Relevancy vs. Reasonableness: Selecting a Senior Assessment for a Small CIS Program

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ABSTRACT

Assessment processes can add to the workload of any IS program, but particularly vulnerable are small programs for which there are a minimal number of faculty to share the load. Assessment techniques must achieve the right balance between relevancy and reasonableness, that is, being meaningful and practical. The purpose of this paper is to report on the efforts of one small IS program in designing a senior assessment strategy. The paper describes (1) the background of assessment, (2) the current situation of the authors' CIS program, (3) the evaluation methodology used for examining assessment options, and (4) the final approach selected to balance relevancy and reasonableness. Results of the paper will be helpful to other programs struggling with their assessment strategies.

INTRODUCTION

The best way to conduct program assessment is a concern for information systems programs of all shapes and sizes. While assessment should be important simply as a means for evaluating program performance, it has taken on greater importance because of its prominence in accreditation processes. No matter whether one is seeking regional accreditation, AACSB accreditation, or ABET accreditation, systematic processes must be in place to assure that students are learning what a program says they are learning.

Assessment processes can add to the workload of any IS program, but particularly vulnerable are small programs for which there are a minimal number of faculty to share the load. Assessment techniques must achieve the right balance between relevancy and reasonableness, that is, being meaningful and practical. The purpose of this paper is to report on the efforts of one small IS program in designing a senior assessment strategy. The paper describes (1) the background of assessment, (2) the current situation of the authors' CIS program, (3) the evaluation methodology used for examining assessment options, and (4) the final approach selected to balance relevancy and reasonableness. Results of the paper will be helpful to other programs struggling with their assessment strategies.

BACKGROUND OF ASSESSMENT

Standards are also known as goals, core competencies, outcome statements, or learning objectives (Campbell *et al*., 2001). Standards can apply to such things as faculty, courses, students, curricula, departments, and facilities. Standards can be set by a particular professor, a course coordinator, a department, a school, a university, an external professional organization (ACM), or an accrediting body (ABET). Standards can be reflected in the many ways including, but not limited to, mission statements, course goals and objectives, curricular learning outcomes, and accreditation standards.

Academic programs implement standards-based assessment for many reasons: (1) to ensure that students have mastered key concepts within the discipline, (2) to gain **e**xternal validation that students have mastered concepts, and (3) to compare curriculum to that of other universities, or (4) to meet accreditation requirements**.** While the first reason may be the most compelling reason for assessment, the last reason is likely the catalyst for formalizing an assessment process. In addition to regional accrediting organizations, information systems programs are often influenced by standards of two discipline-related bodies, AACSB (Association to Advance Collegiate Schools of Business) and ABET.

Table 1 contains assessment related standards for both AACSB (2005), known as "Assurance of Learning," and ABET (2004), referred to as "Objectives and Assessments." While the wording of the standards is different, their intent is the same. Programs need to develop learning goals for students, a means for measuring their attainment, and a feedback mechanism that ensures continuous program improvement.

Accreditation Standard	Standard Content
AACSB, Standards for Business Accreditation, Assurance of Learning Standard, 15 and 16	15: Management of Curricula: The school uses well documented, systematic processes to develop, monitor, evaluate, and revise the substance and delivery of the curricula of degree programs and to assess the impact of the curricula on learning. 16: Bachelor's or undergraduate level degree: Knowledge and skills. Adapting expectations to the school's mission and cultural circumstances, the school specifies learning goals and demonstrates achievement of learning goals for key general, management-specific, and/or appropriate discipline-specific knowledge and skills that its students achieve in each undergraduate degree program.
ABET, Criteria for Accrediting Information Systems Programs, Standard I, Objectives and Assessments	I-1. The program must have documented educational objectives. I-2. The program's objectives must include expected outcomes for graduating students. I-3. Mechanisms must be in place to periodically review the program and the courses. I-4. The results of the program's assessment must be used to help identify and implement program improvement. I-5. The results of the program's review and the actions taken must be documented.

Table 1: Assessment Standards from AACSB and ABET

AACSB identifies three approaches to the assurance of learning: selection, course-embedded measurements, and stand-alone testing or performance at a specific point in the degree program (AACSB, 2005: 62-63). The first approach applies to students entering a program; the last two approaches pertain to students after admission. Of the latter two, course-embedded measurements focus on learning that takes place within a single course, generally under the control of a single faculty member. Stand-alone testing or performance includes learning that takes place across multiple courses, perhaps even an entire program. While course-embedded assessments are useful in measuring learning in a specific course, broader measures are needed to evaluate learning in a program. Often these types of evaluations occur in the senior year.

THE CURRENT SITUATION

The authors are members of a small computer information systems program in the computing sciences (CS) department at a masters-level university in the southeast. Four faculty members teach full-time in CIS. The department is considering ABET accreditation for both the computer science and CIS programs. The CIS program also services the MIS core course for the AACSB-accredited business school, and two business school faculty members support offerings in CIS.

The CIS curriculum committee was tasked with the goal of developing an assessment strategy, in particular how to evaluate graduating seniors. Currently, the CS program in the department uses the ETS major field test for computer science (ETS, 2005). While a strong argument could be made use a similar test approach for CIS, the curriculum committee was concerned about the availability of a suitable test in information systems. Instead, the faculty members chose to examine a full-range of senior assessment options by addressing the following questions:

1. What are the learning goals of the program that need to be measured?
2. What approaches are available for assessing whether or not students have achieved the learning goals?
3. How does each approach fit with our existing structure and processes? Student learning goals? The faculty workload?
4. What approach provides both a relevant measure of learning and a reasonable workload for faculty?

For a small program, finding a good balance between relevancy and reasonableness was an important concern. The most convenient method might not be the most meaningful; likewise, a meaningful assessment approach could bring with it a heavy workload. The curriculum committee's goal was to select an assessment approach that would appropriately balance relevancy and reasonableness.

THE EVALUATION AND SELECTION PROCESS

The process for selecting the best assessment technique for graduating seniors consisted of four steps: (1) identifying learning outcomes, (2) investigating assessment techniques, and (3) comparing assessment techniques against learning outcomes, and (4) selecting the best approach that balanced relevancy and reasonableness.

Identification of Learning Outcomes

As a first step in the assessment process, the CIS faculty developed a list of student learning outcomes for the program. The faculty team reviewed learning outcomes from other IS programs, recommendations from accrediting bodies and model curricula, as well as faculty suggestions. An initial list was constructed followed by several iterations of revisions that produced the learning outcomes shown in Table 2.

The outcomes are categorized into four areas: oral and written communications; societal, ethical, and professional concerns; theory and research; and analysis and design. The faculty tried to focus on competencies at the higher level of Bloom's Taxonomy (Lamb and Johnson, 2005), emphasizing application, analysis, synthesis, and evaluation skills. This meant that the selection of a senior assessment tool would need to correlate with these competencies rather than emphasizing lower-level skills such as knowledge and comprehension.

Category	Outcome
Oral and Written Communications	1. Students will communicate effectively, both orally and in writing, and will have experience communicating to groups. 2. Students will work in teams as both a leader and participant. 3. Students will choose and produce appropriate artifacts of the analysis, design, and project management processes.
Societal, Ethical, and Professional Concerns	4. Students will evaluate professional decisions based on an understanding of ethical issues, especially in terms of the ACM/IEEE computing professional code of ethics. 5. Students will understand the role of the computing sciences in business and society.
Theory and Research	6. Students will comprehend and articulate the fundamental concepts and theories of the discipline. 7. Students will formulate a research question and investigate an answer by applying research methods appropriate to the field.
Analysis and Design	8. Students will properly select and implement algorithms and data structures using appropriate programming languages. 9. Students will evaluate the impact of technologies on a business or other environment, and will plan for subsequent implementation / integration. 10. Students will properly select and apply appropriate hardware, software, database, and communications technologies and system architectures to solve business problems. 11. Students will analyze, design, and implement computer hardware and software systems based on best practices and standards, using appropriate life cycle methodologies and project management techniques.

Table 2: Learning Outcomes for CIS Program

Survey of Assessment Techniques

Several alternatives are available for conducting a senior assessment. Sanders and McCartney (2003) identified the following:

- Surveys (senior exit, alumni, and employer)

- External advisory panel
- Written examination (developed outside or locally)
- Oral examination (using external or departmental examiners)
- Portfolios (maintained by students or by the department)

For the current problem, the use of an external advisory panel was not feasible since the department did not have one in place. The concept of the oral examination existed as part of the senior project conducted in the capstone course. Therefore, of the techniques listed above, the following were considered for senior assessment in the authors' program: a third-party test, a locally-developed test, the senior project, a portfolio, and a survey approach.

Third-Party Test. Using this technique**,** students take an exam and results are used to judge success or failure of each standard measured by the exam. If the exam tests knowledge or competencies that are irrelevant to local curriculum, those questions/sections can be ignored or removed from test.

In computer science, many programs have relied upon the major field assessment examination published by ETS (2005) for objective testing. In information systems, a joint effort to build a credible exit examination is underway with the Institute for the Certification of Computing Professionals (ICCP) and the Center for Computing Education Research (ICCR). The examination is based upon the curriculum outlined by the IS2002 Model Curriculum. The following description from the ICCP Web site describes the grading system:

> Information Systems Analyst. This certification program has been designed for graduating seniors from 4 year undergraduate Information Systems degree programs, especially for those universities following the Information Systems Model Curriculum (ACM, AITP, and AIS sponsored). A 50% or higher pass in the approximately [sic] 3 hour long ISA examination, plus an undergraduate degree, qualifies an individual to receive the title of ISA-Practitioner and at 70% or higher grade, is specified as ISA-Mastery level. A holder of the ISA is automatically enrolled into the ICCP Recertification program (ICCP, 2005).

The fee for administering the examination could be prohibitive for many small programs. At the time of this paper, a sample contract with fee structure was available on the CCER Web site (CCER, 2004).

While the ICCP/CCER exam is probably the most well-known effort to produce an IS assessment exam, other certifications and skills measurements are also available that might be suitable for testing. For example, Brainbench (2005) is an "online skills measurement" company. Tests are $49.99 each, and concentrate on a single skill such as SQL and HTML.

There are several advantages to using a prepared test from a third party. First, the pre-made test reduces the work for faculty to develop an exam, a very attractive feature for small programs. Second, the exam is made by a third party organization which assists with the claim of external validation. Last of all, local students can be compared to students at other universities.

At the same time, there are many disadvantages. External tests can be more expensive than many programs can afford. There is no mechanism for customizing the questions on the exam. Standards not covered by an exam must be assessed separately. Objective testing could be difficult to use for assessing some standards. Faculty may be tempted to "teach to the test" and may have difficulty agreeing on a specific instrument to use.

While the primary deterrent to using a third-party test for many programs is cost, that was not the case for the authors' department. Probably the greater concern was finding a test that the faculty believed was a relevant measure of learning outcomes for the program. The bottom line was that third-party testing met the reasonableness test, but failed the relevancy test.

Locally-Developed Test. Locally-developed testing requires that faculty members write a comprehensive exam covering all standards. Students take the exam and results are used to judge success or failure of each student on each standard measured by exam. As standards change, the test can be modified to reflect changes, part of the feedback loop. Because the test is developed locally, it can be designed to closely match standards. Administration will cost less money than a third-party examination. Faculty members are stakeholders in the development and administration of test.

On the down side, a locally developed test is very time-consuming to construct and maintain. The test will not assist claims of third-party validation unless such a process is included in its development. There will be no ability to compare local results with students at other universities. Similar to third-party exams, the use of local tests may not be appropriate for assessing some standards.

The locally-developed exam technique met the relevancy requirement, but failed the reasonableness test. It could be tailored to the curriculum, but writing a test from scratch did not seem to be a viable option from a workload perspective. Additionally, the test would have no external validity.

Senior Project Method. Comprehensive final project includes a reflection component showing how each standard is met by the project. Faculty members can judge whether student project has adequately met each of the standards. The final project could serve as useful resource with potential employers. A capstone course can be used to coordinate final project and grade individual components. The administrative costs of a final project are low.

A single final project may not adequately reflect all standards. The final project probably will not assist claims of third-party validation except if a third-party is the client for the project or otherwise judges the project. The final project will be difficult and time-consuming to manage. Capstone course content could be missed if the time is used for the final project instead.

The final project technique had merit as a senior assessment for the authors' program. An integrative senior project was already part of the requirements for the capstone course. Students were required to identify a "real-world" project that involved analysis, design, and implementation phases. The current project would require modification to make a suitable senior assessment, but the concept was potentially both reasonable and relevant.

Portfolio Method. The use of portfolios for assessment is well-documented in the computing field (Angel (2001); Estell (2000); Estell (2001); Ury (2001); and Worthington (2000)). Students keep their work over the course of their tenure in a program to produce a completed portfolio of artifacts. The portfolio includes a reflection component showing how each standard is met by the included components. Faculty members can judge whether or not a student has met each standard. Professor guidance is a critical factor in portfolio development.

Portfolios can directly correlate to standards. The capstone course can be used to coordinate portfolio development. Portfolio components are taken from previous classes, thus eliminating the need for capstone class to be used to construct the assessment artifacts. Portfolio contents can change as standards change, and the out-of-pocket costs are low.

Portfolios do not assist claims of validation unless a third-party is involved in their review. Students could include poor quality work in portfolio. Significant time can be required to grade portfolios. The portfolio process must be clearly articulated to students, and students will need advising students during the portfolio process.

For the current problem, the portfolio method met the relevancy needs, but failed the reasonableness requirement. The small number of faculty in the program would be overwhelmed by the workload needed to manage the portfolio process. The portfolio method was not a viable solution.

Survey. Surveys, as well as focus groups or individual interviews, can be conducted with students, alumni, or employers to determine whether standards are being met. The technique can apply to courses, to the curriculum as a whole, or to one or more standards. The option costs less than a third-party test, although surveys certainly have associated expenses. Questions can be very specific and can directly correlate to standards.

Participation and confidentiality can be a problem, particularly with interviews and focus groups. Accurate and adequate sampling can be problematic. Students may be concerned about providing honest answers. Much depends on the interviewer-interviewee rapport. These techniques do not guarantee that every student is (not) meeting the standards. Time is needed to conduct interviews and compile results. Questions and answers may deviate from the discussion of standards, especially in interview format.

The authors' department already employed an alumni and student survey. However, neither provides a direct measurement of student learning outcomes. Their primary emphasis is opinion of the quality of the learning experience. They were a reasonable alternative since they were already in place, but not relevant to direct measurement of student learning outcomes.

A Comparison of Techniques

Table 3 summarizes the alternative techniques in terms of their correlation with outcomes, faculty workload, cost, and external validation of outcomes. The methods that correlated best with learning outcomes were the locally-developed test, senior project, and portfolio method. Of these three the approach that fit best with the current processes of the department was the senior project.

The final project in the capstone course has several advantages as a senior assessment tool. It currently includes components that can be used for assessing oral and written communications outcomes as well as analysis and design. Faculty members of the department are invited to hear the project presentations and ask students about their work.

The current senior project has some deficiencies as a comprehensive assessment tool. It is a course assignment and developed by a single faculty member. From a grading perspective, students can perform poorly on the project and still pass the course. Also, there is no mechanism for external validation.

	Correlation with Outcomes	**Faculty Time**	**Cost to Administer**	**External Validation**
3rd Party Objective Test	Low/Med	Low	High	Yes
Locally Developed Test	High	High	Low	No
Senior Project	High	Med	Low	Yes/No
Portfolio Method	High	High	Low	Yes/No
Surveys, Interviews, Focus Groups	Low/Med	Med	Med	No

Table 3: Comparison Table of Assessment Methods

Selecting the Best Approach

The CIS faculty members have discussed the concept of modifying the current senior project to incorporate components that would provide an appropriate assessment of leaning outcomes for the program. Since the project is currently part of a course requirement, careful consideration was given not to intrude on an instructor's academic freedom. With the help of the instructor, the following components are being considered as additions to the senior project:

- A well-defined set of technical components that all projects must address.
- A formal project proposal review by a faculty review team.
- A formal project defense before the faculty review team.
- An individual reflection paper to be reviewed by the faculty review team.

The faculty review team would provide an "external" review at the front-end and back-end of the project. The team would support the goals set forth by the instructor by ensuring (1) that students deliver acceptable products and (2) that all students are active and contributing participants.

FUTURE DIRECTION

The next offering of the capstone course occurs in Spring 2006. The faculty members plan to incorporate some elements of the senior assessment. The most straightforward component to pilot test is probably the formal project defense since faculty already listen to student project presentations.

In the future, the faculty review team could be broadened to include external reviewers such as employers or clients for whom work is being conducted. Adapting the current capstone project will hopefully provide a relevant assessment of student outcomes while maintaining a reasonable workload for faculty.

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