Beyond Classroom Evaluation: Structuring Research for Dissemination

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As instruction librarians, we work in a dynamic and challenging field riddled with variables. Students and instructors come and go, physical and electronic collections are modified, and search interfaces are subject to upgrades or complete overhauls. While occasional anecdotal evidence from students and course instructors about these variables is valuable, conducting purposeful and well-designed research will lead to greater insight of the impact of instruction in our classrooms and rich communication within the profession. Research is a complex process consisting of hypotheses, methodologies, data collection, analysis techniques, and report writing, which cannot be thoroughly covered in an article of this brevity. Thus, a framework for developing and disseminating instruction-focused research is provided in hopes of increasing the number of meaningful contributions to the professional literature.

Classroom Research Topics

The objectives and outcomes associated with library one-shot sessions and credit-bearing courses are obvious candidates for research. The concepts and skills that instruction librarians teach, the instruction methods they use, what students learn, and how students apply the knowledge learned in instruction sessions center on the objectives and outcomes in place for library classes. While many objectives and outcomes are based on "Information Literacy Competency Standards for Higher Education" (Association of College & Research Libraries, 2000), it is common for instruction librarians to develop additional objectives and outcomes.

The learning environment is another area in which instructors seek to gain more understanding through research. The environment instruction librarians teach in and in which students learn is in a constant state of flux. While the physical environment is relevant, instruction librarians are increasingly creating materials for students in the virtual domain. Additionally, paradigm shifts in education have moved instructors steadily from an individual work environment to a collaborative one. However, this shift does not guarantee increased student success, nor does the collaborative work always mesh well with a physical or virtual environment.

Learning technologies also play an important role in the classroom, and therefore are an area of research interest for instruction librarians. Asking students about the obstacles encountered in library databases may help determine how and what instruction librarians teach. Designing a research project that investigates how students interact with the library web presence is certainly a worthwhile pursuit. It is also tempting to bring new hardware and software into the classroom to engage students. For example, placing compact video cameras in students' hands and asking them to film an area of the library or demonstrating screen-casting software so that students can create their own instructional videos are ripe areas for research.

Many research questions concerning learners originate from a desire to understand what knowledge students already have when they arrive in the classroom and basic demographic information—anything from age to housing situations. Additionally, student experiences, attitudes, and behaviors potentially affect how students learn in library sessions. Stereotypes about libraries, previous unsuccessful interactions with librarians, and the belief that everything can be found full

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text through Google can potentially diminish the impact of a library instruction session. Table 1 presents the aforementioned areas of research and sample questions.

Table 1: Examples of Classroom Research Topics

Category	*Example Questions*
Objectives/Outcomes	Are students able to search for information in library databases?
Learning Environment	Are students able to search for information in library databases more effectively in groups or individually?
Learning Technologies	Are students able to determine when to use one database over another?
Learners	Do students prefer working in groups or individually when learning how to search for information in library databases?

Literature Review

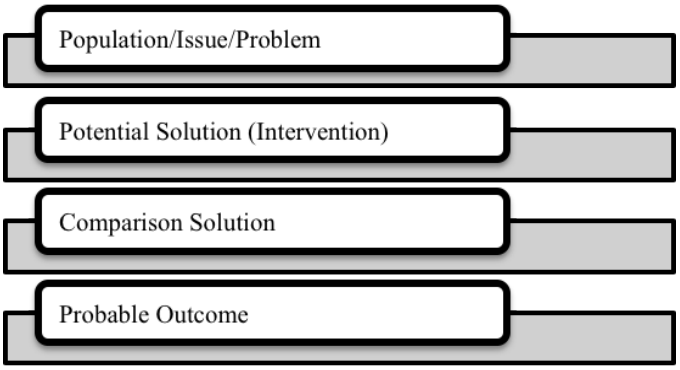
Once a research idea is identified, a literature review should be conducted. A literature review is a systematic examination of an existing body of literature that will aid in the understanding of the timeliness of a topic, possible approaches, and solutions researchers have developed and tested. Investigate literature through library and information science publications and remember that preprints and open-access journals, such as *College & Research Libraries* are freely available on the web. A comprehensive review also includes literature in related disciplines, such as the field of education, as there is a wealth of knowledge related to objectives and outcomes, learning environments, learning technologies, and learners. Collecting relevant publications will save time when later preparing to report on the results of the research. Literature searches also provide ideas as to where it is appropriate to publish.

Writing the Research Question

While it may be tempting to look at multiple research questions, it can be overwhelming. It is possible to design a single research project that measures if students are 1) successful in databases searching, 2) more successful in group learning or individual learning situations, and 3) whether students prefer group learning or individual learning; however, it is better to choose one focus when first beginning to research. Once more established in and accustomed to designing research, testing multiple hypotheses may allow for correlational and possibly causal analysis.

A quick and relatively easy method of writing a research question is to identify a population, issue or problem; establish a solution that addresses the specific population and potentially solves the problem or issue; choose a comparison solution that may simply be the absence of the potential solution; and determine the probable (and hopeful) outcome (see Figure 1). This method of writing a research question is based on the PICO approach to writing clinical research questions (Meza & Passerman, 2011; Nieswiadomy, 2012; Norwood, 2010). See Table 2 for an example of a formulated research question using this adapted method.

Figure 1: Components of a Research Question



First, consider the population involved. If the research results may not be generalizable to a broader population, the research question should identify the specific population with which the researcher will work. Examples of specific populations include "all fall semester freshman composition classes" or "100 undergraduate students in the humanities." A research project that is designed to sustain inferences to a broader population should reflect the broad applicability in the research question (e.g., graduate students). The population is related to an issue or problem—often an obstacle that instructors encounter in the classroom, such as "Students do not know how to find books on a specific topic." For the research question, this statement should not be given in the negative, but rather the potential for the future: "Students need to find books on a specific topic." After identifying the population/issue/problem, potential and comparison solutions should be established. While a researcher may wish to find the best solution to a problem, it is difficult to test all solutions; and evaluating one solution with no comparison only lends itself to arbitrary conclusions of success. For example, if, after the introduction of a solution, 60% of students no longer experience the problem, it may be difficult for the researcher to determine if the solution is an appropriate one. When a researcher compares two solutions inferences can be made as to which solution is most successful. For example, if, with solution A, 60% of students were successful and with solution B, 40% of students experience success, a conclusion can be reached as to which solution instructors should use in the classroom. In the objectives/outcomes example question, "Are students able to search for information in library databases?" it is not obvious that a comparison is made, yet to design a research project around this question a comparison is most likely constructed. When this question is asked, a comparison is made between students searching for information in library databases who have attended a library session and students who have *not* attended a library session. The comparison is a teaching intervention versus *no* teaching intervention. This is a classic pre-test/post-test or placebo group/test group scenario.

The final step in writing the research question is

to contemplate the probable and hopeful outcome(s) of the research. In a general sense, the probable and hopeful outcome is for students to gain the knowledge and skills necessary to be successful in library research and academic life. A specific outcome may be a benchmarked success rate such as "75% of all students will succeed at task A" or simply a conclusion as to which solution (in a comparison situation) has the greatest success rate.

Table 2: Example Research Question Components and Formulated Question

Components	*Example*
Population/Issue/Problem:	Two classes of freshmen English Composition students who need to find two book sources and two journal sources for an assigned paper
Potential Solution:	A 50-minute face-to-face library session using traditional instruction methods
Comparison Solution:	A series of short screen-capture and narrated videos to be accessed by students at their point-of-need
Probable Outcome:	Students search, identify, and retrieve two book sources and two journal sources on a specific topic
Research Question:	For two classes of freshmen English Composition students who need to find two book sources and two journal sources for an assigned paper, will a 50-minute face-to-face library session using traditional instruction methods as compared to a series of short screen-capture videos accessed by the students at their point-of-need increase success of students searching, identifying, and retrieving the four sources necessary for the assignment?

Research Design Using Classroom Assessment Techniques

Once the research question is formulated, the method of investigation should be determined. While numerous research methods are used in library research, the focus here is on classroom assessment techniques (CATs). CATs are a means of determining the extent of learning that takes place in the classroom. Data resulting from CATs is an effective way to measure the impact of library instruction and is feasible in a library session. Table 3 provides some common CATs with brief explanations (Angelo & Cross, 1993).

Table 3: Common Classroom Assessment Techniques

CAT	*Brief explanation*
Minute Paper:	Ask students to provide feedback about their overall learning
One Sentence Summary:	Ask students to summarize their knowledge about a particular concept they learned
Pre-test/Post-test:	Ask students to answer questions at the start of the session and again at the end
Defining Features Matrix:	Ask students to demonstrate an understanding of the differences or similarities between concepts, resources, etc.
Direct Paraphrasing:	Ask students to discuss the breadth of what they learned today (expansion of the one sentence summary)
Knowledge Tests:	Quiz or test student knowledge
Performance Assessment:	Ask students to demonstrate what they learned

As with research methodologies, there are numerous methods for collecting data. Perhaps the easiest method is to use a questionnaire and collect responses on paper. Note that data from the aforementioned CATs can be collected in paper form. Electronic forms, such as a widget on a LibGuide or a Google Form, are also easy to implement. Another common method for collecting data is usability testing. This method is typically administered when conducting performance assessments. Usability testing can include developing a checklist enabling the researcher to judge whether or not tasks are completed and to what degree of success.

Institutional Review Board

After choosing a classroom assessment technique, researchers need to prepare an Institutional Review Board (IRB) application. At colleges and universities, groups that review research proposals before the research is conducted are usually referred to as IRBs or Independent Ethics Committees. This review process protects the rights and ensures the health and safety of human subjects involved in research. Research involving human subjects is covered by the Code of Federal Regulations, specifically the Protection of Human Subjects policy (2011). This federal regulation was instituted to protect human research subjects after the atrocities of the medical experiments of Nazi Germany and the Tuskegee syphilis experiment. While instruction librarians do not typically conduct biomedical experiments, the Protection of Human Subjects policy governs all researchers at institutions that receive government funding and conduct biomedical or behavioral research. While it is doubtful that instruction librarians need worry about students' safety or health during classroom research, librarians need to ensure student rights are protected and privacy is maintained. Students often research personal queries in library sessions, and a student querying information on gynecomastia or drunken driving charges probably does not want to share that information with others.

There are three types of research review: exempt, expedited, and full board. Classroom research is generally considered exempt—meaning only one reviewer need scrutinize and approve the research. The process is fairly simple: the researcher writes an application explaining the necessity of the research, the research methodology, an explanation as to any risks to participants, and a plan to minimize any possible risks. Usually colleges and universities have application forms and detailed instructions for this process. Researchers should build research timelines with the knowledge that IRB approval may take a few weeks to a couple of months, and research cannot begin before receiving approval.

Research & Dissemination

After the IRB application is approved, it is time for the researcher to execute the research plan. With the methodology in place, conducting the research is a matter of plotting and following a timeline. The researcher should explore options for analyzing data collected through questionnaires or usability testing. For many projects, Microsoft Excel is sufficient in order to group, count, assign value, or determine percentages. If needed, advanced software for statistical analysis, such as SPSS, may be available through the campus community. Finally, determine how best to disseminate the results whether through informal or formal channels. Informal sharing often takes place in the form of conversations between colleagues, discussions on list-serves, and internal professional development presentations, such as brown bags. Writing synopses and reflections for blogs or other web venues will help disseminate information quickly. On the other hand, formal sharing, such as conference presentations, webinars, or publishing in journals or edited books requires more time and effort; yet, this method of dissemination can reach a broader audience and become a more permanent part of the scholarly conversation. Writing for publication can be a daunting process; use published research articles as a guide and, at the very least, include the following elements: introduction, literature review, methodology, results, and conclusion.

Conclusion

We encourage instruction librarians to prepare research projects for the possibility of disseminating findings. Enriching the scholarly communication of our profession, providing knowledge to colleagues concerning both successful and unsuccessful classroom practices, and establishing individual records of scholarship are all worthwhile pursuits. Attached is an action plan to guide researchers through the process of structuring research for dissemination within the profession (see Appendix). The action plan outlines the necessary tasks for conducting research with prompts, timelines, and status updates. For more information about conducting library-related research, consult Connaway and Powell's *Basic Research Methods for Librarians* (2010). Conducting and disseminating instruction-related research will positively impact the academic success of students and advance the collective knowledge of the library profession.

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APPENDIX

ACTION PLAN

TASKS	TIMELINE	STATUS
What will you evaluate? • What's your initial idea? • Will you examine objectives/outcomes, learners, environment, technologies, etc.?		
Literature Review • What types of sources will you consult?		
What is your research question? • Population/Issue/Problem _____ • Potential Solution _____ • Comparison Solution _____ • Probable Outcome		
What is your research design? • Will you be using a CAT (minute paper, pre-test/post-test, knowledge test, etc.)? • Who will be your participants? • How many participants will you need?		

TASKS	TIMELINE	STATUS
What is your method of data collection? • Will you be using a questionnaire or doing usability testing? • What is the time commitment on behalf of the participants?		
Have you requested IRB approval? • Are there any risks to participants? • Think you need more training when including human subjects in research? Check out the National Institutes of Health's Protecting Human Research Participants (PHRP) training course at http://phrp.nihtraining.com/users/login.php.		
Conduct Research		
How will you analyze the data? • Who will help analyze the data? • What software is needed?		
How will you disseminate your findings? • Who is your target audience? • Will you submit conference proposals, book chapters, journal articles, etc.?		