A Complementary Measure of MIS Program Outcomes: Useful Insights from a Student Perspective

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ABSTRACT

Assessing student learning is a critical element in today's higher education environment. Learning assurance programs seek to assess and improve the quality of student learning, and may employ both direct and indirect measures. In this paper, we describe a practical learning assurance assessment measure developed and used as a part of a broader program to evaluate and monitor the learning of students in our Management Information Systems major. This measure enables us to evaluate our students' learning as reflected by their confidence, persistence, and willingness to undertake MIS-related tasks. We believe this is an important indicator of learning. This paper describes our development of this measure, use of the measure as an element of our learning assurance program for our MIS major, and insights gained from this assessment approach.

Keywords: Program assessment/design, Direct assessment, Indirect assessment, Assurance of learning, Self-efficacy

1. INTRODUCTION

Learning assurance programs are designed to assess and improve the quality of student learning. Today, assessing student learning is a critical element in the higher education environment. Mandates and requests for measuring and reporting student learning come from an array of sources, including institutional administrators, boards of regents, and accrediting agencies such as the Association to Advance Collegiate Schools of Business (AACSB) and the Higher Learning Commission. A further complication in these learning assurance requests is the varying level of the learning assessment measures requested – some are at the course level, some at the major level, and some at the degree level.

It is not uncommon for faculty members to feel somewhat perplexed by the various calls for learning assurance measures for courses, majors, and overall degree programs. For example, at our AACSB-accredited College of Business Administration, a multi-faceted assessment program designed primarily to assess our Bachelor of Arts degree in Business Administration was developed. Our college's Learning Assurance program provides for a systematic, on-going process of collecting and evaluating several assessment measures that are tied to specific learning goals, and provides feedback for revising both the curriculum and the learning assurance program itself. The multiple assessment approaches included are an end-of-program examination, cooperative education evaluations, surveys of graduates and alumni, and course-embedded assessments. This Assurance of Learning program satisfies AACSB requirements (AACSB, 2010). In addition, at our Midwestern comprehensive state university, annual reports summarizing learning assurance measures for core courses and individual majors must be submitted to our university Provost. These reports are oriented toward satisfying requirements set by the state Board of Regents and the Higher Learning Commission.

In response to these initiatives, we have contributed questions that are included in the end-of-program assessment for the entire Bachelor of Arts in Business Administration degree. Given rapidly changing IS technologies, we found it challenging to create questions that reflect "timeless," essential MIS knowledge, appropriate for all business graduates. We also developed a way to measure learning outcomes for the business core course for which we are responsible (Introduction to Information Systems). At the course level, this was not problematic, since specific exam questions pertaining to course learning objectives could be selected for this purpose. The use of exam questions tied to course learning goals is one way to evaluate learning outcomes at the course level.

To measure learning outcomes for our MIS major, we sought a measure or measures that would provide meaningful insight into our students' learning. We were uncomfortable with using an end-of-program examination, since we wanted measures that would be useful and consistent over time, and were concerned about creating an exam that stays relevant in our rapidly changing technical environment.

We also sought measures that are consistent with our college mission statement, which includes, in part, the development of "exceptional professional skills to contribute immediately and confidently." Following that theme, we wanted to find a way to evaluate our students' learning as reflected by their confidence, persistence, and willingness to undertake MIS-related tasks. We believe this is an important indicator of learning, and feel that a student who is confident in his/her ability to "do" MIS work has achieved an important learning outcome from our MIS major. This concept led us to draw from the computer self-efficacy (CSE) construct, which is based in the broader construct of self-efficacy (Bandura, 1997), a key concept in social cognitive theory. Prior research has found CSE to be significantly correlated with an individual's willingness to choose and participate in technology-related activities, to expect success in these activities, and to demonstrate persistence and effective coping behaviors when faced with technology related difficulties (Compeau et al., 2006; Karsten, Mitra, and Schmidt, 2012). In addition to capturing the learning outcomes of interest to us, the CSE construct also provided useful guidelines for measure development and evaluation. We believe the measure offers complementary, unique, and useful insights into changes in student confidence and competence as they progress through our program.

We will describe a unique learning assurance assessment measure developed and used as a part of a broader program to evaluate and monitor the learning of students in our Management Information Systems major. We believe this assessment measure provides clear and meaningful learning assessment that is closely tied to the program objectives and provides meaningful feedback to the faculty who deliver the courses in the program. It is also relatively straightforward to develop, is quickly administered, and lends itself to fast, easy, and inexpensive statistical analysis and interpretation.

2. LITERATURE REVIEW

Learning assurance programs employ a variety of assessment tools to evaluate student learning. In this section, we briefly describe some recent research on learning assurance in business schools, followed by the theoretical foundation for our learning assurance measure.

2.1 Learning Assurance in Business Schools

Recent research has focused on how to develop learning assurance programs in business schools in order to satisfy AACSB requirements (Martell, 2007; Stivers and Phillips, 2009; Gardiner, Corbitt, and Adams, 2010; Attaway et al., 2011) or to measure learning outcomes in specific courses (Price and Randall, 2008). Direct measures require that actual mastery of topics and skills be demonstrated through actual work, including papers, presentations, speeches, graded assessment items, and pretests and posttests (Price and Randall, 2008; Hollister and Koppel, 2008). Attaway et al. (2011) report on the development of an approach using exam questions to assess learning outcomes in the required IS core course and to guide the improvement of learning outcome achievement. Indirect measures can gather opinions of the quality and quantity of learning that has taken place using focus groups, exit interviews, and surveys. (Rogers, 2006).

There are a variety of ways to evaluate learning outcomes for students in an MIS major. For example, Veltri et al. (2011), describe a curriculum mapping approach, coupled with a standardized certification exam, for curriculum development and measuring learning goal achievement. In our case, since our MIS curriculum by its very nature places considerable focus on "doing," we were comfortable using the student projects completed in the senior-level IS Development Projects course as a direct mechanism to evaluate student learning in our MIS program. The projects completed by students in this course are "live" application development projects for real clients. Because students must complete a working IS application that fulfills their clients' expectations, these projects provide an opportunity for students to apply virtually all concepts and skills expected of MIS program graduates. We utilize the evaluation of these projects as a direct assessment measure of the MIS major's learning goals.

A review of the recent studies on assessment methods shows that these methods do have some difficulties to overcome. Attaway et al. (2011) described some of the challenges associated with obtaining faculty cooperation with the learning assurance program, resulting in potential penalties for faculty members who did not "buy in" to the program. Also, these researchers described the difficulty and expense associated with compiling and statistically analyzing the results of the program. Other assessment programs described (e.g., Veltri et al., 2011), while certainly worthy efforts, are quite complex and cumbersome to create, administer, and maintain over time.

2.2 Self-Efficacy as a Basis for Measure Development

Overall, relatively little research has been found dealing with the creation of informative learning assurance measures that are related to a specific major. While we were satisfied with our direct measure of evaluating senior-level live projects, we felt that more insight could be gained through a complementary measure. We turned to an important and popular construct, self-efficacy, for inspiration and guidance in measure development. Self-efficacy is a well-researched construct with its origins in Social Cognitive Theory (Bandura, 1986). An extensive body of research exists in social psychology, education (see Bandura, 1997), organizational behavior and work-related performance (Stajkovic and Luthans, 1998) and in computer adoption, use, performance, and computer anxiety (see Compeau et al., 2006, for a more complete review). The extant research literature also provides helpful guidelines for developing useful measures of self-efficacy (Bandura, 2001).

Self-efficacy is the belief that one has the capability to perform domain-specific tasks or activities (Bandura, 1986). Bandura and others have found that an individual's self-efficacy plays a major role in how goals, tasks, and challenges are approached. Individuals who perceive themselves capable of performing certain tasks or activities are defined as high in self-efficacy and are more likely to attempt and execute them than are people who perceive themselves as less capable, and are accordingly defined as lower in self-efficacy (Bandura, 1997).

Computer self-efficacy is a popular construct in information systems research (see Karsten et al., 2012; Kher, Downey, and Monk, 2013; Compeau, et al., 2006; Marakas, Johnson, and Clay, 2007). Computer self-efficacy (CSE) "…refers to a judgment of one's capability to use a computer" (Compeau and Higgins, 1995, p. 192). Computer self-efficacy has been consistently and positively correlated with computer adoption, use, and performance (Compeau et al., 2006, Marakas et al., 2007). As Marakas et al. note, however, CSE research has focused heavily on very distinct and narrow domains (e.g., learning spreadsheets). The authors further note that "For businesses and information systems, real world tasks are neither as simple or single-domain focused. Rather, they draw on multiple skill sets and require an individual to be able to perform tasks that span several skill domains" (Marakas et al., 2007:, p. 40). We believe one of the "selling points" of our MIS major and a reason for the historically successful placements of our graduates is the fact that they not only develop skills in information technology, but in core business functions as well (e.g., management, accounting, finance, marketing). Hopefully, a side benefit of this research would be more insight into efficacy estimations in regard to more complex tasks.

3. METHODOLOGY

Our primary goal was to develop a measure that provides us with different but useful insight into the development of MIS student self-assurance with the complex skills and knowledge we believe are needed to be successful in school and the workplace. We also sought a measure that avoided significant complexity and administrative overhead. In the next sections, we provide a brief summary of our MIS program for context. We then describe the development of the initial measure designed to provide additional insight into the self-efficacy of MIS majors. Finally, we discuss the administration of the learning assurance measure and what we expected to see in the results.

3.1 Brief Description of MIS Major

The Management Information Systems (MIS) major at our university follows accepted IS curriculum guidelines and is a 120-hour Bachelor of Arts degree, including a 60 semester hour liberal arts core, 39 semester hours of business core courses, and 21 semester hours of MIS major courses. Of the 21 MIS major credit hours, 18 hours (six courses) are required courses, and three hours (one course) are an elective course. Students complete the MIS major courses during their junior and senior years, following the required business core course, Introduction to Information Systems, taken in the sophomore year. The typical progression taken through the business core and major courses is shown in Figure 1. As shown here, the business core courses are on the left, in rounded rectangles, and the MIS major courses are on the right.

During the junior year, students take two programming-oriented courses focused on business application development and the systems analysis and design course. During the senior year, students take the database management and theory course, an information systems management course, an information systems development projects course, and their chosen elective course. Enrollments in the major peaked at approximately 300 students in the late 1990s and early 2000s, declined, and have currently stabilized at about 150 students.

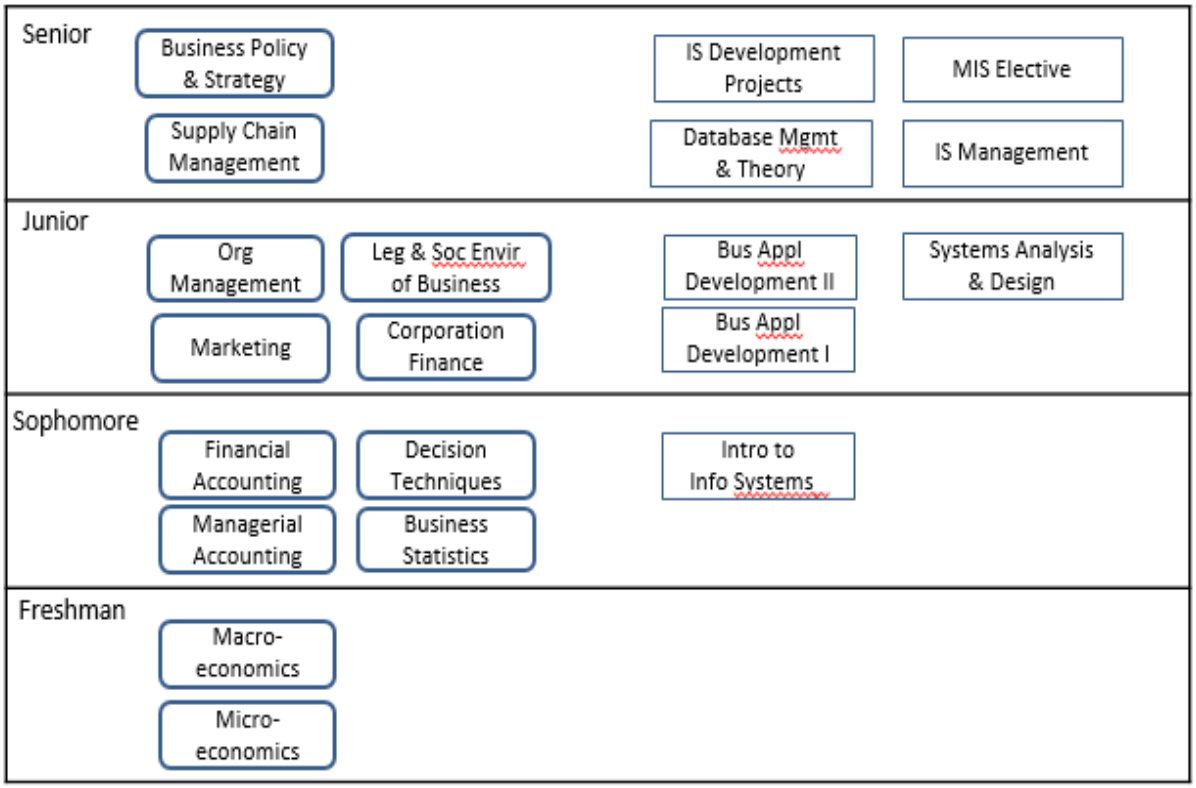

Figure 1: Typical Progression Through MIS Major Courses

3.2 MIS Major Learning Assurance Measure Development

A key component of learning assurance programs is that the assessment activities must be clearly tied to the program's learning goals and outcomes (Gardiner, Corbitt, and Adams, 2010). As previously mentioned, our MIS curriculum is based on accepted IS curriculum guidelines. With a successful, 25-year track record of molding our curriculum to meet the current demands of the marketplace, the MIS faculty was easily able to articulate broad statements of program goals. To make these goal statements more specific, however, we turned to the course syllabi. The best statements of each course's learning objectives are found there. We prepared a list of learning objectives drawn from the course syllabi within the MIS major. We reviewed this list and selected learning objectives that reflected what we believed were the essential learning components of the program. Some of the learning objectives summarize the intent of an entire course (e.g., design and develop interactive, data-driven, web-based applications), while others focus on a component of the course goals (e.g., understand change management). In addition, we also included some learning goals that reflect the 39 hours of business core courses our students take (e.g., accounting, finance), since those courses provide an essential foundation component of the MIS major.

With Bandura's (2001) guide for constructing self-efficacy scales as our reference, we created assessment statements for each learning objective (e.g., I feel confident in my ability to design and develop interactive, data-driven, web-based applications; I feel confident in my understanding of change management). The MIS faculty evaluated each statement to ensure that students should have had sufficient exposure to the terminology, concepts, and skill areas included on the measure prior to the administration of the survey. We also had a small sample of students review the assessment statements to ensure that the wording of the statements was understandable and easy to interpret.

Each statement is measured by a 0-7 point Likert scale, with 0 = not confident and 7 = highly confident. Ultimately, after thoughtful collaboration, the MIS faculty developed and agreed upon a list of 29 items that we believe define the primary skill and knowledge areas in which our MIS majors should gain competence and confidence as they progress through the program. The complete list of assessment item statements is shown in this paper's appendix.

3.3 MIS Major Learning Assurance Measure Administration

The MIS Learning Assurance measure was administered to junior and senior MIS majors at the end of each spring semester. We have administered this measure every year since 2008. When the measure is administered, we stress to the students that the assessment is in no way part of their course grade. We explain that we are not evaluating specific courses or faculty, but are trying to learn more about students' perception of their own learning in the entire MIS program (see the instrument instructions as shown in the Appendix). The assessment was anonymous to encourage students to answer honestly and thoughtfully. We do not collect any demographic data so that students can be completely confident in the anonymity of their responses, and therefore be more candid.

3.4 MIS Major Learning Assurance Measure Expectations

The MIS Major Learning Assurance measure is administered to students at two intervals in the program. A "mid-program" assessment is done with the junior class at the end of their junior year on the last day of the Systems Analysis and Design course. At this point, these students have completed the Intro to IS Course, two programming courses, and the Systems Analysis and Design course. We consider this the half-way point in the MIS program, and we wanted to get some idea of the junior-level students' perceptions of their learning. At this stage of the program, we expect the students to feel rather high confidence in their programming abilities and also in their understanding of the Systems Development Lifecycle, since the junior-level courses focus on these concepts and skills. We would expect some confidence in database concepts, because the students have some limited exposure to database concepts in the Intro to IS course, programming courses, and SA&D course, but we would not expect that confidence to be high. We also do not expect high confidence in IS management topics. We expect some confidence in knowledge of the business core course concepts since many students have nearly completed the business core, although the number of business core courses actually completed by the end of the junior year can vary quite a bit between students.

The same measure was administered to senior students at the end of their senior year in the IS Development Projects class. At this point, students have completed all of the MIS courses and most students have completed all business core courses. A few students do require a summer session or an additional semester to complete the business core courses. We expect that students will have high confidence in IS management concepts, database concepts, and the SDLC, since the senior-level courses focus on those concepts and skills. We also expect high confidence in business core course concepts.

We would expect to see improvement in the overall measures from the junior year to the senior year. It is plausible, however, that students may have lost some confidence in their programming skills because that is not the central focus of their senior level courses. If we did not see an improvement, we have identified an area that needs to be addressed by the faculty. Also, if the level of confidence on one or more measures begins to trend downward over time, we may have identified an area of the program to investigate.

4. RESULTS

The statistical results are shown in Table 1. The data collected in Table 1 displays the results of the most recent surveys administered in spring 2013 and spring 2014. They include 44 juniors in 2013 and 48 juniors in 2014. There were 35 responses from seniors in 2013 and 47 responses from seniors in 2014. Because the measures are administered during class, response rates are nearly always near 100%. For example, it is important to note that the 2013 juniors are

the 2014 seniors, which had an official enrollment of 48 students.

For virtually all questions, there are differences in means and standard deviations in the expected direction between

I feel confident in my ability to…							
	Group	Mean	SD		Group	Mean	SD
Item 1: … design and develop Visual Basic Applications for Windows	J-13	5.77	1.19	**Item 2:** …design and develop inter-active web-based applications	J-13	4.91	1.46
	J-14	5.02	1.28		J-14	4.83	0.88
	S-13	5.29	1.15		S-13	5.23	1.26
	S-14	5.36	1.33		S-14	5.83	1.01
Item 3: … learn a new programming language	J-13	5.91	0.95	**Item 4:** … use a database system (such as Access)	J-13	5.00	1.50
	J-14	5.50	1.35		J-14	4.31	1.27
	S-13	5.91	0.89		S-13	5.97	1.07
	S-14	6.26	0.79		S-14	6.02	1.28
Item 5: … use the software tools of the MIS profession…	J-13	4.65	1.48	**Item 6:** …perform the tasks associated with system analysis	J-13	5.47	0.83
	J-14	4.25	1.66		J-14	5.38	1.02
	S-13	5.69	0.99		S-13	5.54	0.95
	S-14	6.02	1.05		S-14	6.02	0.90
Item 7: …perform the tasks associated with system design	J-13	5.40	0.86	**Item 8:** …understanding of the System Development Life Cycle	J-13	5.81	0.96
	J-14	5.25	1.00		J-14	5.92	0.94
	S-13	5.63	0.94		S-13	5.86	0.94
	S-14	6.00	0.79		S-14	6.13	0.88
Item 9: … understanding of database theory	J-13	2.74	1.81	**Item 10:** …understanding of data models and database design	J-13	3.90	1.65
	J-14	2.98	1.79		J-14	4.17	1.58
	S-13	5.40	0.98		S-13	5.63	1.03
	S-14	5.02	1.54		S-14	5.04	1.03
Item 11: …understanding of data management	J-13	3.42	1.67	**Item 12:** … understanding of system implementation	J-13	4.49	1.55
	J-14	3.85	1.74		J-14	5.00	1.24
	S-13	5.37	1.09		S-13	5.20	1.16
	S-14	5.51	1.23		S-14	5.62	0.97
Item 13: … ability to design system testing strategies	J-13	4.02	1.66	**Item 14:** …understanding of the business functional areas, …served by IS	J-13	5.21	1.23
	J-14	4.40	1.47		J-14	4.75	1.68
	S-13	5.17	1.36		S-13	5.26	1.02
	S-14	5.72	1.17		S-14	5.96	1.12
Item 15: … manage an IS development project	J-13	4.39	1.53	**Item 16:** … understanding of change management	J-13	4.24	1.59
	J-14	4.77	1.59		J-14	5.15	1.20
	S-13	5.69	1.02		S-13	5.46	0.89
	S-14	6.17	0.94		S-14	5.72	0.95
Item 17: …understanding of the legal aspects of information and IS	J-13	3.88	1.82	**Item 18:** … understanding of professional practice in the IS field	J-13	4.79	1.44
	J-14	3.67	1.92		J-14	5.10	1.46
	S-13	4.97	0.98		S-13	6.00	0.91
	S-14	5.53	1.08		S-14	6.21	0.75
Item 19: … assist in defining and planning information systems	J-13	5.02	1.32	**Item 20:** …elicit information requirements for an IS	J-13	5.30	1.04
	J-14	5.33	1.02		J-14	5.25	0.79
	S-13	5.66	0.94		S-13	5.60	1.06
	S-14	6.06	0.84		S-14	6.00	0.91
Item 21: …design an information system	J-13	4.81	1.33	**Item 22:** … implement an information system	J-13	4.72	1.22
	J-14	5.06	1.02		J-14	4.73	1.40
	S-13	5.69	1.28		S-13	5.34	1.30
	S-14	5.85	1.00		S-14	5.91	0.88
Item 23: … manage information systems development	J-13	4.51	1.40	**Item 24:** … prepare and present the deliverables associated with the analysis phase	J-13	4.79	1.30
	J-14	4.52	1.41		J-14	4.83	1.34
	S-13	5.46	1.09		S-13	5.60	1.09
	S-14	6.02	0.85		S-14	6.02	0.87
Item 25: ..prepare and present the deliverables associated with the design phase	J-13	4.91	1.32	**Item 26:** … prepare and present the deliverables associated with the implementation phase	J-13	4.91	1.32
	J-14	4.77	1.19		J-14	4.33	1.52
	S-13	5.63	1.11		S-13	5.57	1.24
	S-14	5.98	0.82		S-14	6.06	0.82
Item 27: … prepare and present the deliverables associated with the maintenance and support phase	J-13	4.52	1.44	**Item 28:** … communicate information systems ideas in written form	J-13	4.95	1.31
	J-14	4.69	1.49		J-14	5.40	1.30
	S-13	5.40	1.14		S-13	5.71	0.99
	S-14	6.00	1.06		S-14	5.91	1.00
Item 29: … orally communicate information systems ideas	J-13	4.98	1.41				
	J-14	5.08	1.54				
	S-13	5.63	1.11				
	S-14	5.96	1.02				

Table 1: Mean Comparisons by Item

both groups of juniors and both groups of seniors. We have applied formal tests to determine the statistical significance of differences over the years, but we have been more concerned with *meaningful* differences between juniors and seniors. For example, Item 1 states "I feel confident in my ability to design and develop Visual Basic Applications for Windows." Juniors in 2013 had a mean of 5.77. The mean on that item for same students as 2014 seniors dropped to 5.36. We have observed similar differences over the years and believe it is due to the fact that juniors are typically enrolled in our Visual Basic course at the time of administration, whereas seniors may not have used Visual Basic in a year. This explanation is supported by the self-efficacy literature (Bandura, 1997) which indicates that self-efficacy is likely to decline over time when skills are not reinforced. As a result of this finding, we are much more aware of the need to reinforce skills learned early in the program over the length of the program, and are taking steps to ensure that occurs.

Another example is provided by item 17, "I feel confident in my understanding of the legal aspects of information and IS." When first administered in 2008, the mean scores for both juniors and seniors was well below the scale midpoint. Based on this feedback, adjustments were made in our Information Systems Management course to more thoroughly address IS legal issues. As a result, substantial improvement in mean scores on this item, demonstrated in Table 1, have been achieved.

5. DISCUSSION

Before beginning the discussion and interpretation of our results, it is important to remember the purpose of this MIS program learning assurance measure. The basis of the learning assurance measure is the set of specific learning objectives of our courses as articulated in the course syllabi. If this measure is to provide value to us as a way of assessing the learning outcomes of the students as they progress through our MIS program, it should enable us to collectively assess our students' degree of confidence and willingness to perform the tasks associated with the course learning goals, which we judge to be an important assessment perspective.

The results for the years displayed show that with the exception of the Visual Basic question, there was a difference in means in the expected direction between both groups of juniors and both groups of seniors. The results suggest that student confidence in their learning does increase from the midpoint of the program to the end of the program. In addition, the standard deviation is smaller for the senior groups compared to the junior groups in nearly every case. This result suggests that there is less variation in confidence among students in their learning at the end of the program compared to the midpoint. We believe both of these results (higher mean scores; less variance) are positive indicators of learning in our program. The fact that there are no meaningful differences between the two groups of juniors or between the two groups of seniors suggests that there is consistency in the learning activities of the courses over the two years of data reported in the study. This finding was not surprising in that we had consistent faculty coverage in all courses during these two years.

The value of this learning assurance measure is its ability to focus on student perceptions and confidence in learning, tied specifically to the learning objectives drawn from the courses in our curriculum. The measure gives us insight into an array of program elements, and helps us monitor student confidence levels in these program elements both at program midpoint and endpoint, and over time with successive classes of students.

We believe this measure has other advantages over typical end of program examination because of the difficulty of developing timeless assessment measures that would not quickly become technologically obsolete. As mentioned previously, one of the significant challenges in creating an end-of-program examination for assessing learning in an MIS major is the constant evolution in the technologies and applications that are covered. For example, just a few years ago, "cloud computing" was a new hot topic, and "social networking" was unheard of. We believe that the learning assurance measures we developed overcome these problems by focusing on timeless skills and competencies that we intend to be the primary learning goals of our curriculum.

Another advantage of this measure is its speed of administration. The learning assurance questionnaire we developed requires about 10 minutes for students to complete. We administer this questionnaire twice: at the end of the students' junior year, and again at the end of the students' senior year. The questionnaire can be administered quickly and takes little time away from the regular class activities. Basic analysis is fast and inexpensive and can be done with a spreadsheet.

The use of this measure has also encouraged a collegial discussion among MIS faculty on issues such as how to make course objectives listed in course syllabi more consistently stated, specific, and measurable, as well as how this measure might be refined over time. One very useful insight is the need to reinforce skills across the length of the program. For example, seniors frequently have indicated less confidence in their programming skills than juniors. The two required programming courses are offered at the beginning of the program and those skills may not be required again until the end of the program project. Consistent with the self-efficacy literature (Bandura, 1997), self-efficacy diminishes without regular reinforcement. Based on our findings, we recognize the need, and have made it a priority to consistently reinforce student skills as they progress through the course sequence.

Finally, we do not believe it is sufficient to perform a one-dimensional assessment of student learning, and we do not advocate measuring student confidence as the only program outcome. Confidence in learning, while important, must be tempered by also assessing competence and mastery. As mentioned previously, we utilize an evaluation of "real-world" student projects as a direct measure and critical component of our program's learning assurance process. However, we have found the learning assurance measure described in this paper provides practical comparisons and insights that are a valuable supplement to more traditional learning assurance measures.

6. LIMITATIONS AND CONCLUSIONS

The learning assurance measure described in this paper was designed specifically to measure the learning goals of our MIS major. Consequently, the measure is tied directly to the course learning objectives of our MIS courses. We would not expect this exact instrument to generalize to all MIS programs. Other MIS programs that would like to utilize this measure should consider using our learning assurance statements as a starting point for their own assessment instrument, but will have to modify the statements to reflect the unique structure and learning outcomes of their own course curricula.

In addition, our situation is characterized by an MIS faculty who is highly collegial and who communicate routinely about our MIS program. We did not face any kind of resistance when implementing this learning assurance measure. Reviewing the results has been a springboard to productive conversations about our courses and curriculum. Since the measure makes it possible to pinpoint weaknesses in a program attributable to specific courses, however, the measure could be perceived as threatening by some faculty in a less collegial environment.

As mentioned earlier, we have chosen to provide the respondents complete anonymity, which we believe is a good thing. As a result, however, we have no way of capturing demographic or other data that might provide additional insights. Given that our majors are very homogenous and traditional (predominantly 20-22 year-old males), we are not sure that collecting additional demographic data would be useful. To date, we think it is worth the tradeoff to get an honest assessment of confidence/capabilities from juniors (perhaps most threatened if we attached names, etc.) and seniors. We believe that the response patterns described in this paper are also attributable to the honesty that comes from complete anonymity. Again, this is a complementary measure designed to provide additional learning assurance insights.

Finally, the use of self-report measures is always a subject for concern. We regularly review our students' responses, looking for any evidence of a ceiling effect (students circling a single number such as "7" for all statements), and have found very few questionnaires that showed this pattern. We believe this consistent mode of responding indicates our students are responding seriously and honestly. We do recognize the concerns of self-report measures, however, and that is also why we advocate this type of measure as a valuable, but not sole, component of a comprehensive learning assurance program.

In summary, we have described the development and use of a learning assurance measure that enables us to evaluate our students' learning as reflected by their confidence, persistence, and willingness to undertake MIS-related tasks. We believe this is an important indicator of learning. We hope that the description of our process and measure might inspire others to follow a similar path and develop similar measures. In programs with a larger, more diverse student enrollment, anonymity could be dropped and student responses could be related to actual competency-based measures. This could provide interesting insight into the validity of this self-reporting measure, and could be a fruitful direction for future research.

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APPENDIX

We are interested in gathering student perceptions of learning in the MIS program. This questionnaire will be administered at the mid-point and at the end of the MIS program. Your feedback will allow us to identify areas in our program where improvements can be made. **We are not evaluating specific faculty or courses.** Rather, we are attempting to gain an overall perspective on our MIS major. Please answer all questions honestly and thoughtfully. Do not put your name on the questionnaire.

		Not Confident Moderately Confident Highly Confident
Q1	I feel confident in my ability to design and develop Visual Basic applications for Windows	0…..1..…2..…3..…4..…5..…6..…7
Q2	I feel confident in my ability to design and develop interactive, data-driven, web-based applications	0…..1..…2..…3..…4..…5..…6..…7
Q3	I feel confident in my ability to learn a new programming language	0…..1..…2..…3..…4..…5..…6..…7
Q4	I feel confident in my ability to use a data base management system, such as Access	0…..1..…2..…3..…4..…5..…6..…7
Q5	I feel confident in my ability to use the software tools of the MIS profession, such as Project and Visio	0…..1..…2..…3..…4..…5..…6..…7
Q6	I feel confident in my ability to perform the tasks associated with system analysis	0…..1..…2..…3..…4..…5..…6..…7
Q7	I feel confident in my ability to perform the tasks associated with system design	0…..1..…2..…3..…4..…5..…6..…7
Q8	I feel confident in my understanding of the Systems Development Life Cycle	0…..1..…2..…3..…4..…5..…6..…7
Q9	I feel confident in my understanding of database theory	0…..1..…2..…3..…4..…5..…6..…7
Q10	I feel confident in my understanding of data models and database design	0…..1..…2..…3..…4..…5..…6..…7
Q11	I feel confident in my understanding of data management	0…..1..…2..…3..…4..…5..…6..…7
Q12	I feel confident in my understanding of system implementation	0…..1..…2..…3..…4..…5..…6..…7
Q13	I feel confident in my ability to design system testing strategies	0…..1..…2..…3..…4..…5..…6..…7
Q14	I feel confident in my understanding of business functional areas, such as finance, accounting, and marketing, which are served by information systems	0…..1..…2..…3..…4..…5..…6..…7
Q15	I feel confident in my ability to manage an information systems development project	0…..1..…2..…3..…4..…5..…6..…7
Q16	I feel confident in my understanding of change management	0…..1..…2..…3..…4..…5..…6..…7
Q17	I feel confident in my understanding of legal aspects of information and information systems	0…..1..…2..…3..…4..…5..…6..…7
Q18	I feel confident in my understanding of professional practice in the information systems field	0…..1..…2..…3..…4..…5..…6..…7
Q19	I feel confident in my ability to assist in defining and planning information systems	0…..1..…2..…3..…4..…5..…6..…7
Q20	I feel confident in my ability to elicit requirements for an information system	0…..1..…2..…3..…4..…5..…6..…7
Q21	I feel confident in my ability to design an information system	0…..1..…2..…3..…4..…5..…6..…7
Q22	I feel confident in my ability to implement an information system application	0…..1..…2..…3..…4..…5..…6..…7
Q23	I feel confident in my ability to manage information systems development	0…..1..…2..…3..…4..…5..…6..…7
Q24	I feel confident in my ability to prepare and present the deliverables associated with the analysis phase of an IS project	0…..1..…2..…3..…4..…5..…6..…7
Q25	I feel confident in my ability to prepare and present the deliverables associated with the design phase of an IS project	0…..1..…2..…3..…4..…5..…6..…7

Q26	I feel confident in my ability to prepare and present the deliverables associated with the implementation phase of an IS project	0…..1..…2..…3..…4..…5..…6..…7
Q27	I feel confident in my ability to prepare and present the deliverables associated with the maintenance and support phase of an IS project	0…..1..…2..…3..…4..…5..…6..…7
Q28	I feel confident in my ability to clearly communicate information systems ideas in written form for a variety of business audiences	0…..1..…2..…3..…4..…5..…6..…7
Q29	I feel confident in my ability to orally communicate information systems ideas for a variety of business audiences	0…..1..…2..…3..…4..…5..…6..…7

STATEMENT OF PEER REVIEW INTEGRITY

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