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# MIXING AND MATCHING

## Assessing Information Literacy

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### ABSTRACT

Authentic assessment of student learning outcomes is much in demand. This paper reviews a variety of assessment methods that measure cognitive, behavioral, and affective levels of learning that can be used to design library class instruction and assessments to improve student learning and teaching of information literacy concepts. The intentional use of these methods to assess undergraduate student learning in many disciplines through working collaboratively with faculty and integrating the assessments in a learner-centered environment is discussed.

### INTRODUCTION AND LITERATURE REVIEW

Student learning outcomes are in demand by government and accrediting organizations, as well as by parents, as measures of what students can actually do with what they have learned during their four years at “expensive” colleges and universities. Institutions are moving beyond knowledge test scores to performance assessments as authentic measures of student learning. Librarians can contribute to this assessment by defining and critically examining their student outcomes and developing

systematic plans for assessment at both the class and programmatic levels.

Dugan and Herson (2002) advocate for a move toward assessing learning outcomes as a more meaningful measure of what students are learning as a result of our teaching rather than aggregated statistics such as the number of instructional sessions taught. This puts the focus of teaching on students and not on test scores. The recursive process of assessing student outcomes and using the results of the assessments to improve teaching is critical to

improving student learning.

Successful assessment includes both summative and formative measures as an integral part of the learning process. Assessment integrated into instruction provides valuable information for librarians and faculty, as well as for students as they reflect on their own learning throughout the course, the program, or their entire educational experience (Gilchrist & Zald, 2008; Oakleaf, 2008). Research suggests that students who become reflective and analytic about their own learning process become better learners (Corno & Mandinach, 1983; Cross, 1998). If assessment of information literacy instruction encourages this self-reflection and engagement with students' own learning, it will contribute to the process of students becoming life-long learners (Grassian & Kaplowitz, 2001).

Gilchrist and Zald (2008) suggest an instructional design approach to assessment as learning consisting of five questions used as a template for a library session (see Table 1), "that consciously aligns the information literacy concepts, teaching strategies, and evaluation techniques with the outcome" (p. 168). Assessment becomes an intentional process throughout the library session. Starting with the outcome and continuing through to developing the criteria for evaluation is only part of the process, however. Using the information from

the assessment to improve teaching and student learning completes the assessment cycle. The authors highly recommend starting by assessing one learning outcome in one or two library sessions and completing the cycle to make changes as a result of those assessments rather than trying to assess everything at once. The first step is to define learning outcomes. Gilchrist and Zald (2008) use a formula for designing learning outcomes that combines a verb phrase with the words "in order to" and a statement of purpose. For example, the students will be able to develop a search strategy in order to effectively search for information on their research topics.

Assessment methods range from measures of recognition and recall to performance measures that demonstrate how students integrate and apply what they have learned. An excellent guide for choosing the best method for different information literacy assessment needs that includes many examples for performance assessments was presented by Oakleaf, Gilchrist, and Radcliff (2009).

**Knowledge Tests and Surveys**

Knowledge tests, which measure what students know rather than what they can do, are the basis of traditional assessment. Fixed choice tests (Oakleaf 2008), such as multiple-choice and restricted-response essay questions (Radcliff,

TABLE 1—INSTRUCTIONAL DESIGN QUESTIONS

1. Outcome:	What do you want the student to be able to do?
2. Information Literacy Curriculum:	What does the student need to know in order to do this well?
3. Pedagogy:	What type of instruction will best enable the learning?
4. Assessment:	How will the student demonstrate the learning?
5. Criteria for Evaluation:	How will I know the student has done this well?

Note: From "Instruction & Program Design through Assessment," by D. Gilchrist and A. Zald. (2008). In C. Cox & E. B. Lindsay (Eds.), *Information literacy instruction handbook* (p. 168). Chicago: Association of College and Research Libraries. Used with the permission of the author.

Jensen, Salem, Burhanna, & Gedeon, 2007), measure only student recognition or recall of facts. They can, however, provide librarians with baseline information about their students' information literacy skills and, if given as pre- and post-tests, measure improvement of those skills. Although they are easy to give and to score, they do not measure higher-order thinking skills, such as analysis and synthesis, and cannot be integrated within the learning process.

Surveys measure the affective domain, how students feel about what they are learning, rather than what they have learned (Radcliff et al., 2007). They are relatively easy to administer, score and compare, but are limited in their scope. Longitudinal surveys, such as pre- and post-information literacy session surveys, can be used to measure changes over time. Monoi, O'Hanlon, and Diaz (2005) developed an inventory to assess self-efficacy before and after an online library course. Their research suggests that students with an increase in self-efficacy also had higher online searching skills. Zoellner, Samson, and Hines (2008) describe the effectiveness of pre- and post-surveys for assessing undergraduate student confidence, perceptions, and attitudes after library instruction in a general education course.

### **Informal Assessments**

Classroom assessment techniques (CATs) measure what students know and also how they feel about what they know (Radcliff et al., 2007) and some involve higher-order thinking skills (Angelo & Cross, 1993). They often encourage collaboration between the librarian and students and demonstrate that learning is a shared process (Grassian & Kaplowitz, 2001). CATs provide quick snapshots of whether students learned the information literacy concepts that had just been presented. They are easy to use anytime during a class to get feedback and to encourage students to reflect on what they are learning. Angelo and Cross (1993) and Gilchrist and Zald (2008) ask students at the end of a library session, "What is the most important thing you learned and what is still muddy or confusing?" Their answers indicate how well certain concepts were taught and give students time to reflect on their own learning. Informal

classroom assessments, such as observations and questions, are easy to incorporate into an information literacy library session and assess cognitive, affective and behavioral domains depending on how they are implemented (Radcliff et al., 2007). Feedback during library sessions is used to make clarifications at the time or to make improvements for the future, but informal classroom assessments are limited to this use.

### **Performance Assessments**

Performance assessments, at the other end of the spectrum from knowledge tests, are authentic measures of learning because students are asked to integrate what they have learned, to think critically, and to problem-solve in order to create a finished product that demonstrates their mastery of the information literacy concepts. Performance assessments are aligned with the learning goals of the class, integrated into the students' active learning process, and used to measure higher-order thinking skills with more complex assignments. As a result, they take more time to create and score than other assessments (Radcliff et al., 2007), but yield more in-depth information to improve student learning and teaching.

Rubrics, descriptive scoring schemes for levels of achievement of learning outcomes (Moskal, 2000), can be powerful assessment tools to measure higher-order thinking skills and facilitate consistent grading when carefully constructed (Oakleaf, 2009). Many educators use them either as a scoring guide for performance assessments (Radcliff et al., 2007; Montgomery, 2002) or as performance assessments themselves (Gilchrist & Zald, 2008; Oakleaf, 2008). Rubrics work most effectively when shared with students at the start of the class because they highlight the expectations and levels of achievement at the beginning of the learning process (Allen & Tanner, 2006). As the detail of description increases on the rubric, the need for individual comments on students' assignments decreases, which can save time on an assessment method that can be quite time consuming. Developing the rubric focuses librarians on their learning outcomes

criteria and achievement levels at the outset and using it allows for reflection on how well the students are achieving those outcomes in order to make changes for that session or for teaching future sessions (Oakleaf, 2008).

**SPECIFIC EXAMPLES OF INFORMATION LITERACY ASSESSMENT**

The author uses a variety of assessment methods to measure cognitive, behavioral, and affective levels of learning of information literacy concepts based on the Association of College and Research Libraries (2000) Information Literacy Competency Standards for Higher Education. The standards define an information literate person as one who recognizes a need for information and can search for, find, evaluate, and use the information effectively. The author uses these methods to assess all levels of undergraduate courses in many disciplines by defining the learning outcomes collaboratively with the faculty and applying them in a learner-centered environment.

The author focuses on learning outcomes and connects them to an instructional plan, which includes assessment and evaluation using Gilchrist and Zald’s (2008) instructional design template (see Table 1). Changes that improve teaching and student learning outcomes over time are based on the cyclic analysis of the assessments. For example, the author, in collaboration with faculty, added annotated bibliographies to research assignments in order to have students not only clearly and concisely

summarize their sources, but also to evaluate their credibility and relevance. Rubrics were added and made more detailed after assessing several classes. Recording information and reflections from each class on an information literacy evaluation form (see Table 2) guided the process. These forms were used as a starting point for teaching the same class again, or for teaching a similar class, to implement any suggested improvements. The progression is not always orderly, but over time, concepts like credibility and relevance of sources become clearer to students, which results in more comprehensive analyses of sources and an improvement in the quality of sources for the research projects. For the author and the students, intentional and reflective assessment starts with small steps and builds incrementally. In a comprehensive information literacy program, the outcomes are cumulative throughout the four years of an undergraduate student’s education.

**Knowledge Tests and Surveys**

In order to determine what to emphasize in a one-time upper-division class library session and analyze the student learning outcomes and teaching effectiveness, the author designed a pre- and post-library session test and survey using SurveyMonkey. The knowledge-based test questions assess the following information literacy concepts:

- How to identify a scholarly periodical article.

TABLE 2—INFORMATION LITERACY INSTRUCTION EVALUATION

<ul style="list-style-type: none"> <li>• Instructional outcomes: what did you want students to learn? (“in order to ...” statements here)</li> <li>• Describe the nature of the instructional presentation: what activities did you use to facilitate learning? (pedagogy)</li> <li>• What was the students’ reaction to the class? (include most important statements and questions here)</li> <li>• How will students demonstrate learning: what are the criteria? (assessment methods and criteria)</li> <li>• Did the students meet the criteria? (assessment results)</li> <li>• Additional comments, problems, or suggestions for improvement? (use of assessment to improve teaching and learning outcomes)</li> </ul>
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- How to identify a primary and secondary periodical article.
- How to identify keywords from the abstract of an article to use in future searches.
- How to use truncation and Boolean terms to limit or expand searches.
- How to use the citation information of one article to find more like it.
- How to get an article that is not linked directly from a database.
- How to evaluate a web page.
- How to create an annotated bibliography.

The survey measures affective learning. It asks students to list where they go most often to find information for a research paper and prompts them to indicate their confidence using those sources. Students may rate their confidence level as very confident, moderately confident, confident, not very confident, or not confident. Students also describe their comfort level with using library resources, such as catalogs and periodical databases, to find information using the same scale: very, moderately, comfortable, not very, and not. Students rate their familiarity with their research topics as very familiar, somewhat familiar, vaguely familiar, or unfamiliar. A range of four or five possible answers was included to get a more detailed estimate of where students perceived themselves to be on the rating scale.

### **Informal Assessments**

Course-integrated active-learning library sessions encourage informal assessment methods such as: observing and questioning students as they work individually or in small groups to complete assignments with specific information literacy learning outcomes. For example, if the learning outcome is for students to be able to differentiate among different types of periodicals in order to select articles for their research and to use those articles to find more like them, both the faculty and the author walk among the groups and observe the discussions. They ask questions to prompt students who are struggling or to encourage students to go deeper in their analysis of the sources. The students are

given a short list of questions as a guide to formulating answers for the class discussion that follows the small group discussions. The main questions are, “What are three characteristics of a scholarly journal that makes it different from a popular source” and “What are three ways you could use an article in your scholarly journal to find more like it?” The discussions of the journals and articles also lead to broader discussions of the publishing process, the value of articles to students, and the importance of publishing and editing scholarly articles to researchers.

As students are looking for articles on their topics as part of their assignment, there is an opportunity to observe where and what they are searching and whether or not they know how to get the full text of an article that is not directly linked from the citation page. Getting a source is another information literacy learning outcome that can be confusing to students in both lower-division and upper-division courses. Sometimes these questions do not come up in class discussions, but are more easily asked by students in small groups or individually as the author is observing their activities. Sometimes the students do not even know they have a question until they begin their work in the session. Because these assessments are informal, the author uses them as a quick check to see how students are responding to what was covered in the introduction to the work session and to plan what might need to be reviewed or covered in an additional library session.

The classroom assessment technique (CAT) of gathering student responses on 3x5 cards either at the beginning or end of the library session is used to engage students initially or to encourage each student to reflect on what they have just learned. At the first-year level, students are asked to write where they go first to look for information and then to state how confident they are that they will find what they need. Many students use Google and even though they say they are confident they will find something, they admit that they are worried that the information may not be credible. Upper-division students are asked, “What is the most important thing

you learned from your past experiences of doing research and what is one problem or frustration you have had?" These questions engage students because they have time to reflect on earlier research experiences and focus on what was positive and negative about them. Students frequently come up with insightful comments related to information literacy concepts. These student comments can be very powerful because they come from the students themselves. Their awareness of how much they have learned also gives them confidence for future research. These responses are summarized and discussed in a future session or given to the students, with possible solutions to the problems the students noted, as a follow-up to the library session to reinforce what they learned in class. Among the most insightful comments have been:

- Start early.
- Cast a wide net—learn what is out there and narrow later.
- Choose keywords carefully so they can be used effectively to search.
- Use a variety of sources.
- “Get in tight” with research librarians.
- Keep track of where you found your sources.
- Have an ongoing reference cited page.
- Use the references of a good source to find more.
- Research can change as you go, depending on what you find.
- Evaluate!

Some of the questions or frustrations that were addressed for these students and used to inform other sessions were:

- How do I come up with good search terms if I am unfamiliar with the topic?
- I never have enough time.
- How do I evaluate secondary literature?
- How do I find the full text of an article when there is not a direct link from the database?

- How do I sort through all the information I find?

To give students a chance to reflect on what they have learned and to ask questions that were not covered during the session, they are invited during the last five minutes of the session to write responses about the most important thing they learned and about concepts that are still muddy or confusing to them. These responses are used to followup with the students and provide the author with feedback on the clarity of her presentation and the importance of what was covered in the session. For example, after the examination of different types of periodicals as part of a library session, some students write that the most important thing they have learned is how to differentiate between popular and scholarly journals. This suggests to the author that this concept is important to teach because some students did not understand the differences before the class.

### **Performance Assessments**

Performance assessments are central to this librarian’s teaching because they provide the most comprehensive measures of teaching and learning. Students are involved as active collaborators in their own learning as they work on assignments that require higher-order thinking skills. Performance assessments are most powerful when they are contextualized within the framework of the course and are given when the students have their assignment and are ready to begin the research process. Collaboration with the faculty is critical to effectively integrating the library sessions into the course syllabus. Most assignments for which there are one or more library sessions have a bibliography component for a research assignment.

In order to prepare students to find their own credible web pages, first-year students are asked to work in small groups before the library session to evaluate selected web pages on their topics. Students use a web page evaluation form and present their evaluations in five-minute sessions during the class. This usually results in lively discussions among the faculty,

this librarian, and students to determine quickly the credibility of the source. This also establishes some criteria that can be used to evaluate other types of sources and gives the author information about how many of these students have previously thought about the credibility of sources.

Bibliographies are also included as an important performance measure. Relevant learning outcomes for bibliographies for which short in-class or after-class assignments are created include finding books, articles, and web pages in order to have credible and relevant sources on student topics. A more comprehensive assignment for students is to develop a search strategy that includes one or more bibliographic entries from the results of the search. Student annotations of the sources are even more informative for the author and students (see Table 3). Annotated bibliographies not only

demonstrate that the students can search for and get the sources they need, but can summarize and evaluate them for their credibility and relevance to their topics. Feedback from the author on these short assignments provides scaffolding for students to build on in order to create a final bibliography for the class of credible and relevant sources of information to use for their paper, poster or presentation. If faculty members include a grade given by this librarian for these assignments in the students' overall grade, even just as part of their class participation, it helps to emphasize the importance of the assignments to the course as a whole. The faculty and author can also assess the final products for the broader learning outcomes of the course, as well as for the quality of the sources selected and the effective and ethical use of that information in the project. The author uses analytic rubrics (Moskal, 2000) to make students aware of the expectations and

TABLE 3—RESEARCH QUESTION AND SEARCH STRATEGY LIBRARY ASSIGNMENT

<p><u>Purpose</u></p> <ol style="list-style-type: none"> <li>1. To develop a research question and a search strategy in order to effectively search for information on a topic of interest to you for your paper.</li> <li>2. Use your search strategy and library resources in order to find a book or an article that is credible and relevant to the topic to use for your paper.</li> </ol> <p><u>Where do I Start?</u> Develop your research question and a search strategy.</p> <ol style="list-style-type: none"> <li>1. What are you interested in researching? Write it as a question.</li> <li>2. Write the main concepts (keywords) in your research question.</li> <li>3. Write any other words that could be used to describe those concepts.</li> <li>4. What do you know about your topic that could help you to find information?</li> <li>5. What do you want to know about your topic?</li> <li>6. What kind of information do you need (ex. cultural, historical, political, scientific)?</li> <li>7. Using your keywords to start, search for one relevant source for your topic. Use your online Library Class Research Page for guidance.</li> </ol> <p><u>Briefly annotate your source.</u></p> <p>For a book:</p> <ol style="list-style-type: none"> <li>1. Write the citation information for your book using your citation style guide.</li> <li>2. Who is the author? Is there any information about the author? How could you find any information?</li> <li>3. Who is the publisher? Is it a university press? Does it matter?</li> <li>4. What is the date of publication? Does it matter?</li> </ol> <p>For an article:</p> <ol style="list-style-type: none"> <li>1. Write the citation information for your article using your citation style guide.</li> <li>2. Who is the author? Is there any information about the author? How could you find any information?</li> <li>3. What is the title of the journal? Is it popular or scholarly? How can you tell?</li> <li>4. What is the date of publication? Does it matter?</li> </ol> <p><b>FOR EITHER SOURCE:</b> Write a brief summary of what you think the book or article is about and why it is relevant to your research question.</p>
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performance levels for annotated bibliographies when the assignments are given, as well as to score them. Table 4 is an example of one of these rubrics from a first-year class. The rubric breaks down the learning outcome of creating an annotated bibliography into its component parts. In this class, the author used the rubric after noting that, even after in-class practice evaluating different types of periodicals, students did not understand how to find credible and relevant sources. Analysis of sources and

complete concise annotations written by the students were high priorities for this faculty. The author has collaborated for a number of years with this faculty member, which made it easy to create and change the assignments as necessary. A rubric was used in this class because of the successful use of a similar rubric in an upper-division class to improve the quality of sources through a more thorough evaluation of their credibility and relevance. In the class with first-year students, the rubric was discussed

TABLE 4—ANNOTATED BIBLIOGRAPHY ASSESSMENT RUBRIC

Student name: \_\_\_\_\_ Total Points: \_\_\_\_\_  
 Criteria for evaluation of annotated bibliographies. Maximum points = 50.

Criteria for Evaluation	10	8	5	0 - 2
Description of pathway to articles (search strategy)	Includes databases, search terms, and limits	Missing one step	Missing more than one step	Not included
Annotation (summary) of sources*	Exceptionally well written, thoughtful, and concise descriptions of the sources	Vey good descriptions of the sources	Uneven or inadequate descriptions of some of the sources	Inadequate descriptions for most or all the sources
Evaluation of sources	Sources are critically evaluated for credibility, including author and/or publication information	Most sources are critically evaluated for credibility	Many sources are not critically evaluated	Most sources are not critically evaluated
Relevancy of sources	The relevancy of each source to the topic is clearly stated. How will you use this information?	Most sources have a statement of relevancy	Many sources do not discuss relevancy	Most or all sources lack relevancy statements
Documentation of sources	Correct citation style including accession numbers when available	Most parts of the citations are correct	More than one citation is missing data or not cited using correct style	All sources are not documented properly

\* If wording is copied from any of the articles a 0 will be given for this criterion.

and given to the students to help clarify the learning outcomes and the performance levels for search strategies and annotations as they were working on modified library assignments. Use of the rubric resulted in the selection of more scholarly articles and more complete summaries, annotations, and evaluations. Next time the librarian will hand it out at the beginning of the library session so that students will understand the expectations at the beginning of their research process.

Annotated bibliographies combined with a rubric have generated the most follow-up questions and consultations of any information literacy library assignment the author has used, perhaps because the rubric gives students specific points to discuss. Both the author and the faculty can give feedback on the bibliographies, but the faculty participation is optional. This librarian always gives feedback. Even if the final bibliography for the class is not required to be annotated, a few annotations on the library assignment and the feedback on them help students to reflect on what considerations are important when selecting sources and where they are on those standards of evaluation so they can have confidence in or improve their sources for their final bibliographies.

#### FUTURE DIRECTIONS

There has not been one library session in which these assessments were used that the author did not make at least one change for the next session. She will continue to use all these assessments for the specific information they provide, but her focus will be on improving performance measures because they provide her with the most authentic assessments for information literacy outcomes. For example, search strategy assignments combined with annotated bibliographies and rubrics measure how students integrate and apply what they have learned to create bibliographies with credible and relevant sources. Rubrics were used in a few classes initially to aid in the consistent grading of bibliographies. The author will continue to create and expand descriptive rubrics to use in more classes to systematically develop outcomes and achievement levels for

the assignments and to make learning outcomes and achievement levels clearer to students at the start of their research. The next step could be to create rubrics for all of the search strategy assignments in order to improve searching and, as a result, the sources students find for their bibliographies. Although descriptive rubrics take time to develop, they save time in the long run because the instructor does not need to write extensive feedback for each student. They also encourage interaction with the students.

#### CONCLUSION

This paper addresses the need for authentic assessment of student learning outcomes and how librarians can contribute to institutional efforts to move in that direction. Performance assessments are the most authentic assessment because they require students to demonstrate that they can integrate and apply what they have learned. Other assessments, such as tests, surveys, and informal assessments, also play an important role in improving learning and teaching through providing snapshots of student learning during library sessions, building confidence, encouraging reflection, and making students active learners.

The author intentionally customizes and combines different assessment methods with different strengths and weaknesses, in order to plan and monitor her library instruction and analyze the effectiveness of that instruction on student outcomes of information literacy learning concepts. The assessments are the basis of making changes to improve teaching and learning, as well as to actively engage students in their learning. Pre- and post-knowledge tests and surveys are used to establish a baseline of what students know and how they feel about what they can do before the library session and provide a measure of what they know and how they feel as a result of the class. Increasing students' confidence makes them better learners. The author uses informal assessments to encourage students to be collaborators in their learning process and to provide a snapshot of the effectiveness of teaching during library sessions. She uses

performance assessments to provide the basis for her comprehensive analysis of student learning outcomes and to improve teaching and student learning. Course-integrated assessment provides students with the scaffolding to become information literate life-long learners. Information literacy assessment is an incremental process, but each step can have lasting results.

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