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Developing an Assessment Process for a Master of Information Systems Program

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ABSTRACT

This paper describes the process used to develop and implement an assessment plan from the ground up for a new Master of Information Systems program. The mapping of learning goals to objectives to specific courses is illustrated with direct and indirect measures. The program was first offered January 2008, and the second cohort of completed January, 2010. Assessment results from the first two cohorts as well as preliminary analysis of current cohorts are presented to demonstrate the continuous improvement process in the program. The experience of developing and assessing a new program led to significant improvements in the assessment process itself. The initial cumbersome data collection led to the development of an online system for faculty reporting of results and improvements. Challenges of administering and assessing a blended program of weekend residencies and online course delivery are discussed.

Keywords

Master of Information Systems, Assessment Plan, Assessment Results

INTRODUCTION

The Information Systems faculty at Wright State University developed a Master of Information Systems (MIS) in response to demand from Management Information Systems alumni and the regional information technology community. The program is a 13 month program totaling 48 quarter credit hours. There are five weekend residencies. Each of four quarters begins with a residency where the faculty for each course has a full day of class time. The time includes some introductory lecture plus cases, team work, guest speakers or a tour. Ten four credit-hour courses are delivered consecutively in five week sessions. There is an eight credit hour individual or team project that has a faculty advisor and a corporate sponsor. Students submit their project proposals at the end of the first residency. The project presentations to faculty, sponsors and guests occur during the fifth residency which is followed by a hooding ceremony.

MASTER OF INFORMATION SYSTEMS BACKGROUND

Planning for the Master of Information Systems began in 2004 with a pre-proposal submitted in 2005. New programs are reviewed by a university reading committee then forwarded to the Ohio Board of Regents (OBR). The Chancellor of the OBR has delegated the responsibility for the assessment of new graduate degree programs to the Regents' Advisory Committee on Graduate Study (RACGS), which is composed of the graduate deans of the Ohio public universities plus the University of Dayton and Case Western University. Graduate program evaluation by RACGS leads to a formal recommendation and report from RACGS to the Chancellor of the OBR. The full proposal was sent to the Ohio Board of Regents in 2006. The proposal was defended in front of RACGS in February, 2007 and received full approval from the Ohio board of Regents in April, 2007.

The Information Systems Corporate Advisory Board was involved with review of the proposal. Individual board members assisted in the program defense with RACGS. Board members reviewed the curriculum structure and individual syllabi and their feedback was used in program development. Some board members served as subject matter experts in assisting in development of course materials and review of the online materials.

Admission to the MIS program requires a minimum of 3 years experience in the IT field (or closely related work area), in or on a track to assume a role of senior professional responsibility, a bachelor's degree in the field of information systems (or a closely related discipline) with a grade point average meeting the Wright State University classification of "regular status" for graduate students, and three professional letters of reference.

The first cohort of the Master of Information Systems started January, 2008 and the second cohort began January, 2009. We currently have the third and fourth cohorts in progress, starting respectively July, 2009 and January, 2010. The program is taught by seven full-time faculty and three adjunct faculty who are subject matter experts.

DEVELOPING THE ASSESSMENT PLAN

The MIS Curriculum Committee has overall responsibility for all courses. A lead faculty member is designated to have specific responsibility for each course in the MIS program. For course development, the lead faculty member was supported by an external subject matter expert. The lead faculty member is responsible for the articulation and synthesis of course learning objectives and outcomes. The lead faculty members are responsible for allocating subject material to courses, ensuring there is minimal overlap across courses, ensuring course descriptions are appropriate, and ensuring content is consistent with current practice.

The MIS Assessment Plan was developed by the MIS Curriculum Committee which has primary responsibility for program assessment of the MIS program. The program started with a staff member, who was also an adjunct faculty member in the undergraduate program, serving as administrative director. After the first cohort, a tenured faculty member became the academic director of the Master of Information Systems. The academic director leads the assessment effort. Following Wright State University procedures, the assessment plan was submitted to the Assistant Dean for Administration who is coordinating our AACSB assessment efforts and to the Associate Provost. Annual reports are provided to the college and Associate Provost. The assessment reports identify findings from the assessment measures, improvements identified and implemented, and follow-up results.

The MIS Curriculum Committee followed AACSB guidelines for graduate program assessment. From the AACSB Accreditation Standards (2010), “the level of knowledge represented by the students of a specialized master’s level program is the:

- Application of knowledge even in new and unfamiliar circumstances through a conceptual understanding of the specialization.
- Ability to adapt and innovate to solve problems.
- Capacity to critically analyze and question knowledge claims in the specialized discipline.
- Capacity to understand the specified discipline from a global perspective.”

AACSB recommends four to ten learning goals for each degree program. The learning goals should match the mission of the institution and the degree program. The goals we developed are:

LEARNING GOAL #1: Master of Information System graduates will demonstrate an understanding of current information systems theories and best practices.

LEARNING GOAL #2: Master of Information System graduates will understand the appropriate use of information systems methodologies to adapt and innovate the design of information systems.

LEARNING GOAL #3: Master of Information Systems graduates will demonstrate the capacity to perceive, analyze, and solve business problems using information systems technology.

LEARNING GOAL #4: Master of Information Systems graduates will demonstrate the capacity to perceive, analyze and resolve information systems related ethical issues.

The college goals include to develop successful and ethical leaders capable of making valued contributions to businesses and to partner with individuals, businesses, government and other organizations to enhance professional, entrepreneurial and socio-economic progress. The problem solving emphasis in the course curriculum and the sponsored project support the college mission.

Mapping to the Curriculum

The white paper *AACSB Assurance of Learning Standards: An Interpretation* (2007) recommends a five step process for assessment. The first step is to establish learning goals and objectives. Step two is to align the curricula with adopted goals. In our original curriculum development, we developed the course objectives and mapped them directly to the appropriate

learning goals. We then continued with the third step of developing the assessment instruments and measures. As we progressed through the assessment of our first cohort, we determined that the course objectives were too specific and it was difficult to aggregate the results in a meaningful way for assessing the learning goals. The MIS Curriculum Committee then reviewed all the course objectives, grouped the most relevant objectives that directly supported the learning goals and developed our current mapping. Each of the four learning goals has two to four objectives. For example, the objectives for Learning Goal #1, Master of Information System graduates will demonstrate an understanding of current information systems theories and best practices, are:

1. Understand and apply current IS practices (e.g. ERP, BI, EAI, CRM)
2. Understand and apply current IS management techniques (e.g. TCO, ESB, CSF, BPM, PM, outsourcing, portfolio management)
3. Model and design appropriate business processes for IS solutions.
4. Develop or adopt appropriate metrics and benchmarks for business and IS activities.

Table 1 below shows the mapping of the four learning objectives of Learning Goal#1. Course titles are listed in Table 2.

Objective	MIS 788	MIS 790	MIS 791	MIS 792	MIS 793	MIS 794	MIS 795	MIS 796	MIS 797	MIS 798	MIS 799
LO 1.1	X			X	X	X	X				
LO 1.2					X				X	X	
LO 1.3	X		X								
LO 1.4		X		X					X	X	X

Table 1. Mapping of learning objectives to courses

Course number	Course Name
MIS 788	Information Systems Strategy
MIS 790	Technology-enabled Business & Organizations
MIS 791	Business Process Management
MIS 792	Customer Relationship Management & Business Intelligence
MIS 793	Enterprise Application Integration
MIS 794	Advanced Data Management for the Supply Chain
MIS 795	IS Project Management
MIS 796	Information Assurance
MIS 797	Management of Technical Services
MIS 798	IT Outsourcing & Partnerships
MIS 799	Information Systems Capstone Project

Table 2. Master of Information Systems Courses

Developing the Measures

The MIS program is assessed using a mix of direct and indirect measures. AACSB lists a variety of approaches for directly assessing student learning including selection, course embedded measures, and demonstration through stand-alone testing or performance. Selection is based on students being admitted to a program based on their knowledge and skills from prior educational experiences. To validate selection requires a measure such as a standardized exam or placement exam. Although our entrance requirements include at least three years of related experience and three professional references, we are not requiring placement tests to demonstrate competency so we are not relying on selection for assurance of learning.

Course-embedded measurements are most common. We chose to embed multiple choice questions in each of the online courses. Multiple response questions in pre-test and post-tests are delivered online in all courses. Each objective is assessed in several courses as illustrated in Table 1. Each individual objective has five to sixteen questions distributed among the

courses. In addition, the capstone projects are evaluated by both the project advisor and by the corporate or organizational sponsor, and this feedback is analyzed. A survey form for soliciting the feedback was provided.

Indirect measures include surveys/exit interviews of the graduates upon completion of the program. One and three year alumni are surveyed. Additional feedback is sought from the IS Corporate Advisory Board.

Although not directly assessing student learning, each student does complete an online course survey at the conclusion of each course. The survey consists of 15 questions organized into three sections: course design, instructor support, and general comments. With the blended delivery of our program, we wanted to get more feedback on the effectiveness of the online materials, the online discussions, and the student experience. Since the first residency of the second cohort of the Master of Information Systems was starting as the first cohort concluded, we decided that more immediate feedback was needed before the alumni feedback. Working with Communications and Marketing at the university, we designed a survey that was administered at the end of the fourth residency of the first cohort. Questions focused on improvements for the residency experience, online materials, sequence of courses, value of specific topics, and integration of the project with the courses. Quantitative and qualitative responses were sought.

Annual assessment reports are submitted to the college assessment coordinator and the Associate Provost.

LESSONS LEARNED FROM FIRST COHORT

Improvements to the Master of IS Program

The lead faculty member of each course provided specific improvements for the next cohort in their reports. The MIS Curriculum Committee reviewed these summaries. In addition to improvements identified within courses, the program sequence was modified. Responding to feedback from the first cohort and evaluation of the student projects, MIS 795, IS Project Management, was moved up to be the third course in sequence in the Master of IS program, to enable students to use the project management tools to help with their capstone project. A reading, *Building Better Business Cases for IS Investments* (Ward, Daniel, and Peppard, 2008) from MIS Quarterly Executive, was provided to help students formulate the business case in their project proposal. Then the students used an online discussion group to discuss the business cases for their projects.

We determined that students needed more guidance and better defined expectations for MIS 799, Information Systems Capstone Project. The syllabus for MIS 799 was completely rewritten and the students were provided with more clearly defined expectations for the proposal, the intellectual contribution, the final presentation and the final report.

In the first cohort, time was set aside at the residencies for students and advisors to meet. With the second cohort, students were able to attend one or more final presentations from the first cohort during their first residency. The project proposals were due at the end of the second residency and advisors were assigned. The IS Project Management course actively involved the students in discussing the business cases for their projects with their cohorts. The third residency required each project team to make a presentation on their project, the plan and the status. This allowed for better feedback from all faculty, not just advisors, plus fellow students. The fourth residency was again used as an advising time and the fifth residency was devoted to the final presentations.

Improvements to the Assessment Process

The assessment results from the direct measures were below expectation. In addition to looking at improvements in the delivery of the content, the questions were evaluated to see which ones were ambiguous, poorly worded, or did not accurately reflect the material. One of the biggest problems was a mismatch between direct measures and program delivery and content. For consistency in evaluation and ease of administration, we had chosen multiple response questions. However the majority of the courses did not use traditional midterm and final exam evaluation for student performance. The majority of the student work was cases, written papers, projects and discussion. Furthermore, in most of the courses, the assessment questions were presented as an end of course quiz that did not count as a portion of the student's grade. Even though these were graduate students, there was a lack of incentive to do well on the assessment quiz.

Faculty are developing a more appropriate set of measures for the learning objectives extracted from the descriptive content on project reports, assignments, etc. turned in by students. Appropriate rubrics are also being developed. This is a continuing process but a number of the improvements were implemented in the second cohort. In other cases, where the direct measures are appropriate, additional opportunities for students to self-assess are being developed. For example, in the IS Project

Management class, each course segment now has self-assessment quizzes with typical questions from the PMI project certification tests.

We also determined that our form to solicit feedback on the projects from the faculty advisor and sponsor was not sufficiently specific. We developed detailed rubrics for intellectual contribution, the oral presentation and the written paper. The criteria for evaluation of the written paper is shown in Table 3 below. The rubric rated each criteria from 1 to 5.

Criterion
Extent to which the project report is consistent with the expected general structure (title page, approval page, etc.)
Extent to which the project report is consistent with general writing requirements (language, voice, etc.)
Extent to which the business problem is clearly described (including overview of sponsoring organization, project scope, etc.)
Extent to which the state-of-the-art review is clearly described (including highlights of relevant aspects to the problem)
Extent to which the alternative solutions are clearly described (including criteria for comparisons)
Extent to which the final solution is clearly described (including business case for the solution)
Extent to which the actual implementation (or the implementation plan) of the final solution is clearly described
Extent to which the benefits (or expected benefits) of the final solution are clearly described (including metrics, analyses, etc.)

Table 3: Criteria for Master of IS Report

IMPROVING THE REPORTING PROCESS

Step 4 of the AACSB White Paper on Assurance of Learning Standards is the collection, analysis and dissemination of assessment information. The data needs to be shared with the appropriate faculty committees, in our case the MIS Curriculum Committee, and the leadership of the business school. After the MIS Curriculum Committee submits the report to the college, it is reviewed by the Assistant Dean of Administration and the Dean of the college. The department chair works closely with the MIS Curriculum Committee in review of the report before submission to the college.

Parallel to the assessment of the first cohort, the college was working to standardize the reporting format for assessment of the undergraduate core, the MBA, and the other professional master's programs in the college. After meetings with the Deans, one of the authors developed the RSCOB Online Assessment System to both simplify the data collection process for faculty and to create the needed reports.

The assessment system is developed using the J2EE (java 2 Enterprise Edition). The system currently has over 15 JSP modules with backend business logic Javabeen classes, totaling over 4000 lines of application code and uses a MySQL 5.1 database.

The system is set up to handle multiple degrees. To initially set up the Master of Information Systems, the learning goals were entered then the learning objectives. Next the courses were entered. The direct measure question titles were entered and identified by learning goal and objective. To enter the direct measure question results, the term and course are selected. Figure 1 shows the screen to enter the question results. Either the number of students that answered correctly or the mean score can be entered. Our Learning Management System summary results were used for the data entry below. Faculty and a graduate assistant have secure login and access for the data entry.

You are here: [Home](#) > [Task selection](#) > Term data entry

Assessment data entry for Master Of Information Systems

Order table by: Course No Learning Goal/Objective

<input type="checkbox"/>	Qid	Course no	Section	LG	LO	Q. title	N	#/% Correct	Mean	Old title (if needed)	Worksheet
<input type="checkbox"/>	52	MIS 795	91866	1	1	LG 1.1 - Project m	10	0.0	40.0		worksheet
<input type="checkbox"/>	53	MIS 795	91866	3	3	LG 3.3 - Risk resp	10	0.0	92.5		worksheet
<input type="checkbox"/>	54	MIS 795	91866	3	3	LG 3.3 - Project	10	0.0	23.3		worksheet
<input type="checkbox"/>	55	MIS 795	91866	3	3	LG 3.3 - Project 2	10	0.0	20.0		worksheet
<input type="checkbox"/>	56	MIS 795	91866	4	1	LG 4.1 - Ethical d	10	0.0	90.0		worksheet
<input type="checkbox"/>	57	MIS 795	91866	4	1	LG 4.1 Ethical challenge	10	0.0	70.0		worksheet
<input type="checkbox"/>	58	MIS 795	91866	4	1	LG 4.1 Unethical behavior	10	0.0	100.0		worksheet

Figure 1: Assessment data entry for Master of Information Systems

After analyzing results, faculty can then enter planned improvements for the next offering of the course. The instructor goes to Manage Analysis and Improvements then selects a term and clicks on “Enter Analysis and Improvements”.

Manage Analysis and Improvements

Select a Term:

Figure 2: Prepare to enter course improvements for Master of Information Systems

The following window appears to choose a course and a learning objective and enter the improvements into the box.

Add an improvement bullet point for Summer 2009 Cohort in course:

Enter improvement bullet point and learning objective coverage below:

"Improvements"

Select the learning objective

- 1.1 Understand and apply ... ERP, BI, EAI, CRM)
- 3.3 Use data mining, dia ... and make decisions.
- 4.1 Be aware of the ethi ... f the IS profession.

Figure 3: Enter course improvements for Master of Information Systems

The RSCOB Assessment System generates an assessment report for each learning goal in the Master of Information Systems. The MIS Curriculum Committee then reviewed, edited, and approved the report for submission to the college. A sample of the reporting for Learning Goal 1, Objective 4, Develop or adopt appropriate metrics and benchmarks for business and IS activities is shown in Table 4.

	Q#12 (MIS 790)	Q#13 (MIS 790)	Q#14 (MIS 790)	Q#32 (MIS 792)	Q#33 (MIS 792)	Q#66 (MIS 797)	Q#77 (MIS 798)	Q#78 (MIS 798)	Q#79 (MIS 798)	Q#80 (MIS 798)	Q#81 (MIS 798)	Q#148 (MIS 799)	Avg. # Correct	Avg. % Correct
11 students														
Average % by Question	20.70			85.00		85.00	85.00							68.92

Table 4: Presentation of assessment results for Learning Objective #1.4

This table was followed by our analysis of the results and the planned improvements in each course.

CONTINUOUS IMPROVEMENT RESULTS

Demonstrated improvements were made across all learning objectives in the 2009 Winter cohort, cohort 2. As described, the assessment process was completely revised, with many new and revised questions (the number of questions increased from 39 to 84). The assessment process was also better defined for both faculty and students. Instructors are now encouraged to include assessment as part of the deliverables of the course, instead of additional ungraded work.

With the RSCOB Online Assessment System, course assessment question results can be reported as soon as the course is completed. Table 5 shows the assessment for MIS 788, Information Systems Strategy, which is the first course in the sequence. This course has shown gradual improvement overall, but with individual concepts or questions still below expectation.

Question ID	Question title	Learning Objective	Question text	2008-WI	2009-WI	2009-SU	2010-WI
1	LG 1.1	1.1	CIO's must be cognizant of which of the ...	96.90	92.90	88.90	100.00
3	LG 1.3-Q1	1.3	Which of the following is often overlook...	75.80	80.70	90.00	71.40
4	LG 1.3-Q2	1.3	In business, a _____ is defined as an i...		77.80	55.60	85.70
5	LG 1.3-Q3	1.3	Which one of the following is NOT correct...		77.80	80.00	85.70
6	LG 2.1-Q1	2.1	The role of information systems in the a...	57.60	59.70	66.70	50.00
7	LG 2.1-Q2	2.1	Sears Roebuck, in the United States, ana...		72.20	70.00	92.90
9	LG 2.3-Q1	2.3	As information systems development conti...	18.20	63.20	100.00	85.70
10	LG 2.3-Q2	2.3	The main driver of operational outsourci...		55.60	30.00	50.00
11	LG 2.3-Q3	2.3	Which of the following represent risks a...		88.90	100.00	92.90
Weighted Average across questions:				62.13	74.31	75.59	79.37

Table 5: Improvements based on Winter 2008 Cohort direct measures

Since we had overlapping cohorts, the course summaries are useful for the instructor to track results and plan improvements for the next cohort. The direct measures from the individual courses are summarized by learning objective as each cohort ends. Then the MIS Curriculum Committee reviews the assessment results for the program and analyzes the results.

The MIS Curriculum Committee is currently reviewing the assessment results for the second cohort, which ended January, 2010. The results show steady improvement over the first cohort. Table 6 summarizes the results for the four objectives of Learning Goal #1.

Learning Goal. Objective Number	Average % Correct Cohort 1 (Winter 2008)	Average % Correct Cohort 2 (Winter 2009)
1.1	47.80%	65.68%
1.2	53.60%	71.24%
1.3	77.90%	81.56%
1.4	68.92%	70.55%

Table 6: Learning Goal #1 Assessment results for Winter 2008 and Winter 2009 Cohorts

SYSTEMETIZING THE ASSESSMENT PROCESS

The last step in the AACSB White Paper on the Assurance of Learning Standards is to use the assessment information for continuous improvement. This includes documenting that the process is being carried out on an ongoing, systematic basis. We have found that faculty involvement and commitment are integral to the success of this process. The Master of IS program is structured to have an academic program director and a curriculum committee comprised of the participating faculty. Each course has a lead faculty member with course responsibility.

The RSCOB Online Assessment System contributes to the successful continuous improvement of our program. Simplifying the collection and data entry is important to continued participation by all of the faculty. Standardizing the reporting makes it easier to track the improvements made and their effectiveness.

CONCLUSION

The development of the Master of Information Systems allowed us to simultaneously develop an assessment process for the program. Starting early was key to having learning goals and learning objectives defined to map our curriculum to the learning goals as the program was evolving. The process involved faculty early in the planning and faculty continue to be engaged in curriculum development and improvements.

Keeping the process manageable was a challenge. The development of the RSCOB Online Assessment System simplifies the data collection, reporting of improvements, analysis of results and generation of summary reports for the college and for our AACSB accreditation. The results from the second cohort which has finished the program and preliminary results from individual courses in the third and fourth cohorts show a steady improvement.

Developing measures appropriate to a graduate program with the majority of the curriculum delivered online presented challenges. Faculty are continuing to work to improve the alignment of the assessment direct measures with the course content and delivery methods. Even with assessment experience in other programs, we learned that the assessment process, the curriculum delivery and the curriculum content all needed review and improvements.

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