

TWEAKING YOUR PRE AND POST: CAPTURING STUDENT LEARNING AT THE SESSION LEVEL

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INTRODUCTION

During the Summer 2014 semester, using the ILIAC model (Oakleaf, 2009), the Germanna Libraries initiated a formal, outcomes-based assessment process intended to demonstrate the value of the library instruction program, and to improve student learning and librarian teaching skills. First, librarians articulated the *session-level* learning outcomes associated with the Library Instruction Program. Six learning outcomes, which support Germanna's Information Literacy general education goal, were created following best practices espoused by the Association of College and Research Libraries. Next, learning activities were designed to support these outcomes.

Library instruction at Germanna is primarily course-related and assignment-based, which optimizes student learning by drawing direct connections between library instruction and coursework. Germanna adheres to a "one-shot" library instruction model, in which library faculty collaborate with teaching faculty to design 75-minute sessions. In accordance with best practices related to pedagogy, two or three learning outcomes are covered in a one-shot session (Oakleaf et al., 2012, p. 10), through a combination of lecture and learning activities.

ENG 111 and ENG 112, which are the college's first and second semester freshmen composition courses, comprise 60-65% of the library instruction sessions taught each semester. Both courses contain learning outcomes that are consistent with the Library Instruction Program's learning outcomes, and both courses are assessed for student learning in information literacy per the college's general education assessment plan. Because most degree-seeking students are advised to take ENG 111 and ENG 112 during their first year of matriculation, the Library Instruction Program is an integral part of the "First Year

Experience" at Germanna. ENG 111 is also the primary library instruction access point for most certificate-seeking students.

Given the foundational role of ENG 111 within the college curriculum, and within the library instruction program, the course represented a logical starting point for the formal assessment of student learning as a result of library instruction.

During Summer 2014, three learning outcomes were identified as being the most frequently addressed in ENG 111 library instruction sessions:

1. Students will be able to contrast popular and scholarly periodicals in order to select relevant and appropriate source types for a specific assignment.
2. Students will be able to apply a set of evaluative criteria to an outside source in order to gauge its credibility/reliability.
3. Students will be able to construct effective and efficient search strategies in library databases in order to retrieve articles relevant to a specific assignment.

With these three learning outcomes in mind, research on a suitable assessment instrument was conducted. Internal validity was a major factor driving the selection of an assessment instrument. In order to isolate student learning that occurs as a result of the learning activities during a "one-shot" library instruction session, an assessment instrument is required that reduces the influence of confounding variables, such as prior learning. A preliminary review of the scholarly LIS literature revealed that relatively few articles address the assessment of student learning in one-shot sessions using pre- and post-tests. Despite this gap, the preliminary literature review did reveal several relevant articles (Bryan & Karshmer, 2013; Swoger, 2011; Walker & Pearce, 2014). Academic library websites were also searched for peer examples of pre-

and post-tests. A brief knowledge test was then developed around the selected learning outcomes and administered as a pre- and post-test in selected ENG 111 library instruction sessions during the Fall 2014 and Spring 2015 semesters.

Several weeks into the Fall 2014 pilot, it became apparent that pre-test scores for the multiple choice questions were higher than anticipated. However, based on observations of classroom discussions and feedback in one-minute papers, librarians were confident that students had not achieved the learning outcomes prior to the library instruction session. The assessment instrument underwent a minor revision (See Appendix B), and was administered throughout the remainder of the Fall 2014 semester, including late September and October. In the Spring 2015 semester, the assessment instrument underwent a major revision (See Appendix C), and the revised assessment instrument was administered in a small sample of ENG 111 library instruction sessions.

METHODS

Assessment Instrument

The assessment instrument, a brief knowledge test, was created in LibSurveys (LibGuides v.2), and all questions were marked as “required” to eliminate the possibility of partial survey completion. The pre- and post-test were identical, containing two multiple choice questions and one short answer question accompanied by a screenshot (see Appendix A). Appendix A contains the assessment instrument used at the start of the Fall 2014 semester. However, question one was slightly modified several weeks into the fall semester (see Appendix B), and assessment results prior to the modification were excluded from the final pool of Fall 2014 assessment data.

For the Spring 2015 pilot, question one in the assessment instrument was again revised, incorporating a common student misconception into the answer choices (see Appendix C).

Participants

Only ENG 111 library instruction sessions in which the library instructor’s session was focused on the three learning outcomes measured by the assessment instrument were considered for inclusion in the pilot assessment project. A percentage of ENG 111 library instruction sessions, such as those addressing ethical use of information at length, were not considered for inclusion in the pilot. Additionally, within the subset of classes considered for the pilot assessment, the classes in which the assessment was administered were not randomly selected.

The assessment instrument was administered in 40% of the ENG 111 library instruction sessions taught during the Fall 2014 semester, which comprised 10 “one-shot” sessions. In the Spring 2015 semester, a revised assessment instrument was administered in 29% of the ENG 111 “one-shot” library instruction sessions, which comprised 4 classes.

Procedures

The pre-test was administered during the first seven minutes of each session, and the post-test was administered during the last seven minutes of each session. A standard script regarding test procedures was not followed. However, at the outset of each administration of the assessment instrument, students were usually advised to give each question their “best guess” and were usually informed that the assessment was anonymous and ungraded. Students were also advised to scroll down to view the screenshot accompanying the third question, and to click submit when finished with the assessment.

During the data interpretation phase of the assessment cycle, question three—the open-ended question in the assessment—was scored using a rubric (see Table 1).

Table 1: Rubric for Question Three

RUBRIC FOR QUESTION 3			
	2	1	0
Students will be able to construct effective and efficient search strategies in library databases in order to retrieve articles relevant to a specific topic/assignment.	At least one strategy for narrowing search results is accurately and fully described	Description is vague or incomplete	No Description or inaccurate description

RESULTS

For the Fall 2014 semester, Figures 1 and 2 illustrate the percentage of correct responses in the pre- and post-test relative to each question in the assessment instrument. Figure 1 addresses the two multiple choice questions, and Figure 2 addresses the short answer question. In the Fall 2014 semester, the percentage change in correct responses for the multiple choice questions in the post-test was 10% for question one and 7% for question two (see Figure 1). For question three, the short answer question, the percentage of students scoring at the highest performance level—level two—increased by 18% in the post-test (see Figure 2). Additionally, for question three, the percentage of students scoring either a two or a one increased by 13% in the post-test.

In the Spring 2015 semester, the assessment instrument was administered with a major revision to question one. Figure 3 compares the pre- and post-test results for question one during Fall 2014 and Spring 2015. In the Spring 2015 semester, the revised iteration of question one was associated with a significant drop in the percentage of students answering the question correctly in the pre-test, as well as a five percent increase in the percentage of students answering the question correctly in the post-test (see Figure 3).

Figure 1: Fall 2014 Pre/Post-Test Results: Q 1 & Q2 (Multiple Choice)

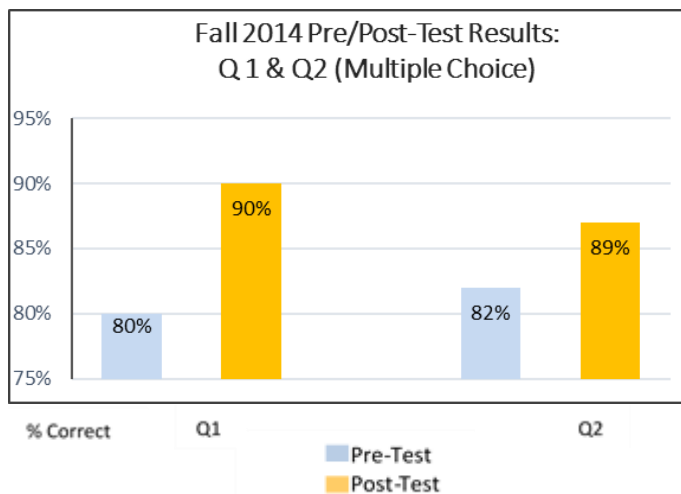


Figure 2: Fall 2014 Pre/Post-Test Results: Q3 (Short Answer)

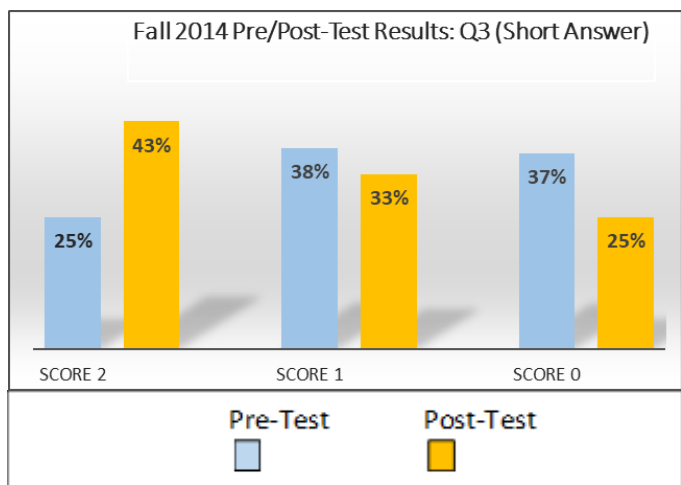
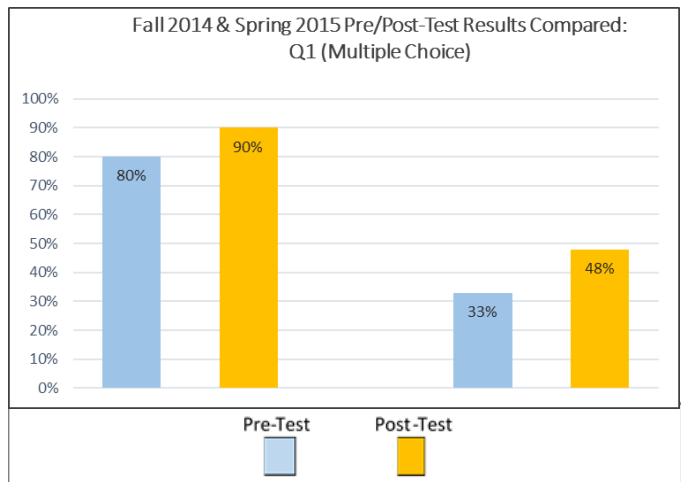


Figure 3: Spring 2015 Pre/Post-Test Results Compared: Q1 (Multiple Choice)



DISCUSSION

As an assessment instrument, pre and post-tests greatly reduce the impact of confounding variables when attempting to measure student learning at the session-level. Other assessment instruments, such as post-tests alone, lack the same level of internal validity. Due to the lack of scholarly LIS literature on the use of pre- and post-tests in the context of one-shot library instruction, this seems like an area well-suited to further investigation.

The results of the pilot library instruction assessment project at Germanna indicate that, when using pre- and post-tests, question construction is a major factor in accurately capturing the full extent of student learning relative to the learning outcomes addressed in a one-shot session. Within the relatively small body of LIS literature addressing the creation of pre- and post-tests in the context of either one-shot library instruction sessions—or for-credit information literacy courses—some authors have mentioned that students scored surprisingly high on some of the pre-test questions (Bryan & Karshmer, 2013; Hufford, 2010; Swoger, 2011). However, explanations regarding this phenomenon were limited. In Germanna’s pilot project, high pre-test scores for the multiple choice questions in the assessment instrument were interpreted as flaws in the design of the assessment instrument. Despite the high pre-test scores for the multiple choice questions, informal observations during classroom learning activities, coupled with feedback from one-minute papers, and the relatively low pre-test scores for the short answer question in the assessment, led librarians to believe that students had not achieved the learning outcomes associated with the multiple choice questions prior to their library instruction session.

Constructing effective test questions is an area in which academic librarians frequently have limited experience, as evidenced by the lack of library literature related to the topic and the simplistic nature of many existing pre/post-test instruments. However, there are many “best practices” associated with constructing effective multiple choice questions, and librarians would benefit from reviewing education literature related to the topic. Crafting effective multiple choice questions requires that incorrect answers be plausible, in order to ensure that students are selecting the correct answer based on their knowledge, rather than a logical guess. In the pilot, incorporating a common student misconception into the answer choices for question one (see Appendix C) greatly reduced the chances that students would select the correct answer in the pre-test (see Figure 3). The revision was also accompanied by a larger percentage increase in correct post-test responses, when compared with the previous iteration of the question (see Figure 3). In addition to creating plausible distractors as incorrect responses, it should be noted that, even modifying the verbiage of the *correct* answer can increase the relative plausibility of the distractors, which was informally observed after an early, minor revision of the assessment instrument (see Appendix B).

Multiple choice questions are ill-suited to effectively gauge higher levels of learning within Bloom's taxonomy. With this in mind, question three in the assessment instrument, which was associated with a relatively high level learning outcome—constructing effective and efficient search strategies in library databases—was designed as a short answer question. Most students interpreted question three as relating to a very specific aspect of constructing effective and efficient search strategies—applying database limiters—although some students mentioned the role of search connectors in their responses. In Fall 2014, for question three, the percentage increase in correct post-test responses—those scoring at the highest performance level—was higher (18%) than any of the multiple-choice questions. As the assessment instrument is further refined, more attention to the level of learning associated with each outcome will be given to ensure that learning outcomes are matched to appropriate types of test questions.

The library literature indicates that authentic, performance-based assessment is perhaps the most reliable indicator of student learning (Diller & Phelps, 2008). However, the time constraints of the one-shot can make authentic assessment of session-level learning seem daunting. Still, the possibility of using authentic assessment to measure changes in student learning as a result of a one-shot session represents an area for further inquiry. The pilot also reinforces the importance of using multiple modes of assessment, including classroom assessment techniques—such as one-minute papers—to arrive at a more accurate picture of student learning. In Germanna's library instruction assessment pilot, feedback from one-minute papers helped to expose flaws within the pre- and post-test.

There are larger questions associated with the pilot project that require further investigation, such as: how much of an impact on student learning can we reasonably expect to have within the one-shot library instruction model? What percentage increase in correct post-test responses for a question should be considered "success?" Also, how would students fare in the post-test a week after their library instruction session? These questions call attention to the limitations of the one-shot library instruction model. Despite the continued prevalence of the one-shot, other approaches have been successfully pursued in academic libraries to overcome the one-shot's limitations, including the "double-shot" or "few-shot" models, as well as for-credit information literacy courses. However, these options require additional expenditures of staff time, as well as additional buy-in from faculty. In particular, at many institutions, incorporating a for-credit information literacy course into the college curriculum poses significant challenges. In addition to increasing the amount of time spent in the classroom with students, librarians are also attempting to expand their impact on student learning by incorporating flipped classroom methods into library instruction models. While "flipping" sessions has the potential to increase the impact of library instruction on student learning, it poses additional challenges for isolating student learning that occurs as a result of in-class learning activities if the pre-test is

administered prior to students' interaction with digital learning objects.

Germanna librarians are pursuing a number of options to close the assessment loop. First, the library plans on continuing to revise the assessment instrument, in order to ensure that it accurately captures student learning at the session level. Second, the library plans on devoting three or four minutes at the end of future classes to review the correct answers with students *after* the pre-test, which supports the concept of assessment for learning (Oakleaf, 2010). Consideration is also being given to having students complete a second, follow-up post-test one week after the session. Moreover, consideration is being given to creating unique identifiers for students that preserve the anonymity of test results, but allow the library to track changes in the responses of individual students. As several students inevitably arrive late to each library instruction session—or leave early—this would increase the accuracy of the assessment results. Additionally, during the next phase of the pilot, the library will introduce inter-rater reliability into the scoring of open-ended questions by having at least two librarian assessors, and by having at least one norming session for each rubric utilized in the scoring process.

Finally, when the assessment instrument is sufficiently revised, the results of the assessment may be used to draw conclusions about the effectiveness of specific learning activities or pedagogical approaches.

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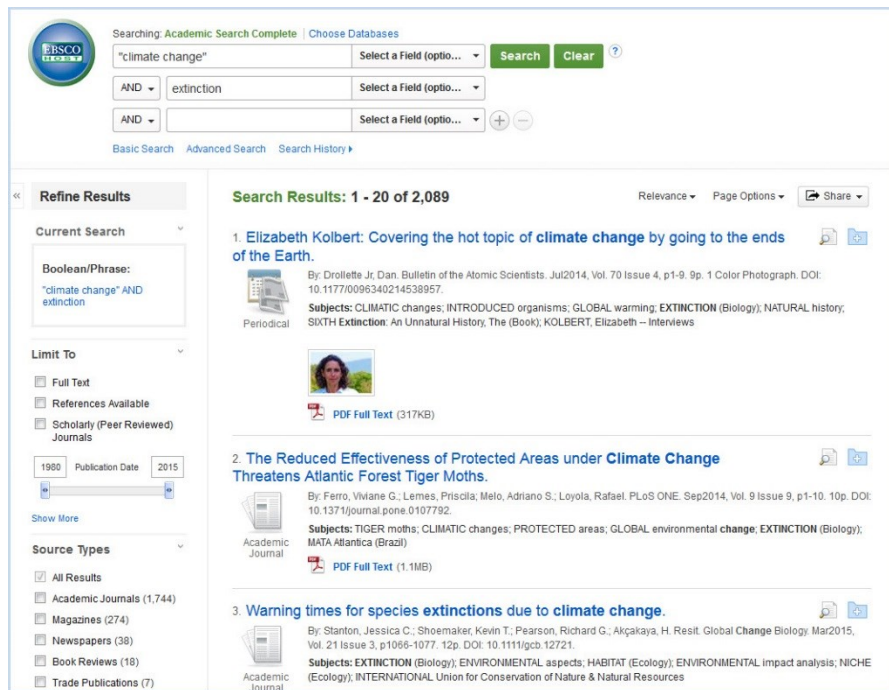
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APPENDIX A

FIRST ITERATION OF THE ASSESSMENT INSTRUMENT: EARLY FALL 2014

1. Which of the following would you find in a scholarly journal article?
 - A) Glossy pictures
 - B) Casual language
 - C) Accurate citations
 - D) Numerous advertisements
2. Which of the following would you consider to determine the credibility/reliability of an outside source?
 - A) Ease of access
 - B) Authority of the writer
 - C) Number of user comments
 - D) Number of page visits
3. Look at the screenshot below. In the screenshot, you'll see a list of search results from a library database. What is one way of narrowing down this list of search results using the options available to you in the database?



The screenshot shows a search interface with the following elements:

- Search Bar:** Contains the query "climate change" AND "extinction".
- Search Results:** 1 - 20 of 2,089 results.
- Refine Results Panel (Left):**
 - Current Search:** "climate change" AND extinction
 - Limit To:** Full Text, References Available, Scholarly (Peer Reviewed) Journals.
 - Publication Date:** 1980 to 2015.
 - Source Types:** All Results (checked), Academic Journals (1,744), Magazines (274), Newspapers (38), Book Reviews (18), Trade Publications (7).
- Search Results List:**
 - 1. Elizabeth Kolbert: Covering the hot topic of climate change by going to the ends of the Earth.**
 - By: Drollette Jr, Dan. Bulletin of the Atomic Scientists. Jul2014, Vol. 70 Issue 4, p1-9. 9p. 1 Color Photograph. DOI: 10.1177/0096340214538957.
 - Subjects: CLIMATIC changes; INTRODUCED organisms; GLOBAL warming; EXTINCTION (Biology); NATURAL history; SIXTH Extinction: An Unnatural History, The (Book); KOLBERT, Elizabeth -- Interviews
 - PDF Full Text (317KB)
 - 2. The Reduced Effectiveness of Protected Areas under Climate Change Threatens Atlantic Forest Tiger Moths.**
 - By: Ferro, Viviane G.; Lemes, Priscila; Melo, Adriano S.; Loyola, Rafael. PLoS ONE. Sep2014, Vol. 9 Issue 9, p1-10. 10p. DOI: 10.1371/journal.pone.0107792.
 - Subjects: TIGER moths; CLIMATIC changes; PROTECTED areas; GLOBAL environmental change; EXTINCTION (Biology); MATA Atlântica (Brazil)
 - PDF Full Text (1.1MB)
 - 3. Warning times for species extinctions due to climate change.**
 - By: Stanton, Jessica C.; Shoemaker, Kevin T.; Pearson, Richard G.; Akçakaya, H. Resit. Global Change Biology. Mar2015, Vol. 21 Issue 3, p1066-1077. 12p. DOI: 10.1111/gcb.12721.
 - Subjects: EXTINCTION (Biology); ENVIRONMENTAL aspects; HABITAT (Ecology); ENVIRONMENTAL impact analysis; NICHE (Ecology); INTERNATIONAL Union for Conservation of Nature & Natural Resources

APPENDIX B

SECOND ITERATION OF THE ASSESSMENT INSTRUMENT: MID-FALL 2014

1. Which of the following would you find in a scholarly journal article?
 - A) Glossy pictures
 - B) Casual language
 - C) ~~Accurate~~ Numerous citations
 - D) Numerous advertisements
2. Which of the following would you consider to determine the credibility/reliability of an outside source?
 - A) Ease of access
 - B) Authority of the writer
 - C) Number of user comments
 - D) Number of page visits
3. Look at the screenshot below. In the screenshot, you'll see a list of search results from a library database. What is one way of narrowing down this list of search results using the options available to you in the database?

The screenshot shows a search interface for EBSCO eBooks. The search query is "climate change" AND "extinction". The results page displays three search results, each with a title, author, publication information, and a PDF full-text link. The first result is by Elizabeth Kolbert, the second by Ferro, Viviane G., and the third by Stanton, Jessica C. The interface includes a 'Refine Results' sidebar with options to limit results by publication date and source types.

Searching: Academic Search Complete | Choose Databases

"climate change" Select a Field (optio... Search Clear

AND extinction Select a Field (optio...

AND Select a Field (optio... + -

Basic Search Advanced Search Search History >

Refine Results

Current Search

Boolean/Phrase:
"climate change" AND extinction

Limit To

Full Text

References Available

Scholarly (Peer Reviewed) Journals

1980 Publication Date 2015

Show More

Source Types

All Results

Academic Journals (1,744)

Magazines (274)

Newspapers (38)

Book Reviews (18)

Trade Publications (7)

Search Results: 1 - 20 of 2,089 Relevance Page Options Share

1. Elizabeth Kolbert: Covering the hot topic of climate change by going to the ends of the Earth.

By: Drollette Jr, Dan. Bulletin of the Atomic Scientists. Jul2014, Vol. 70 Issue 4, p1-9. 9p. 1 Color Photograph. DOI: 10.1177/0096340214538957.

Subjects: CLIMATIC changes; INTRODUCED organisms; GLOBAL warming; EXTINCTION (Biology); NATURAL history; SIXTH Extinction: An Unnatural History, The (Book); KOLBERT, Elizabeth -- Interviews

Periodical

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Academic Journal

PDF Full Text (1.1MB)

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Subjects: EXTINCTION (Biology); ENVIRONMENTAL aspects; HABITAT (Ecology); ENVIRONMENTAL impact analysis; NICHE (Ecology); INTERNATIONAL Union for Conservation of Nature & Natural Resources

Academic Journal

APPENDIX C

THIRD ITERATION OF THE ASSESSMENT INSTRUMENT: SPRING 2015

1. Which of the following are you LEAST likely to see listed in a scholarly article?
 - A) The college or research institution at which the writer works
 - B) The degrees that the writer has received in their field of study
 - C) The position title that the writer holds in their place of employment
 - D) The names of the colleges from which the writer received degrees
2. Which of the following would you consider to determine the credibility/reliability of an outside source?
 - A) Ease of access
 - B) Authority of the writer
 - C) Number of user comments
 - D) Number of page visits
3. Look at the screenshot below. In the screenshot, you'll see a list of search results from a library database. What is one way of narrowing down this list of search results using the options available to you in the database?

The screenshot shows a search interface for 'Academic Search Complete'. The search query is 'climate change' AND 'extinction'. The results are displayed in a list format, showing three search results. The first result is 'Elizabeth Kolbert: Covering the hot topic of climate change by going to the ends of the Earth.' by Drollette Jr, Dan. The second result is 'The Reduced Effectiveness of Protected Areas under Climate Change Threatens Atlantic Forest Tiger Moths.' by Ferro, Viviane G., Lemes, Priscila, Melo, Adriano S., Loyola, Rafael. The third result is 'Warning times for species extinctions due to climate change.' by Stanton, Jessica C., Shoemaker, Kevin T., Pearson, Richard G., Akçakaya, H. Resit. The interface includes a 'Refine Results' sidebar on the left with options for 'Limit To' (Full Text, References Available, Scholarly) and 'Source Types' (All Results, Academic Journals, Magazines, Newspapers, Book Reviews, Trade Publications). The search results are numbered 1-20 of 2,089.