Oakleaf, 2008, 2009a, 2009b; Rinto, 2013) the researchers decided to assess four criteria: quality and authority of sources, variety and range of sources, annotations (only for the annotated bibliographies), and citation accuracy. These areas were scored on a three point scale. After collecting the annotated bibliographies, the research team held norming sessions during which they scored multiple bibliographies together, talking each other through their thought processes. Then each librarian scored ten bibliographies separately, and the team reconvened to compare scores. During this session, the librarians revised the rubric, and once scores were normalized, two librarians scored each bibliography. If the librarians did not agree on a score, they met to discuss the scores until they reached a consensus (in one instance a consensus could not be reached and a third scorer was consulted.)

The research team scored the final bibliographies using the same process, with the addition of identifying source types as either a reference source, book, article, website, or other. The final bibliographies were turned in during exam week (the seventeenth week of the semester). Although all students were required to include a works consulted page with their final papers in addition to this final bibliography the researchers did not ask to see the works consulted pages. Nevertheless, some students handed in these works consulted pages so these were analyzed in their own group. After scoring the final bibliographies, the researchers reviewed the annotated bibliographies again to note the source types included, so that the same data was collected for both assignments. The researchers also noted whether sources in both bibliographies came from the course LibGuide or whether they were one of the assigned course texts.

Results
Overall Trends
The researchers collected 84 annotated bibliographies and 74 final bibliographies, with 70 students having completed and turned in both assignments. Some students dropped the class or did not complete all assignments, so not all students turned in both an annotated bibliography and a final bibliography.

Analyzing all the completed annotated bibliographies, researchers found that out of a possible twelve points (three points each for quality of sources, variety of sources, annotations, and citation accuracy) students' average score was 10.03. The average for quality of sources was highest, at 2.84, while the average for annotation quality was lowest, at 2.39 (see Table 1).

Out of a possible nine points for final bibliographies (since final bibliographies did not include annotations) students' average score was 7.07. The average for quality of sources was highest, at 2.51, while the average for citation accuracy was lowest, at 2.09.

Table 1. Average scores for annotated and final bibliographies

Score Category	Annotated Bibliographies (*n*=70)	Final Bibliographies (*n*=70)
Quality of sources	2.84	2.51
Variety of sources	2.40	2.47
Annotations	2.39	NA
Citation accuracy	2.40	2.09
Total score	10.03	7.07

The investigators posited that student skills would improve from the annotated bibliography completed near the beginning of the semester to the final bibliography, but the data showed the opposite to be true. The researchers used SPSS to analyze the data for those students who turned in both an annotated bibliography and a final bibliography. Results of a T-test revealed a statistically significant decrease in total scores from the annotated bibliography to the final bibliography (the annotated bibliography scores were adjusted to exclude the annotation category). There was also a statistically significant decrease in both the quality of sources used and the accuracy of citations used by students from one bibliography to the next. While the scores for variety of sources did improve from the first assignment to the second, the improvement was not statistically significant (see Table 2).

Table 2. Paired samples test of scores for both annotated bibliographies and final bibliographies

Score Category	Mean difference	t	Sig. (2-tailed)
Quality of sources	.329	4.208	.000
Variety of sources	-.071	-.743	.460
Citation of sources	.314	3.494	.001
Total score	.571	3.522	.001

There was a statistically significant increase between the number of sources used in the annotated bibliography and those used in the final bibliography, as well as a statistically significant increase in the use of two types of sources: reference sources (encyclopedias and dictionaries) and websites. Similarly, there was a statistically significant decrease in the number of articles used in the final bibliography as compared to the annotated bibliography. While there was an increase in the number of books used, the increase was not statistically significant (see Table 3).

Table 3. Paired samples test of number of source types for both annotated bibliographies and final bibliographies.

Sources Used	Mean difference	t	Sig. (2-tailed)
Total	-3.886	-4.125	.000
Reference Sources	-3.143	-5.930	.000
Books	-.743	-1.393	.168
Articles	1.957	4.236	.000
Websites	-1.871	-5.048	.000
Other	-.086	-.715	.477

Number of Sources Used in Bibliographies
The guidelines for the annotated bibliography assignment stipulated that students needed to cite and annotate a minimum of ten sources. Out of 84 annotated bibliographies, 9.5 percent included fewer than ten sources, 16.7 percent included more than ten sources, and 73.8 percent included exactly ten sources.

The total number of sources included in the final bibliography increased by 37 percent from the annotated bibliography. Students were encouraged to build upon their assignments throughout the semester, and typically they used some of the same sources in both bibliographies.

For the final bibliography assignment, students were not given a minimum number of required sources to cite. The data show that when they were not given a target, 70 percent of students cited more than the ten sources required in the annotated bibliography assignment, while 21 percent cited fewer than ten sources, and 9 percent cited exactly ten. Thirty-six percent of students cited 15 or more sources in their final bibliographies, and 17 percent included 20 or more.

Source Types (See Figure 1)

Books
On average, students used 3.9 books in the annotated bibliography assignment, with books comprising 37 percent of the sources used in this assignment. For the final bibliography, students used an average of 4.7 books, and books comprised 32.5 percent of the overall total sources. Book usage increased 18.9 percent from the annotated to the final bibliography.

Journals

Students used an average number of 4.1 journal articles in the annotated bibliography. Journal articles comprised 39 percent of their sources in the annotated bibliography assignment overall. For the final bibliography, students used an average of 2.2 journal articles, which accounted for 15 percent of the overall number of resources used in that assignment. Despite the increase in sources used overall, the use of journal articles decreased 48 percent from the annotated bibliography assignment to the final paper.

Reference Sources
On average students cited 2 reference sources such as encyclopedias or dictionaries in the annotated bibliography assignment, with these reference sources comprising 18.5 percent of the sources cited in this assignment. In the final bibliographies, students used an average of 5.1 reference source entries. Reference materials comprised 35 percent of the overall sources used in the final bibliographies. The number of reference sources used increased 161.8 percent from the annotated to the final bibliographies.

Websites
Websites accounted for only 3 percent of the overall total number of resources used in the annotated bibliographies. On average students used 2.2 websites in their final bibliographies and these websites comprised 16 percent of the overall total number of resources used. Students cited a sum total of 25 websites in the annotated bibliographies, but used 156 websites in their final bibliographies. The number of websites used in the final bibliographies increased by a notable 524 percent from the annotated bibliographies.
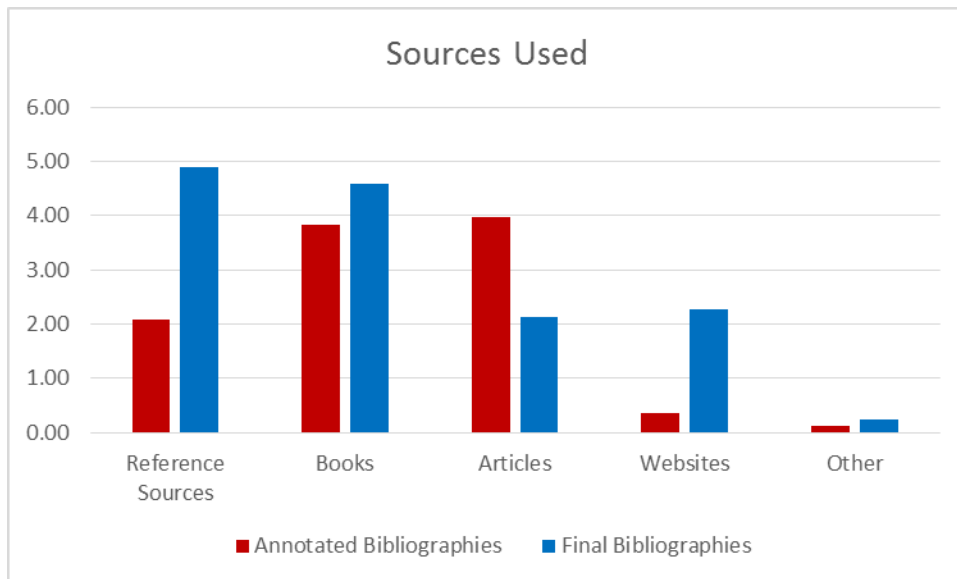

Figure 1. Average number of source types used in annotated and final bibliographies.

Course Texts
The professor encouraged students to use required and recommended course texts to aid in understanding difficult philosophical concepts. The syllabus included four textbooks on

understanding and writing about philosophy. While students could include textbooks in their annotated bibliographies, they would not count towards the ten required sources. In their annotated bibliographies, 17.8 percent of students included course texts; 35.1 percent in their final bibliographies. Of the 30 students who turned in an additional works consulted page, 53.3 percent included course texts.

Sources from LibGuide
The course instructor and the librarians who led the library instruction sessions encouraged students to use resources included on the course LibGuide. For the annotated bibliography, 90.5 percent of students used at least one source from the LibGuide, while 86.5 percent of students used the LibGuide for at least one source on the final bibliography. The average number of LibGuide sources used in the annotated bibliography was 4.7 and 6.0 in the final bibliography.

Works Consulted
In addition to the annotated bibliography and final bibliography, 30 students also contributed their works consulted page to the researchers, which included works not directly cited in their final papers. Of the 30 submitted works consulted pages, the average number of sources was 18.8, substantially higher than the average number of sources for the annotated bibliography (10.4) and higher than the average number of sources for the final bibliography (14.2). Twenty percent included all the sources on their Annotated Bibliographies in their works consulted page. Thirty percent of students included 50 percent or more of the sources from their annotated bibliographies in their works consulted page. Ten percent did not refer to any of the same sources on both. The fact that half of the student group who submitted works consulted pages included sources on that list from their Annotated Bibliographies shows that many of the sources included on the Annotated Bibliography were not directly cited in the research paper. These initial sources were helpful to students in understanding their topics, but students opted to cite from other sources instead.

Discussion
The overall decline in bibliography scores surprised the investigators. The timing of the library instruction sessions could be a contributing factor to this decrease. Both sessions were conducted two weeks before the annotated bibliographies were due, near the beginning of the semester, while the final bibliographies were turned in with their final papers at the end of the semester (twelve weeks after the instruction sessions). Researchers have found that with this type of "one-shot" (or "two-shot") instruction, the greatest impact on students can be seen in short-term behavior (Hovde, 2000). The fact that library instruction seemed to have an immediate effect on student behavior is promising, but what can librarians do to extend that impact?

The number of sources students used in both assignments suggests that most students will meet designated assignment requirements, neither exceeding nor falling short of quotas. These findings support those of Knight-Davis and Sung (2008) who found that an instructor's paper

requirements strongly influence student citation behavior. The fact that students' citations increased in number in the final bibliographies in this study might suggest that not providing a minimum number of sources could encourage more students to go further with their research. In fact, without a benchmark of minimum number of sources, 53 percent of students cited more than 15 sources on the final bibliography, and 17 percent of students cited more than 20 sources. However reassuring these numbers might seem, it would be misguided for students to think that more is better when citing sources. Further analysis of final papers would be required in order to determine the relationship between the number of sources cited and the quality of the writing and research. Still, the fact that students at times become almost overzealous in their research when not given a quota suggests that quotas can backfire and limit open-ended research and inquiry.

In examining the number of websites and journal articles used in the final bibliography, researchers found that students used almost the same number of websites as they did journal articles. However, in the previous assignment, students used more journal articles and a minimal number of websites. The difference might again be explained by the library instruction sessions, confirming Gilbert's results that students cite more library sources after instruction (2009). During these library instruction sessions, librarians covered how to find scholarly articles in library databases and gave students time to search for journal articles in class, so many students were able to get a head start on finding their sources. By the time the final bibliographies were due, students were busy with other final assignments and exams and concerned about working under deadlines (Burns and Harper, 2012).

Finding scholarly journals takes time and effort, and students often have difficulty reading the scholarly content of journal articles (Detmering and Johnson, 2012; Head, 2013; MacMillian and MacKenzie, 2012; Rosenblatt, 2010). Project Information Literacy's (PIL) Report on college freshmen provides ample support of this fact; freshmen in their second study struggled with "reading, comprehending, evaluating, and applying the scholarly sources they had found" and admitted to having difficulty with scholarly language and writing style (Head 2013, 19). Philosophy in particular can be a difficult discipline for first-year students. The increasing inclusion of course texts in bibliographies as the research project progressed, as was also noted in Head and Eisenberg's earlier PIL study (2009) further indicates that students needed secondary sources to explain these difficult topics.

Differences in the use of articles between the two assignments might also be attributable to differences between the assignments. It might seem easier to summarize an article for an annotated bibliography than to extrapolate key points from the article and integrate them into a fluid argument (Rosenblatt, 2010). The researchers note that poor scores on annotations revealed that students did not excel in this skill either! The decrease in scholarly article usage between the first and second assignment could have significant implications for both research assignment design and library instruction. On the one hand, if peer-reviewed articles are upheld as the "gold standard" of source types for a research assignment, librarians may need to develop instructional strategies to ensure that students can effectively read, understand, draw

meaningful information from these articles, and then integrate them into their research. On the other hand, if beginning students are finding peer-reviewed research articles difficult to integrate into their research, this might be a call for librarians and instructors to reexamine and challenge why it is necessary to incorporate these source types into a first-year composition paper. The trends in this study suggest that librarians need to further discuss with faculty the pedagogical reasons for emphasizing certain types of sources over others, in order to either adequately support students in using scholarly articles or to influence changes to first-year assignments.

While a 524 percent increase in the use of websites may seem extreme, the fact remains that students used many more reference sources and books in their final bibliographies than websites. Researchers have shown that in general, students cite more books after library instruction (Cooke and Rosenthal, 2011). The instructor of this course encouraged students to use background sources like encyclopedias, to help them gain introductory information to particular theories and ideas. This confirms the importance that classroom instructors have on the actions of their students. If librarians can work with them to stress information literacy concepts after library sessions, students may retain more of what they have learned.

Based on students' average scores, it appears that students do appreciate the importance of quality sources, something that is emphasized during library instruction. (Although this score went down for the final bibliography, it was still higher than scores on variety or citation accuracy.) Students relied heavily on sources from their course LibGuide, revealing their trust that the guide contained quality sources, as well as a preference of using sources and tools provided by their instructor and the librarians (Rafferty, 2013). In fact, the course LibGuide received 4731 views between September 9th, the date of the first library session, and December 4th, the date the final paper was due.

The low scores on citation accuracy seem to suggest that students had a particularly difficult time differentiating between sources, especially online sources. The librarians in this study often struggled to find the online sources students used, given the citation information provided. Besides punctuation errors, common mistakes included not recognizing the difference between a website name and a section of the website (or an article on a website), the inability to differentiate between a journal name and an article name, the inability to locate the name of the author of an online encyclopedia, magazine, or web article, misinterpreting information found on the internet, and not providing accurate information regarding primary sources found on the web. This finding suggests that librarians may be well served in taking time to acknowledge internet searching in library sessions and to teach students to be "smarter" about searching the web, a point Georgas makes in her study of student use of Google and library databases (2015). Indeed, evaluation is an important area that the researchers would like to address in the future.

The low scores on citation accuracy may also reveal a change in students' priorities as the semester progressed and as their final assignment due date approached. Final paper grades rely much more (if not all) on students' writing ability and the ability of integrating sources,

perhaps making citation accuracy seem less relevant. Students may have reasonably spent the majority of their time writing and editing their papers, leaving citations until the very end. Without looking at their final papers, there is no way of knowing whether citation scores had any bearing on the grade students received on these final papers.

Conclusion

The results of this study have several implications for information literacy programs. Timing of sessions in relation to research assignments remains important as others have noted (Cook and Klipfel, 2015; Daland, 2015; Malenfant and Demers, 2004), and the researchers hope to space sessions throughout the course of the semester, in order to provide a "refresher" session for students completing final papers. When this is not possible (due to an instructor's syllabus or other issues) a series of citation "clinics" might be offered toward the end of the semester to discuss common mistakes and help students in the final stages of their research. There are also implications for future areas of emphasis in library instruction. If instructors view the usage of peer-reviewed articles or other source types as integral to a well-written research paper, how can librarians work with instructors to help students better understand difficult sources and integrate them into their research? Project Information Literacy recommends a move away from one-shot instruction toward more embedded librarianship, which may be one answer (Head 2013), although developing these types of relationships can take time.

It remains clear that a strong partnership with instructors and faculty in other disciplines is of utmost importance to delivering successful information literacy instruction. The LibGuide created for this particular class was highly used and enabled students to find high-quality sources. This guide was created with the help of the instructor, and his enthusiastic endorsement of it to his students made clear that it would be of value to them. A possible future addition to the guide could be a page on website analysis and a list of reputable websites. Since time limitations prevented librarians from covering web site analysis during library sessions, this inclusion could be a way to provide this valuable information.

Many questions remain, which the researchers hope to address in subsequent studies. Data obtained from these students in research journals will provide a wealth of information concerning why students chose particular types of resources and why they cited what they cited. Discovering the reasoning behind student research behaviors will allow information literacy instruction librarians to make more informed pedagogical choices for library instruction.

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