



The information literacy instruction assessment cycle

Instruction
assessment cycle

A guide for increasing student learning and improving librarian instructional skills

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Received 11 December 2007
Revised 8 September 2008
Accepted 10 September 2008

Abstract

Purpose – The aim of this paper is to present the Information Literacy Instruction Assessment Cycle (ILIAC), to describe the seven stages of the ILIAC, and to offer an extended example that demonstrates how the ILIAC increases librarian instructional abilities and improves student information literacy skills.

Design/methodology/approach – Employing survey design methodology, the researcher and participants use a rubric to code artifacts of student learning into pre-set rubric categories. These categories are assigned point values and statistically analyzed to evaluate students and examine interrater reliability and validity.

Findings – By engaging in the ILIAC, librarians gain important data about the information behavior of students and a greater understanding of student strengths and weaknesses. The ILIAC encourages librarians to articulate learning outcomes clearly, analyze them meaningfully, celebrate learning achievements, and diagnose problem areas. In short, the ILIAC results in improved student learning and increased librarian instructional skills. In this study, the ILIAC improves students' ability to evaluate web sites for authority.

Research limitations/implications – The research focuses on librarians, instructors, and students at one institution. As a result, specific findings are not necessarily generalizable to those at other universities.

Practical implications – Academic librarians throughout higher education struggle to demonstrate the impact of information literacy instruction on student learning and development. The ILIAC provides a much needed conceptual framework to guide information literacy assessment efforts.

Originality/value – The paper applies the assessment cycle and “assessment for learning” theory to information literacy instruction. The ILIAC provides a model for future information literacy assessment projects. It also enables librarians to demonstrate, document, and increase the impact of information literacy instruction on student learning and development.

Keywords Students, Information literacy, Assessment, Worldwide web, Higher education, Evidence-based practice

Paper type Conceptual paper

Introduction

Assessing student learning is a rapidly growing focus of institutions of higher education. If libraries intend to remain relevant on campus, they must demonstrate their contributions to the mission of the institution by becoming involved in assessment, the process of understanding and improving student learning (see Table I). This is particularly true in the area of information literacy instruction. Through assessment, academic librarians can demonstrate how information literacy instruction contributes to student learning and development. In order to leverage the full power of



Table I.
Definitions of assessment
concepts

Terms	Definitions
Assessment	The process of understanding and improving student learning
Formative assessment	Assessment that takes place while teaching and learning are ongoing; designed to make continuous improvement
Summative assessment	Assessment that takes place after teaching and learning come to an end; designed to be a final evaluation
Assessment for learning	Assessment that supports learning; inseparable from teaching
Assessment as learning	Assessment that helps students learn how to learn
Assessment as learning to teach	Assessment that helps educators learn how to teach so that student learning increases
Learning goals	Broad statements of intended learning
Learning outcomes	Specific statements of intended learning; formatted with active verbs (the student will + active verb. . .)
Rubric	Charts used to judge quality of student products or performances; comprising of criteria and performance level descriptors

assessment, librarians need to adopt conceptual frameworks of assessment that will enable them to facilitate learning, increase instructional quality, and answer calls for accountability. One such framework is the Information Literacy Instruction Assessment Cycle (ILIAC). This cycle provides a systematic process for documenting and improving both librarian instructional ability and student information literacy skills. This article describes the seven stages of the ILIAC and presents a case study that demonstrates the power of the ILIAC to increase librarian teaching skills and student information literacy.

“Assessment for learning” theory

The ILIAC is grounded in “assessment for learning” theory, as articulated by Shepard (1989), Wiggins (1989), and Stiggins (1991). Assessment for learning theory suggests that “good teaching is inseparable from good assessing” (Wiggins, 1996). According to this theory, assessments can be tools for learning, and students can learn by completing an assessment (Arter, 1996). Thus, assessment should be thought of not just as evaluation, but as a “primary means” of learning (Battersby, 2002). Arter (1996) explains, “Educators do not teach and then assess; nor do they think of assessment as something that is done to students. Instead, they consider the assessment activity itself an instructional episode”.

Assessment as learning

Not only do assessment for learning theorists believe that assessment and teaching are inseparable, and that students can learn and be assessed simultaneously; they also contend that the connection between teaching and assessment can “lead to a substantial increase in instructional effectiveness” (Popham, 2003) by helping students learn how to learn. This contention is supported by significant research (Black and Williams, 1998). Some educators describe this dimension as “assessment as learning” (Learning and Teaching Scotland, 2008). Grassian and Kaplowitz (2001) describe the potential for assessment as learning in information literacy instruction:

Our learners can also gain from the assessment process. As they reflect on the instruction, what they have learned, and how that information has been useful to them, learners begin to explore the learning process itself, thus engaging in the metacognition process. They delve into how they interacted with the information being presented and consider how they might do this more effectively in the future. A well-designed assessment . . . benefits the learner and helps to reinforce the material that was taught. Research has indicated that people who become aware of themselves as learners – that is, those who are self-reflective and analytic about their own learning process – become better learners. They move from being ‘surface learners’ who merely reproduce information provided by others to ‘deep learners’ who not only understand the information, but can apply it appropriately in a variety of settings (Corno and Mandinach, 1983; Cross, 1998). As a result, thoughtfully designed assessments can enhance the students’ abilities to become life-long learners. Assessment, therefore, contributes to the overall goals of ILI. It enhances the learners’ experience by allowing them to examine how they learn and to develop more efficient and effective IL strategies and skills.

Assessment as learning to teach

Assessment for learning theory does not end with an increase in student learning. When educators assess learning repeatedly and make instructional changes over time, their pedagogical skills increase. The process by which assessment helps educators to improve their teaching skills may be termed “assessment as teaching” or “assessment as learning to teach”. The practice of focusing on student learning goals and outcomes, assessing student attainment of learning outcomes, and implementing instructional changes to increase student learning leads to the ongoing improvement of teaching skills. Specifically, assessment provides feedback librarians can use to improve their skills (Knight, 2002), reflect on their teaching (Warner, 2003), examine their attitudes and approaches to learning (Bresciani *et al.*, 2004), and test their assumptions about learning (Warner, 2003). Librarians can use also assessment to learn what to teach and how long to teach it (Popham, 2003). In sum, assessment for learning theory combines teaching, learning, and assessment activities in ways that produce both more knowledgeable students and more skilled teachers.

Conceptual framework of information literacy instruction assessment

Although assessment for learning theory is becoming more broadly embraced by K-12 educators, it is not yet well known to most higher education faculty. To facilitate the adoption of good assessment for learning practice, proponents of higher education assessment have developed cyclical models (see Figure 1 and 2) (Maki, 2002; Bresciani, 2003). Recognizing that academic librarians are even less familiar with assessment for learning theory and practice than departmental faculty, Flynn *et al.* (2004) cite their institutional assessment cycle (see Figure 3) as a point of reference to assist academic librarians in collaborating with faculty on assessment activities. As academic librarians become increasingly active in the teaching and learning mission of their institutions and committed to producing information literate students, they require their own model of assessment for learning practice – the ILIAC.

Based on these early general assessment cycles, the ILIAC (see Figure 4) is tailored to the needs of academic librarians; it identifies the steps required to assess information literacy instruction in higher education. The ILIAC includes seven stages and then loops back to the beginning, where the cycle begins anew.

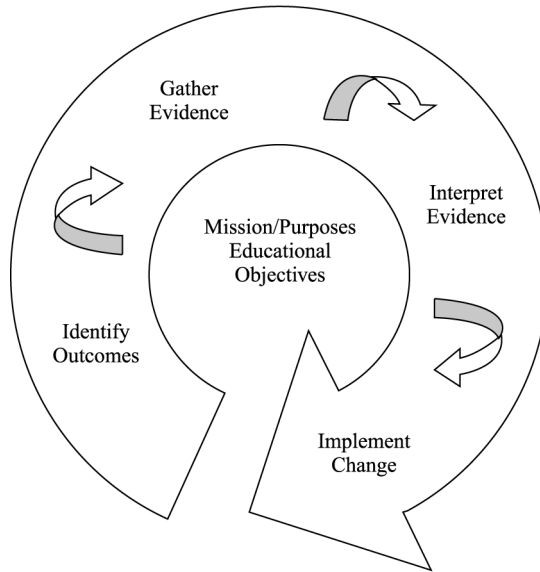


Figure 1.
Maki assessment cycle

The Iterative Assessment Cycle

Adapted from
Peggy Maki, Ph.D.
by Bresciani, M.J.

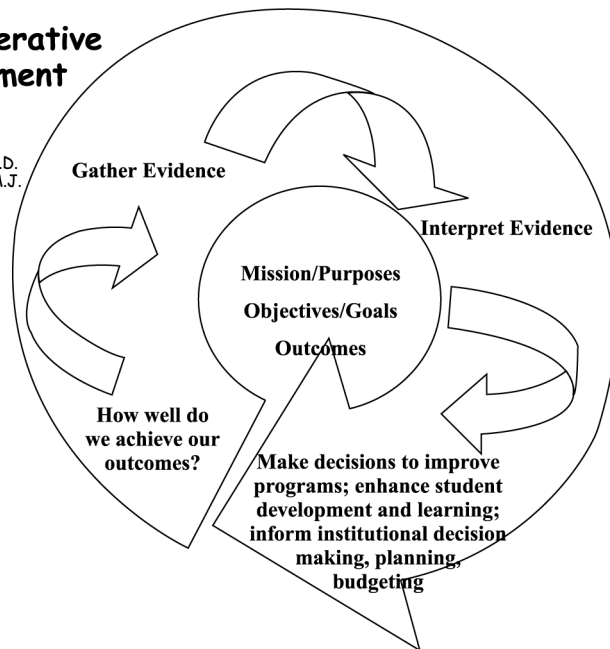


Figure 2.
Bresciani assessment cycle

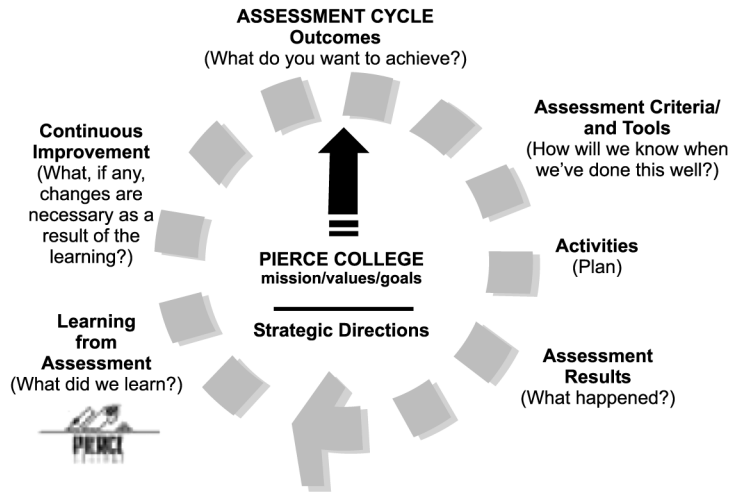


Figure 3.
Pierce college assessment cycle

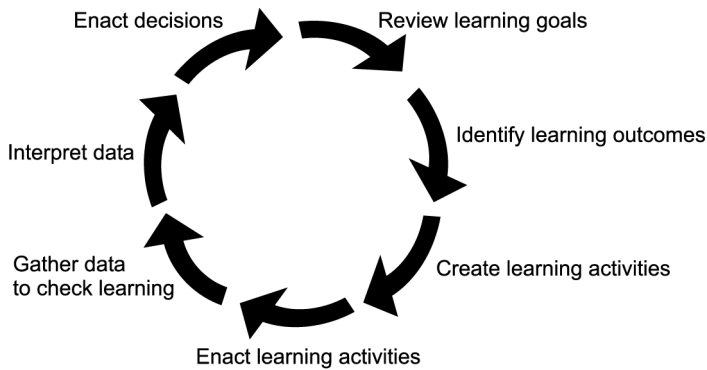


Figure 4.
The information literacy instruction assessment cycle

Stage 1 – review learning goals

The first stage of the ILIAC is “Review Learning Goals”. At this stage of the process, librarians review the learning goals they intend to address through instruction. For many academic librarians, this process will include an examination of the *Information Literacy Competency Standards for Higher Education* (Association of College and Research Libraries, 2000). If the planned instruction is integrated into a course, this process will also include consideration of curriculum and/or course goals. An example goal might be, “The information literate student evaluates information and its sources critically”.

Stage 2 – identify learning outcomes

The second ILIAC stage is “Identify Learning Outcomes”. After reviewing the learning goals for a particular instructional task, librarians focus on specific, teachable, assessable learning outcomes. These outcomes are phrased in student-centered language and include action verbs. An example outcome might be, “Students will be able to distinguish popular and scholarly sources”.

Stage 3 – create learning activities

Stage 3 of the ILIAC is “Create Learning Activities”. Once learning outcomes have been determined, librarians design learning activities such as lectures, tutorials, demonstrations, hands-on exercises, small group discussions, etc. In this stage, librarians devise plans based on learning theory, instructional best practices, and prior knowledge of student learning needs.

Stage 4 – enact learning activities

In the “Enact Learning Activities” stage, librarians deploy the instructional activities developed in the previous stage. These learning activities may be delivered face-to-face or online (synchronously or asynchronously). During this stage, librarians may gather fast formative feedback about student learning using comprehension checks and other classroom assessment techniques (Angelo, 1993). Librarians may use this data to revise learning activities “on the fly” (see Figure 5).

Stage 5 – gather data to check learning

The fifth stage of the ILIAC is “Gather Data to Check Learning”. In this stage, librarians collect data to assess student achievement of the learning outcomes for the instructional activity. Data collection tools might include surveys, tests, or performance measures such as collecting worksheets from an instructional session, answers to questions in an online tutorial, search queries entered in a database, etc. (Note: It is important to match the data collection tools to the type of learning to be assessed as tools are grounded in different learning theories and have varied strengths and weaknesses (Oakleaf, 2008a)). The data collection process may have commenced during the previous step if formative feedback was collected during the instructional process.

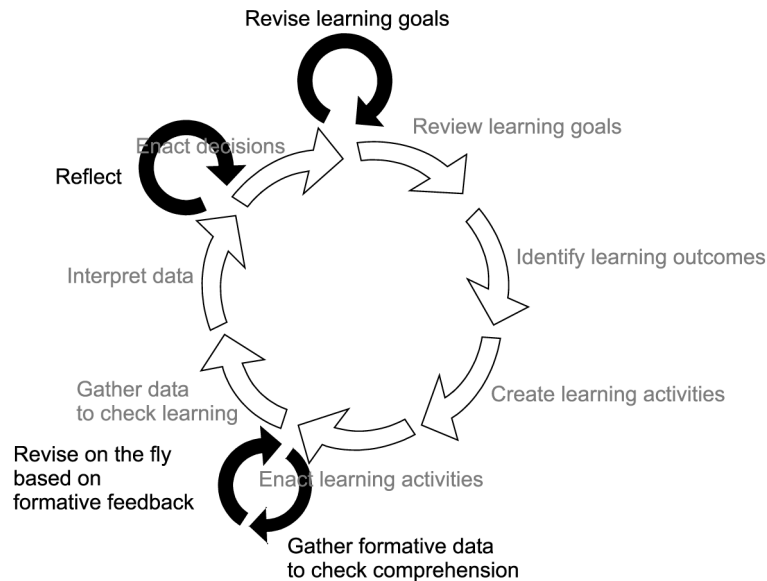


Figure 5.
ILIAC with reflective
revision layer

Stage 6 – interpret data

In the “Interpret Data” stage, librarians examine, analyze, and synthesize the data collected in stage 5. This process may include statistical analysis using a software package or coding of student work samples. Once analysis is complete, librarians reflect on the data and determine how it might be used for instructional decision-making.

Stage 7 – enact decisions

In the “Enact Decisions” stage, librarians make decisions and take actions. Actions might include refining learning outcomes, making improvements to instructional activities, or changing methods for gathering or interpreting data. Librarians may also report their results and major conclusions to interested stakeholders at this stage (see Figure 6).

Importantly, the seventh stage of the ILIAC includes the “closing the loop” process, a phrase attributed to Maki (2004). To close the loop, librarians move from enacting decisions to a new review of learning goals. This process ensures improvement by continuing the assessment cycle.

Many assessment proponents emphasize the importance of closing the loop. Carter writes, “To be meaningful...librarians must use [assessment] data to evaluate their programs and make changes necessary to improve those programs” (Carter, 2002). Samson states, “An assessment is only valuable when the analyses are used to augment or change the program being assessed” (Samson, 2000). Grassian and Kaplowitz (2001) also grasp the cyclical nature of assessment and the continuing challenge to close the loop. They summarize:

We plan. We develop. We deliver. We assess and evaluate the results of the assessment. We revise, deliver the revised material, and assess and evaluate again. Perfection is always just out of reach; but continually striving for perfection contributes to keeping both our instruction fresh and our interest in teaching piqued.

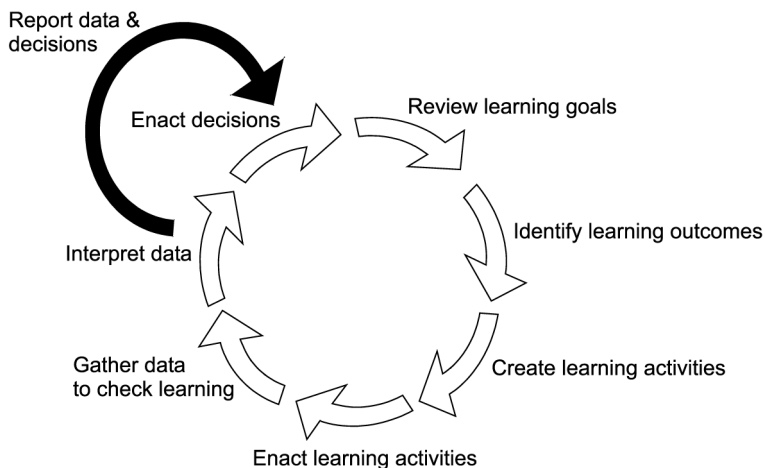


Figure 6.
ILIAC with reporting layer

By encouraging continuous improvement of instruction, the closing the loop process ensures increased student learning.

Rubric assessment of student web site evaluation skills: a case study

Background

At North Carolina State University (NCSU), a research-extensive university, students are required to complete General Education Requirements (GERs) in order to graduate. According to the NCSU model for general education, students select courses from predetermined category lists. Only one course is a requirement for all students at NCSU. That course is English 101, a first-year writing course. In a typical year, approximately 97 percent of NCSU first-year students enroll in English 101. The remaining 3 percent “place out” of the course based on college admissions test scores.

Because it is a GER course, all English 101 instructors are required to teach and assess specified learning outcomes. The English 101 outcomes states that students must “demonstrate critical and evaluative thinking skills in locating, analyzing, synthesizing, and using information in writing or speaking activities” (NC State, 2005). One way in which English 101 addresses this outcome is a mandatory requirement that all students complete an online information literacy tutorial called Library Online Basic Orientation (www.lib.ncsu.edu/lobo2) or LOBO. (Named for the university mascot, the LOBO tutorial earned the ALA/Information Today “Library of the Future” Award and was named as a Peer-Reviewed Instructional Materials Online (PRIMO) “Site of the Month”.) To fulfill GER requirements, English 101 instructors integrate modules of the LOBO tutorial throughout the course. As students progress through the tutorial, they are prompted to answer open-ended questions that reinforce or extend concepts taught in the tutorial. Students’ answers are maintained in a database and offer a rich data set for assessing the achievement of learning outcomes.

One way to demonstrate the power of the ILIAC to improve teaching and learning is by example. The following case study describes two rounds of the assessment cycle employed to improve an online information literacy tutorial and increase students’ ability to evaluate web sites for authority.

ILIAC Round 1

The LOBO tutorial teaches a broad range of skills. However, the assessment of student learning in this study focused on one skill: the ability to evaluate web sites for authority. This is a skill that many librarians and English 101 instructors would like students to exhibit.

Round 1, stage 1 – review learning goals

During the planning phase of the LOBO tutorial, the NCSU instruction librarian (the author and researcher) reviewed the learning goals set forth in two Association of College and Research Libraries (ACRL) documents: the *Information Literacy Competency Standards for Higher Education* and the *Objectives for Information Literacy Instruction: A Model Statement for Academic Librarians*. Learning goals that describe the ability to evaluate web sites for authority include:

- *Standard 3.2*, “The information literate student articulates and applies initial criteria for evaluating both the information and its sources”;

- *Standard 3.2.a*, “The information literate student examines and compares information from various sources in order to evaluate reliability, validity, accuracy, authority, timeliness, and point of view or bias”;
- *Standard 3.2.c*, “The information literate student applies evaluative criteria to information and its source”; and
- *Standard 3.4.g*, which states that students should: describe “why not all information sources are appropriate for all purposes,” distinguish “among various information sources in terms of established evaluation criteria,” and apply “established evaluation criteria to decide which information sources are most appropriate” (Association of College and Research Libraries, 2001).

Round 1, stage 2 – identify learning outcomes

In Stage 2, the instruction librarian adapted the broad goals listed above to form the *LOBO Information Literacy Skills Objectives and Outcomes* document (Oakleaf, 2004). From this document, the instruction librarian identified five specific LOBO tutorial outcomes to teach and assess in Round 1 of the ILIAC:

- (1) The student will articulate established evaluation criteria.
- (2) The student will apply criteria to analyze information, including authority, to information and its source.
- (3) The student will investigate an author’s qualifications and reputation.
- (4) The student will evaluate sources for use.
- (5) The student will indicate whether or not a specific, individual source is appropriate for the purpose at hand, based on established evaluation criteria, and provide a rationale for that decision (Oakleaf, 2004).

Round 1, stage 3 – create learning activities

The NCSU instruction librarian led a team of librarians and English 101 instructors to create the learning activities in the LOBO tutorial (Oakleaf, 2008b). Beginning with LOBO outcomes and an outline, the team wrote content, integrated technology, and launched the tutorial (Oakleaf and Argentati, 2004b). The tutorial content instructing students to use authority as a criterion for web site evaluation is depicted in Figure 7.

Round 1, stage 4 – enact learning activities

Early in the LOBO development process, the Director of the First-Year Writing Program agreed to make the tutorial a mandatory component of English 101. As a result, virtually all first-year students complete the tutorial and respond to the integrated open-ended questions. In the web evaluation section of the tutorial, students type the URL of a web site they have chosen as a possible resource for their research paper assignment. In subsequent screens, they respond to questions about the web site. On the “Authority” page, students are confronted with two questions:

- (1) Can you tell who (person or institution) created the site?
- (2) Are the author’s credentials listed on the site?

Then students respond to the following prompt:

Answer the questions above for the web site you’re evaluating. Overall, does what you know about the authorship of the web site indicate that it’s a good resource?

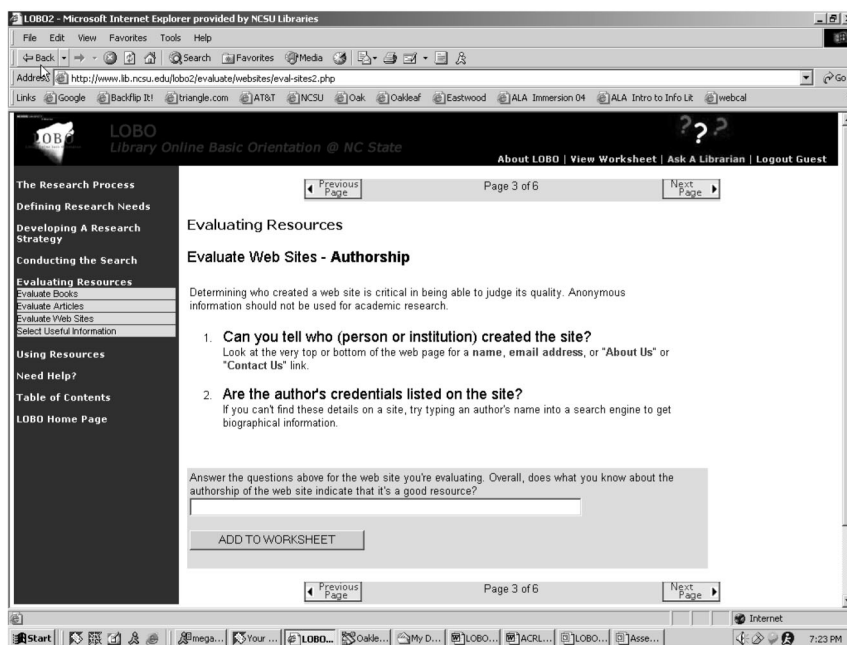


Figure 7.
LOBO tutorial in round 1

Student responses to the prompt are collected in a secure database within LOBO. From the database, they can be printed or emailed to English 101 instructors. Responses can also be mined for assessment data.

Round 1, stage 5 – gather data to check learning

In this study, the process of gathering data to check for learning was straightforward because student responses to LOBO questions were collected in a database. The instruction librarian retrieved student responses to the web site authority question from the database and separated the responses from personally identifying information. For the initial assessment of student responses, the instruction librarian randomly selected 50 answers for analysis.

Round 1, stage 6 – interpret data

Because the form and content of student responses varied widely, the instruction librarian chose to use a rubric-based approach to assessing learning. Rubrics are useful assessment tools for coding student responses into pre-set categories and translating the textual data of student answers into quantitative terms (Oakleaf, 2007). While far less common than survey and test approaches, rubrics are gaining popularity as information literacy assessment tools (D'Angelo, 2001; Merz and Mark, 2002; Rockman, 2002; Emmons and Martin, 2002; Buchanan, 2003; Choinski *et al.*, 2003; Franks, 2003; Gauss and Kinkema, 2003; Hutchins, 2003; Kivel, 2003; Kobritz, 2003; Warmkessel, 2003; Smalley, 2003; Knight, 2006; Oakleaf, 2009).

In order to understand the rubric approach to assessment used in this study, a short definition of a rubric is in order. Rubrics are tools that describe the parts and levels of

performance of a particular task, product, or service (Hafner, 2003). Rubrics are often employed to judge quality (Popham, 2003) and they can be used across a broad range of subjects (Moskal, 2000). Full model rubrics, like the one used in this study, are formatted on a grid or table. They include criteria or target indicators down the left hand side of the grid and list levels of performance across the top (Callison, 2000). Criteria are the essential tasks or hallmarks that comprise a successful performance (Wiggins, 1996). Performance level descriptors “spell out what is needed, with respect to each evaluative criterion. . .[for] a high rating versus a low rating” (Popham, 2003).

Rubrics can be described as holistic or analytic. Holistic rubrics provide one score for a whole product or performance based on an overall impression. Analytic rubrics, like the one employed in this study, “divide. . .a product or performance into essential traits or dimensions so that they can be judged separately – one analyzes a product or performance for essential traits. A separate score is provided for each trait” (Arter, 1996). To obtain a summary score from an analytic rubric, individual scores can be summed to form a total score (Nitko, 2004).

In this study, the instruction librarian designed a full model, analytic rubric (see Table II) to assess student ability to evaluate web sites for authority based on ACRL standards and LOBO outcomes. The rubric included four criteria and three levels of performance. The criteria listed in the rubric were:

- (1) “Articulates Criteria”;
- (2) “Cites Indicators of Criteria”;
- (3) “Links Indicators to Examples from Source”; and
- (4) “Judges Whether or Not to Use Source”.

The rubric also described student behavior at three levels:

- (1) Beginning;
- (2) Developing; and
- (3) Exemplary.

The instruction librarian revised numerous times based on feedback from NCSU institutional assessment professionals. After the rubric was thoroughly revised, a reference librarian who did not participate in the creation of the LOBO tutorial analyzed the 50 student responses in order to avoid bias.

Round 1 analysis revealed that a majority of students scored an *Exemplary* for the first criterion on the rubric indicating that students were able to address the authority of a web site (88 percent). Most students also scored an Exemplary on the second criterion of the rubric, demonstrating that they were able to refer to indicators of authority (90 percent). However, less than a third (32 percent) of students scored an Exemplary on the next rubric criterion and were able to give specific examples of authority indicators from the site they evaluated. Fewer than half (44 percent) earned an Exemplary rating on the last criterion and were able to provide a rationale for accepting or rejecting the web site based on their assessment of the site’s authority (see Table III).

Round 1, stage 7 – enact decisions

Based on Round 1 assessment results, two decisions were made to improve library instruction and increase student learning. First, the instruction librarian decided to

Table II.
Round 1 rubric

Evaluation criteria	Beginning	Developing	Exemplary	Student learning outcomes
Articulates criteria	0 - Student does not address authority issues	1 - Student addresses authority issues, but does not use criteria terminology such as: author, authority, authorship, or sponsorship	2 - Student addresses authority issues and uses criteria terminology such as: author, authority, authorship, or sponsorship	<i>LOBO 3.1.1</i> The student will articulate established evaluation criteria. (ACRL 3.2.a)
Cites indicators of criteria	0 - Student does not address authority indicators	1 - Student refers vaguely or broadly to authority indicators, but does not cite specific indicators such as: domain, server, or ~ in URL; presence of personal or corporate author name, e-mail, "About Us" or "Contact Us" links; or author credentials	2 - Student cites specific authority indicators such as: domain, server, or ~ in URL; presence of personal or corporate author name, e-mail, "About Us" or "Contact Us" links; or author credentials	<i>LOBO 3.1</i> The student will apply criteria to analyze information, including . . . authority . . . to information and its source. (ACRL 3.2.a, 3.2.c)
Links indicators to examples from source	0 - Student does not cite examples of authority indicators from the site	1 - Student refers vaguely or broadly to examples of authority indicators from the site under consideration, but does not cite specific examples	2 - Student cites specific examples of authority indicators from the site under consideration	<i>LOBO 3.1</i> The student will apply criteria to analyze information, including . . . authority . . . to information and its source. (ACRL 3.2.a, 3.2.c)
Judges whether or not to use source	0 - Student does not indicate whether or not the site is appropriate to use for the purpose at hand	1 - Student indicates whether or not the site is appropriate to use for the purpose at hand, but does not provide a rationale for that decision	2 - Student indicates whether or not the site is appropriate to use for the purpose at hand and provides a rationale for that decision	<i>LOBO 3.1.2</i> The student will investigate an author's qualifications and reputation. (ACRL 3.2.a) <i>LOBO 3.2</i> The student will evaluate sources (e.g., article, web site, book, journal, database, catalog) for use. (ACRL 3.4.g)

Evaluation criteria	Percentage of “exemplary” students (%)	Description of exemplary performance
Articulates criteria	88	Student addresses authority issues and uses criteria terminology such as: author, authority, authorship, or sponsorship
Cites indicators of criteria	90	Student cites specific authority indicators such as: domain, server, or ~ in URL; presence of personal or corporate author name, e-mail, “About Us” or “Contact Us” links; or author credentials
Links indicators to examples from source	32	Student cites specific examples of authority indicators from the site under consideration
Judges whether or not to use source	44	Student indicates whether or not the site is appropriate to use for the purpose at hand and provides a rationale for that decision

Table III.
Round 1 percentages of students earning exemplary scores

improve the content of the tutorial by providing more guidance for students in locating examples of authority indicators in web sites. This change improved the instructional quality of the tutorial and offered students more assistance in deciding whether to use the web site in question.

Second, the results of the Round 1 assessment were also used to improve the rubric itself. The instruction librarian revised the rubric to make performance levels mutually exclusive so that student responses did not fall between, or in multiple, performance levels. To facilitate student self-assessment and make the process more transparent to students, a student version of the rubric (see Table IV) was posted online under a link labeled “How might an instructor score your answer?”

Finally, the instruction librarian shared the initial assessment data at an undergraduate assessment conference (Oakleaf and McCann, 2004). This presentation piqued the interest of faculty in other campus units and demonstrated to the campus community the library’s commitment to assessment of student learning.

ILIAC Round 2

Round 2, stage 1 – review learning goals

In Round 1 of the ILIAC, students adequately demonstrated that they could articulate criteria to evaluate web sites and cite indicators of web site authority. They were less able to find examples of those indicators in the web sites they had chosen as possible resources for academic papers (32 percent) and to provide a rationale for why they would or would not actually use the site as a resource (44 percent). To improve teaching and learning in these two areas, the instruction librarian decided to focus Round 2 assessment on the standards most relevant to these skill areas:

- *Standard 3.2.c*, “App[ly] evaluative criteria to information and its source”.
- *Standard 3.4.g*, “Describe...why not all information sources are appropriate for all purposes; distinguish...among various information sources in terms of established evaluation criteria; app[ly] established evaluation criteria to decide which information sources are most appropriate”.

Table IV.
Student version of the
rubric

Evaluation criteria	Beginning	Developing	Exemplary
Uses criteria terms	0 - This is the score you would receive if you don't address the authority of the web site you're evaluating	1 - This is the score you would receive if you address the authority of the web site you're evaluating, but you don't actually use precise terminology in your answer, such as: "authority", "sponsorship", or "authorship"	2 - This is the score you would receive if you address the authority of the web site you're evaluating and you use precise terminology such as: "authority", "sponsorship", or "authorship"
Cites clues/indicators of criteria	0 - This is the score you would receive if you don't address the signs or "indicators" of authority you looked for in the web site you're evaluating	1 - This is the score you would receive if you address the signs or "indicators" of authority that you looked for in the web site you're evaluating, but you don't name specific indicators	2 - This is the score you would receive if you address the signs or "indicators" of authority that you looked for in the web site and named them, such as: URL, "tip offs" (domain, server, ~), presence of personal or corporate author name, e-mail, "About Us" or "Contact Us" links, or credentials
Cites examples from source	0 - This is the score you would receive if you don't provide examples of authority indicators you looked for from the web site you're evaluating	1 - This is the score you would receive if you refer vaguely to examples of authority indicators, but you don't cite specific examples from the web site you're evaluating	2 - This is the score you would receive if you cite specific examples of authority indicators from the web site you're evaluating
Judges whether or not to use source	0 - This is the score you would receive if you don't state whether or not the web site you're evaluating is appropriate to use for your assignment	1 - This is the score you would receive if you state whether or not the web site you're evaluating is appropriate to use for your assignment, but you don't explain your reasoning for that decision	2 - This is the score you would receive if you indicate whether or not the web site you're evaluating is appropriate to use for your assignment and explain your reasoning for that decision

Round 2, stage 2 – identify learning outcomes

Similarly, the instruction librarian focused Round 2 outcomes on these skill areas:

- the student will apply criteria to analyze information, including authority, to information and its source;
- the student will evaluate sources for use; and
- the student will indicate whether or not a specific, individual source is appropriate for the purpose at hand, based on established evaluation criteria, and provide a rationale for that decision.

Round 2, stage 3 – create learning activities

In this stage of Round 2, the instruction librarian made the teaching improvements identified during Round 1. First, the content of the LOBO tutorial was revised to give students additional guidance on evaluating web sites for authority (see Figure 8). Second, the open-ended questions were revised to promote increased student analysis of web sites and elicit more detailed responses. The new prompt provided more structure for student responses:

Respond to the following prompts in the space below, using complete sentences:

- Identify the “domain type” of the site you’re evaluating and explain why that is acceptable or unacceptable for your needs.
- Identify the “publisher” or host of the site and tell what you know (or can find out) about it.
- State whether or not the site is a personal site and explain why that is acceptable or unacceptable for your needs.
- State who (name the person or institution) created the site and tell what you know (or can find out) about the creator.
- Look for the author’s credentials on the site. List his/her credentials and draw conclusions based on those credentials. If there are no credentials listed, tell what conclusions you can draw from their absence.
- Using what you know about the AUTHORITY of this web site, explain why it is or is not appropriate to use for your paper/project.

Round 2, stage 4 – enact learning activities

During the second round of the study, more than 800 students responded to the LOBO web site evaluation prompt. A small number of responses could not be scored due to blank entries or lack of adherence to directions. From the remaining responses, a random sample was selected for analysis using the Round 2 rubric.

Round 2, stage 5 – gather data to check learning

Armed with confidence, experience, and a NCSU Committee on Undergraduate Program Review grant gained as a result of Round 1 of the ILLAC, the instruction librarian employed a more rigorous approach to gathering data to check for learning in Round 2. First, the instruction librarian retrieved a semester of responses to the web site authority prompt from the LOBO answer database. Then, the responses were separated from personally identifying information. The null and unscorable responses were removed, and the remaining 800 responses were numbered consecutively. Using a random number table, 75 student responses were selected for the study – an amount sufficient for delivering statistically significant results.

The screenshot shows a web page titled "LOBO Online Basic Orientation @ NC State". The page is part of a tutorial, specifically "Evaluating Resources". The main heading is "Evaluate Web Sites - Authority". The text explains that the URL and author information are crucial for judging site reliability and that anonymous information should not be used for academic research. It lists five questions to consider when evaluating a site's authority: 1. What type of domain does the site come from? 2. Who "published" the site? 3. Is it a personal web site? 4. Can you tell who (person or institution) created the site? 5. Are the author's credentials listed on the site? Below the questions, there are prompts for students to respond to in complete sentences. The page also includes navigation buttons for "Previous Page" and "Next Page", and a footer with contact information and a URL.

Figure 8.
LOBO tutorial in round 2

In this round of the ILIAC, a more formal approach was taken to the assessment of student responses as well. To ensure valid and reliable data for decision making, multiple raters were enlisted to analyze student responses. These raters were recruited through informal conversations, emails, listservs, and verbal announcements.

Round 2, stage 6 – interpret data

Methodology – A survey design methodology was employed in Round 2 to interpret student learning data. Using a rubric, 25 raters each coded 75 student answers into pre-set rubric categories, and these categories were assigned point values. In order to

describe student performance, test for interrater reliability, and explore the validity of the rubric, the point values were subjected to quantitative analysis. According to Lincoln (2005), this approach is called “discovery phase” or preliminary experimental design, and it is commonly employed in the development of new rubrics. (Note: The methodology employed in round 2 is unique in information literacy assessment literature and described in detail by Oakleaf (2009).)

Participants – A total of 25 raters and the NCSU instruction librarian participated in Round 2. The raters were selected from five groups: NCSU librarians, NCSU English 101 instructors, NCSU English 101 students, instruction librarians from Association of Research Libraries (ARL) libraries, and reference librarians from ARL libraries.

First, raters scored the 75 student responses using the Round 2 rubric. Then the instruction librarian entered the data from the rubric score sheets into an Excel spreadsheet. For each response, raters’ scores for the four criteria were recorded. Then, scores were analyzed to check for interrater reliability. The instruction librarian also checked the validity of these scores by comparing them to the scores assigned by the instruction librarian – the researcher and expert rater. In this type of study, it is an accepted practice to compare a group of raters to a “gold standard” to check for validity. Gwet explains that the gold standard is the “correct classification of subjects made by an experienced observer”. When a gold standard approach is used, it is assumed that “the researcher knows the ‘correct classification’ that may be due to an expert judgment”.

Statistical analysis revealed that not all raters provided consistent and accurate ratings of student work, but a subset of raters produced highly reliable and valid scores (Oakleaf, 2007). This “expert” rater group included two NCSU librarians and three English 101 instructors. As a result, the analysis of student learning was limited to the scores provided by these experts – the instruction librarian and the five strongest raters.

“Links indicators to examples from source” – When evaluating a web site for authority, students should demonstrate the ability to identify indicators of authority in the web site they are evaluating. So, the third criterion of the Round 2 rubric assessed students’ ability to demonstrate this outcome (see Figure 9).

Student responses that did not address examples of authority indicators from their web site were classified as a *Beginning* performance. Students who referred vaguely or broadly to examples of authority indicators but did not provide specific examples were categorized as *Developing*. Students’ responses that included specific examples of authority indicators located in their web site were classified as an *Exemplary* performance.

The distribution of student responses across levels of student performance is shown in Table V. Both the researcher and the expert raters agreed that over 90 percent of students demonstrated an *Exemplary* performance for this criterion. Most students located and identified specific examples of authority indicators in the web sites they evaluated. This result indicates that the instructional improvements made after round 1 resulted in student learning.

“Judges whether or not to use source” – When evaluating a web site for authority, students should also determine whether or not a site is appropriate for the purpose at hand, usually the completion of an academic paper or project. Using the rubric, raters classified students who did not indicate whether or not a web site was appropriate as *Beginning*. Students who indicated whether or not a site was appropriate, but did not

Evaluation Criteria	Beginning	Developing	Exemplary
Articulates Criteria	0 - Student does not address authority issues. <input type="radio"/>	1 - Student addresses authority issues, but does not use criteria terminology. <input type="radio"/>	2 - Student addresses authority issues and uses criteria terminology such as: author, authority, authorship, or sponsorship. <input type="radio"/>
Cites Indicators of Criteria	0 - Student does not address authority indicators. <input type="radio"/>	1 - Student refers vaguely or broadly to authority indicators, but does not cite specific indicators. <input type="radio"/>	2 - Student cites specific authority indicators such as: domain, server/publisher/host, or ~ in URL; presence of personal or corporate author name, email, "About Us" or "Contact Us" links; or author credentials. <input type="radio"/>
Links Indicators to Examples from Source	0 - Student does not address examples of authority indicators from the site. <input type="radio"/>	1 - Student refers vaguely or broadly to examples of authority indicators from the site under consideration, but does not cite specific examples. <input type="radio"/>	2 - Student cites specific examples of authority indicators from the site under consideration. <input type="radio"/>
Judges Whether or Not To Use Source	0 - Student does not indicate whether or not the site is appropriate to use for the purpose at hand. <input type="radio"/>	1 - Student indicates whether or not the site is appropriate to use for the purpose at hand, but does not provide a rationale for that decision that cites authority issues and/or indicators. <input type="radio"/>	2 - Student indicates whether or not the site is appropriate to use for the purpose at hand and provides a rationale for that decision citing authority issues and/or indicators. <input type="radio"/>

Figure 9.
Round 2 rubric

RESEARCHER USE ONLY: Total Score ___/8

Table V.
Round 2 scores for "links indicators to examples from source"

Evaluation criteria	Beginning		Developing		Exemplary	
	Researcher	Experts	Researcher	Experts	Researcher	Experts
Links indicators to examples from source (%)	5.3	1.9	1.3	6.7	93.3	91.5

provide a rationale based on authority were categorized as *Developing*. The *Exemplary* classification included students who indicated whether the site was appropriate, then provided a rationale for that decision based on authority.

The distribution of student responses in Table VI shows the ratings assigned by the instruction librarian and five expert raters in this study. Nearly 1/4 of the student responses fell into the *Beginning* category because students did not indicate whether the web site they were evaluating was appropriate for their assignment. Approximately 1 in 5 students judged the appropriateness of the web site; however, they did not clearly connect the site's appropriateness to authority. About 50 percent of the students used authority to determine whether a web site was appropriate. This assessment reveals that more instructional improvements are necessary to support student learning in this area.

Table VI.
Round 2 scores for "judges whether or not to use the source"

Evaluation criteria	Beginning		Developing		Exemplary	
	Researcher	Experts	Researcher	Experts	Researcher	Experts
Judges whether or not to use source (%)	26.6	27.7	22.6	19.2	50.6	53.1

Round 2, stage 7 – enact decisions

Because rubric assessment yields such descriptive data about what students know and can do, this study provides a detailed picture of students' ability to evaluate web sites using authority. For example, Round 2 revealed that, after changes were made in the LOBO tutorial following Round 1, most students located and identified specific examples of authority indicators in the web sites they evaluated. However, students need more help using authority to determine whether or not a web site is appropriate for academic purposes.

Round 2 results were used to make additional instructional improvements. For example, following the study librarians created a lesson plan that instructors can use to teach students to apply evaluative criteria and decision making skills when selecting sources for academic assignments (LOBO lesson www.lib.ncsu.edu/lobo2/lessonplans/13_evalweb_siteslesson.doc). This lesson is located on the "For Instructors" section of the LOBO tutorial.

Round 2 results also suggest directions for future assessments. First, librarians learned that one round of the ILIAC is often insufficient to fully realize improvements in librarians' instructional abilities and student information literacy skills. As a result, future assessment plans will recognize the need for multiple assessment cycles. Second, librarians learned that not all assessors of student learning can produce reliable and accurate scores (Oakleaf, 2007). Therefore, future assessments of student learning will include a check for rater consistency and accuracy.

Conclusion

By engaging in two rounds of the ILIAC, NCSU librarians articulated learning outcomes clearly, analyzed them meaningfully, gained important data about student skills, celebrated learning achievements, and diagnosed problem areas. As a result, librarians improved pedagogically and students demonstrated increased learning. Indeed, this case study offers a model for future assessment projects by demonstrating that the ILIAC is a helpful conceptual framework that facilitates both the documentation and improvement of librarian instructional abilities and student information literacy skills. As such, the ILIAC is a valuable tool for librarians employing assessment to prove the contribution of the academic libraries to the institutions of higher education.

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