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Communications of the Association for Information Systems

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Implementing Direct and Indirect Assessment in the MIS Curriculum

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Abstract:

Assessment and continuous improvement have become focus areas for accrediting agencies. The process used to develop assessment plans within a sequence of MIS courses at a major midwestern university is described. The process includes establishing student outcomes, developing assignments that tap into these outcomes, and utilizing both direct and indirect assessment measures. Actionable insights that can be gleaned to improve pedagogy from the use of both direct and indirect measures are described.

Keywords: accreditation, assessment, student learning outcomes, continuous improvement, MIS curriculum, writing

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I. INTRODUCTION

College and university programs in engineering and technical fields are searching for ways to satisfy demands for a new and more intensive type of educational assessment. In the U.S., these imperatives originated from federal and state governments, which began demanding that colleges and universities provide clear evidence that their students are actually learning what the institutions are teaching [Hunt, Simonds, and Hinchliffe 2000]. In response to the federal insistence on accountability, the six regional agencies chartered by Congress to accredit all colleges and universities receiving federal funds have altered their approaches to educational assessment over the past 20 years. Concerned about the preparation of new college graduates entering the workforce, professional accrediting agencies, including the Accreditation Board for Engineering and Technology (ABET) and the American Association of College and Schools of Business (AACSB), have recently transformed their accreditation criteria in similar ways.

In this paper, we describe the development and implementation of a multifaceted assessment plan for a program that satisfies the requirements of both regional and professional accrediting agencies. We also tell how work on our assessment plan benefited our Management Information Systems (MIS) program in several significant ways even before implementation.

II. FOCUS ON STUDENT LEARNING OUTCOMES AND CONTINUOUS IMPROVEMENT

In essence, the recent changes in accrediting standards represent a seismic shift in focus from what academic programs teach to what their students learn. Thirty years ago, schools could demonstrate their effectiveness to regional and professional accrediting agencies by pointing to the high quality of their course and curricular content. No longer satisfied by impressive course requirements and syllabi, accrediting agencies now require educators to demonstrate and document that they have produced high-quality student learning in much the same way that businesses must demonstrate the quality of their output. For example, AACSB [2008] tells schools that they must show “what *they* [students] have learned.”

As this outcomes-oriented approach to assessment developed, it incorporated another key concept from business and industry: continuous improvement. Palomba and Banta [1999] capture this added dimension by defining assessment as the “systematic collection, review, and use of information about educational programs undertaken for the purpose of improving student learning and development.” Assessment is used not only to measure student learning but also to monitor and continually improve the quality of programs [Gardiner 1994] as well as provide a successful student learning experience [Cooper and Heinze 2007]. A multitude of accrediting agencies require assessment as defined in this way. For example, the North Central Association’s Higher Learning Commission [2002] specifies that institutions it accredits build an institutional culture that values assessment of student learning, provides patterns of evidence for this learning, and uses the evidence to improve programs, thereby increasing student learning.

The focus on continuous improvement in both the program and student learning highlights the ways assessment differs from grading and evaluation. Grading focuses on the individual student and tries to answer the question: How much does the student know? Evaluation asks whether a course or program meets some pre-set standard. In contrast, assessment focuses on a program or a subset of a program such as an individual course and helps identify ways to improve the course or program, thereby increasing student learning. Table 1 summarizes this distinction.

Table 1. Assessment versus Grading and Evaluation

Activity	Focus	Question
Grading	Individual Student	How much does he or she know?
Evaluation	Course or program	Does it meet a standard?
Assessment	Course or program	How can we improve it?

III. THE IMPERATIVE FOR ASSESSMENT BY INFORMATION SYSTEMS PROGRAMS

For information systems programs, the imperative to develop assessment programs is driven by the two major accrediting agencies: the Association to Advance Collegiate Schools of Business (AACSB) and the Accreditation Board for Engineering and Technology (ABET).

The AACSB states in its Web site [AACSB 2008] that "Every school should enunciate and measure its educational goals." AACSB emphasizes the need for schools and programs to define their learning goals and then operationalize these goals by developing strategies for measuring the extent to which they are achieving their goals. AACSB also requires schools to show that they have *used* the results of these measurements to improve their curricula, pedagogy, and teaching materials. Moreover, schools must demonstrate that they are continuously engaged in the process of defining or refining learning goals, operationalizing them, measuring results, and taking action based on the results.

AACSB accredits each degree program in a school, such as a BS or BA, not individual majors and minors. In contrast, ABET accredits individual programs of study, including ones in Information Systems (IS). To qualify for ABET accreditation, an IS program must define its student learning goals for graduating students. The program must also establish and continuously use mechanisms for reviewing its curriculum and courses, and it must use the results to identify and implement improvements. Finally, the program must document the reviews it has conducted and the actions it has taken as a result [ABET 2008].

IV. DEVELOPMENT OF ASSESSMENT PLANS

To satisfy the demand for assessment that leads to continuous improvement, academic programs are advised to create a systematic and cyclical process that identifies specific student learning and, sometimes, developmental objectives, measure the extent to which students achieve objectives, disseminate the result to those responsible for the outcomes, and support the efforts of those responsible for making changes to the program that increase student learning [ATF 2004].

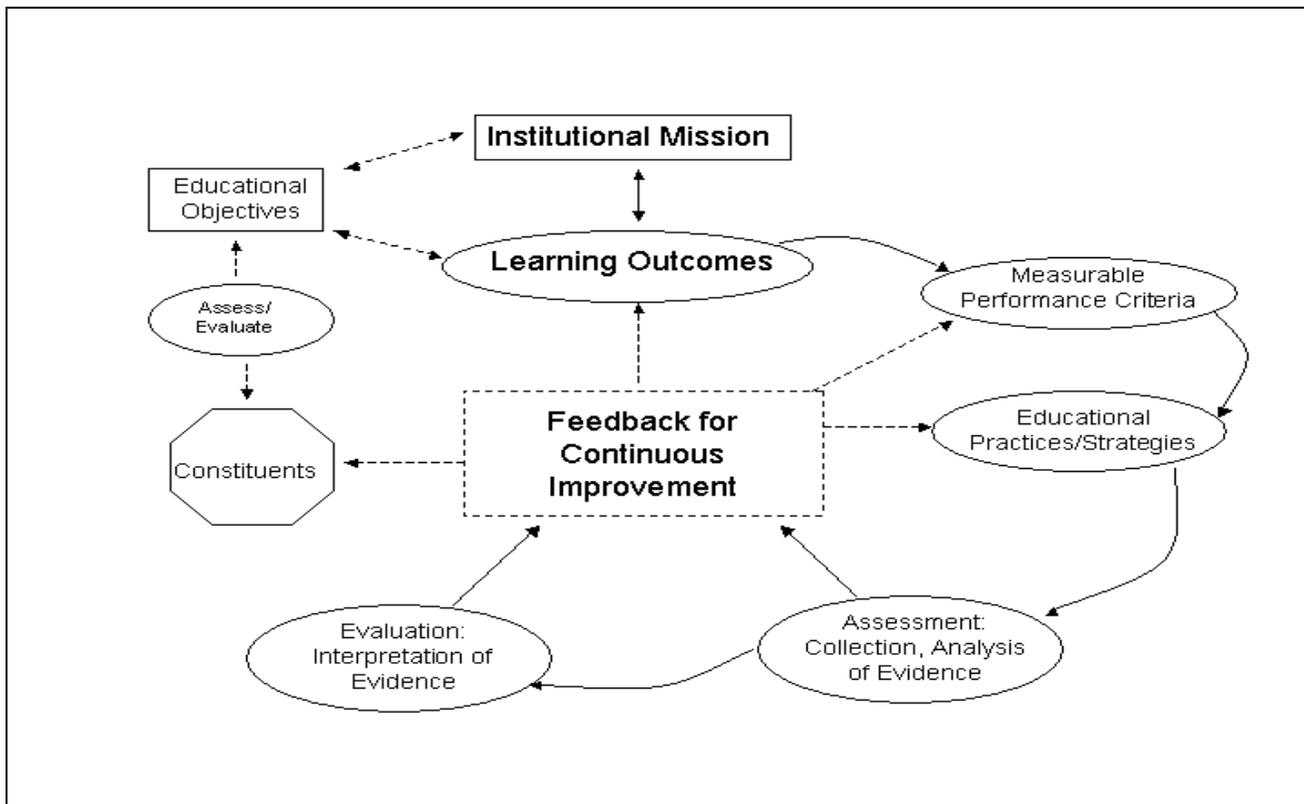


Figure 1. Assessment Process Framework [Rogers 2006]

Components of Assessment Plans

The many components of a systematic assessment process interrelate in complex ways, as illustrated in Rogers' [2006] diagram, shown in Figure 1. The process starts with the interplay of a program's educational objectives and the institution's overall mission. The educational objectives describe the expected accomplishments of the graduates

during the first few years after graduation. These objectives are inflected by the institution's mission, such as its commitment to providing a liberal education. The interplay of program objectives and the institution's mission generates a set of learning outcomes that specify what the students should have learned by the time they graduate. So that students' achievement of these outcomes can be evaluated, they are operationalized as descriptions of what students should be able to do by graduation. For instance, an MIS learning outcome might specify that students should be able to design a database and query it to determine which vendors provide the most reliable products or which customers provide the greatest percentage of profit. A program's overall curriculum, individual courses, and teaching practices must be aligned to generate these desired outcomes. By asking the students to engage in activities (writing database queries, taking tests, writing memos, etc.) that are based on a course's or program's student learning outcomes, faculty can determine how well students have learned to do what the course or program intends to enable them to learn to do. The areas in which the students are least capable become targets for pedagogical changes. Even in the most effective course or program, some areas will be weaker than others, so improvement is always possible.

Barriers to Creating Assessment Plans

The business and technology schools in which most IS programs reside teach the value businesses and industries gain from continuous improvement processes resembling the assessment processes that accrediting agencies require. Nonetheless, faculty in many programs are reluctant to establish formal assessment programs for one or more of an interrelated set of reasons.

First, many faculty are reluctant to define their educational objectives in terms of student learning outcomes. Institutions of higher education long ago adopted the practice of defining objectives in terms of what they teach, of their coverage of the important topics. They have difficulty imagining the payoff from the challenging task of recasting their objectives in an unfamiliar way. Second, some faculty do not believe that assessment can produce results that would help them achieve their own goals as educators. Instead, they view assessment as "busy work" whose only purpose is to satisfy the unreasonable demands for "accountability" by university administrators, accrediting agencies, or legislators and other groups outside of education altogether. Third, some faculty believe that the unspoken but real purpose of assessment is to evaluate them individually or to encroach upon their academic freedom rather than to improve courses and programs.

One of faculty's major reservations about assessment arises from the amount of detailed work it requires. Even those who acknowledge the possibility that assessment might produce positive results question the costs involved versus benefits received. For example, Challa et al. [2005] enumerate the significant tangible and intangible human resource costs required for the ABET accreditation process, in which assessment plays a very large role. We certainly encountered reluctance to buy into our assessment initiative. For example, we suspect that one senior faculty member never really bought into our assessments efforts. Nevertheless, this individual provided input to the development of learning objectives and was required to give the standard assignments that are detailed in Section V. In Section VI.6, we discuss the value of a well-designed project management plan as an important lesson we learned.

The remainder of this paper describes what was done and learned as we addressed each of these barriers while developing and implementing an assessment plan for an MIS program at a large midwestern university that focuses on liberal education.

V. MIS THEMATIC SEQUENCE ASSESSMENT

Our assessment efforts started with a successful application for an internal grant from the university's Center for Writing Excellence (CWE) to initiate a "Writing across the Curriculum" effort within a "thematic sequence" (three-course concentration) that we were developing in MIS. The thematic sequence is taken not only by non-MIS students wanting to satisfy the university's liberal education thematic sequence requirement, but also by students majoring or minoring in our program. Consequently, improvements in the courses would strengthen our overall programs.

By applying for this grant, we were responding, in part, to a 2003 survey in which U.S. employers "reported that many college students graduate without the communication and writing skills necessary for success in the workplace" [Merhout and Etter 2005, p. 2 referencing Malveaux 2003]. Like faculty in most other business programs across the nation, we desired to improve the written and oral communication skills of our students. We also wanted to use writing to develop our students' critical thinking skills, thereby better addressing the liberal education objectives of our institution. Bean [2001] argues that writing is a key method for developing critical thinking and problem-solving abilities, skills that are imperative for technical workers who must keep up with rapid changes in

technology [Nelson 1992]. Our project team included three MIS faculty members and two persons from the Center for Writing Excellence.

Developing Student Learning Outcomes

We began our writing-across-the-curriculum efforts by determining how writing could most effectively help students achieve the thematic sequence's goals. We approached this task by focusing on the things we wanted our students to be able to do on the job after graduation. Perhaps that approach accounts for the ease with which we abandoned our former "what we teach" objectives for ones that captured what we wanted to help students "learn to do." Our thematic sequence is designed to enable students to explain and contribute effectively to an organization's development and use of information systems. Therefore, we defined the sequence's goals in terms of the intellectual and communicative tasks we want them to be able to perform at work. However, we did not adopt the top-down strategy of using these program outcomes to drive the outcomes for all the courses. As we developed student outcomes for each of the three courses in the sequence, we also refined learning outcomes for the entire sequence. Also, we defined *all* the outcomes for the entire thematic sequence, not just the conceptual and communication outcomes, but also the ability to use basic IT to achieve business-related goals. After defining these outcomes, we determined where and how writing should fit in the curriculum. This process enabled us to identify the written assignments that would most help students learn the technical and business content of the courses. Thus, instead of making writing an add-on to the courses, we used it as one of the teaching strategies for helping students achieve other learning goals. Because members of our team were not the only MIS faculty who taught courses in the sequence, we asked for feedback on our evolving learning outcomes from the sequence's other instructors. When we achieved drafts that incorporated the consensus of this group, we also invited comments and suggestions at meetings of the MIS program's entire faculty.

By defining student learning outcomes for the courses and overall sequence, we had already immersed ourselves in the process of developing an assessment plan. In addition, this process enabled us to notice gaps between what we wanted the students to accomplish at the end of the sequence and what we planned to include in each course. Alignment of the individual courses with the goals of the entire program is one of our biggest gains from this process.

Developing Methods for Measuring Student Performance

Assessment can be accomplished through both direct and indirect measures of student learning. Direct measures involve a systematic and objective examination of actual student products to determine the extent to which the students are able to do what the program's student-learning outcomes state they should be able to do. Examples of direct measures for IS programs include the examination of databases students have designed and reports in which they advise imaginary or real decision-makers about the best course of action to take, based on their analysis of enterprise data. In contrast, indirect measures ascertain the students' perceptions of the extent of their abilities relative to stated program or course learning outcomes. These perceptions may be gathered via surveys, focus groups, and exit interviews. Although both direct and indirect measures may be used in assessment, AACSB states that indirect measures alone are no longer sufficient. Direct measures must be included. Moreover, multiple methods and multi-source approaches reduce bias and increase the validity of data. We thus decided to use both.

To develop direct assessment methods for measuring student performance, we began by determining what we would ask the students to do to demonstrate their knowledge. So that we could measure their mastery of each course's learning outcomes, we proposed assignments that varied from objective to objective, but included individual writing and technical homework as well as context-based essay questions on exams. For example, to measure students' mastery of one technical outcome in the introductory course, we required an assignment that asks them to solve a practical problem using an Excel spreadsheet with Pivot tables.

In this way, we identified the general guidelines for types of assignments, exam questions, and other projects that students would be asked to do in every section of each course. In the process, we spotted gaps in our curriculum design. We discovered that we currently had assignments that were addressing learning outcomes outside the course they were in and also found that we needed to move some outcomes to a different course. Developing the relationship between student outcomes and assignments was very much an iterative and enlightening process.

For direct assessment of our introductory course, we chose a couple of the most important learning objectives and then designed an assignment and final exam essay that were required in all sections. We then developed the evaluation rubrics to be used for assessment of the student artifact created. Rubrics help ensure that the assessment criteria are clear and that measurement is standardized, so that faculty and accreditation reviewers know what constitutes a good outcome and why.



To gather indirect measures, we created a survey that asked students to rate their ability to perform each of the student learning outcomes we had identified. The survey was to be given to every student at the end of the semester.

A process diagram with the major steps in the development of the learning outcomes, assignment guidelines, assessment assignments/artifacts, and rubrics is shown in Figure 2. A more detailed timeline of the activities and resources involved in our project is presented in Appendix 1.

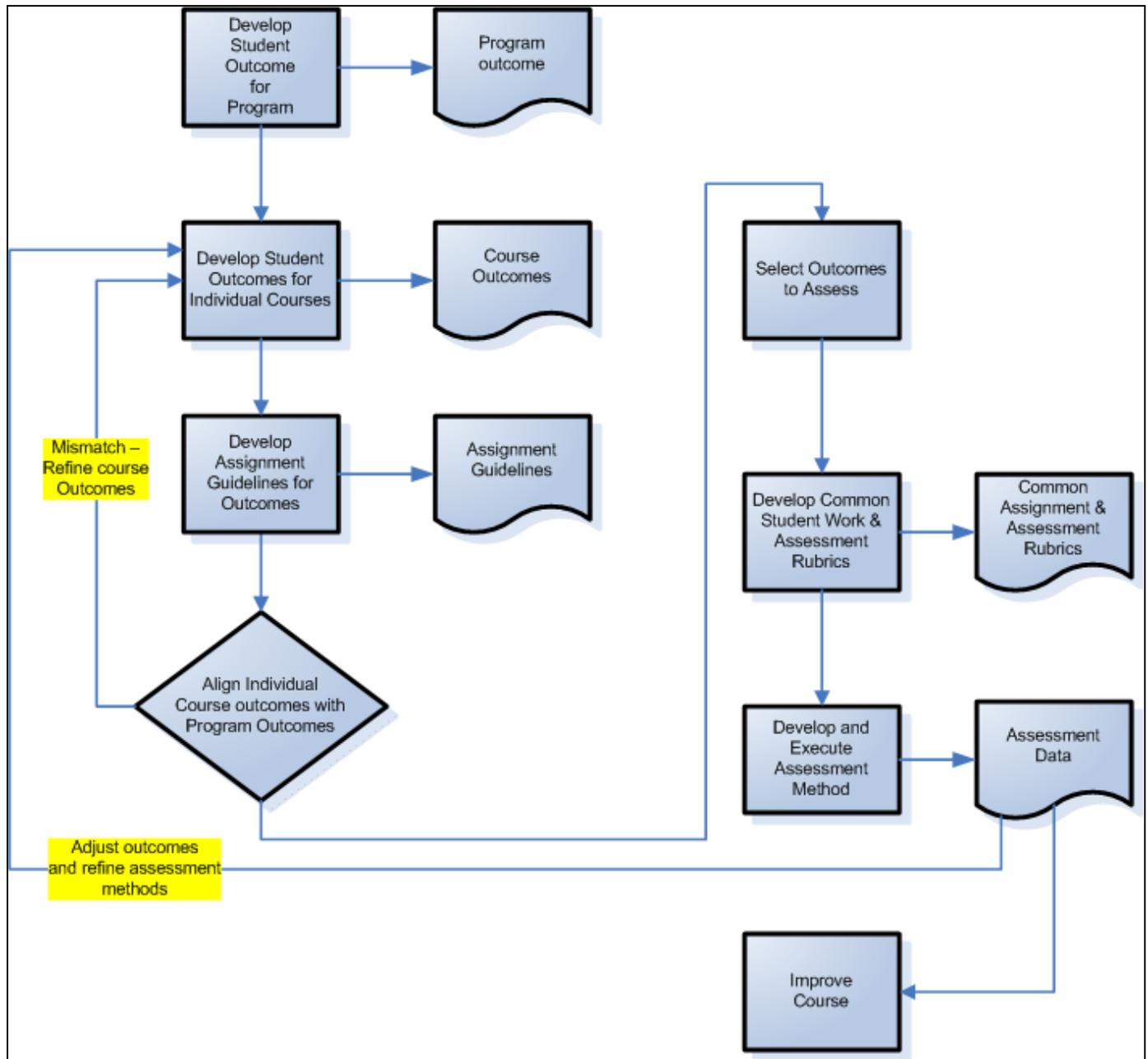


Figure 2. Major Steps in Learning Outcomes and Rubric Development

Creating an Assessment Cycle

We created guidelines for graded course activities that could be used to tap into every learning outcome in each course. However, assessing every outcome at one time would be an overwhelming task. Fortunately, a program can achieve continuous improvement without assessing all student learning outcomes simultaneously. On a rolling basis, a subset of learning outcomes for a course can be evaluated in any semester or year. We established the cycle illustrated in Figure 3, which has some courses in the thematic sequence evaluated every year, while a particular course is assessed every other year. During the non-assessment year, the previous assessment results are used to plan and implement improvements. Complete coverage is realized over a longer period of time. However, the

assessment cycle never ends. All outcomes can be reassessed to determine the effectiveness of any changes implemented. Also, as a program improves, outcomes are redefined, requiring additional assessment.

Preparing for assessment of a course involves planning the mix of direct and indirect measures to be used, determining how the data will be gathered and analyzed, and deciding how improvements will be fed back into the course and program.

YEAR	ACTIVITY	COURSE			
		235 Information Systems	302 Database Management	303 Enterprise Systems	495 MIS Capstone
First	Assess		X	X	
	Plan and Implement Changes	X			X
Second	Assess	X			X
	Plan and Implement Changes		X	X	
Third	Assess		X	X	
	Plan and Implement Changes	X			X
Fourth	Assess	X			X
	Plan and Implement Changes		X	X	

Figure 3. Four Years of a Two-Year Cycle of Perpetually Rolling Assessment and Improvement

Preparing the Course Syllabus

The first course assessed was the thematic sequence’s first course, an introduction to MIS. The course has many sections and several instructors. To make course-wide assessment possible, all the instructors needed to agree on the course’s learning objectives and the types of products students would produce (including responses to exam questions). However, we didn’t want to insist that every section be identical. Thus we coordinated meetings at which all the instructors worked together to define the course assignments in general terms. The meetings helped ensure that the instructors understood the course outcomes and every faculty member agreed to follow the course guidelines.

1. Minimum number and types of writing and technical assignments
2. Amount of the final exam that is common to all sections
3. Boundaries for composition of grade: for example, at least 10 percent of final grade must be based on written work and 20 percent of exam points must be short answer or essay.

This general framework let the faculty shape their own courses within a set of boundaries that focused all sections on achieving the same student learning outcomes.

Measuring Student Outcomes

We assessed the sequence’s first course using one indirect and three direct methods. Each method generated actionable insights not provided by the others.

Indirect Measure

For our first indirect assessment, we created a student survey based on the learning outcomes we had developed. For example, one desired outcome was that students learn how to “Explain the role of information technology including: How information systems influence organizational competitiveness.” This outcome was translated into a survey question that asked students to agree or disagree with the statement, “I can explain how an information system could give a company competitive advantage.” Each of the outcomes was translated to a survey question that students responded to using a five-point scale that varied from strongly disagree to strongly agree with three being neutral.



This survey was then administered at the end of the course to all students. The data were collected and the results analyzed by a neutral third party. Analysis of the results helped us to:

1. Identify areas where course faculty collectively should concentrate on refining their teaching methods to improve student learning;
2. Identify areas where individual faculty should concentrate;
3. Recognize specific faculty who can help others learn how to teach a particular area more effectively;
4. Realize that all faculty may have things to learn from—and teach to—others.

Figure 4 shows the mean response to each question for each faculty member involved in teaching the course. This diagram clearly shows that the students perceive themselves to be weakest at the learning outcomes associated with questions 7, 8, 9, 17, and 18. These are outcomes that all faculty can work toward improving. Simultaneously it also shows areas where every faculty member is doing reasonably well.

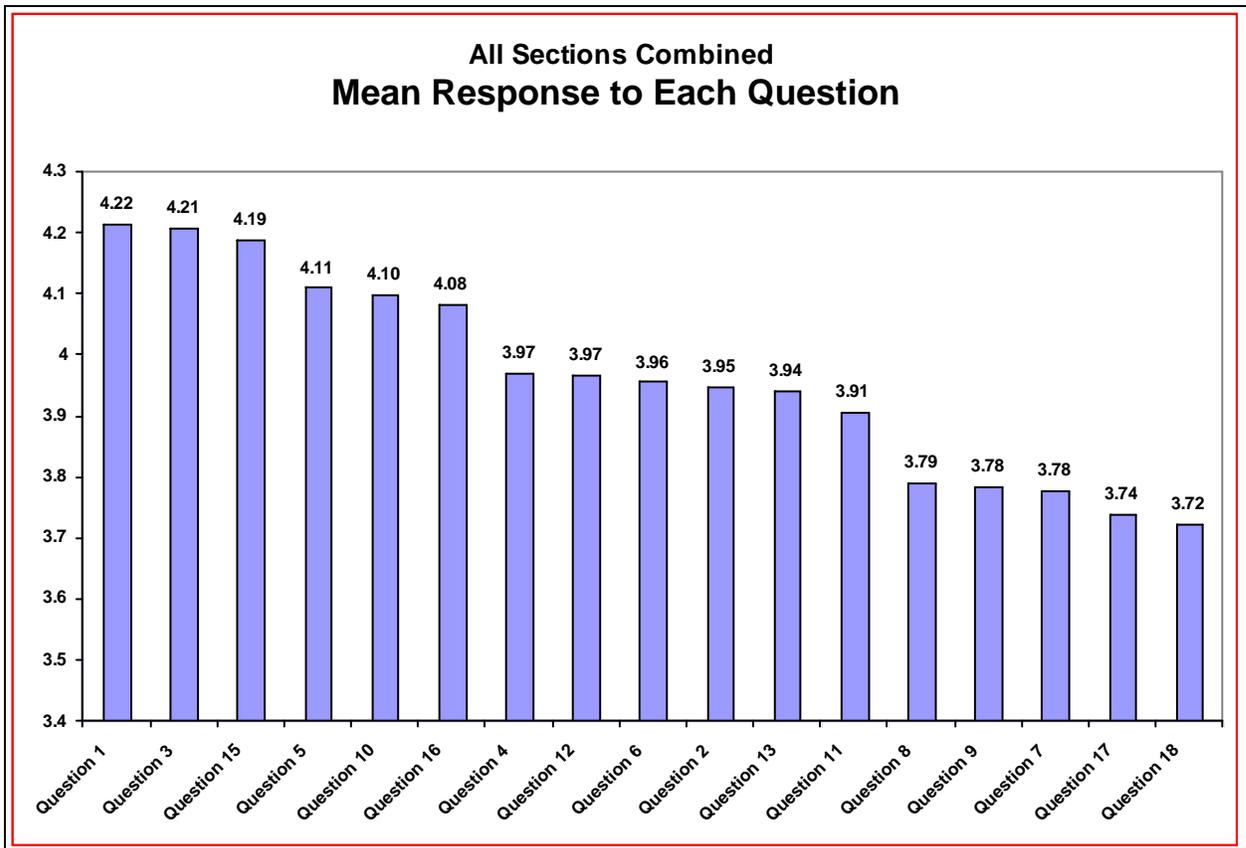


Figure 4. Strengths and Areas for Improvement for All Faculty as Indicated by a Student Survey with Questions Keyed to Course Objectives

We also examined the survey results for individual faculty. Figure 5 shows that one instructor's students felt more confident that they could explain "how an information system could give a company competitive advantage" (Outcome 1) than that they could explain "how emerging information technologies, such as RFID, affect how corporations make their business strategies" (Outcome 7). This suggests that the instructor should concentrate on improving course material or pedagogical processes relating to Outcome 7 rather than Outcome 1. Note that the name "Wright" is an imaginary moniker given to this particular instructor by the third party doing the data analyses (to ensure anonymity).

The top half of Figure 6 shows which instructors are doing better at a specific outcome. This information can then be used to have that instructor provide tips to everyone else as to how that specific outcome can be improved. In this specific case, we can easily see that two instructors are doing relatively better than others. Thus, it helps identify the instructors to whom others can turn for help. The data actually told us that every instructor has something they are excellent in, and at the same time every instructor can learn from others. For example, Figure 6 shows that Instructor "Hadid" is relatively better at outcome 2, while a different instructor, "Pei," is better at outcome 13. Hadid and Pei can potentially improve their outcomes by learning from each other.

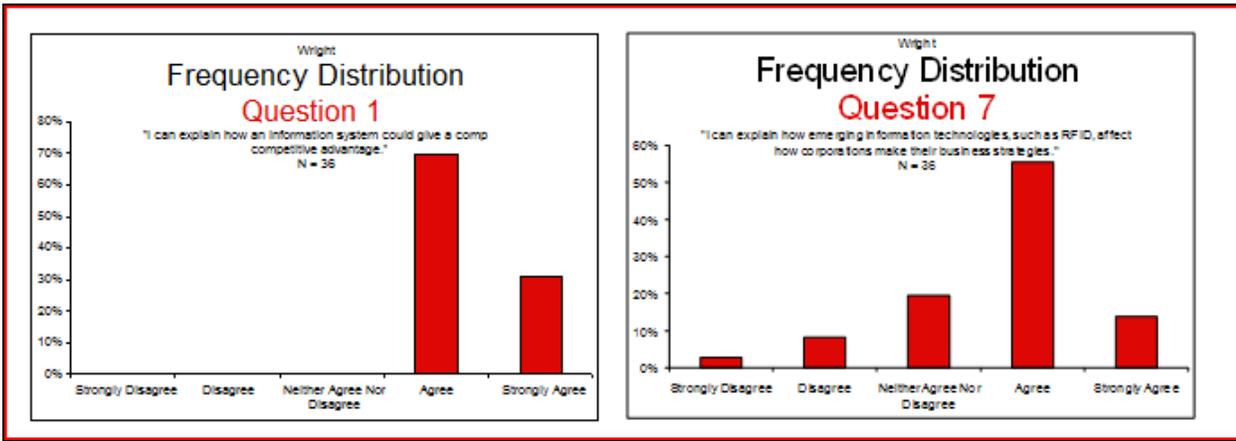


Figure 5. Comparison of Survey Results Showing Where an Instructor Is Teaching Very Effectively and the Instructor Has an Opportunity for Improvement

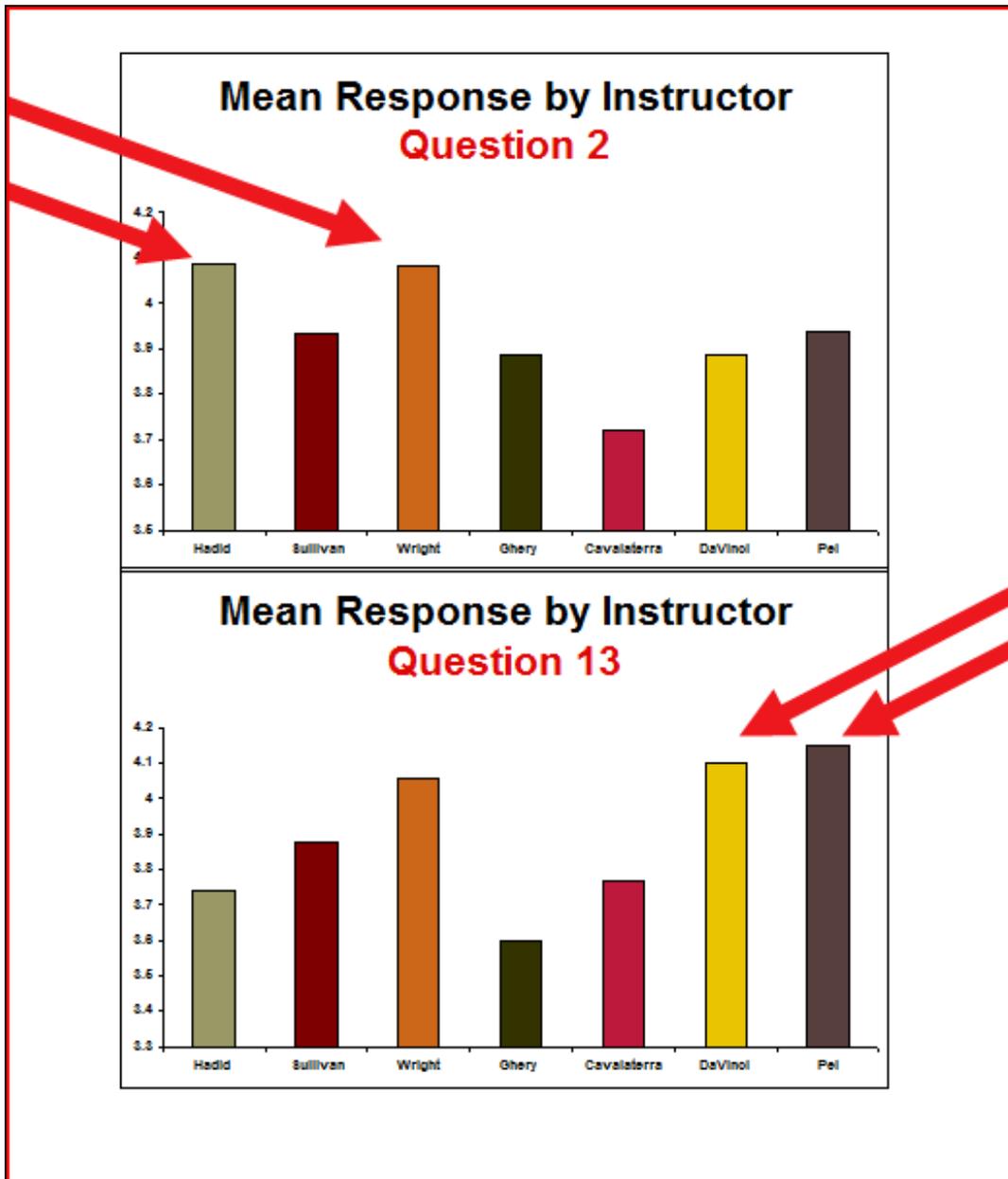


Figure 6, All Instructors Can Help Others in Some Area

Creating the questionnaire took several meetings for discussing drafts, plus writing and editing time. It can be used for as long as the course goals remain the same, presumably several years. Although we had students fill out paper forms, the data could be compiled on line and analyzed very quickly. From a small investment of time, we gleaned a wealth of information to help with course improvement.

Direct Measures

Two of our three direct measures involved examining student writing. This kind of assessment requires more time than surveys and similar indirect measures. The time needed is even greater for a multi-section, multi-instructor course because the assessment involves a greater coordination of efforts and gathering of student artifacts. Consequently, we chose to use student writing to assess only two of the 18 objectives. The two objectives chosen were ranked by the faculty as the ones most deserving of immediate attention. We plan to rotate through the objectives in the future so that the course is continually improving. In the future, the results of indirect measures such as student self-assessments could guide our choice of outcomes for direct assessment.

For our first direct measure, we assigned a paper written in class that would enable students to demonstrate the degree to which they had achieved one of the course's major objectives, which is to learn how "to choose when spreadsheet and database technologies are applicable to solve various business problems." For the second, we prepared a final exam question that required students to write a short essay that would let us understand how thoroughly they had learned "how organizations develop, acquire and implement information systems and the role that users play in this process." The essay prompt and exam question were carefully drafted and reviewed by the faculty teaching the course. We also created a rubric for each one. Whereas the survey posed only one question related to each learning objective, the essay and exam question gave more fine-grained information related to students' learning. The rubric for the essay included 13 criteria. The exam question's rubric had seven.

Ten percent of the student essays and responses to the exam questions were randomly sampled from each section of the course. All information that might identify the student or instructor was removed. The student artifacts were then evaluated by the course instructors and other department members at an offsite location. For each set of student artifacts, the process began with an activity designed to help the faculty reach a common understanding of the assessment rubric and its scales. First, all the faculty rated the same artifact using the appropriate rubric. They then shared their ratings. If they disagreed about the rating to give for a particular criterion, they discussed the reasons for their differing ratings with the goal of reaching a consensus. This process was repeated with several student artifacts of varying quality until the faculty application of the rubric's criteria converged.

The faculty then rated the randomly sampled student artifacts. Each was rated by three faculty members. The average of all the ratings given for each criterion was then calculated and graphed. Figure 7 shows the results from the ratings of the midterm essay. It has the same general form as Figure 4, but conveys a different set of insights because it focuses on the sub-objectives for only one of the course's overall objectives. For example, it shows that our course was effective at helping students learn how to describe strengths of Excel (Criterion 1c) and SQL (Criterion 2a), but much less effective at helping them describe a circumstance where using the two together might be useful (Criterion 3a). Information like this from our assessment of the midterm essay and short answers on the final exam helped us identify areas where the instructors could most profitably concentrate their collective efforts at developing new teaching strategies for helping students achieve the course's learning objectives. Unlike the survey, however, the assessments of the midterm essay and the short essay exam questions did not provide information to guide individual instructors in improving student learning in their courses. Evaluating a sufficiently representative number of papers from each instructor's students would require too much time. Nevertheless, in an effort to increase student learning for their own sections, some instructors did use the rubric to evaluate the work of their own students.

Using written artifacts to evaluate student learning did consume a lot of time. However, the process itself had several benefits even before we used the rubrics to assess the student artifacts. For example, when we were creating the rubrics, our (sometimes animated) conversations about the individual courses and entire thematic sequence generated several course refinements. When we discussed our differing ratings of the same student artifacts during the calibration part of the process, we learned a lot about one another's interpretations of the same course goals as well as about our varying expectations concerning student performance.

Our third direct measure focused on the students' answers to the multiple-choice questions on the final exam, which was common to all sections of the course. Because the students answered the questions on sheets that were machine graded, our data gathering and analysis went very quickly. Devising questions aligned with the course's learning objectives consumed most of the time we devoted to this part of our assessment plan. For example, one of the student outcomes was "access information in a relational database using structured query language tools." This outcome was assessed with a set of five objective questions on the final exam. Figure 8 shows the results for these

questions. They indicate that students had developed the most mastery on sub-dimensions 44 and 47. Sub-dimensions 45, 46, and 48 were places that instructors should rethink their pedagogy. The results also indicate that two instructors, C and D, are performing better than the other two. Instructors A and B could turn to instructors C and D for help in teaching this area if the instructors were identified to each other. However, we did not let any faculty member know the survey results from any other faculty member's class. We made clear that our assessment effort was not intended to critique individual instructor's teaching abilities, but rather an effort to identify general opportunities to improve the course. We chose this policy to allay the concerns of potentially reluctant faculty members. The last thing we wanted was an instructor feeling that our assessment initiative would produce results that might be used against him or her. Instead, we explained that we were focusing on aggregate results from all students in all sections in order to identify areas where it appears that students overall were not acquiring the expected skills and knowledge. The survey produced one completely unexpected result: we discovered that the majority of the multiple-choice questions on the common final examination did not address directly the course learning objectives that we had defined as part of the assessment initiative.

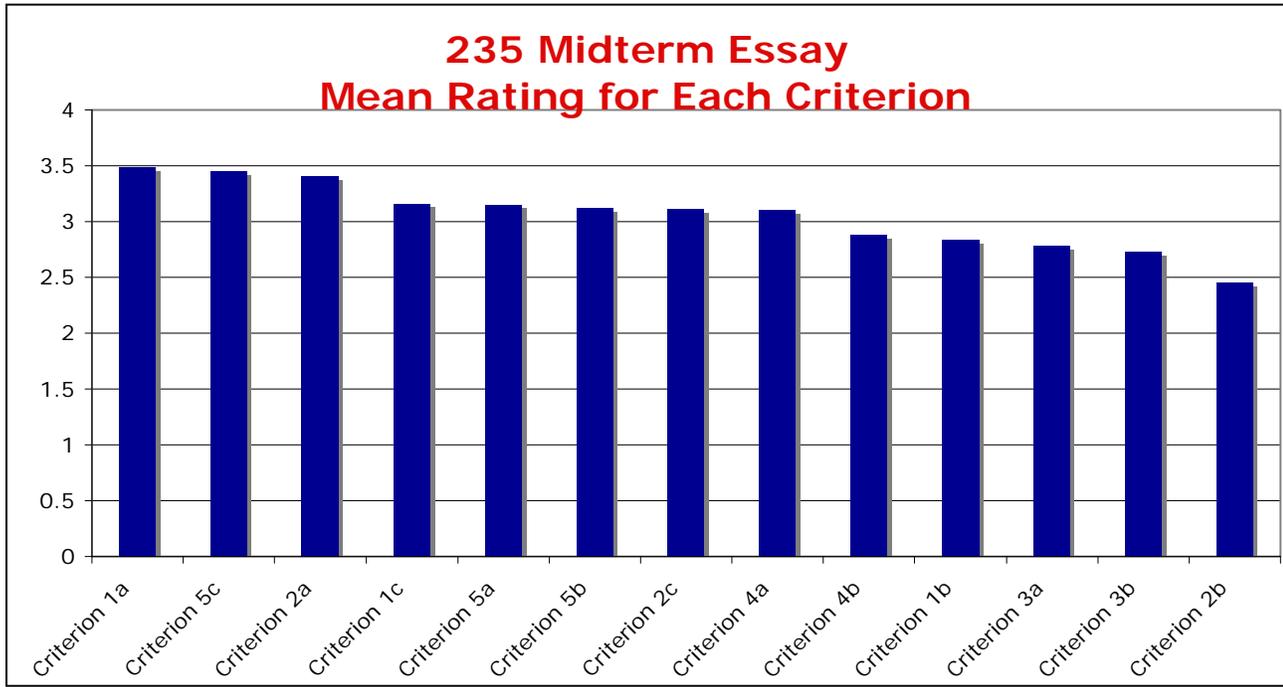


Figure 7. Mean Ratings of Students' Midterm Essays

VI. LESSONS LEARNED

Throughout this process, we learned quite a bit about assessment, our program, our courses, and each other. This section attempts to share some of what we learned that could be useful to others interested in assessment.

Assessment Helps Faculty Improve Courses and Programs

All four assessment methods produced results that helped us pinpoint specific areas in which we could improve our pedagogy.

Defining Objectives in Terms of Student Learning Outcomes Pays Off

Beyond providing the foundation for all of the other elements of assessment, the processes of defining student learning outcomes have many benefits. For the individual, they clarify the goals of a course. For faculty, they open an invigorating and beneficial conversation about the results they want to achieve for their students.

The Time Needed for Assessment Can Be Made Manageable in Several Ways

The time required for assessment can be managed by examining student work that is an integral part of courses, not an add-on. For example, by working simultaneously on our writing and assessment plans, we created writing assignments that help students master complex technical and communication skills, provide the basis for evaluating each individual student's performance, and assess the effectiveness of the course in achieving its goals. The time required for assessment can also be managed by deciding how much to assess now and how much in the next cycle, perhaps a year or two in the future. By using students' answers to the questions on the machine-graded

portion of the final exam we found a way to conduct even direct assessment that can be accomplished in very little time.

Different Assessment Methods Complement Each Other

Each of the assessment methods we used, including both direct and indirect methods, provides different perspectives on a course or program. All of the perspectives are useful. Together a variety of methods provide a powerful tool to faculty.

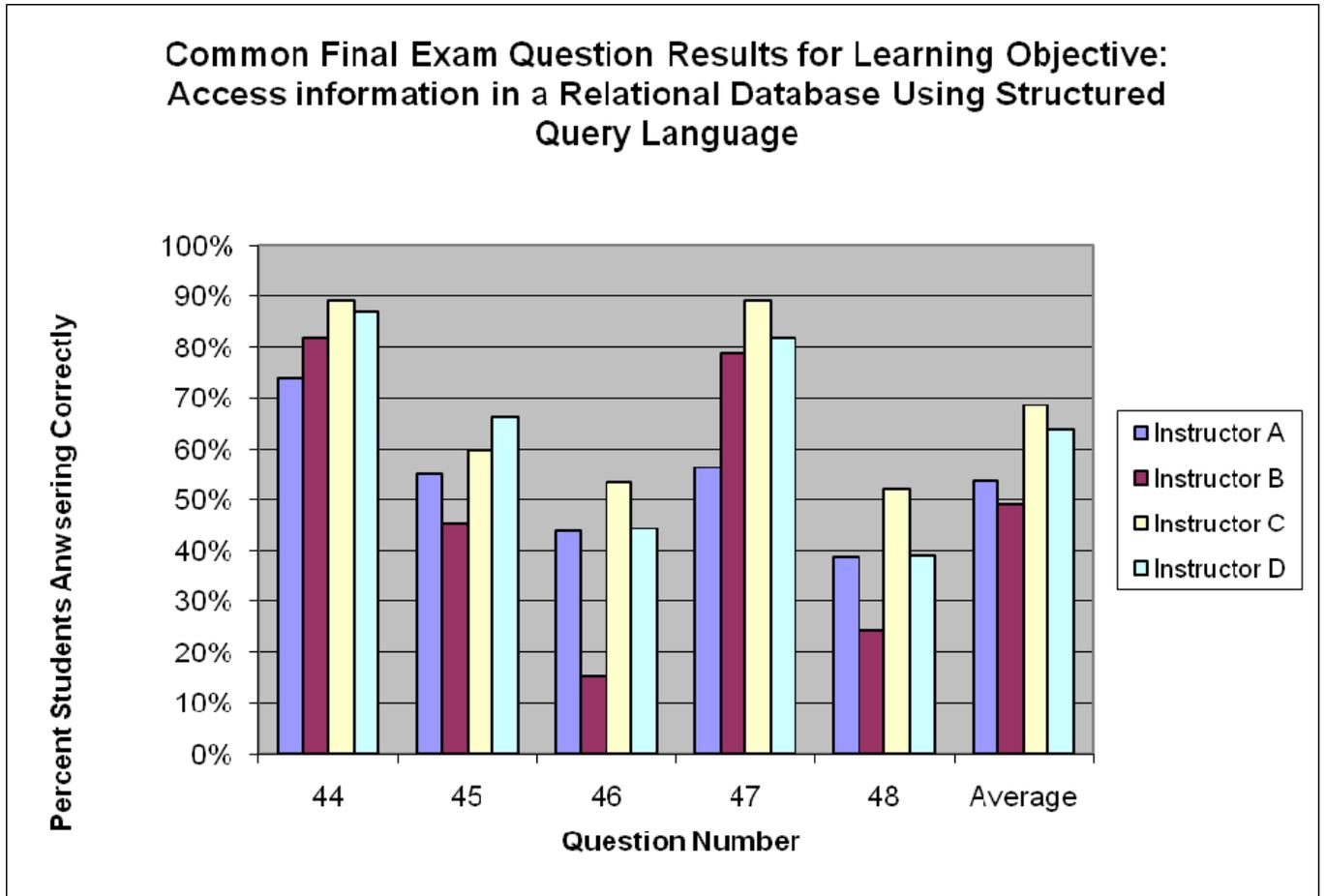


Figure 8. Results of the Direct Measures of the Multiple-Choice Questions on the Final Exam

Significant Faculty Involvement Is Essential—and Possible to Obtain

A study at our university [ATF 2004] found that “Departments often viewed the assessment process as an administrative task that resulted in a report, rather than as a process that could be used to improve the quality of student learning. When viewed this way, assessment becomes a burden, something faculty will not be motivated to take seriously. Hence, faculty buy-in for assessment and in the generation of assessment documents is critical.” AACSB states that effective assessment is both mission driven and faculty owned.

We believe that our approach, which eventually led to significant (but not total) faculty buy-in, is both novel and effective and that an account of it will make a contribution to others. In most of the institutions we are aware of, administration has been the prime mover of the assessment process. In contrast, our process started from the ground up by interested faculty, as a consequence of taking up a new curriculum initiative and of the collaboration between MIS faculty and the Center for Writing Excellence.

A Well-Designed Project Plan Helps Immensely

In programs like ours, where some faculty members seem reluctant to buy in, a well-design project plan can increase participation and benefit. Instead of insisting on equal participation by all faculty, we created a plan that relied on different levels of participation for different groups. Our core of highly motivated faculty invested the largest effort. We occasionally called on assistance from faculty who were less committed but still supportive of the

assessment initiative. Faculty who were involved in teaching the courses in the three-course program were brought in at various stages and involved in the development of outcomes and rubrics. After we had decided to include a common essay-writing assignment in the introductory course, we engaged all course faculty in creating the assignment. At critical points, we asked all program faculty to review, comment on, and eventually approve our evolving assessment plan. For instance, the outcomes as a whole were presented, and approval of the outcomes was solicited and obtained before we proceeded to development of plans for gathering data on students' achievement of the outcomes. Faculty members who opposed assessment had an opportunity to express their objections. This step-by-step approach helped establish ownership and reduce distrust of the process. Our assessment project gained department sanction in the way that many other projects do, through a democratic process that grants official approval even when it does not produce unanimous support.

Another important feature of our project plan was the pace at which we decided to proceed. Rather than trying to finish quickly, we worked deliberately. By pacing the project, we avoided overburdening ourselves, allowed time for other faculty to absorb our methods and rationale, and enabled ourselves to adjust to insights we gained along the way, as described in Section VI.

We learned that our own project management plan could have been improved by including a schedule for sharing the assessment results with all faculty. Because our initial plan did not schedule this important step in the assessment process, we paused after analyzing our data. If we had not paused, program faculty could have used the assessment results to improve their courses a semester earlier.

Continuous Communication Is Crucial and Has Several Benefits

Our project management plan was supplemented by continuous communication with faculty in the MIS program. An initial kick-off meeting was used to communicate the goals of the project and invite participation. The process being followed was explained, and everyone's cooperation was sought. We kept faculty updated as to our progress at departmental meetings even when their advice or approval was not being solicited. Throughout the two-years of work reported in this article, the assessment initiative was woven into the faculty's general conversation. This continuous communication, combined with the project management plan described above, enabled us to establish the initiative as something that emerged from within the department rather than as something to be resented and resisted because it was imposed from outside by a university administrator, accrediting agency, or other group demanding "accountability."

Facilitators Can Ease the Introduction of Assessment Programs

We found the facilitators from the writing center helped us navigate through the process. A facilitator can outline the process and guide the team. By removing hurdles of miscommunication and ensuring that everyone defines terms the same way and understands what is required, a facilitator smoothes the work processes.

University Commitment Is Critical

It is essential to have top management support assessment initiatives. The American Association for Higher Education's (AAHE) assessment forum (1992) recommends that "the push to improve educational performance is a visible and primary goal of leadership; improving the quality of undergraduate education is central to the institution's planning, budgeting, and personnel decisions." We have been blessed with support from our top management in making grants available and providing facilitators and resources for training.

Conferences and Workshops Are Helpful

Attending a conference and workshop devoted to assessment helped us understand issues and strategies that can make the process go smoothly for the department and faculty involved. Conference workshops should feature broad faculty participation so that buy-in is easier.

Assessment Software Is Desirable

It is clear that some kind of automated process would speed the gathering of the assessment data and make the direct assessment processes easier. Most course management systems do not provide for course or program assessment. Software such as STEPS that supports the data gathering and automates some of the direct assessment process is just starting to appear in the market.

Continuous Monitoring Is Needed

We found the process of updating established outcomes and rubrics to be continuous. Ours are updated every year, as we bring in changes and modifications to our courses and program. For example, we found it necessary to revisit

and change the outcome of the second course in our sequence, as that course also was embedded in a new minor program that was developed within the department.

It is essential to restate assessment's importance at the beginning of every academic year, because of changes in faculty due to retirements and new hiring. This ensures that faculty within the area are aware of the assessment process. Hence, assessment must be continuously championed and monitored within the department until it becomes an ingrained essential part of the curriculum process.

A Focus on Assessment from the Beginning Is Helpful

Because we did not start our project as an assessment initiative, we spent much more time than we would have otherwise.

VII. HURDLES TO OVERCOME

While we truly believe in and present a pragmatic framework and approach to assessment, there are a number of limitations and/or hurdles that still need to be addressed.

Faculty Buy-in Remains Incomplete

We have not achieved complete buy-in from all faculty. Program faculty who have not fully embraced assessment nonetheless have contributed to and benefited from the assessment project indirectly. For instance, they participated in the assessment discussions in weekly meetings of the staff for the introductory course. Unfortunately, several missed other opportunities to benefit from the process. For example, while they administered the indirect measures survey in their classes, some did not take us up on our offer to provide the results from their own sections of the introductory course. Consequently, they have not been able to use the insights they could have gained to improve the outcomes for their future students. We could have delivered the results to them even though they did not ask us to do so. However, we have decided against this action. We feel that if we emphasized results from individual sections, we could cause all the faculty to conclude erroneously that the assessment plan's goal is to evaluate faculty rather than to find ways to improve courses. If faculty were to draw that conclusion, we would probably have lost buy-in from some faculty who now support our project. We continue to search for ways to reap greater course and program improvement when some faculty do not believe in assessment.

Final Exam Does Not Match Outcomes

Incomplete faculty buy-in creates another challenge we have not yet surmounted. The multiple-choice component of our common final exam for the introductory course is largely focused on the textbook's material rather than mapping to the course's more substantial student learning outcomes. We could gain significant insights for improving the course by bringing assessment motives into construction of the final exam, which is created collaboratively by all of the course's faculty. However, faculty members who do not fully appreciate assessment's value prefer to focus multiple-choice questions on the textbook's content. Our plan for addressing this issue is to be patient and proceed slowly. We believe that as we demonstrate to all faculty the benefits that can be achieved within the agreed-to framework, we will be able to progress gradually to fully outcomes-based exams.

New Faculty Have not Been Included

We also need to improve the way we train new faculty. They are assigned to teach the introductory course using the new, assessment-based approach. However, we have not yet devoted the necessary time to explaining to them the benefits of assessment, the reasons we use the process we have adopted, and the ways they can most productively contribute to and benefit from assessment.

Approach Has Not Yet Been Scaled to Entire Program

So far, the approach we took with the three-courses thematic sequence has not been pushed to the entire MIS program. In fact, the department has revised the entire MIS major curriculum, without applying the outcome-based approach to it. The approach was ignored due to factors beyond our control. For example, there was pressure to revise the MIS major quickly to stop the enrollment declines seen in the MIS major. As we progress further with our assessment and can show results of improvement of the delivery of some courses, we believe the curriculum will evolve toward an outcomes-based and assessment-enriched form.

VIII. CONCLUSION

Responding to requirements by accrediting agencies, most universities are embarking on a process to implement course and program assessment. Used at a large midwestern university to assess a portion of the MIS curriculum, the process described in this paper can be applied to IS programs at many other institutions. The process begins

with defining student learning outcomes for a program, followed by definition of outcomes for the program's courses. A plan for assessing the outcomes involving a mix of direct and indirect measurements is then developed. Assignments, rubrics, and survey instruments are then created to assess student outcomes. Information from indirect measures through perception-based student surveys provides insight into areas needing improvement in the course, pinpoints improvement areas for individual instructors, and identifies instructors who can help other instructors. Creating direct measures through the assessment of randomly sampled student work is resource intensive but can be used in combination with less time-consuming indirect measures. These measures all generate data that can guide improvements to curriculum and pedagogy. Their use can be arranged in a rotating schedule that provides feedback on continuous improvement in student learning outcomes and also satisfies various stakeholders in higher education without overburdening faculty.

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Editor's Note: The following reference list contains hyperlinks to World Wide Web pages. Readers who have the ability to access the Web directly from their word processor or are reading the paper on the Web, can gain direct access to these linked references. Readers are warned, however, that:

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APPENDIX 1: PROJECT ACTIVITY TIMELINE AND RESOURCES INVOLVED

	Major Project Milestones	Resources Involved		
		Project Team	Course Faculty	MIS Faculty
m 1 Su	Writing across the Curriculum Project Kickoff	X	X	X
1 Fall	MIS 235 Student Outcomes Drafted MIS 235 Student Outcomes Reviewed, Revised, and Adopted	X X	X	X
1 Spring	MIS 235 Syllabus Revised to Align with Student Outcomes Project Focus Shifts 235 to Assessment MIS 235 Indirect Assessment Survey Created MIS 235 Indirect Assessment Survey Administered	X X	X X	
m 2 Su	MIS 235 Indirect Assessment Data Analyzed MIS 235 Indirect Assessment Results Presented at AMCIS	X X		
2 Fall	MIS 235 Syllabus Revised to Respond to Indirect Assessment Results MIS 302, 303, and 495 Student Outcomes Drafted MIS 302, 303, and 495 Student Outcomes Reviewed, Revised and Adopted MIS 235 Outcomes for Direct Assessment Selected	X X X	X X X	X
2 Spring	MIS 235 Syllabus Revised to Include Common Writing Assignment for Direct Assessment MIS 235 Common Writing Assignment Created MIS 235 Common Final Exam Created with One Essay Questions Plus 45 Multiple-Choice Questions for Direct Assessment MIS 235 Rubrics Created for Assessing Common Writing Assignment and Essay Questions from Final Exam MIS 302 & 303 Indirect Assessment Survey Created MIS 235 Common Writing Assignment Administered MIS 235 Final Exam Administered MIS 235, 302, 303 Self Assessment Surveys administered	X X X X	X X X X X	X
m 3 Su	MIS 235 Common Writing Assignments and Essay Questions from Final Exams Evaluated for Direct Assessment	X		X

Resource Notes and Explanations

- The **Project Team** included the authors. Two are MIS 235 instructors, two are with the Center for Writing Excellence and the other is a member of the department. The team met 8 to 10 times per semester and typically invested 2-3 hours doing project work between meetings.
- **Course Faculty** for MIS 235 consisted of 6 to 8 faculty teaching 13 to 16 sections (depending on semester). The course faculty attend a course kickoff meeting at the beginning of fall semester and one-hour weekly coordination meetings to discuss course pedagogy, progress, and consistency. Approximately 10-15% of this time was devoted to assessment project tasks.
- The entire **MIS Faculty**, 14 members, were kept involved by reviewing and adopting learning outcomes for the courses.
- The largest single effort was the direct assessment of the common writing assignment and final exam essay in the third summer. Seven faculty members spent five hours in a single session evaluating student artifacts. The session was led by two faculty from the Center for Writing Excellence.

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