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Course-Embedded Assessment of IT Competency: A Case Study

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INTRODUCTION

This study develops course-embedded assessment measures that can be used to assess learning outcomes in a graduate course in Management Information Systems (MIS) at an urban public university. The results of the research should assist the school in satisfying several steps in its Student Learning Outcomes Assessment Plan by identifying, developing, and pilot testing measures of learning outcomes. Specifically, the proposed research develops assessment methodologies and rubrics to assess learning goals in selected courses in an MBA program, and uses the results for continuous improvement of both the courses and assessment methodology.

The remaining sections are organized as follows. The next section explains the assessment model used in the present study. The remaining sections describe the research design, and discuss preliminary research results and conclusions.

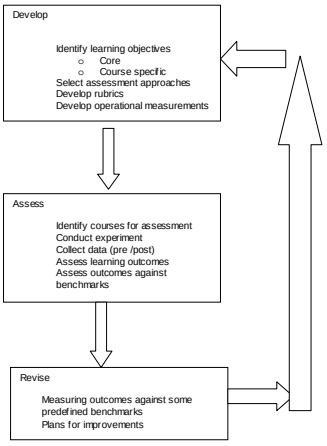
THE MODEL

The assessment model used in the present study is presented in Figure 1. This approach has three major steps:

DEVELOP: This phase involves planning the experiment, the process and measurements and includes the following steps:

- Identify learning objectives
  - Core
  - Course specific
- Select assessment approaches
- Develop rubrics
- Develop operational measurements

Figure 1. Assessment framework



ASSESS: This phase involves the actual experiment; i.e., designing and conducting the experiment and data collection and includes the following steps:

- Identify courses for assessment
- Conduct experiment
- Collect data (pre /post)
- Assess learning outcomes
- Assess outcomes against benchmarks

REVISE: This phase involves measuring outcomes against predefined benchmarks and using the results in planning improvements.

The present study will:

- Select a learning objective of the MBA program and develop course-embedded assessment methodologies and rubrics to assess the achievement of this objective in the Information Systems and Technology course.
- Conduct experiments to measure student competency of the learning objective.
- Use the results as feedback for continuous improvement in the course.

RESEARCH DESIGN

The present study was conducted at an urban public university in the Mid-Atlantic region. The university is an upper-division university and has mostly commuter students. The above framework is being used to assess learning outcomes in the Information Systems and Technology course, a required course in the MBA program. This course was selected for implementation of the framework because it includes core competencies of the MBA program as well as field-specific skills and abilities. MBA students may take the undergraduate business prerequisites for the program at other institutions. One difficulty in assessing student performance is a potential learning gap that may influence the learning outcomes of subsequent classes. The next section discusses the development phase of the present study.

Development Phase

Selection of Learning Objectives

Stakeholders involved in higher education realize that "educational goals should reach far beyond the scope of traditional subject area domains" (Marzano, Pickering, and McTighe, 1993, p. 9). AACSB (2005, p. 59) also emphasizes that learning goals for business programs should include "general knowledge and skills goals, which while not management specific, relate to knowledge and abilities that graduates will carry with them into their careers."

The learning objectives that we use as the basis of our assessment activities were selected from the program learning objectives of the MBA programs. The Information Systems and Technology course has

the following course objectives, some of which are related to the basic MBA learning objectives and some of which are discipline-specific:

- **Stock of Basic Business Toolbox**: Demonstrate an understanding of the vocabulary, concepts, and skills of IT and their applications to businesses.
- **Become IT Capable**: Demonstrate an awareness of emerging information technologies (e.g., expert systems, image processing, electronic data interchange, geographic databases, groupware, pen-based computing) and their potential impact on individuals, groups, and firms.
- **Develop Critical Thinking Skills**: Demonstrate an understanding of new IT technology in an organization and across business functions.
- **Develop an Ethical Perspective**: Demonstrate an awareness of ethical issues generated by information technology and the responsibilities of being a professional, including ethical standards.
- **Develop Team Building Skills**: Demonstrate the capacity to form and function in emergent teams.

Our assessment of student learning will focus on the information technology (IT) competency. IT competency is a program goal of the MBA program and is defined as "the ability to use information technology to help perform tasks, communicate, and make decisions." The IT MBA program competency is a combination of the Stock of Basic Business Toolbox and Become IT Capable learning objectives for the Information Systems and Technology course.

Selection of Assessment Approaches

We assess three aspects of IT competency – IT resource awareness, using IT, and understanding IT. We use:

- Questionnaires at the beginning and end of the course to measure IT resource awareness and self-efficacy (belief in his/her ability to perform a specific task) of various IT skills
- Projects and assignments to measure using and understanding IT

Development of Operational Measurements and Rubrics

Quality Matter's rubric framework (http://www.witc.edu/instruct/assess/index.htm) was used to develop the IT competency rubric used for assessment in Figure 2. We developed the rubric for IT competency using Rubistar (http://rubistar.4teachers.org/index.php). The rubric will be refined and additional rubrics evaluating specific components of IT competency will be developed after evaluating our experiences with the initial rubric.

Figure 2. Assessment rubric

Information Technology Competency

Student Name: _____

Category	4	3	2	1
IT resource awareness	Aware of all IT resources, internet, WWW, digital library and basic IT concepts, hardware, and software	Aware of major IT resources and concepts including basic IT concepts, hardware, and software	Aware of some IT resources and concepts including basic hardware and software	Limited awareness of IT resources and IT concepts
Using IT	Uses IT resources efficiently and effectively to solve problems.	Uses IT resources to solve the problems.	Sometimes uses IT resources to solve problems, but does not use them consistently.	Rarely uses IT resources to solve problems.
Understanding IT	Understands and can use IT resources	Understands and can use some IT resources	Sometimes understands and uses IT resources	Rarely understands and often "plays" with the resources instead of using them as instructed.

A set of quality indicators to use in measuring IT competency was developed as follows:

- IT resource awareness
- Using IT
- Understanding IT

After quality indicators were developed, a measurement scale was developed, using a scale similar to the one used for course grading (http://rubistar.4teachers.org/index.php); i.e., 4, 3, 2, 1 (A, B, C, F).

Assessment Phase

Collect Data

Twenty-eight students enrolled in the Information Systems and Technology course on the web during the Fall 2005 semester were given a survey at the beginning of the semester. The questionnaire was divided in several sections:

- Demographic information
- Familiarity with e-learning environment
- Basic definition of IT terms (understanding IT)
- Self-efficacy skills in the following areas
  - Internet browsing (understanding IT)
  - Spreadsheet analysis (application of IT)
  - File transfer protocols (FTP) (using IT)
  - Web page development (using IT)
  - Database applications (using IT)
  - Technical writing skills (not directly related)

A similar questionnaire was given at the end of the semester. Responses to the pre- and post- questionnaires will be compared to measure improvement during the semester. Improvement in student responses to the basic definition of IT terms section will be measured using the rubric in Figure 2.

Students' Backgrounds

Students were given 1% of their grade for completing the questionnaire at the beginning of the course. Participation was voluntary. 52% of the students were female. 82% of the students were employed. Students worked an average of thirty-seven hours per week. The university is flexible and allows students to take face-to-face, on-line, or a mix of face-to-face and on-line courses. Only 18% of the students identified themselves as taking only on-line courses. Forty-four percent (44.4%) of the students were taking their first on-line course. Seventy-three percent (73.1%) indicated that they were general business majors or had not decided on a concentration in their graduate programs. Based on the demographic information provided by the students, our sample appears to be relatively homogenous with respect to background, work experience, gender, and types of courses taken.

Students' Perceptions of their IT Competency at the Beginning of the Course

Students were asked their perceptions of their abilities in several IT areas at the beginning of the course using a ten-point scale (1=Low; 10=High). These results are presented in Tables 3(a) through 3(e).

Because IT competency is required of all students entering the program, we would expect the majority of students to have minimal deficiencies in IT. On a ten-point scale, we would expect an IT competency at least equal to 5 (approximately the median of the scale). However, our results indicate otherwise and the students' perceived competencies vary in different IT areas.

The results of our survey at the beginning of the course indicate that students' perceived IT competency was highest for their ability to create a spreadsheet (100% rated this competency at five or higher) and for their ability to perform research by browsing the Internet (92.9% rated

Table 3(a). Spreadsheet competency (Mean - 7.96; Median - 8.00)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	5	3	10.7	10.7	10.7
	6	2	7.1	7.1	17.9
	7	5	17.9	17.9	35.7
	8	6	21.4	21.4	57.1
	9	7	25.0	25.0	82.1
	10	5	17.9	17.9	100.0
	Total	28	100.0	100.0	

Table 3(b). Web browsing research competency (Mean - 8.05; Median - 8.00)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	4	2	7.1	7.1	7.1
	5	2	7.1	7.1	14.3
	6	1	3.6	3.6	17.9
	7	4	14.3	14.3	32.1
	8	1	3.6	3.6	35.7
	8	5	17.9	17.9	53.6
	9	4	14.3	14.3	67.9
	10	9	32.1	32.1	100.0
	Total	28	100.0	100.0	

Table 3(c). Internet file-transfer competency (Mean - 5.88; Median – 6.00)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	4	14.3	16.7	16.7
	4	2	7.1	8.3	25.0
	5	5	17.9	20.8	45.8
	6	5	17.9	20.8	66.7
	7	1	3.6	4.2	70.8
	8	1	3.6	4.2	75.0
	9	1	3.6	4.2	79.2
	10	5	17.9	20.8	100.0
	Total	24	85.7	100.0	
Missing	System	4	14.3		
Total		28	100.0		

Table 3 (d). Database competency (Mean – 5.00; Median – 5.00)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	3	10.7	10.7	10.7
	2	3	10.7	10.7	21.4
	3	3	10.7	10.7	32.1
	4	4	14.3	14.3	46.4
	5	4	14.3	14.3	60.7
	6	1	3.6	3.6	64.3
	7	3	10.7	10.7	75.0
	8	5	17.9	17.9	92.9
	9	1	3.6	3.6	96.4
	10	1	3.6	3.6	100.0
	Total	28	100.0	100.0	

Table 3 (e). Webpage creation competency (Mean – 3.92; Median – 3.50)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	6	21.4	25.0	25.0
	2	5	17.9	20.8	45.8
	3	1	3.6	4.2	50.0
	4	2	7.1	8.3	58.3
	5	2	7.1	8.3	66.7
	6	3	10.7	12.5	79.2
	7	3	10.7	12.5	91.7
	9	2	7.1	8.3	100.0
	Total	24	85.7	100.0	
Missing	System	4	14.3		
Total		28	100.0		

this competency at five or higher). The range of perceived competencies in other areas was wider. Twenty-five percent of the students rated their ability to transfer files over the Internet lower than five. Forty-six percent (46.4%) rated their ability to create a database lower than five. Fifty-eight percent (58.3%) rated their ability to create a webpage lower than five.

Assess Learning Outcomes

At the end of the semester, students will again be surveyed about their perceived competencies in the above IT areas and their familiarity with basic IT terms. Their responses will be compared with their responses at the beginning of the semester. The rubric in Figure 2 will be used to assess improvement in IT awareness (rubric category 1). The following projects will be used to measure improvement in using IT and understanding IT (rubric categories 2 and 3):

- Spreadsheet
- Web page creation
- Database
- File transfer

Assess Outcomes against Benchmarks

Currently, to our knowledge, there are no established benchmarks related to IT competency assessment. We believe that because our MBA program requires a B average to graduate, an 80% IT competency level (an equivalent of a B) is reasonable. This benchmark will be reviewed after we evaluate our assessment results at the end of the semester. This iterative process will be used as we continue our IT assessment activities over several semesters. We will provide the final results in our presentation.

CONCLUSION

Assessment is becoming a requirement for getting and maintaining accreditation in higher education. As the delivery modes of higher education change and include many forms of delivery (face-to-face, web-based courses, blended courses, hybrid courses), stakeholders are becoming concerned about the quality of education. Assessment, in general, helps maintain quality. This paper discusses the development of a plan to assess IT competency in a required introductory IT course in an MBA program.

REFERENCES

References will be provided on request.