

Updating Your Tool Belt

Redesigning Assessments of Learning in the Library

Most librarians and staff who perform library instruction in academic settings place a high value on assessment. They understand that determining what our students bring with them to the instruction lab and what they learn during the hour we teach them helps improve teaching. Some study the latest in assessment techniques and educational theory and form high ideals for themselves and for their libraries' instruction programs.

However, when faced with realities of our programs, successful though they may be, improving assessment that is performed across instructional programs can be a daunting task. Academic libraries' efforts to institute or improve library instruction assessment can lead to anxiety as librarians are pulled between using old favorite assessment tools and making major overhauls.

The authors of this article have developed an approach to assessment wherein librarians study the components of learning and use these to enhance familiar tools they already use for library assessment during instruction. This allows librarians to greatly improve the quality of their tools while feeling a sense of ownership without losing particular features of importance.

This study discusses three popular assessment tools (pretest/posttest sets, posttests, and activities) that were enhanced using this technique and the evidence of learning that each gathers. The authors

use data collected with each tool to discuss the strengths and weaknesses of each tool and suggests strategies for tool selection.

Innovative and enthusiastic instruction librarians work hard to improve teaching in their departments. They reach out to new campus faculty, create engaging online tools, and continually try new techniques in the classroom. They assess their students' learning, and encourage their colleagues to follow suit. The question of how best to assess often arises at this point. With many library instructors, many majors, unconventional library research assignments, and often only seventy-five minutes per semester with students, challenges of choosing thorough, informed assessments quickly outweigh ideals. The popular "one-minute paper" starts to look enticing again.

The authors of this paper bring a range of perspectives on higher education as well as a wide variety of assessment techniques and theory. All are actively engaged with the education of college and university students. Based on their research at the Auraria Library in Denver, Colorado, they recommend continuous reexamination of a department's assessment tools, based on the detailed breakdown of student learning (into factors of knowledge, skills,

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and attitudes) that is examined later in this paper. Further, their findings indicate that even a simple awareness of what one's tools actually test encourages improvement of these tools. Briefly studying the components of learning can lead many instructors to make positive changes in content or evaluation methods, whether simple or large scale.

The process designed for this study began by collecting assessment tools being used in a library instruction program and identifying the factors of learning covered by each. Tools may be revised to cover additional factors of learning. They are then used in the classroom and revised again, in response to "real life" factors, such as skills necessary for a particular course or adjusting the overall level of difficulty. The techniques also work on a smaller scale, for better incorporating learning theories into an individual's assessment efforts. This article includes sample rubrics and instruments for testing information literacy across subject boundaries.

The major strength of this analytical process is that it allows a particular library instruction program, or an individual instructor, to revise assessment tools that are already in use. Rather than discarding current instruments and starting from scratch, instructors study the components of learning and use these to improve the tools they are already comfortable with. This may entail updating tools' content or changing how students' answers are evaluated. Either way, both departments and individuals will find this method easier than creating completely new tools.

LITERATURE REVIEW

It is important to note that this review focuses on one-shot library instruction sessions. Librarians embedded in college classes, for example, have proposed more in-depth methods of evaluation appropriate to their situations. In general, these do not apply smoothly to one-shot scenarios.

Current Trends in Assessment of Learning

One major theme in recent assessment-related library literature is the culture of assessment on college and university campuses. Colleges and universities develop this culture and often campus-wide standards to go with them. Libraries can then adopt or adapt the standards and fit in with the culture. Some libraries also choose to create their own cultures of assessment before their institutions. This freedom to innovate is one of academic libraries' most fortunate and productive strengths.

Many libraries have found that taking part in

university-wide assessment programs and publicizing their assessment work to faculty members outside the library validates their work to these faculty and encourages more productive collaboration between libraries and academic departments. Susan E. Searing of the University of Illinois at Urbana-Champaign writes that even small assessment efforts can make a meaningful difference in the acceptance of information literacy as a critical component of the curriculum. By sharing assessment results, librarians generate good will between the library and the academic program.¹

Claudia Ruediger and Donald Jung highlight the fact that now "information literacy skills are common learning indicators found in accreditation and assessment documents."² Regional and professional accreditation groups have incorporated information literacy into their standards as well.³

Even if a university has not begun an institution-wide assessment program, librarians can "demonstrate to a reluctant faculty and administration the utility of a new initiative."⁴ Showing faculty that students learn to apply their information literacy skills and assessing how well students are learning with the resources the library has demonstrates dedication to students' learning.⁵ Nancy O'Hanlon of the Ohio State University has applied an outcomes assessment model in situations where universities have not yet added information literacy to curriculum requirements. She advocates libraries' creation of their own information literacy programs. Since direct measurement of what students learn through these programs is difficult, collecting faculty perceptions of students' learning and development after these programs can help gain faculty support.⁶

Diller and Phelps have researched the use of portfolios, rubrics, and other more holistic methods of evaluation to help students understand expectations and measure their own growth. They provide an example of a matrix created to help students understand goals related to information literacy and other areas of learning throughout a general education curriculum.⁷ They also provide a highly detailed "Communication and Information Literacy Rubric," which could be used on a single assignment or throughout a course.⁸ Knight provides another rubric meant to measure information literacy in assignments in a freshman composition class.⁹ Her rubric assesses student work using criteria from ACRL's *Information Literacy Competency Standards for Higher Education*.¹⁰

The State of Library Instruction and Assessment

As assessment receives more and more attention

throughout all units of colleges and universities, the body of literature on assessment of library instruction is growing rapidly. To make the review manageable, and also to reflect changing trends in library instruction and its assessment, this review is primarily limited to works published in 2000 and later. One exception is the inclusion of Evan Ira Farber's work. From 1962 through 1994, he developed practices to guide librarians' collaboration with faculty in other departments.¹¹ Although the exact methods librarians use to provide such philosophies over time should change, the philosophies themselves provide continuing guidance.

Libraries in the United States have used the ACRL standards to shape their information literacy programs in multiple ways. Numerous instruction departments have used them to design rubrics to assess information literacy in student assignments. Some are designed to be used by librarians and a few by academic faculty.¹² One of the most important aspects of the standards has been in the design of learning outcomes. Avril Cunningham notes that "instruction librarians now routinely make it a practice to write three to five learning outcomes for a class based on ACRL's *Information Literacy Competency Standards*."¹³

A small but significant body of literature in library science journals has covered a shift in the types of questions librarians ask students during assessment. In the past, assessment forms frequently asked students to rate librarians' teaching style, level of familiarity with the material covered in class, and so on. Library researchers label these "affective surveys."¹⁴ This change allows librarians to gather significant information on student learning, rather than simply finding out whether students found the hour vaguely satisfying.

The majority of recent (2000–2008) literature on assessment of library instruction sessions focuses on formats of assessment used and questions asked to more directly measure learning and comprehension. This recent literature on assessment of library instruction has also suggested a twist on effective surveying. Houlson notes that students' responses to questions about the most useful thing learned and which resources they would recommend to others¹⁵ can prove quite revealing. While these responses do not directly reveal librarians' proficiencies, they suggest comfort levels and may help project usage of specific research tools.

In many library instruction programs, instructors assess learning as a group but do not collect information on students as individuals. Houlson advocates getting students to work in groups, then share their results on whiteboards around the classroom.¹⁶ While individual results are not

collected, students learn from each other, and librarians gauge the class's overall understanding. Ondrusek and colleagues suggest "informal performance exercises"¹⁷ or ungraded online activities.

The debate over online versus paper formats has increased over the past several years. The current consensus seems to be that online tools have a variety of advantages: easy collection of data and holding student interest, but that most libraries still use paper tools. Currently, discussions of online tools focus more on content and course design than on technical details.¹⁸

Formats of Assessment Tools

A review of the literature on assessment of library instruction produces an enormous list of potential formats of the assessments themselves and of the questions they contain. Some formats are recommended many times, while others show experimentation on the librarians' part. Below is a partial list of assessment formats described in literature since 2000. Types that are novel or particularly well described are cited here.

- One-minute paper: students are asked to write about a given topic for one minute. Topics often focus on students' perceived learning or satisfaction.
- Pretest : a skills test administered before library instruction, generally within the first few minutes of class.¹⁹
- Posttest only : a skills test given after students have received library instruction, generally during the last few minutes of class. Some library instructors also choose to test students several days or weeks after library instruction.²⁰
- Pre and posttest sets : a skills tests given to the same group of students before and after library instruction. Tests may be administered so that the librarian can judge individuals' before-and-after performance.²¹
- Free response questions on skills learned: students are asked to write a brief essay either displaying or discussing skills learned during library instruction.
- Viewing student research papers : librarians arrange to read papers written by students who have received their library instruction. Librarians may then evaluate the quality of research apparent in the papers.²²
- Viewing student portfolios : a similar technique, using student portfolios rather than papers.²³
- Pretest, posttest, and post-posttest sets:

students complete quizzes before library instruction, immediately after receiving library instruction, and several days, weeks, or months after receiving library instruction. Quizzes may or may not be matched to measure individual students' learning.²⁴

Most librarians do not suggest using significantly different assessment tools and questions for subject-specific classes and basic courses such as freshman composition.

Dimensions of Learning: Knowledge, Skills, and Attitudes

This study's model of student learning, based on Bloom's Taxonomy of Learning Domains, discusses three dimensions of learning: knowledge, skills, and attitudes.²⁵ Current literatures often discuss these dimensions in the context of learning in particular disciplines. The following materials discuss them in more general terms.

Peter Ackerman discusses the idea of the "knowledge repertoire," a collection of information that students can be expected to possess and apply at particular stages in their education, such as the end of high school.²⁶ Armin Weinberger, Karsten Stegmann, and Frank Fischer discuss "knowledge convergence," which refers to the knowledge that students bring together and share when they work in groups or other interactive settings.²⁷ This concept may be revealing when posttests are used or when students are allowed to consult each other during class activities.

The report titled *How Should Colleges Assess and Improve Student Learning?: Employers' Views on the Accountability Challenge* provides insight on students' use of classroom skills in the real world; it is one of the select resources that discusses the concept of skills in general. Not surprisingly, employers strongly advocate the development and assessment of skills at colleges and universities through projects, internships, and other practical applications.²⁸

Numerous resources discuss students' attitudes toward learning. Fewer cover assessment of those attitudes. However, their methodologies can provide useful guidance. *Educating the Net Generation and Serving the Millennial Generation* discuss the generation of students that make up the bulk of today's undergraduates in the United States.²⁹ Remedios and Lieberman's article discusses the question of whether easy courses necessarily receive more positive evaluations, a frequent concern among educators. While much of the article specifically discusses learning throughout

a semester-long course, comparisons of students' knowledge before and after lessons or units can help library instructors understand how results of single evaluations or assignments affect students' attitudes toward the class.³⁰

What is missing?

Choinski and Emanuel note that relatively little literature is currently available on outcomes-based assessment for one-shot library instruction classes.³¹ There is also a lack of studies that compare effectiveness or usefulness of multiple assessment tools in an academic library setting. Our research aims to fill in both of these gaps in knowledge.

Knowledge, Skills, and Attitudes

Early in the project, the researchers chose to focus on knowledge, skills, and attitudes as the three overarching components of learning. The following definitions, from discussions based on Bloom's work, apply to this study:

- *Knowledge*: "relates to the acquisition and application of knowledge and understanding. It deals mainly with learning of an intellectual nature, covering the range from simple recall through to analysis and evaluation of information."³²
- *Skills*: the ability to apply prior knowledge and use it to carry out tasks.
- *Attitudes*: "deals with learning that has a substantial emotional basis and covers the range from having an awareness of feelings through to amending behavior so that it becomes consistent with new values and beliefs."³³

Breaking our research into Bloom's categories allowed us to clearly define our areas of analysis. It also helped us align our work with much other research and many past studies conducted in more traditional classroom settings.

BACKGROUND

The Auraria Library proves an optimal testing ground for library assessment tools. Its campus houses three separate educational institutions: the University of Colorado Denver (UCD) (which offers bachelor's through doctoral degrees), Metropolitan State College of Denver (a four-year institution which offered open admissions at the time of the study), and the Community College of Denver. The Community College of Denver (CCD) has attained Hispanic-Serving Institution status,

and Metropolitan State College of Denver (MSCD) plans to achieve this status within the next few years. At the time the study was conducted, enrollment stood at approximately forty thousand, with twenty-eight thousand full-time equivalent (FTE). The student body exhibits tremendous diversity in terms of educational backgrounds, majors, races, ethnicities, technological competencies, languages, ages, and socioeconomic statuses. The challenge of providing instructional offerings that meet everyone's needs encourages librarians to develop versatile teaching methods and tools. Assessing learning at the Auraria Library provides data on how a wide range of students learn research skills.

During the 2008–09 school year, about fifteen reference and instruction librarians and staff provided nearly 650 library instruction sessions for the three schools. About 41 percent of the sessions were considered freshman composition classes. The Auraria Campus institutions offer a total of six levels of freshman composition: English 1020 and 2030 at UCD, English 1020 at MSCD, and English 090, 121, and 122 at CCD. CCD English 090 is considered a remedial literacy skills class, but librarians teach the same research skills during this class, more slowly, and with more time set aside for individual help. The researchers decided to include this course in the study because the librarians generally consider it a part of the freshman composition program and because it allowed for testing a more diverse set of skills and educational needs. All three schools follow fairly traditional models of testing and placement into freshman composition courses at the beginning of students' first year. One exception is that, since UCD does not offer remedial courses of any sort, UCD students needing remedial reading assistance take English 090 through CCD. Students at one institution may also apply to take courses at another for personal or curricular reasons. These situations are unusual, though; this study only recorded one instance of cross-institutional enrollment. More commonly, students either complete an entire program of study at a single institution or complete several years of entry-level coursework at CCD or MSCD and transfer to UCD.

OBJECTIVES

Our study worked toward four objectives:

1. Propose a method of identifying assessment tools in use at a particular academic library, assess the learning measured by each tool, identify gaps in the assessment, and recommend how these gaps may be measured.
2. Provide details about factors of learning that can be assessed through library instruction.
3. Provide sample instruments for assessing student learning in the library instruction lab and tools for scoring these instruments.
4. Discuss real-life challenges to assessing learning in the library instruction lab.

METHOD

Creation of the Assessment Tools

During the summer of 2008, all Auraria Library instructors were invited to submit their assessment tools to the researchers. Six instructors contributed a total of fifteen tools. The researchers examined all the submissions and determined that nearly all could be clearly grouped into one of three categories: pretest/posttest sets, posttests (administered without a pretest), and activities. Karen Sobel, reference and instruction librarian, and Lorrie Evans, head of instruction at the Auraria Library, then analyzed the types of library instruction content that appeared on most tools, regardless of subject. The five common areas were:

1. information literacy
2. database usage (either selecting a database or applying skills)
3. catalog usage (usually applied)
4. search skills (e.g., Boolean terms)
5. general library information (such as where to request particular types of assistance).

The researchers then designed representative tools that could be used across the freshman composition program: a pretest/posttest set, a posttest, and activities (projects that simultaneously allow students to perform their own research and librarians to monitor learning). This accomplished the dual purpose of evaluating the most popular types of tools and encouraging our test instructors to practice working a variety of types of assessment into their instruction sessions.

Questions in all five areas were included on the pretest/posttest set and the posttest. All types except general library information were included in the activity. The researchers began by creating multiple versions of the pretest/posttest sets and the posttests. Every pretest or posttest asked the questions in the order listed above. This made it considerably easier for the researchers to glance over results. Pretest/posttest sets were marked with random numbers so that pairs could be matched. No student names were collected with any instruments.

Originally there was only one version of the

activity; however, once it was administered, instructors and researchers alike noticed that students appeared to be copying each other's answers. Thus the activity was revised to make two versions with identical questions in different orders. Activities gathered before that time were removed from the study and considered a pilot. The activity was intended to guide students toward thinking about search terms, then locating four sources to use for a regular assignment from their freshman composition course. Samples of all the instruments are available in the appendixes.

Tools were given to library instructors in a packet. Packets contained enough tools for one library instruction session, institutional review board (IRB) letters for all students, and a script for presenting the study to students.

Sample

Data was collected from a total of 249 students in the six levels of English discussed above (48 from CCD, 171 from MSCD, and 30 from UCD). All students were asked to identify their gender, the school they were enrolled in, year in school, and full-time or part-time enrollment. Students were given the option to opt out of study participation; these students' scores were kept for the library instructor's personal use. They were not included in the final figures.

Instructors

All Auraria Library instructors were offered the chance to participate in this study. Five chose to participate: four reference and instruction librarians and one classified staff member with many years of experience performing library instruction. Instructors were offered a spreadsheet of the data they personally collected in exchange for their work.

Instructors were introduced to the assessment tools and were asked to incorporate them into their lessons with as little change from their normal practices as possible. The researchers discussed the importance of "not teaching to the test" but did not otherwise guide instructors other than to answer questions.

Scoring

All pretests and posttests (with or without a pretest) had five questions, one in each area. All questions were marked as correct or incorrect. No partial credit was allowed. Thus, a pretest and posttest given to a single student could be

compared, as could posttests from the pre/post set and posttests administered alone. On the posttest (administered without a pretest), the researchers chose to mark omitted questions as omitted, rather than incorrect. The researchers believe the distinction between completing a question incorrectly and choosing not to attempt a question gives important data on both knowledge and attitudes.

Activities were scored using a rubric (appendix A). The rubric focuses on the major factors of learning and uses a simple zero-to-two-point scoring system. Sobel and Wolf practiced scoring the activities together to establish inter-rater reliability. While the two-point scale does not reflect great nuance, it allows librarians to score quickly. When the rubric was applied, a score of zero indicated that a student had either skipped the item entirely or made a weak attempt at completion. Few students misinterpreted any questions. A score of one generally indicated that a student had completed a question and met the requirements exactly. A score of two indicated that a student had provided insightful answers, or otherwise gone above and beyond the requirements, thus setting him or herself up well to begin research.

Scores from the pretest/posttest sets and the posttests are not directly comparable with scores from the activity packets. Since all of the instruments test similar skills, however, library instructors who feel comfortable with the material tested can easily review feedback from mixed groups of testing materials and judge students' understanding.

RESULTS

Posttests

Results from posttests administered without a pretest (table 1) demonstrate significant understanding in every area. While some instructors may have hoped for higher scores in information literacy, the fact remains that 67.2 percent of students were able to choose the correct answer from a list designed specifically to challenge their prior beliefs. Had partial credit been allowed, considerably more students would have gained points. After practicing the use of Boolean search skills in both databases and the library catalog, 69.3 percent of students could use these search terms correctly. After discussing several individual databases as well as the research benefits of choosing appropriate databases, 72.3 percent of students could make a correct selection, given a proposed need. Finally, 80.3 percent of students could answer a question on practical facts about the Auraria Library, using information that had been provided verbally

during the session. All of these questions had a remarkable 0 percent omission rate, indicating high student engagement.

The applied library catalog question unfortunately fell victim to an Internet outage. One entire section (comprising 8.8 percent of the sample group) was unable to complete this question, thus rendering results insignificant. An additional 16.1 percent of students did not complete this question for unspecified reasons. Notably, this question was the only one requiring Internet usage; thus, failure to complete the item could reflect technical problems or other factors. That said, many instructors anecdotally expressed satisfaction that 56.9 percent of the class came up with correct call numbers, as this is an important skill and a time-consuming challenge for many undergraduate students.

Pre/Posttest Sets

The pretest/posttest sets' omission rates are, unfortunately, quite striking (see table 2 for activity results). The applied library catalog question received a dismal 23.8 percent omission rate on both the pretest and posttest. While the library catalog questions' omission rates merit additional discussion later in this paper, it is also interesting to see how much higher omission rates are in the

pretest than in the posttest. The other four pretest questions averaged a 16.8 percent omission rate, while the other four posttest questions averaged 2.2 percent omission. Experienced library instructors can make many guesses at the reasons. Students often straggle in and may prefer to spend the moments before instruction begins on sending a last text message or checking a personal e-mail account. Although this frustrates the researchers, it is instructive to see this proven statistically.

In the majority of cases, students did demonstrate learning gains, which is important. Applied use of the library catalog rose from 38.8 percent correct to 53.8 percent correct. Use of Boolean search terms increased from 66.3 percent correct to 80.0 percent correct. Knowledge of general library information rose from 57.5 percent to 71.3 percent. The database question, in which students demonstrated no statistical evidence of learning, and the information literacy question, where students demonstrated a decrease from 72.5 percent to 56.3 percent, remain troubling and suggest possible failure of the instrument, among other options. It is interesting to note that, in the posttest-only group (table 1), statistics on the information literacy question were much more positive.

Table 1. Raw Data from Posttest Only Sets

Question	Correct	Incorrect	Omitted
Information literacy	67.2%	32.8%	0%
Library catalog (activity)	56.9%	18.2%	8.8%*
Search skills (Boolean)	69.3%	30.7%	0%
Databases (multiple choice)	72.3%	27.7%	0%
General library information	80.3%	19.7%	0%

* 8.8% because of an Internet failure during one session; an additional 16.1% for undefined reasons
Note that questions were given in this order on all posttests. See appendix C for sample instrument.

Table 2. Raw Data from Pretest/Posttest Sets

Question	Pretest Correct	Pretest Incorrect	Pretest Omitted	Posttest Correct	Posttest Incorrect	Posttest Omitted
Information literacy	72.5%	23.8%	3.8%	56.3%	41.3%	2.5%
Library catalog (activity)	38.8%	37.5%	23.8%	53.8%	22.5%	23.8%
Search skills (Boolean)	66.3%	27.5%	6.3%	80.0%	16.3%	3.8%
Databases (multiple choice)	50.0%	22.5%	27.5%	46.3%	52.5%	1.3%
General library information	57.5%	15.0%	27.5%	71.3%	27.5%	1.3%

See appendixes B and C for sample instruments.

Table 3. Student Scores on the Activities

Question	Students scoring "2" = above proficient	Students scoring "1" = proficient	Students scoring "0" = below proficient
Stating topic	100%	0%	0%
Keywords	93.8%	6.3%	0%
Synonyms for keywords	93.8%	6.3%	0%
Book citation 1	87.5%	6.3%	6.3%
Book citation 2	56.3%	0%	43.8%
Article citation 1	81.3%	18.8%	0%
Article citation 2	93.8%	0%	6.3%

Note that book citation 1 and book citation 2 have the same requirements, as do article citation 1 and article citation 2. See appendix A for sample instrument.

Activity

Statistics from the activity (table 3) show high performance in all categories. On each item except for the second book citation, at least 81.3 percent of students received a score of two. For the second book citation, 43.8 percent of students either omitted the item or provided minimal information, possibly indicating impatience to move on and collect the items. Looking through the completed activity papers, the researchers felt that in many cases, overall performance indicated significant engagement. Students found the activity useful for their own research purposes and thus put effort into it.

DISCUSSION

So, How Do I Choose an Instrument?

As the researchers predicted throughout the study, no one instrument "won." Rather, strengths and weaknesses of each tool appeared. (See table 4 for a summary.) The activity maximized student engagement, and students completed it at a high rate. Scores for the activity were generally high, and anecdotally it appeared that students put additional effort into sections that helped them in practical ways, such as gathering articles for a research paper. Students appeared to respond well to the structure and content of the activity. In this way, the attitude component becomes clear. The downside was that library instructors quickly determined that activities do not smoothly fit into every instruction session. Nevertheless, they are a valuable part of the assessment repertoire and one that students appreciate for its guidance and practicality.

While librarians administering the survey did not have specific goals for scores, all anecdotally expressed satisfaction with the results, with the

possible exception of library catalog usage. The library catalog question was affected by a failure of the wireless Internet during one class session. While frustrating, this highlighted the "real life" setting of the study.

The strengths and weaknesses of pretest/posttest sets and posttests administered alone are more clearly indicated by the research. One of the issues is that the pretest/posttest set shows learning gains and allows some inference about the effects of the instruction. The posttest given alone indicates whether students have mastered the material but does not provide information about the effectiveness of instruction. Thus it depends on the purposes for the assessment in deciding which approach to take. And of course the posttest given alone requires less class time which is significant in an hour long class. With the pretest/posttest set, students can see how much they improved, and sometimes the pretest can act as an advance organizer and actually boost performance.

Matching a pretest and a posttest for an individual student, or even collecting class data without matching, yields rich data on student learning and skill development. However, as evidenced by the data, if students feel that they are completing this for the instructor's sake, they do not necessarily feel compelled to perform well or complete the task. Library instructors report watching students set the posttest aside in favor of taking a few more minutes to perform research. Most educators cannot argue with that attitude!

The posttest administered by itself clearly does not provide such rich data on learning. However, it has a much higher completion rate than posttests given along with a pretest. Perhaps more importantly, students seem more compelled to complete the slightly labor-intensive questions,

Table 4. Advantages and Disadvantages of Testing Tools Covered in this Study.

Assessment Tool	Advantages	Disadvantages
Posttest Only	High rate of completion Can compare with average “before” knowledge Takes only five minutes out of class (or can be completed outside the instruction session, with classroom instructor’s cooperation) Easily integrated into lesson	Cannot directly compare “before” and “after” performance
Pre-Test/Post-Test Set	Can compare “before” and “after” for each student, or for the class as a whole Can be completed outside the instruction session, with classroom instructor’s cooperation Easily integrated into lesson	High omission rate Takes more time out of class
Activities	High rate of student engagement Sets students up for their research Can serve as the basis for a lesson Can be shaped to complement academic classroom assignments	Rubric-based scoring may lack in nuance Development of rubric takes time

such as applying catalog skills, when the pretest is omitted. Since library instructors are working toward a particular end result—students learning a particular set of skills—using the posttest alone may, surprisingly, gather more useful data on the end goals of a lesson. The researchers note that, once a library instructor has become familiar with the levels of knowledge and skills that a particular group (such as students in English 2030) bring to class, he or she may prefer to focus on administering posttests, with only periodic usage of pretests.

Consistent scores of two on the activity may indicate a “ceiling effect”: the activity may have been somewhat too easy for many students. This possibility brings up questions familiar to library instructors. Should the activity have included more advanced research techniques that would challenge students more? Was the purpose of the activity to measure or to facilitate learning? These questions do not have easy answers. Rather, they should inspire other instructors to consider similar issues when designing their own activities.

Revision of Instruments

One additional opportunity that library instructors will have is the chance to easily update and experiment with assessment tools. Unlike the researchers in this study, they can tweak tools each time they are used. The researchers plan to experiment with many revised instruments as well and test those that show promise or intriguing results.

The process of development this study describes may seem frustratingly complex. However, the objective of this process was simple: creating three well-designed sample tools that represented the work done by fifteen instructors. Readers who wish to adapt these techniques to their own instruction may simply identify the assessments they already use and work to improve content and application of these tools.

Time and Dedication

One-shot library instruction sessions only provide a single, tiny snapshot of students’ knowledge, skills, and attitudes. Librarians generally do not get to follow students’ learning across an academic career or even across a semester. Movements toward embedded librarian relationships will hopefully help librarians gather more data on learning across the years. These scenarios should also yield more data and anecdotal evidence on how testing differs when students feel some level of dedication to the librarians.

Omission in the Pre/Posttest Set

One of this study’s most striking findings is the idea that students are dramatically more likely to omit questions from a posttest if they have already taken a pretest. Perhaps they feel that they have already done the same task and do not need to complete it again. If this supposition is correct

then omission statistics from the posttest should be read very differently than omissions on the pretest. It is also possible that students feel that they have already taken time out from their research and do not need to take more time. Either way, this deserves strong consideration from library instructors. One instructor thought of this omission in terms of distraction—at the beginning of the class, students were ready to take on whatever tasks they were given. By the end of class, they were either distracted by their own research or by readiness to finish the session.

The researchers wondered whether instructors in more traditional disciplines had researched omission rates and patterns for similar types of exercises. A search of education literature found that recent research on omission has focused on students with special needs, such as learning disabilities. Other literature, such as Abad, Olea, and Ponsoda's work, provides guidance for researchers on how to statistically handle omitted answers.³⁴ None truly approach the questions of why the average student chooses to skip a particular question and what other behaviors, such as continued omission, relate to that choice.

This topic merits more research for completely practical reasons. Questions raised in this initial testing include asking whether creating pretests and posttests with significantly different questions would yield more complete responses. Such instruments would have to be crafted with care, so as to still allow for close comparison. Another area for study is whether librarians with semester-long class relationships, such as embedded librarian positions, can collect more thorough results. Will students fill out all the questions if they feel more connected with the librarian?

SUMMARY

The researchers recommend that librarians use this work as inspiration for improvement of their own library instruction programs. They intend for their analyses of the components of learning as well as the strengths and weaknesses of each category of assessment tool to guide other instructors' choices. Most importantly, they hope that instructors at other institutions will feel more capable of improving their libraries' assessment efforts. They may work toward this by strengthening existing tools or by using information provided in this study to create new tools.

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APPENDIX A. RUBRIC FOR ACTIVITY

1. Write a short paragraph describing the topic of your paper.

	BELOW PROFICIENT	PROFICIENT	ABOVE PROFICIENT
Write a few phrases that describe the focus of your assignment for this course. Underline some of the key concepts.	Offers no phrases/viable keywords or phrases that don't contain key concepts and that do not clearly connect to the assignment.	Offers two or more clear phrases/viable keywords with key concepts that coherently describe assignment focus.	Offers three or more richly descriptive phrases/viable keywords with clear key concepts that capture the assignment focus.

2. List at least three search terms you would try using in the database when starting your research.

	BELOW PROFICIENT	PROFICIENT	ABOVE PROFICIENT
List at least three key concepts related to your topic.	Offers fewer than three concepts or concepts that are largely unrelated to the topic.	Offers three or more key concepts related to topic.	Offers three or more key concepts that relate to topic in creative, interesting ways.

3. If the search terms above don't work well, what are at least three other terms you could use to search for similar information?

	BELOW PROFICIENT	PROFICIENT	ABOVE PROFICIENT
List some synonyms for your key words.	Offers fewer than three synonyms or synonyms that are unrelated to the key words.	Offers three or more synonyms that accurately relate to the key words.	Offers three or more synonyms that insightfully relate to the key words.

Books

Search the library catalog for two books that could be used as sources for your paper. One could be a government document. See if the books are available to check-out. Write the location and call number below.

Book 1

- Title
- Location
- Call Number
- Available?

	BELOW PROFICIENT	PROFICIENT	ABOVE PROFICIENT
Search the library catalog for two books that could be used as sources for your paper. See if the books are available to check-out. Write the location and call number.	Identifies books that are inadequate sources for the topic, may not correctly indicate whether they are available for check-out, and may not give the correct location and call number.	Identifies two books that are adequate sources for his or her topic, correctly indicates whether they are available for check-out, and gives the correct location and call number.	Identifies two or more books that are excellent sources for his or her topic, correctly indicates whether they are available for check-out, and gives the correct location and call number.

Articles

Use the databases we discussed to find two articles that will help with your research.

Article 1

Which database did you use?

Article 2

Which database did you use?

	BELOW PROFICIENT	PROFICIENT	ABOVE PROFICIENT
Use the databases we discussed to find two articles that will help with your research.	Does not locate articles appropriate to his or her topic or does not use databases discussed in class.	Locates two articles adequate for his or her topic using one of the databases discussed in class.	Locates two or more articles clearly appropriate to his or her topic using two or more databases discussed in class.

Note—listing a correct database will not be taken into account.

APPENDIX B. SAMPLE PRETEST OR POSTTEST ONLY

I give consent for my performance on this activity to be included in the study *Comparison of Tools for Assessing Learning during Library Instruction*.

Circle one answer for each question.

Which school do you attend?

- Community College of Denver
- Metropolitan State College of Denver
- University of Colorado Denver

What year are you in at your school?

- First year
- Second year
- Third year
- Fourth year or beyond

Are you attending classes full time or part time?

- full time
- part time

What is your gender?

- female
- male
- transgendered/other

When you need the ideas of experts, the best place to look is: (Check one or all that apply.)

- Reference books
- Journal articles
- The Internet
- a and b
- b and c

What is the call number for Agatha Christie's *A Caribbean Mystery* at Auraria Library?

Putting a * at the end of a word in an Auraria Library catalog search means

- Nothing
- The same thing as "and"
- Making the word plural
- Looking for that word plus any ending

To find an academic or scholarly article on your subject, go to:

(Check one or all that apply.)

- Google
- Academic Search Premier
- LexisNexis
- A subject-specific database found through a subject search on the database page

Where can you go to ask for a librarian's help with a research question?

- circulation desk
- reference desk
- research center
- reserves desk

APPENDIX C. SAMPLE POSTTEST (ADMINISTERED WITH PRETEST).

Note: Posttests administered without a pretest also included a demographics section. This ensured that demographics were collected on all subjects.

I give consent for my performance on this activity to be included in the study *Comparison of Tools for Assessing Learning during Library Instruction*.

Circle one answer for each question.

FEATURE

Which of these citations is for a book?

- Michaels, Jessica. "Gender in Art Films of the 1990s." *Studies in Film Culture* 14.6 (2004): 40–47.
- O'Hara, Lucas. *Three Ancient British Settlements*. New York: Harcourt Brace, 1995.
- Desai, Mohini. "Chemistry in Science Fiction Novels." *Downtown Denver Science Fiction Club*. 2006. University of Colorado Denver. 8 Mar. 2008 <<http://www.ucdenver.edu/campusorg/scifi/may06/page7.html>>.
- D'Adro, Katie. "Marine Ecology and the El Niño Effect." *Chicago Tribune* 6Apr. 1998: C7.

Who is the author of *A Cook's Guide to Asian Vegetables*? (Hint: check the library catalog.)

Putting an "and" between two keywords means:

- You are searching for materials with that phrase in the title.
- You only want materials that discuss both concepts.
- The same thing as putting an "and" between two keywords.
- You want materials that discuss one concept or the other.

Which is the best source for finding full-text scholarly/academic articles?

- Academic Search Premier
- the library catalog
- LexisNexis
- "find a scholarly article" box

Which is NOT available for free at Auraria Library?

- electronic copies of newspaper articles
- research help
- snacks (only at lunch time)
- electronic books and encyclopedias