Information Literacy Assessment: A Review of Objective and Interpretive Methods and Their Uses

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Abstract: Information literacy, generally defined as the critical reception, evaluation, and use of information for professional and personal purposes, has been recognized as a critical skill at both the national and international level. Professional associations and regional accrediting bodies have likewise acknowledged the significance of the topic by identifying information literacy as a key student learning outcome. Consequently, institutions are increasingly integrating information literacy instruction into the academic curriculum, in turn creating the need to assess instructional impact. However, information literacy is a relatively new concept and credible assessment tools are only now forthcoming. Many institutions are relying on locally developed assessments to document instructional efficacy, but these instruments may not be considered acceptable evidence for program reviews. This paper summarizes several information literacy assessment tools recent to the market, including three instruments that measure cognitive knowledge of information literacy skills at the general education level and a test that measures knowledge of information sources and structures pertinent to the field of education. Information literacy has roots in library instruction and two techniques derived from bibliometrics, a library and information science research method, are also presented. Multiple methods of assessment are suggested to validate an assessment program and the described bibliometric techniques can be used in conjunction with other information literacy assessments.

Introduction

Whether for professional development or academic training, effective information skills are an integral part of all academic programs. Due to the escalating complexity of the environment, individuals are faced with an abundance of information choices – in their academic studies, in the workplace, and in their personal lives. Seeking, evaluating, and managing information from multiple sources offers a foundation for continued growth as individuals move into their first professional positions and assume increasing responsibility in all areas of life (Association of College and Research Libraries [ACRL], 2000). The importance of information literacy has been recognized in the United States for the past several decades, and it is becoming increasingly prominent in the international arena as well. Information literacy was a dominant theme at UNESCO (2005) conferences hosted in the Czech Republic (2003) and Egypt (2005), and attendees established that information literacy deficiencies represent an overarching societal concern. Proponents of information literacy suggest it is the critical literacy for the 21st century (Bruce, 2003; Shapiro & Hughes, 1996) and that it serves as the foundation for intellectual empowerment within every discipline, across every sector (Jackman, 1999).

Information that is available both in print and electronic format ranges widely in authority and quality and initial reports indicate that students are increasingly relying on information gleaned from the Internet, yet many are not critically examining this information (Pew Internet & American Life Project, 2005). More specifically, Mary Kennedy (1997) suggests that education students may not be conceptually prepared to take full advantage of the information available and expertise in accessing, examining, and using scholarly information may rest with a few. Perhaps this is why information literacy has been recently recognized by professional associations (American Association of School Librarians [AASL] & Association for Educational Communications and Technology [AECT], 1998; International Society for Technology in Education [ISTE], 2000; National Council for Accreditation of Teacher Education [NCATE], 2002) and regional accrediting bodies (c.f.e, Middle States Commission on Higher Education, 2002; New England Association of Schools and Colleges, 2001; Northwest Association of Schools, Colleges, and Universities, 2003) as fundamental to success in a rapidly changing, technology and information

intensive environment. Consequently, institutions are increasingly integrating information literacy instruction throughout the curriculum, which in turn has created the need to assess student learning.

The purpose of assessment is to measure institutional effectiveness and the quality of education. Assessment seeks to answer questions about which students learn, what they learn, and how well they learn, and explores pedagogical practices and educational experiences that foster student learning (Maki, 2002). Understanding how information literacy instruction impacts student learning outcomes is a necessary first step to informing and improving planning, curriculum, and instruction decisions and developing a theory-connected practice of successful instructional techniques (Hernon & Dugan, 2004; Lopez, 2002; Maki, 2002). However, assessment results are not limited to revealing how effective programs are for internal decision-making purposes, they also offer evidence regarding institutional performance for external program reviews. Assessment supports institutional integrity by providing evidence that accomplishments match intentions. Accrediting agencies have a strong commitment to student learning and to using assessment results as means to document and improve student academic achievement and faculty effective teaching (Lopez, 2002). This paper describes several methods that directly measure student learning and that can be considered for use as part of a comprehensive information literacy assessment program.

Assessment Approaches and Purposes

A necessary first step in planning an outcomes assessment program at the program level is aligning existing performance standards and objectives with the institutional mission and program goals to create educational learning outcomes. One of the most comprehensive examinations of information literacy has been conducted by the Association of College and Research Libraries (ACRL, 2005), which has developed a set of standards that state that the information literate student:

- determines the nature and extent of the information needed;
- accesses needed information effectively and efficiently;
- evaluates information and its sources critically and incorporates selected information into his or her knowledge base and value system;
- individually or as a member of a group, uses information effectively to accomplish a specific purpose; and
- understands many of the economic, legal, and social issues surrounding the use of information and accesses and uses information ethically and legally.

Each of the ACRL standards has associated performance indicators and measurable student learning outcomes to support assessment initiatives. The ACRL performance indicators have been aligned with information and technology standards for teacher candidates as prescribed by the National Council for the Accreditation of Teacher Education (NCATE) and the International Society for Technology in Education (ISTE) (Beile, 2005; Educational Testing Service [ETS], 2004). Alignment of the ACRL standards with the NCATE-relied upon ISTE standards was successfully used in conjunction with the ETS Information and Communications Technology (ICT) Literacy Assessment and the Information Literacy Assessment Scale for Education (ILAS-ED), a tool specifically designed to measure teacher candidates' information literacy skill levels. Opportunity exists to make use of the existing ACRL objectives framework with locally-developed information literacy assessment tools.

After goals and measurable objectives are established for the academic program, the next step is to decide on appropriate measures that assess how well students are meeting the goals and objectives. Assessment tools are broadly classified into the categories of direct and indirect measures. Direct measures assess the skills, competencies, behaviors, and attitudes faculty expect their graduates to have attained, and examples include, for instance, commercially available or locally developed tests and portfolios, internship experiences, and capstone projects that use faculty-developed scoring rubrics. Alternately, indirect measures of student learning rely on self-report data that ascertains the perceived extent or value of the learning experience. Indirect measures can consist of alumni, employer, and student surveys, persistence, retention, and graduation studies, exit interviews, and job placement data (Lopez, 2002). They are often used to supplement direct measures, and can provide information that may enrich aspects of what the direct measures suggest about students' learning (Lopez, 2002).

Program reviewers look for methods that accurately capture student achievement and rigorously reviewed measurement techniques that directly measure learning outcomes are most often relied upon. It is for this reason

that techniques that fit this description are emphasized in this paper. These measures, however, can be further categorized into objectively scored or interpretive, and cognitive or performance based. Examples of objectively scored, cognitive assessments include the selected-response Project SAILS information literacy test, James Madison University's Information Literacy Test (ILT), and the Information Literacy Assessment Scale for Education (ILAS-ED). Of these, the ILAS-ED is the only instrument designed to measure knowledge of information literacy concepts related to education. Methods that investigate student performance and application of information literacy concepts constitute another approach to assessment. There is a difference between knowing about a topic and being able to apply the knowledge and perform a skill, and proponents suggest performance-based methods may reveal more information about students' ability to actually use or apply skills in an authentic environment. Performance-based assessments can serve also to validate scores on a standardized test; there is an expectation students who do well on a test will also be able to demonstrate that knowledge by executing the skill.

Many performance-based assessments are locally designed, and their development involves identifying criteria that characterize achievement of an outcome and developing scoring ranges that distinguish among students' levels of achievement, known as rubrics. Rubrics that are appended to this paper have been used to analyze the quality of term paper bibliographies and evaluate writing found in theses, dissertations, and term papers. The Educational Testing Service's iSkills assessment constitutes a third type of measure, and can conceivably be thought of as a hybrid between objective and interpretive, and cognitive and performance-based approaches. The iSkills test is described in more detail in a later section, but essentially allows the test taker to apply knowledge by constructing answers that require a combination of technology, information use, and critical thinking skills.

Figure 1. Direct measures categorized by type

	Objective	**Hybrid**	**Interpretive**
Cognitive	Project SAILS IL test JMU ILT ILAS-ED		
Hybrid		ETS iSkills	
Performance-based			Citation analysis Literature review analysis

As information literacy skills are interpreted by the context in which they are applied, program goals and key student learning outcomes must be identified prior to choosing appropriate assessment methods. For example, if a goal of the program is for students to produce better researched and documented papers, then rubrics can be applied to the reference list to evaluate the quality of sources cited by the student. Similarly, if a program goal is for students to critically analyze the research in their field and synthesize it in papers, theses, and dissertations, then tools that evaluate the sophistication of thesis development and structure of the literature review can be employed. Student portfolios or capstone experiences can also be assessed using existing course rubrics modified to include information fluency criteria. Developing and administering instruments for analyzing student performance is admittedly labor intensive, and their utility may be limited to selected upperclass and graduate students or courses.

More practical for large-scale assessment, current initiatives have pragmatically focused on development of objective tests. Two of the better known information literacy tests are the Project SAILS and iSkills tests. The Project SAILS test is used for cohort analysis with comparison of test results to benchmark institutions. The purpose of the test is to see how an institution performs in relation to peer institutions. Based on this approach, it is easy to conclude that the Project SAILS instrument is norm-referenced. Although iSkills was designed to compare performance at the institutional level, work is being conducted to establish individual passing scores. JMU's ILT and the ILAS-ED are also criterion-referenced tools, and test scores can be interpreted to indicate mastery of the subject. Test results can be used both for making decisions about individuals as well as evaluating instructional efforts.

Review of Instruments

The American Association for Higher Education (2005) writes that learning is multidimensional, integrated, and revealed in performance over time. To validate an assessment program and to successfully measure the range of student achievement, multiple methods of assessment, administered at critical points throughout the learning process, are necessary (Lopez, 2002; Maki, 2002). To achieve this goal assessment methods that supplement standardized test results should be considered. Examples include assessment of term paper bibliographies, analysis of writing in term papers, theses, and dissertations, administration of discipline-specific tests, review of student portfolios, and evaluation of an embedded information fluency component in a capstone course exam or final project. Six methods are presented, three instruments readily available on the market that assess information literacy skills at the general education level and three developed that can be used for discipline-specific assessment. The purpose, format, development, validity and reliability evidence, availability, and contact information of each of these measures is presented. The three scales developed by the authors will be appended to the paper.

James Madison University's ILT

The ILT is a computerized, multiple-choice test developed collaboratively by the James Madison University Center for Assessment and Research Studies and the Libraries. It is designed to assess the ACRL information literacy standards (James Madison University, 2004). The ILT measures Standards 1, 2, 3, and 5 at the general education level. It does not address Standard 4, as this competency is not easily measured by a multiple choice test. Steven Wise (personal communication, August 15, 2005), one of the project directors, notes the test can be used for program assessment or to test individual student competency. The ILT contains 60 items, plus five pilot items, and takes approximately one hour to complete. It is Web-administered and developers note it is multimedia intensive. To more fully measure students' cognitive abilities, the test has 41 knowledge items and 19 items to assess application of knowledge. The test has been in development a little over two years and is available for administration by other institutions.

ETS iSkills

The iSkills purports to measure students' cognitive and technical skill levels in an authentic technology-intensive environment (Educational Testing Service, 2004). Two tests: Advanced, which targets juniors and seniors in four-year institutions. Starting in August, it will be ongoing test administrations with a two week turnaround time on scores. Core version: less of a reading load and the tasks are a little less difficult. Core targets freshmen and sophomores at four-year institutions and first and second year students in community colleges. Both are 75 minutes (14 short tasks around 4 minutes each, plus one 15 minute task, reduced from two hours. Institutions will receive a data file for their own analysis. Score reports include student performance compared to institutional mean and comparable institutions. Cost is $33 per student per test with a minimum order of 100 students, the time it takes to complete the test is approximately 75 minutes, open testing started in fall 2006.

Project SAILS test

Another general information literacy knowledge test, developed by Project SAILS, evolved in response to the need for an information literacy assessment instrument that can be administered across institutions and that provides data regarding institutional performance when compared to identified benchmark institutions or national standards.
The goal of Project SAILS (2001), a federally funded initiative, was to develop an information literacy assessment instrument that has been proven valid and reliable, is easy to administer, is standardized, allows for use at any institution, and provides for both internal and external benchmarking. To date, Project SAILS has developed and field tested approximately 250 items for their information literacy test bank. Since its inception five years ago, over 80 institutions have used the SAILS instrument to assess their information literacy instruction programs. See http://sails.lms.kent.edu for more information.

The aforementioned assessment measures are examples of large-scale, standardized instruments. Although iSkills purports to be performance-based, it does not specifically relate to individual disciplines. In order to measure program-specific skills the assessments must be interpretive, contextual, and authentic, and relate to students'

demonstrated ability to use information within the context of the discipline. This entails moving from objective measures to interpretative methodologies, from general education skills to discipline-specific abilities, and from emphasizing cognitive knowledge to behavioral performance. For education, students and future professionals should not only be able to efficiently and effectively use general information sources, but also know how to access information sources to locate scholarly articles, professional journals, specialized materials to inform their practice, including conference papers, government reports, and other grey literature.

The Information Literacy Assessment Scale for Education (ILAS-ED)

An assessment tool for education-specific information sources is the *ILAS-ED*, which is based on alignment of Association of College and Research Libraries information literacy competency standards with the International Society for Technology in Education's *National Educational Technology Standards for Teachers (NETS*T.)* The 22 item, multiple choice instrument is designed for undergraduate students enrolled in teacher education program (Beile, 2005). The instrument is freely available and takes approximately 30 minutes to complete.

Citation analysis rubric

Capstone assignments can include group and individual presentations, research projects, papers, and poster sessions. Rubrics can be applied to these experiences to evaluate the level of information fluency skills demonstrated by candidates. Programs that require a lengthy student paper as the capstone experience may have a program goal for students to produce better researched and documented papers. In this instance rubrics can be used to evaluate the quality of sources cited by the student (c.f., Haycock, 2004; Kohl & Wilson, 1986). To address the question of students' assumed ability to thoroughly mine the scholarly information, a rubric was developed and used to evaluate citations for term papers and dissertations (Beile, Boote, & Killingsworth, 2003). Citations were evaluated on the criteria of scholarliness, currency, and appropriateness of the source to the subject being developed. Scholarliness was defined as "How good was the fit of the source for the topic?", currency as "Was an appropriate decision made regarding retrospective versus contemporary sources for the topic?", and appropriateness as "Was the material type appropriate for treatment of the topic?"

Literature review rubric

Criteria for assessing students' ability to take information and synthesize it into their writing were adapted from Hart (1999) and developed into a rubric used to assess the quality of literature reviews (Boote & Beile, 2005). Hart's initial criteria included: distinguish what has been done from what needs to be done, discover important variables relevant to the topic, synthesize and gain new perspectives on the field, identify relationships between ideas and practices, establish context of the topic and the problem, rationalize the significance of the problem, enhance and acquire the subject vocabulary, relate ideas and theory to application, identify the main methodologies and research techniques that have been used, and place the research in a historical context to show familiarity with state-of-the-art developments. This rubric assesses higher order critical thinking and writing skills.

Summary

Different levels of thinking skills are associated with various learning outcomes, and assessment tools should be employed that most authentically measure the skill level. For example, multiple-choice format tests are thought to measure lower-order thinking skills, although information literacy emphasizes higher-order thinking processes. The justification for some approaches is the need for a method that is easy to administer and produces readily analyzable data; the qualification is that multiple forms of assessment are needed to truly gauge student performance and program effectiveness. Ultimately, no single measure can capture the complexity of learning. To validate an assessment program and to successfully measure the range of student achievement, multiple methods of assessment, administered at critical points throughout the learning process, are necessary. The American Association of Higher Education (2005) writes that learning is multidimensional, integrated, and revealed in performance over time.

This paper is significant for several reasons. First, various tools that can be used to assess education students'

information literacy levels are presented. Second, a multiple methods approach to assessment is advocated. Different aspects of each of the tools is discussed, and include the purpose of the approach and what it purports to measure, as well as development and format of the tool, evidence of validity and reliability, current availability, and contact information. Concrete examples of how a multiple methods approach to assessment will provide the reader with ideas and possibilities for designing their own assessment program. Use of these approaches promises to provide valuable data for informing curricular and programmatic decisions, as well as satisfy the need for systematic and trustworthy reporting of instructional impact. Based on implications for information literacy instruction program evaluation, this paper will be of interest to education faculty, college and university administrators, and accreditation review personnel.

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