

THE QUESTIONABLE EFFICACY OF ONE-SHOT INSTRUCTION FOR FIRST-YEAR STUDENTS:

A Scoping Review

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INTRODUCTION

After learning that reduced staffing was expected to continue for the foreseeable future, a group of academic librarians decided to re-evaluate the costs and benefits of library services related to reference and instruction. Inspired by compelling arguments that challenge the value of one-shot library instruction in the works of Meulemans and Carr, Bowles-Terry and Donovan, and Pagowsky, they decided to investigate the efficacy of first-year one-shot library instruction (FOSLI).¹ These librarians—henceforth referred to as the authors—wanted to transition away from high-cost, low-impact services, but also desired to make evidence-based programmatic changes. In order to determine FOSLI's efficacy, the authors decided to conduct an evidence synthesis review of the library literature.

While there are no previous systematic reviews focused entirely on FOSLI, there are systematic reviews that analyzed one-shot library instruction. Koufogiannakis and Wiebe conducted a systematic review and meta-analysis of the library literature that evaluated the effectiveness of teaching methods.² They found that in twelve out of sixteen studies, traditional instruction performed higher than control (i.e., no instruction) groups. And of the four studies that were eligible for meta-analysis “size of effect would be somewhere between small and moderate”³ In their 2007 systematic review comparing traditional instruction with computer assisted instruction, Zhang, Watson, and Banfield described a subset of their findings: “Two studies (Cherry, and Holman) found that instruction of any kind was superior to no instruction, while Koenig found that face-to-face, computer-assisted instruction (CAI), and no instruction were equally effective.”⁴ Grabowsky and Weisbrod appear to be the first to conduct a systematic review on the impact of library instruction on graduate and professional students.⁵ With caveats that their study had fundamental differences from the Koufogiannakis and Wiebe study, they did find that library instruction had a positive effect on graduate student learning “and that the average increase in score is about one standard deviation” whereas Koufogiannakis and Wiebe found a much smaller positive effect of approximately one-third of a standard deviation.⁶

This contributed paper will add to these discussions by describing the preliminary findings of a scoping review on the efficacy of one-shot library instruction, focusing on its impact on

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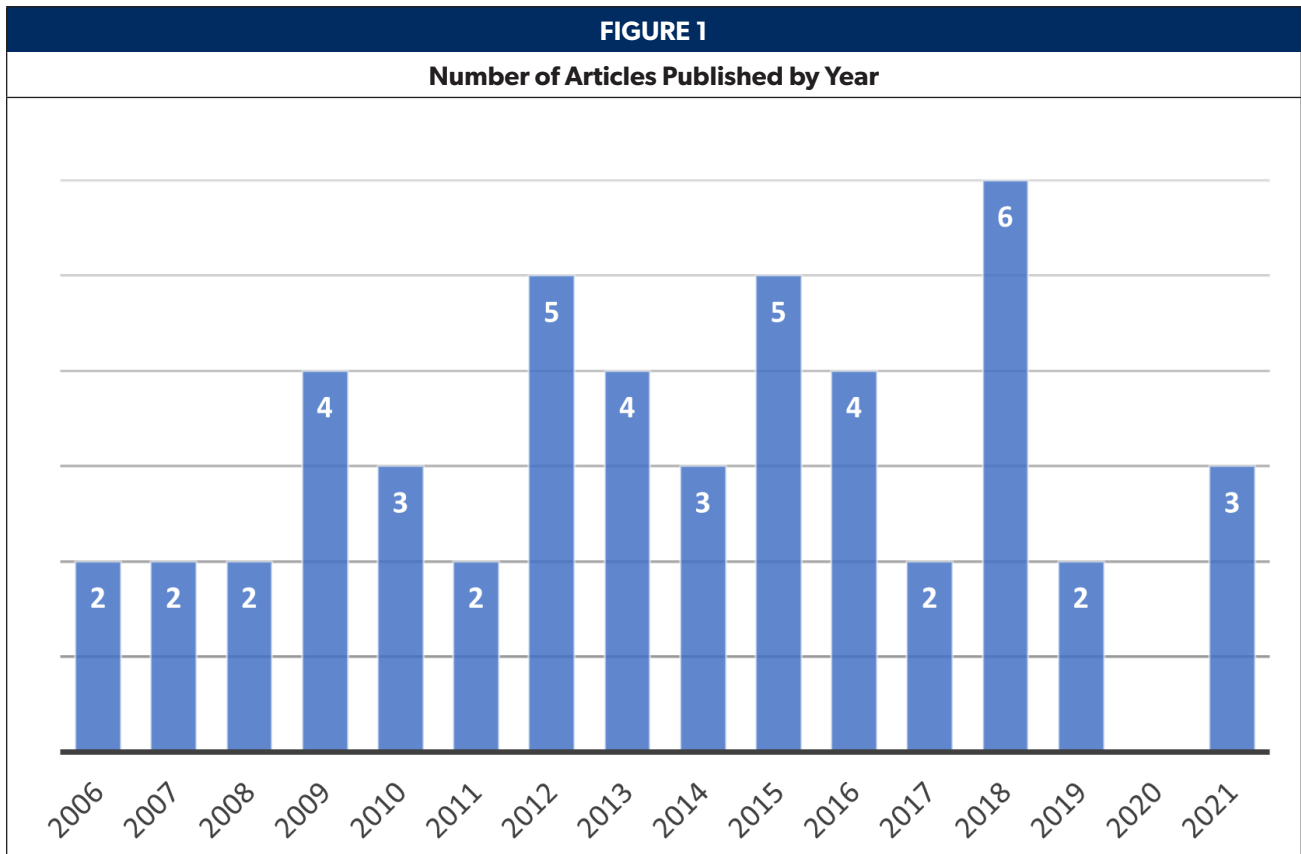
first-year students. While the full analyses will be made available in a future publication, the authors will use this paper and presentation to share initial trends that emerged from their review, discuss the state of the literature, and offer recommendations for future research.

METHODS

The authors reviewed literature surrounding the efficacy of one-shot information literacy instruction for first-year college or university students. Original, peer-reviewed qualitative or quantitative studies were included if they were found in any of six databases using a predetermined search string, were published in English between 2006 and 2021, and focused on first-year, one-shot library instruction for populations in college and university settings.

A total of 2,974 references were added to Rayyan, an online systematic review software application, and underwent detailed screening and conflict resolution, resulting in the disqualification of all but seventy-eight references. During the process of data extraction, it was determined that some of the remaining articles did not meet the inclusion criteria and were removed from the study, leaving forty-nine remaining articles.

The forty-nine articles within our scope were published between 2006 and 2021, with a consistent rate of at least two per year, peaking in 2018 with a total of six articles (see figure 1). The only year without any articles published was 2020, presumably due to the effects of the COVID-19 pandemic.



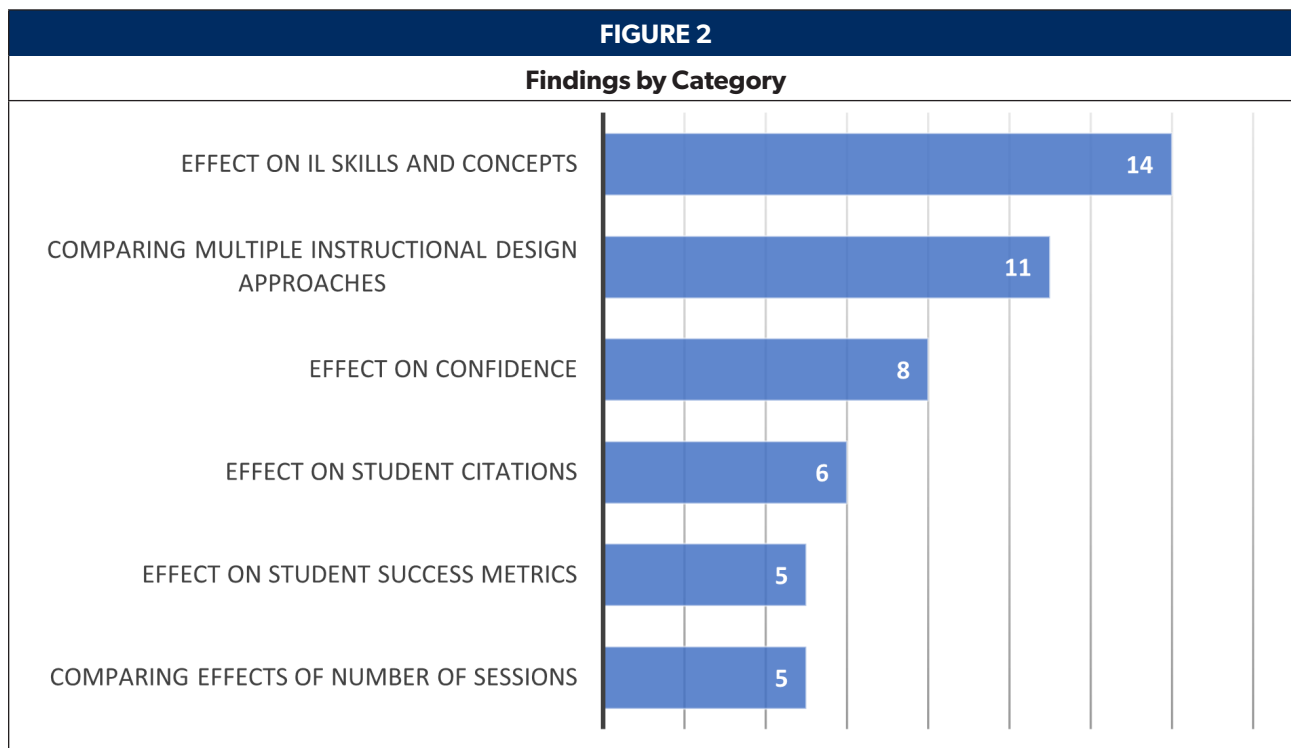
Much like other scholars experienced when trying to conduct their own systematic reviews and meta-analyses, the authors were unable to pool data and continue their research as a systematic review due to insufficient data reporting and widely varying (sometimes flawed) evaluation and research methods.⁷ Consequently, it was determined that transitioning the project to a scoping review would be more appropriate.

PRELIMINARY FINDINGS

Preliminary findings consist of analyses of impact, statistical significance, and limitations within the corpus of FOSLI literature.

The Impact of First-Year One-Shot Library Instruction

The authors divided the corpus of forty-nine articles into six categories based on the primary nature of their findings (see figure 2). The initial findings of this review are organized by these categories in decreasing order of frequency.



Effect on IL Skills and Concepts

The majority of studies (fourteen) examined the effect of FOSLI on one or more (typically several) information literacy skills and concepts commonly covered in library instruction sessions, such as (but not limited to) plagiarism, retrieving journal articles, the library website, Boolean operators, the online catalog, call numbers, and search strategies. Findings included gains between two and twenty percent from pre- to post-test (when such measures were used), with the highest gain reported by Byerly, Downey, and Ramin: thirty-five percent improvement from pre- to post-test, but only on a single question involving use of *Academic Search Complete*.⁸ Pre-tests indicated low to modest levels of initial ability in relation to information literacy or library skills, and these initial skills levels were so low that even with significant post-test improvement they rarely exceeded intermediary levels. Apart from concern over skill levels, two sets of two articles expressed problems with students not capitalizing upon the skills imparted during library instruction.

The first two observed that students were capable of demonstrating competence with database search skills during class, but failed to employ those skills when conducting their own research. The second two further lamented that even when students successfully retrieved scholarly sources for their research, they failed to engage with those sources in any substantive manner, going through the motions without grasping the purpose.

Comparing Multiple Instructional Design Approaches

Eleven studies compared one or more approaches to teaching information literacy, often with the intent of discovering a more effective method of imparting the skills and knowledge routinely associated with FOSLI. These studies compared traditional, lecture-based FOSLI to alternative approaches such as (but not limited to) scavenger hunts, problem-based learning, research guides, and clickers. They compared different modes of instruction (e.g., online vs face-to-face), or investigated a new method, such as audience response systems (clickers). Instructional design approaches varied widely, with studies seldom overlapping in their topics of investigation. Of the two pairs of two studies that overlapped, two studies found online information literacy instruction modestly superior to FOSLI. Two other studies investigated clickers. One, by Walker, used a control group and found that students benefited equally from traditional FOSLI and clicker-enabled FOSLI, enjoying a 10-30% increase in post-test scores. The other featured a pre- and post-test methodology with no control group and observed modest improvements (ten to twenty percent higher scores) on the post-test. One other broad pattern that emerged in the findings was that instructional design methods that involved greater effort on the part of the librarian, especially if that effort resulted in the library session being course-integrated, generally yielded superior results, albeit to a weak or modest degree, in comparison with traditional, lecture-based, non-course-integrated FOSLI. Numbers are not provided as these improvements were not expressed in ways that allow for meaningful comparisons. While the purpose of studies in this category was to explore different approaches to library instruction and identify superior practices, their findings revealed that most approaches worked equally well and that when differences were present, the magnitude of these differences was small.

Effect on Confidence

Eight studies investigated changes in student confidence associated with information literacy skills and concepts before and after library instruction. The studies in this category showed the largest magnitude of effect. These results are tempered by observations that increases in student confidence after FOSLI do not appear to reflect increases in student learning. Nierenberg observed that "...levels of confidence in all three topics increased as well, seemingly to a greater extent than their actual abilities."⁹ And the one confidence study that included an objective measure testing student learning as a counterpoint to confidence ratings found that "60% of students provided an accurate example on the pre-test and only sixty-two percent provided an accurate example on the post-test, despite claims of feeling more confident on the topic."¹⁰ When placed in context with the weak or modest effect sizes of the other forty-one studies in the corpus, it seems likely that Nierenberg and Freeman and Balta's observations are representative: increases in student confidence after FOSLI are probably not suggestive of increases in student learning.¹¹

Effect on Student Citations

Six studies investigated the effect of FOSLI on student citations, analyzing lists of references from actual student papers for evidence relating to source type (e.g., book, article, or website), method of discovery (free Web vs library databases), or citation accuracy. Findings were roughly split between modest improvements (increased number of sources cited, increased variety of sources cited, increased number of scholarly sources cited) and apparent lack of effect (persistent citation errors despite instruction on the topic, no increase in the use of scholarly sources), with two investigators emphasizing the impact of research assignment requirements on student citations: if the assignment requires a specific source type, such as scholarly articles, students are more likely to cite them.

Effect on Student Success

Five studies looked for FOSLI's effect on student success metrics such as GPA, course grade, and retention. A majority (three) of the studies found a small or mixed effect on course grades, with one study showing a small GPA increase and another showing no effects whatsoever. Two studies with course grade effects found that FOSLI correlated with a slight boost to the number of A-grades awarded but that was paired in both cases with

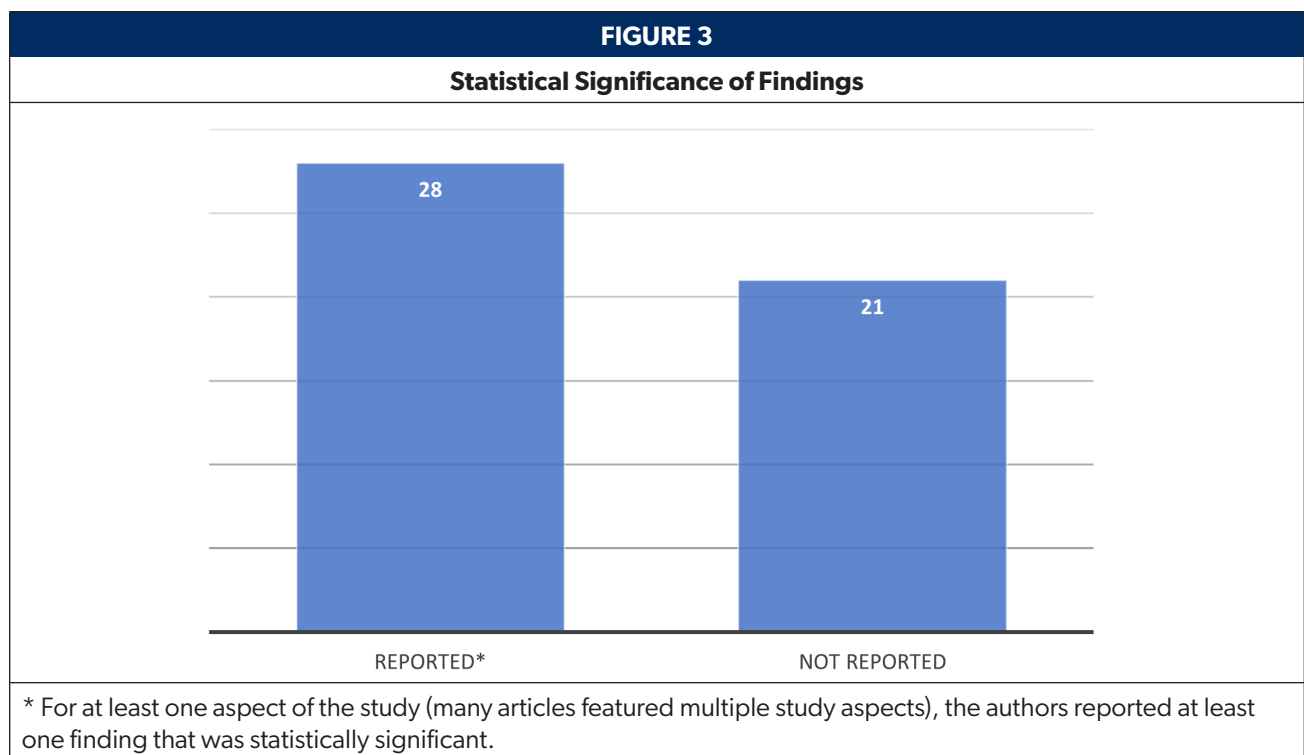
an increase in Cs, Ds, or Fs, although Coulter (2007) suggests these results are the byproduct of limitations in the study.¹² No studies found a relationship between FOSLI and retention.

Comparing Effects of Number of Sessions

Five studies compared the effects of the number of library sessions, generally in the hope of learning if—and to what degree—there is a relationship between the number of library sessions experienced and student learning. As the scope of this study was literature on single-session first-year library instruction, studies comparing the effects of multiple sessions were only included if they provided data on single-session instruction. Overall, findings suggested that FOSLI, that is, a single session of instruction, is ineffective, or, in one case, even harmful to student performance.¹³ Three studies found that two or more sessions are necessary in order to observe improvement, while another study found no relationship between the number of library sessions and student course grades, writing ability, or information literacy skills. In sum, one session is likely insufficient to produce measurable impact, and no library instruction might be preferable to a single session.

Role of Statistical Significance in Studies of First-Year One-Shot Library Instruction

Statistical significance demonstrates that an observed effect is indeed real and exceedingly unlikely the result of random chance. Statistical significance—whether an effect is *real*—is best used in conjunction with the concept of practical significance, which describes whether an effect *matters*. The threshold for an effect mattering is of course a subjective line, but it is an important subjective line to draw: at what point is the juice of one-shot library instruction not worth the squeeze? The authors do not seek to answer this question here. Instead, the authors examine the presence and absence of statistical significance within the corpus, and the rhetorical moves surrounding it. The authors also do not share granular comparisons of statistical significance findings as study methodologies were simply too disparate for any such comparison to be meaningful. Figure 3 visualizes the breakdown of studies reporting statistical significance within the corpus.



The majority of studies (twenty-eight of forty-nine) reported that statistical significance was determined for at least one area of the study. Many studies investigated multiple research questions, so it was not uncommon (occurring in eighteen of twenty-eight studies) to encounter studies with both statistically significant and not statistically significant findings, with 10 studies reporting only statistically significant results. The remaining twenty-one studies did not mention or allude to statistical significance. Rather than an omission or oversight on their part, this absence is due to the wide variety of methodologies employed in the study of FOSLI, many of which do not involve the collection or analysis of data compatible with calculations of statistical significance.

In reviewing the presence and handling of statistical significance within our corpus, in 7 of the twenty-eight articles (twenty-five percent) that reported statistical significance findings, the authors observed a troubling rhetorical trend: When findings were not statistically significant in relation to one or more aspects of a study, the nature or magnitude of the desired effect was emphasized and the lack of statistical significance was disregarded, often using the transitions such as “however” or “although”, as in this hypothetical example: “No statistically significant relationship was found between the pre- and post-tests. However, students who attended library instruction performed better on the post-test, suggesting that library instruction is indeed valuable.”¹⁴ Logically, of course, this is nonsense. It is imperative not to disregard the results of statistical analysis when those results conflict with desires.

Additionally, the value of statistical significance was never downplayed in any of the 28 articles in which statistical significance was reported—it was only undermined when not in service of demonstrating positive (desirable) results. This “having their cake and eating it too” rhetorical pattern can be explained, at least in part, by the pressure FOSLI investigators (usually academic librarians with instruction responsibilities) are under to demonstrate the value of library instruction, and, indirectly, their livelihoods, as Wegener vividly articulates:

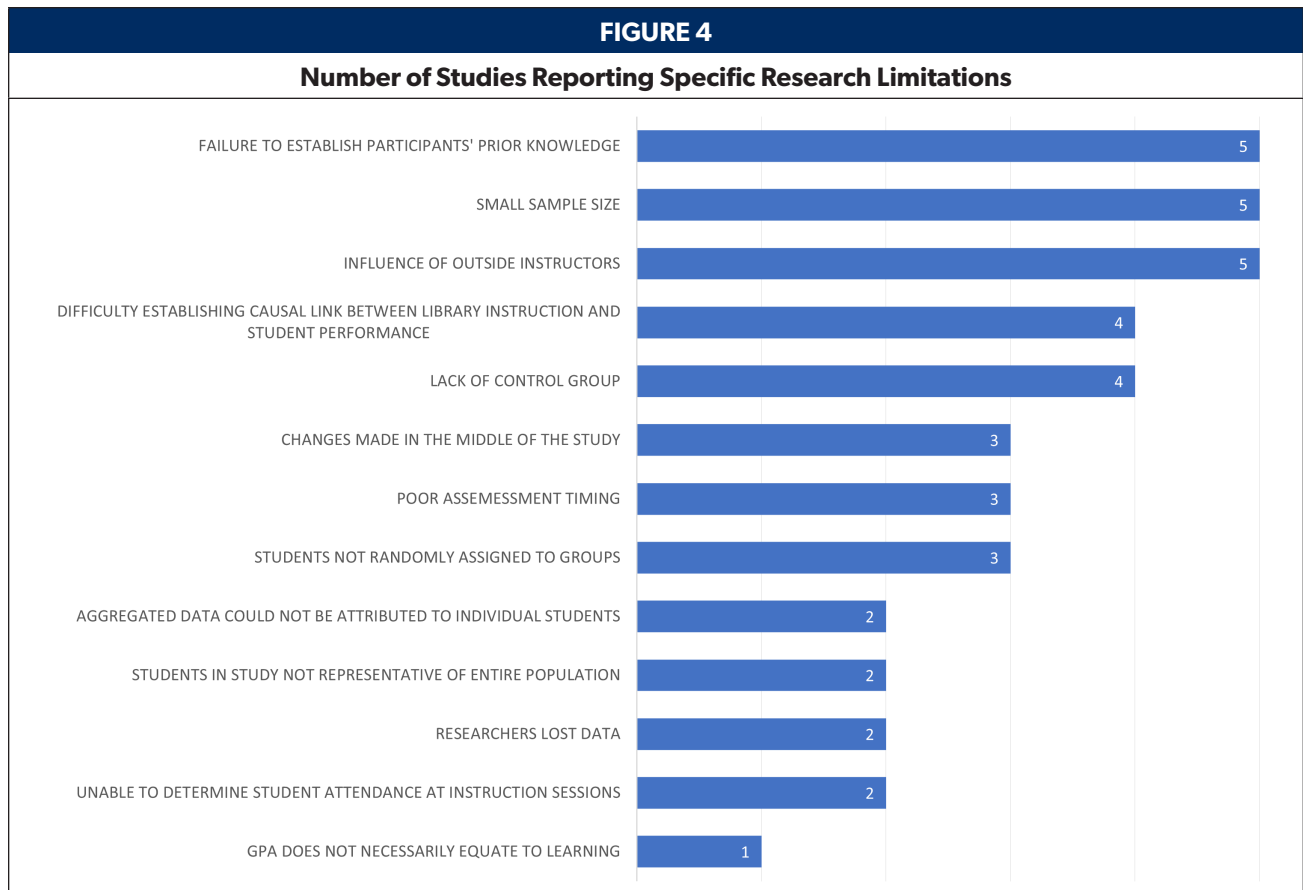
Librarians need to justify their existence, while still making sure to equip the students as best they can to cope with the changing information climate. The onus is on the librarians, therefore, to persevere, to make their workshops more relevant to the students, and to add to the growing trend in successful assessment to show the non-believers out there how good librarians actually are at what they do.¹⁵

Because of these political pressures to demonstrate value, FOSLI investigators are incentivized to A) find the value they are looking for, and B) if that value is not evident, to rhetorically circumvent the methods and suggest that the value exists despite either a lack of evidence, or evidence to the contrary.

Limitations of First-Year One-Shot Library Instruction Studies

Studies in the corpus cited a total of thirteen different limitations, which are discussed here in descending order (see figure 4).

The most common limitation cited was a failure to establish participants’ prior knowledge. Not accounting for previous library instruction that students might have had in high school, in another class, at another institution, or for other help students were given on their project could have skewed student performance. Low sample size was the next most commonly reported limitation, and was often attributed to low course attendance numbers or low survey response rates. A small sample size primarily means that the results should not be used to represent an entire population; they only apply to the individuals taking place in the study, and can lead to findings with distorted magnitudes.¹⁶ A contributing factor to smaller sample sizes could be the period of data collection. The studies that mentioned this limitation took place over one (four of the studies) or two (1 study) semesters. Finally, five studies all noted the influence of outside instructors as a limiting factor. Understandably, it is difficult to create a controlled environment when you are a visiting lecturer. Researchers were unable to account for whether some course instructors placed a greater emphasis on the research process than others, whether they gave their class more support, and whether they gave any follow-up lessons during subsequent classes that could have affected the assessment, either for good or ill. In one instance, the classroom instructors administered the librarians’ assessment incorrectly, requiring researcher intervention and ultimately an alteration of the study.



Four of the articles reported two additional important limitations. The first is the difficulty of establishing a causal link between library instruction and student performance because too many variables were involved. The second is a lack of control groups. These studies did not involve a control group or there were problems with how the control groups were implemented. Some researchers also intentionally chose not to use control groups, as they did not feel it was ethical to deny students access to library instruction or services. Randomly assigning students to a particular experimental group—true experimental design—was also noted as an impossibility when instruction was given to whole classes and not individuals.

CONCLUSION

This paper presents the preliminary findings of a scoping review that investigated the efficacy of one-shot library instruction for first-year students. The goal of this review is to further the conversation about the future of academic library instruction programs and the role, if any, one-shot library instruction should play therein.

One-shot library instruction, whether for first-year students or other audiences, is a labor-intensive undertaking warranting strong evidence in favor of its impact to justify its expense. The existing body of research suggests that the effort returns little meaningful impact for the cost of the investment. However, the research is riddled with flaws that call the results into question. To improve the quality of research on FOSLI, the authors suggest that future studies incorporate the following seven recommendations.

1. Identify meaningful metrics for evaluating success that can be used in multiple studies, facilitating replicability and meta-analysis.
2. Perform true experimental studies. While experimental methodology poses practical and even philosophical challenges, it is the only method for determining causal relationships.
3. Control for population. Adding controls for demographics, especially socioeconomic status, will allow

- researchers to better understand FOSLI's impact.
4. Control for previous library instruction or pre-existing research skills. Establishing baselines for each participant prior to instruction allows for more nuanced and valid analysis.
 5. Control for course instructors. FOSLI does not exist in isolation; it is offered within the context of college courses. Differences between individual instructors of those courses can affect how students perceive and benefit from library instruction.
 6. Avoid or at least acknowledge conflicts of interest. When the principal investigators are investigating aspects of their job duties, such as librarians who are investigating FOSLI, conflicts of interest can arise. An investigator might be emotionally invested in justifying that duty or, conversely, desirous of revealing that duty as needless. Further, some investigators might fear for their livelihoods or status within the campus community, and those fears or emotional investments could result in unconscious bias even if the investigator acts in good faith.
 7. Pair discussions of statistical significance with practical significance. Given FOSLI's high cost in human effort, practical significance (is this practice helping students in a meaningful way?) and not just statistical significance (is the effect real, regardless of its magnitude?) should be clearly established.

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NOTES

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14. The authors do not quote directly from any articles in support of this point in order to avoid calling out any single researcher, and because the authors feel that there are mitigating factors in play.
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