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We have evidence, they are learning: using multiple assessments to measure student information literacy learning outcomes.

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Abstract

Best practice for assessment suggests that evidence gathered from multiple sources and viewed holistically should reinforce each other and allow for meaningful conclusions. That is how the California State University in San Marcos has embarked on assessing their Information Literacy Program. This pro-active Program targets instruction for all academic degrees and information competencies are also embedded in each lower-division General Education course. Librarians and disciplinary faculty work together to ensure that students successfully master these information literacy (IL) competencies. Three different assessment initiatives will be presented in this paper. The use of the iSkills test as a backbone for the study of first-year students and their retention; IL outcomes as measured in the General Education Assessment Plan; and participation in the annual assessments for academic programs are three campus-wide initiatives gathering evidence that students are becoming information literate.

Introduction

Measurement of student learning outcomes is geared to demonstrating that college changes students both cognitively and affectively. Students are asked to show the specific knowledge and skills they have acquired while in college. Libraries too are being required to conduct meaningful assessment. As described in Dugan and Hernon (2002) libraries have long had a descriptive system of counting inputs, the resources used to support the library functions, such as collections, staffing, and technologies, and outputs which measure workload such as books circulated or number of questions answered. This early system of assessment focused on what the librarians could easily capture and generally had little follow-up since the data was not necessarily used for improvement. These measures continue to be used and are valid for making administrative decisions and for planning purposes but they do not enhance our understanding of student learning.

Starting in the 1980's libraries began to include surveys or questionnaires geared at judging satisfaction with library services. One model of interest, LIBQUAL+™, the adaptation of the SERVQUAL instrument, measures customer service satisfaction and is widely adopted by the library community. Measuring the quality of service poses a challenge as service is abstract, relative, subjective and based on user expectations (Shi and Levy, 2005). Service in a library includes both the information provided (the product) and the assistance in getting that information (the process) including the attitude of staff. It is very important in applying these satisfaction measures to differentiate between the library user expectations and their actual needs.

However assessment of an information literacy program is much more complex as neither inputs, outputs or user satisfaction will provide the needed evidence. It is necessary to show that the program has a profound impact on the educational mission of the larger institution and is a major contributor to the success of the students in meeting the learning outcomes established for them.

Assessing Information Literacy Programs

Gratch Lindauer (2004) identifies three arenas of higher education from which evidence for assessment of information literacy programs can be drawn. These are the Learning Environment (the curriculum, co-curricular experiences and independent student learning), the Information Literacy Program Components (formal or informal instruction including one-on-one opportunities or instruction-focused reference services) and Student Learning Outcomes (performance measures, portfolios, standardized assessments, etc.) These three areas overlap and must be viewed in the context of the broader institution. An assessment plan must gather evidence from all three arenas to assure a comprehensive assessment of the information literacy program.

Conversation surrounding information literacy assessment tends to assume that everything being written and developed is necessarily new, this is not the case. For example, after gathering data on student achievement using tests and surveys librarians have recently concluded that students are very confident about their information skills but their performance shows otherwise (Caravello, Dunn, Katz, Maughan, among others). However, writing more than 30 years ago Masse Bloomfield (1974) quotes Felix Snider as writing "the unanimous conclusion from the testing done and from personal observation is that most students are seriously lacking in knowledge and ability to use books and libraries effectively" (Bloomfield, p.221).

An excellent review of assessment at various institutions is provided by Kapoun (2005). Gathering data from 320 libraries across the U.S. the results clearly show that most libraries (57%) use a questionnaire to survey students and that the questions asked are overwhelmingly geared to student rating of instruction rather than to assessing student learning. Because developing measures to document the library's contribution to learning at the institutional level is challenging, some may say impossible, libraries have turned to surveys to gather some feedback. Using a portfolio for program assessment (Chapman, Pettway and White, 2001) involves gathering and reviewing student ratings of instruction, lesson plans as well as librarian reflections on their teaching practice. The portfolio is compiled each semester and forms the basis for discussion of future goals and action plans. Along these same lines, Guise (2005) suggests a systematic and reflective analysis of various components of the program by gathering

data, describing current practice, and doing comparisons using other libraries identified as best practice as models. This form of programmatic-level environmental scan is taken one step further by comparing current practice with expectations for the future.

Standardized testing was very popular in college libraries as early as the mid-1960s with many of the tests in use at the time dating from as early as the 1930's. Bloomfield (1974) reviews various tests but focuses on the most popular, the Feagley test, used in over 100 college libraries. She realized that a more complex test was needed stating, "if we want students to have the ability to use various need to be designed" (Bloomfield p.225). Her final conclusion, after comparing and critiquing more than 20 tests is that, "Before we can design what are effective learning experiences in terms of either courses or tests, we are going to have to determine our library skill objectives and the needs of students as prescribed by teachers with more understanding than we have had in the past" (Bloomfield p. 230). Writing in 1977, Fjallbrant states that these tests are "artificial and do not adequately measure the students' ability to use the complex information tools available" (p.89) while providing an excellent review of the literature and indentifying a series of psychometric tests.

Jackson (1993) analyzes three such tests: the Iowa Test of Educational Development (1988) proposed to evaluate the skills needed to use important sources of information; the Test of Achievement and Proficiency (1990), aimed at measuring students' ability to use known information sources such figures, maps, graphics and dictionaries; and the Comprehensive Test of Basic Skills (1989) aimed at measuring the students' study skills or the students' ability to find and use information. Jackson determines that these tests include such information skills as "comprehension, application, analysis, interpretation, synthesis, and evaluation" (Jackson, p.27). What is not measured is the process of focusing a topic, developing a thesis statement or a search strategy, and, of course, searching in an online environment.

Further research is needed to see why the library community decided to totally abandon these tests rather than adapt them to current needs, or at the very least use them as a basis for developing a new test rather than reverting to student satisfaction surveys. However, various colleges and universities in the United States have developed tests focused primarily on fundamental skills for using a library, those easier-to-measure skills such as reading a citation for a book or journal article or arranging books in call number order. These lower-order thinking skills were the same as those tested in the Feagley test and a comparison of the results would make for interesting reading. Examples include UC Berkeley (Maughan), at UCLA (Caravello,et.al., 1999) and more recently Flaspohler (2003).

More recently librarians and others from institutions around the United States have developed tests to measure student information literacy skills. These are partly a response to a local need but also reflect a national demand. King's College, the California Bay Area Community Colleges Information Competency Assessment Project, James Madison University, and Kent State University are some examples. While some of these test initiatives have not been successful, others have begun to be used nationally. Cameron (2007) provides a discussion of the information literacy test developed by James Madison University. And one study using this test was reported by Latham and Gross (2007).

Another standardized information literacy test that is gaining popularity is the one known as Project SAILS. Originally developed by a group at the Kent State University it was endorsed by the Association of Research Libraries (ARL) in 2003 when the Association took over the responsibility of coordinating and managing the marketing and public relations for the project. The development of the test is best explained by O'Connor, Radcliff and Gedeon (2001). These librarians were keen on building on past experiences with testing and did a thorough literature review and study of previous tests. While reinforcing the need to develop standardized measures of student learning, the authors agree that "the ability to measure the higher level concepts of information literacy at all is also questioned" (p.167). One study using the SAILS test is reported by Rutgers University Libraries (2005). Oregon State University has also used this test and has multiple years of data in the process of being analyzed (Deitering and Davidson).

The iSkills test

Perhaps the most well-known of the information literacy tests is *iSkills*, created by the Educational Testing Service, a private company creator of numerous standardized tests including the TOEFL, the Scholastic Aptitude Test and many others. Developed in conjunction with various colleges and universities it has been field tested for several years across many campuses. This online scenario-based test of student skills in information and technological literacy is loosely based on the *Information Literacy Standards for Higher Education* (ACRL, 2000). There are 2 versions, the Core test for graduating high school or first year college students, and the Advanced version targeted for juniors or third year students. The *iSkills* test measures seven areas of performance as described in the following table.

Area:	Definition:	Students were asked to:
Define	Understand & articulate the scope of an information problem to facilitate the search	Narrow a customer's particular needs; Identify appropriate features for a product to solve an office problem.
Access	Collect and/or retrieve information from web pages, databases, discussion groups, email or online print media.	Analyze the possible reasons for an internet search's poor results; Search a database to obtain information
Evaluate	Judge whether information satisfies an information problem by determining authority, bias, timeliness, relevance, etc.	Evaluate emails to determine whether they contained complete information for further action; Evaluate web sites as useful for a research project.
Manage	Organize information to help you or others find it later.	Fill in an organizational chart to reflect the structure of a department; Reduce the size of an email in box by deleting/saving attachments.
Integrate	Interpret and represent information	Complete a table according to

Area:	Definition:	Students were asked to:
	summarize, compare and contrast, from multiple sources.	specific criteria; Fill out a spreadsheet to determine the season records of teams.
Create	Adapt, apply, design or construct information in digital environment.	Edit & format a document; Create a presentation slide arguing in favor of a particular position.
Communicate	Disseminate information tailored to a particular audience in an effective digital format.	Format a document; Select & organize slides for two distinct presentations to different audiences.

Institutions receive several score reports. The Institutional Data Files includes administration information (e.g. start and end time of each individual student test), self-reported student profile and demographic information, the assessment information (e.g. reported score, total testing time, number of tasks completed), self-reported student background information (including scores on other tests such as the Scholastic Aptitude Test, hours of employment, etc), and up to nine questions generated by the individual institution. Two other reports sent to the institution include the Institutional Skill Area Report which shows the performance of students in one institution on each of the skill areas compared with the performance of the selected reference group (high school students or college students); and the Aggregate Task Performance Feedback Report which shows the number and percentage of students in the institution who achieve the highest score for each of the components of the tasks and skills areas. For either report students who completed fewer than 4 tasks or spent less than 10 minutes in either of the two sections of the test are excluded from the results. These score reports provide data that can be used for various important purposes. For example they can help determine the placement of transfers in various courses, they can be used to measure specific outcomes such as use of spreadsheets or word processing software, they can provide evidence for accreditation requirements or to perform an evaluation of the curriculum based on the strengths and weaknesses found.

Additionally students receive individual score reports which explain their scores both in terms of their peers and in terms of the highest score that they could have achieved. These can be used by the students to help guide them in their academic career by showing them areas that may need additional attention.

The California State University system was a forerunner in assessment of information literacy skills (Dunn, 2002) and also was very involved in developing this test. At CSUSM our interest in the test is two-fold. Not only do we have a strong information literacy program required in the lower-division General Education (core curriculum) courses. But we also have a computer competency requirement, an entry-level requirement of computing skills that has been in force since the early years of our campus. Part of our interest was to see if the *iSkills* could replace this locally developed test. Numerous lessons were learned from our participation with the *iSkills*. Other CSU campuses have reported on their experiences (Cameron.et.al., Somerville et.al) and Katz (2007) describes overall student performance on various tasks as shown in the table below.

Evaluation of a Web site:	Percent answering correctly
Judged objectivity correctly	52%
Judged authority correctly	65%
Judged timeliness correctly	72%
Identified one web site that met all criteria	49%
Selecting a research statement for a class assignment:	
Identified statement that captured demands of the assignment	44%
Picked a reasonable but too broad statement	48%
Pick statements that did NOT address the assignment	8%
Asked to narrow an overly broad search:	
Selected the correct revision	35%
Selected a revision that marginally narrowed the search	35%
Web search task:	
Entered multiple search terms to narrow results	40%
Search a large database:	
Used a strategy that minimized irrelevant results	50%

In Fall 2006 CSUSM began a two-year study using the Core *iSkills* test as the backbone to accompany data gathered to assess students in their first year of college. The criteria for lower-division GE courses require that the faculty demonstrate how information literacy and use of the library are integrated into their courses. Yet in conversations with faculty and in the reports that result from academic program reviews a recurrent theme reflects a perception that CSUSM students are not prepared for college-level research. With this project we hoped to initiate a discussion on campus surrounding students' research skills, to measure students' abilities as presented by the *iSkills* test, and to measure the variables surrounding students' success rates as provided by grade point average, and retention or persistence.

The following table clearly shows that student's performance improved in all skill areas except the areas Define and Manage, with the largest improvements in the areas of Integrate and Evaluate. Managing information or the skills in the Create category clearly fall in the realm of computer competency.

Skill Area	Pre-test median score	Post-test median score
Define	70	70
Access	59	68
Evaluate	50	63
Manage	70	70
Integrate	61	79
Create	61	72
Communicate	35	45

The Educational Testing Service (ETS) worked with the National Literacy Policy Council and in early 2008 published the results of a study that determined standards and recommended cut points for each performance level. This will help determine which students meet the ICT literacy standards and which may need additional instruction (Katz and Tannenbaum, 2008).

Catts (2000) makes a strong argument against using standardized tests. They can be “unfair, either to an institution which sets goals which are different from those assumed in the standardised test. Or to the individual students who are not drawn from the same culture as the population on which the test was ‘standardised’ ”. (Catts, p.277) Both are very valid concerns that must be addressed. Lopez (2002) agrees “... unless the particular test selected has been found to be appropriate to the specific learning objectives it is being used to measure.... They may not provide students an opportunity to demonstrate skills sufficiently in problem solving tasks’ or they may not adequately measure higher level thinking skills, the practical application of knowledge, or the development of values.” (Lopez, p.363)

The General Education Program Assessment

Much of what constitutes information literacy instruction – critical thinking, computer literacy, problem-solving and lifelong learning, directly affects student learning in all their courses. This requires us to work closely with disciplinary faculty and their student learning assessments to fully gather the data on information literacy skills. “Faculty, librarians, and others will find that discussing assessment methods collaboratively is a very productive exercise in planning a systematic, comprehensive information literacy program. This assessment program should reach all students, pinpoint areas for further program development, and consolidate learning goals already achieved. It also should make explicit to the institution’s constituencies how information literacy contributes to producing educated students and citizens.” (*Information Literacy Competency Standards*, p. 6)

Collaboration throughout the institution is needed to develop a curriculum that “helps students at various places in their academic studies by seamlessly weaving information competence horizontally and vertically throughout the curriculum, with ample reinforcement occurring in both lower-division and upper-division courses.” (Rockman, p.189) Over the years librarians and faculty at CSUSM have worked hard to restructure academic programs to ensure that students have the opportunities to become information literate (Sonntag and Ohr, 1996). Rockman (2002) accurately recognizes that information literacy instruction includes a variety of factors when she states, “discipline-based faculty must be collaborative partners in the learning process across the curriculum, courses must be intellectually linked to each other whenever possible, information literacy skills must be reinforced and developed over time, and students must have built-in opportunities for success from freshman to senior levels.” (Rockman p.187)

A General Education Assessment Plan was implemented at CSUSM beginning in Fall 2006 and this first cycle focused specifically on two programmatic student learning outcomes: Written Communication and Information Literacy. These two student learning outcomes have been measured in all of the six General Education Areas required for all undergraduate students. It should be noted that a student could be enrolled in any or all of the various courses assessed during any given semester or year. Through individual discussions with the instructors of these

GE courses, the specific assignments to be used as evidence were identified. A common rubric used by the instructors as they graded these assignments asked them to determine the following:

Thesis: Students make a clear statement of their thesis in their writing.

Organization: Students demonstrate effective paragraph organization in the essay/assignment.

Mechanics: Students consistently demonstrate clear sentences and proper mechanics (punctuation, spelling, reference, agreement)

Finding appropriate sources: Students can locate appropriate references for their papers and assignments.

Using sources: Students interpret and use the information found in their papers/assignments (the sources are not just listed in the bibliography but rather there is evidence that the students are actually using what they read).

Thus each piece of writing was assessed on 3 dimensions of written communication and 2 dimensions of information literacy using a 5-point rubric where a 3 was considered adequate. The following shows our assessment to date (3/2008).

- Total faculty contacted: 50
- Total number of faculty who agreed to participate: 39
- Total number of faculty who participated: 29
- Response rate: 74.4% (29/39)
- Total number of different courses assessed: 11
- Total number of pieces of student writing assessed: 1179

Results presented in Table one below clearly show that at least 80% of the students met the minimum criteria for each of the 5 dimensions. But the number of students who rated superior (or a score of 5) on any of the dimensions is much lower, in the 20% bracket. An interesting finding is that students had a greater ability to find information sources than in using them. This is very easy to understand as students generally tend to find some information, perhaps not the best information, tend to have satisfactory searching skills using online retrieval systems, and generally have some information literacy instruction during their first year of college targeted to the Information Literacy Standard Two: *The information literate student accesses needed information effectively and efficiently* but not necessarily Standard Four: *The information literate student, individually or as a member of a group, uses information effectively to accomplish a specific purpose.*

Results			Results by GE Area				
Student Learning Outcome	% meeting minimum	% rated superior	SLO	A2 Written Comm	A3 Critical Thinking	B4 Quantitative Reasoning	Dh US History
Thesis	86.9	20.0	Thesis	94.4	79.2	86.8	80.9
Organization	86.0	21.1	Organization	94.6	88.3	64.0	85.2
Mechanics	86.2	20.9	Mechanics	93.5	87.9	67.5	85.5
Finding sources	86.5	25.5	Finding info	91.2	90.3	NA	73.1
Using sources	82.9	20.1	Using info	92.0	88.8	NA	59.9

Table one

Table two

Table two above shows the results of this assessment in some of the specific learning Areas of the GE. This provides us with very important information in that we see that students in the Written Communication Area are much more capable of finding and using sources. We know that students in this area received at least one class hour of instruction from a librarian on finding and using information sources to support their research. Additionally the students are taught how to use these sources as evidence to support their viewpoints in their research papers. Much the same can be said regarding students in the Critical Thinking Area, a large part of their instruction is targeted towards understanding how information can be used to substantiate their arguments however we know that they do not receive targeted information literacy instruction to the same extent as the writing courses. Nor do they have library-use assignments but rather base their written assignment on texts used in the course perhaps making the finding of information less of an issue. One area for further research would be to better understand how to help students *use* the sources they find.

The Quantitative Studies Area courses do not do library-based research, and the U.S. History Area courses while they do research, do not receive information literacy instruction. One finding that reinforces anecdotal data is that students do not make connections between one course and another. If they learn about it in one area they do not necessarily apply it in another area. This is of much concern to us and something that we will target for improvement in the future.

This GE Assessment Plan is quite similar in some ways to the approach taken by O’Hanlon at the Ohio State University (2007). An analysis of course syllabi looked to understand the goals and objectives of courses where students would likely be exposed to information literacy instruction. This analysis and a corresponding faculty survey, gathered data on what the students were expected to do in research projects or assignments and whether the instructor or a librarian taught the skills to be successful in the project or assignment. Gathering this data across an entire academic degree program can provide an overview of information literacy learning in that program and allow librarians to initiate a dialogue with the program faculty about necessary support for student success. The annual assessments and periodic program review process may allow us a platform for similar analysis and dialogue at CSUSM.

Annual Assessments and program reviews

Conducting comprehensive reviews of academic degree programs to insure quality education is

common practice throughout the United States mandated by most accrediting agencies. These program reviews study the educational practices, the curriculum, the faculty and the student learning experiences of a specific degree program. The program review process is guided by academic audit questions that require the program to have clearly articulated student learning outcomes aligned to the curriculum of the program, and widely distributed and communicated to students. Starting in Fall 2007, academic degree programs at CSUSM are expected to provide annual reports on how they have measured student achievement of these outcomes throughout the program but especially upon graduation, and to describe how the results of these achievement measures are being used to improve the program. During the program review these annual assessment reports are compiled and summarized as part of the self-study process.

The Information Literacy Program has programmatic student learning outcomes as embodied by the *Information Literacy Standards* and performance measures. These form the basis for our curriculum, what we teach and what we want to measure. This first year of annual assessments encouraged us to propose inclusion into the campus program review cycle. Once approved and funded, the librarians were quick to decide that Standard Three: *the information literate student evaluates information and its sources critically and incorporates selected information into his or her knowledge base and value system*, would be the area of focus. One of the primary goals of the IL Program is to help students become critical thinkers when using information. We ask that they evaluate information based on a series of criteria and that they develop the skills needed to be critical consumers of information – learning to look for bias, and generally to be wary of the information they use.

Because librarians generally teach class sessions tailored to specific assignments and usually are not with any particular students more than one or two hours, it was decided that all students in all the various classes at whatever level, would be assessed, whether the lesson plan called for discussing evaluation of resources or not. The majority of students participating in this assessment were first-year students in the GE First Year Experience course (known as GEL) and majoring in Business.

In this assessment students were asked “What characteristics do you look for to determine if an item (book, article, website) is scholarly, and appropriate for college-level research?” The student responses were coded based on the answer. For example, if a student answered that they focus on the website domain (.org or .edu) they scored one point for that answer. However if they looked for a reference list or works cited page then they received 2 points for the answer. Student with 1-3 points were rated “Partial”, with 4 points were rated “Acceptable” and with five or more points were labeled “Exceptional.”

This table displays the results of one year of assessment on this measure. We see that 47% of all first-year students and 56% of all GEL students answered at the exceptional or acceptable level as opposed to only 30% of the upper-division (junior and senior level) students. In general 46% of the lower-division students (first-year and sophomores) answered at the acceptable or exceptional level as opposed to only 30% of the upper-division students.

ALL	GEL	UP-	LOW-
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	DIV		DIV	
n/a	5%	3%	11%	5%
partial	48%	42%	59%	49%
acceptable	30%	33%	14%	29%
exceptional	17%	23%	16%	17%

We acknowledge that students in the GEL course were taught evaluation criteria in their 3-weeks of information literacy instruction; we also know that students do not necessarily retain this information and thus we tested them on the last day of the module. This partially explains why these students did better than other first year students and than all other students. It is clear from the results that our students do not generally make conscious their criteria for selecting materials. It is also clear that our first year students are getting more instruction in evaluation of resources than perhaps the upper-division students, many of whom are transfers from local colleges, have received in their lower-division coursework.

Conclusions

What do these assessments tell us of student information literacy? What conclusions do we draw regarding the efficacy of the Information Literacy Program? What improvements or changes can be made based on these assessments? We acknowledge both challenges and opportunities in the future. The development of *Information Literacy Competency Standards*, the various documents that allow us to benchmark best practice, and the rise of several standardized information literacy tests provide us with options when it comes to assessment. We do not however want to fall into the trap of becoming over-reliant on standardized tests due to the ease of administration.

While use of the *iSkills* test proved very informative, alone it does not give us enough insight into our students' information literacy competencies and future administrations may depend on the continued conversations surrounding its use as a replacement for the in-house computer competency test that all students must pass. However when viewed in conjunction with other sources of evidence, we see a picture emerge. The results of the *iSkills* test showed us that our students need help in defining and managing their information. It is interesting to note that the students did well in the Integrate skill area leading us to believe that they can use the information. However when reviewing the tasks in the Integrate area we see that they are completing a table and filling out a spreadsheet which is not comparable to the kind of skills required for using information in an academic setting.

The GE Assessment while more limited in scope gave us evidence that students have difficulty transferring skills learned in one course to assignments in their other courses. It also confirmed that students in the Written Communication Area are learning the information literacy skills we target for that course. Many valuable lessons have been learned from this first year, we look forward to many years of GE Assessment data that will provide input to the Information Literacy Program. Finally the results of our annual assessment for program review shows that students that start their college career at CSUSM demonstrate a greater understanding of the criteria for evaluating information than those students who transfer to CSUSM from another college. Recognizing that the main focus in our teaching tends to be on finding and evaluating

information, we now have a small group that is brainstorming methods for teaching the two critical areas of defining a manageable topic (Standard One) and using information appropriately (Standard Four). Several of us are also developing plans to better target instruction for transfer students and a renewed focus on upper-division information literacy instruction.

At CSUSM we will continue to use both the GE Assessment and the annual assessments within the Information Literacy Program as well as those generated within the various academic degree programs to gather evidence of students' information literacy. However we need to continue to explore some of the other issues surrounding information literacy assessment. These issues could include the lack of faculty emphasis, expectations and support for information literacy instruction; student motivation in taking standardized tests; the inclusion of information literacy, or lack thereof, explicitly or implicitly in the curriculum; and the need to work as one on campus to assess all general learning outcomes not just information literacy. Additionally we want to focus on some of the bigger assessment questions. Do we know enough about the needs of our students as shaped by both their information-seeking behavior and their specific assignments? Can we use technology to recreate the path that a student takes when seeking information such that we can measure their information literacy skills, chart their learning and be able to state when they have become information literate? Do we really understand the complex aspects of information literacy such that we can single them out for assessment?

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