In this issue:

Extending the Value of MIS Programs

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Abstract: In recent years, the educational fields of computer science and related computer disciplines have experienced a downturn in student interest. Although the demand for computer technologists is expected to increase, the number of students entering this field of study has steadily declined. Affected departments are resorting to innovative approaches to cope with the situation. Since the value of computing and communications technologies lies in their application, it is natural to consider the possible support Management Information Systems (MIS) programs could provide to other disciplines and professionals. In this paper, the authors explore the extended value of MIS to Accounting majors in their preparation for acquiring professional certification. They specifically examine the technology content of the Certified Internal Auditor (CIA) certification examination and determine the degree to which the MIS curricula (2002 Model and its implementation in their university) meet the content specifications of the examination. Through this illustration, they put forward an approach for extending the value of MIS programs.

Keywords: MIS program, Certified Internal Auditor Examination, IS2002 Model Curricula

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Extending the Value of MIS Programs

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ABSTRACT

In recent years, the educational fields of computer science and related computer disciplines have experienced a downturn in student interest. Although the demand for computer technologists is expected to increase, the number of students entering this field of study has steadily declined. Affected departments are resorting to innovative approaches to cope with the situation. Since the value of computing and communications technologies lies in their application, it is natural to consider the possible support Management Information Systems (MIS) programs could provide to other disciplines and professionals. In this paper, the authors explore the extended value of MIS to Accounting majors in their preparation for acquiring professional certification. They specifically examine the technology content of the Certified Internal Auditor (CIA) certification examination and determine the degree to which the MIS curricula (2002 Model and its implementation in their university) meet the content specifications of the examination. Through this illustration, they put forward an approach for extending the value of MIS programs.

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1. INTRODUCTION

The estimated percentage of newly declared Computer Science and Computer Engineering majors declined by about 48 percent between the Fall of 2002 and 2005 (Zweben, 2006). A recent study (Hira and Hira, 2005) observes that, nationwide enrollments in MIS departments within Business Schools are down by more than 20 percent. One of the reasons attributed for the reduction in enrollment is offshore outsourcing (Matloff, 2004). Over the past five years, many U.S. software developers and hardware manufacturers have obtained financial advantages through the pursuit of overseas development. Offshore outsourcing offers U.S. businesses several advantages including lower wage rates, favorable exchange rates and governmental subsidies in select countries, lower costs of living and 24/7 time platforms (Weinberger, 2003). Through overseas contracts, companies leverage their in-house expertise with the technical acumen of a large, willing and highly-skilled technical workforce. The need for skilled developers will continue as the invasive nature of computing continues to expand into all aspects of society. Thus, a broadening range of expertise will be required to develop special-

ized systems to accommodate a variety of needs (McGettrick, Boyle, Ibbet, Lloyd & Lovegrove, 2005).

Academicians have suggested several strategies to both enhance enrollment as well as cope with the consequences of reduced enrollment (Ferguson, Henderson, Huen & Kussmaul, 2005; Rajaravivarma & Surendran, 2005). Specifically, they suggest adjusting the programs for market situations for retaining their viability. With the pervasiveness of technology in every aspect of life, opportunities can be found by looking beyond the boundaries of the programs themselves and expanding into other areas. These include integration into other degree programs having a high dependence upon technology, preparation for certification examinations, and continuing education.

In this paper, the authors first explore the possibility of extending MIS services for preparing the Accounting majors for their professional examinations as a means to answer a broader research question of *how to extend the value of MIS/CIS programs*. As part of their solution, they then devise a mechanism for determining the extent to which the current MIS programs provide support in the preparation of IS/IT topics in the Certified Internal Auditor (CIA) examination. They identify the deficiencies and suggest a comprehensive solution in the form of a customized IS minor. In the next section, they establish the background to the larger research question by examining the motivational factors behind the research: the IT aspects of accounting certifications and the opportunities provided by computing curricula.

2. BACKGROUND

In his 2001 article, Denning noted the need for a demand-side mentality in the field of computer science as directional control shifted from computer technologists to community and industrial leaders. Computer technologists manage the "intellectual and scientific core of the field," but the products are driven by the demands and practical concerns of the common users (Denning, 2001). The challenge now facing the field of computer science is to cross "the chasm that separates computing, the discipline, from IT, the profession (Denning, 2001)." Technology plays a part in almost

every industry. Thus, capitalizing on that role through specialized discipline-oriented classes could be another alternative for rescuing declining programs (McGettrick et al., 2005). Over the past five years, degree programs related to areas such as health care, finance, marketing, and accounting have experienced marked increases in enrollment numbers. With the growing concern for financial accountability and increasing legislative actions instituting more stringent fiscal reporting procedures and auditing controls, the need for technical support to implement these measures will continue to increase. Thus, the field of accounting is emerging as an area offering the possibility for positive collaborative educational efforts between the technical and business realms. This is especially true with respect to academic curricula development, compliance with the Sarbanes-Oxley Act of 2002 (SOX), achievement of various professional certifications, and continuing professional education credit.

IT in Accounting Education

The American Institute of Certified Public Accountants (AICPA),the American Accounting Association (AAA), the Institute of Management Accountants (IMA), the Institute of Internal Auditors (IIA), the International Federation of Accountants (IFAC), and other professional organizations have stressed the need to integrate more IT training into accounting education. For example, the IFAC (2006) identified IT education requirements for students planning to enter the accounting profession and for professional accountants in the International Education Guidelines: Information Technology in the Accounting Curriculum. The AICPA (1996) provided strategies for integrating information technology into the accounting curriculum, responding to an earlier version of the guidelines.

Albrecht and Sack (2000, 52) recommended reforms in several areas of accounting education to better meet the needs of the accounting profession. One such area was IT instruction. They found that accounting professionals and accounting faculty ranked information systems as the second most important topic of study for an accounting major. IT skills were found to be the fourth most important skill for accounting students

after analytical and critical thinking, written communication, and oral communication.

In the May 2005 issue of The CPA Journal, O'Donnell and Moore asked "Are accounting programs providing fundamental IT control knowledge?" In answering this question, the authors reviewed the status of the AIS/IT auditing course in accounting programs in respect to the size of the accounting department, as well as the IT interests of full-time accounting faculty. The results of the study suggested that there are many students graduating from accounting programs that do not provide IT control knowledge or other IT competencies needed in the accounting field. The ubiquities of computer systems throughout organizations and the increased emphasis on assurance of information technology processes in relation to accounting practices has increased the awareness and need for accounting professionals to have IT control knowledge and skills.

The Public Company Accounting Oversight Board's (PCAOB) Panel on Audit Effectiveness, which was created with the passage of SOX, noted an increasing need for auditors to have a higher level of technology skills, and recommended that firms develop specific training programs in IT for auditors. Schools, in turn, were asked to help with this effort by providing accounting graduates with the basic skills to satisfy the expanding need for accountants with IT control knowledge (O'Donnell and Moore, 2005).

The AICPA, recognizing the challenges faced by accounting educators to integrate IT into accounting curriculum and by accounting professionals to keep up-to-date with the rapidly changing IT environment, created the Technology Curriculum and Competency Model Task Force to define IT competencies for the accounting profession. This Committee, in 1996, responded to an earlier version of the IFAC's International Education Guideline (IEG) 11: Information Technology for Professional Accountants by providing a document that called for a new "mind set" and offered strategies for integrating IT as a core part of the accounting program rather than a discipline peripheral to accounting (IFAC, 1996, 2). IEG 11 (IFAC, 2006) was recently revised; the AICPA strategies of integration are even more important.

Robert Half International, Inc. (2005) emphasized that "Accountants are at a professional advantage if they can communicate clearly with the firm's chief information officer (CIO) and information technology staff. Specifically, accounting professionals will need an excellent working knowledge of the implementation of new and existing business applications, system integrity and security, data mining, and knowledge management" (Robert Half International, Inc., 2005, 6). Lending further support to the importance of IT knowledge, the Institute of Internal Auditors have acknowledged that business people must be able to communicate effectively with their information technology staff in order to identify and manage the risks that threaten the availability, confidentiality, and integrity of the organization's core information assets (IIA). Technology proficiency will remain a critical skill for next generation accountants as firms continue to seek employees who understand both the financial and technology aspects of various business initiatives (Robert Half International, Inc., 2005). Therefore, academicians across disciplines should work together to develop curricula that prepare future business and accounting professionals for IT challenges and opportunities.

Accounting Certifications

There has been a significant expansion and demand for professional certification relating to accounting and technology. Results of the Robert Half International, Inc. 2005 survey reported in the March 2006 Journal of Accountancy emphasized that although the certified public accountant (CPA) licensure "remains a key requirement for advancement in public accounting and private industry," the certified internal auditor (CIA), the certified management accountant (CMA), the certified fraud examiner (CFE), the Certified Information Systems Auditor (CISA), the Certified Information Systems Security Professional (CISSP), and the Certified Information Technology Professional (CITP) are also some of the most marketable and in demand certifications for accounting and finance professionals who wish to demonstrate expertise in business technology issues (AICPA, 2006, 17). Although the focus of each of these certifications is unique; the need for demonstrating competency in IT concepts and topics is a common thread running through all of the certifications.

Certified Internal Auditing

Certified internal auditors with requisite IT knowledge and proficiency are in increased demand. As business controls and processes continue to be automated, reliability, accuracy, and timeliness of financial reporting depends heavily on IT systems being implemented and monitored for effectiveness. The Sarbanes-Oxley Act of 2002, which was passed to increase the credibility of financial reporting, has created a greater need for public companies to have IT controls in place to help ensure the reliability of financial data and compliance with the law. Management is expected to document and test relevant general IT controls in addition to appropriate application-level controls that are designed to ensure that financial information generated from a company's application systems can reasonably be relied upon. Appropriate controls must, therefore, be put in place so that technology can enable compliance (Damianides, 2005, 78). Accounting, internal auditing, and IT personnel will need to interact closely with each other and with management to ensure that the proper IT controls are identified, implemented, and monitored.

The Certified Internal Auditor (CIA) designation is the only globally accepted certification for internal auditors and remains the standard by which individuals demonstrate their competency and professionalism in the internal auditing field. The CIA examination is administered by The Institute of Internal Auditors (IIA). The CIA certification, in particular, requires that candidates demonstrate proficiency or knowledge of the internal auditor's role in governance, risk and control, the internal audit engagement, business analysis, information technology, and business management skills. Candidates must exhibit a thorough understanding and ability to apply concepts (denoted as Level P for proficiency) or knowledge of terminology and fundamentals (denoted as Level A for awareness) in various topic areas. This paper will provide a technique for relating those competencies to IT curricula.

ACM Computing Curricula 2005

In order to meet the IT content required for the various accounting certifications with the existing resources, one could first examine the various computing curricula. Of the five undergraduate degree programs in comput-

ing (ACM, 2005), the Information Systems Curriculum (IS2002) and the Information Technology Curriculum (IT2005) appear to address the organizational systems issues better than the other three (Computer Science, Computer Engineering, and Software engineering). IT2005 is relatively new and lacks model curricula. On the other hand, model curriculum and guidelines are available for IS. Most business schools use these guidelines in designing their own MIS/CIS programs. The topics listed under each of the ten courses in the IS course specifications (Gorgone, Davis, Valacich, Topi, Feinstein, & Longenecker, 2002) are considered in this paper.

3. METHODOLOGY

If taking a few relevant MIS courses might help the accounting majors in their CIA certification effort, the question then becomes, which courses in the MIS curriculum are relevant? A practical method is presented here for answering this question and for determining other supplementary courses needed to cover all the IT topics in the CIA certification. This method effectively uses the following available resources:

- The list of IT topics in the CIA certification and the level of competence for each topic (See http://www.theiia.org/?doc_id=22 for the CIA syllabus)

- The topic descriptions for each course in the IS2002 model curriculum (See Gorgone et. al, 2002 for the curriculum details)

- The courses and topics offered in an MIS program that implements the IS2002 model curriculum. (See Table 1 for an example curriculum used in this paper.)

The method itself consists of mapping topics at two levels. At the first level, the mapping is performed between the CIA syllabus and the IS2002 Model Curriculum. In the second level, the mapping is provided between the IS2002 Model Curriculum and an actual MIS program. The mapping model was developed by entering all of the IT related topics, along with their corresponding competence levels as specified in the CIA certification syllabus, into the first column of a model. For each topic, the respective courses having matching topics in their descriptions are noted in the next column in the table. This

is not a difficult task since there are only ten courses to examine and the topics and the scope of the model courses are clearly spelled out. In an ideal situation, an analysis of the topic matches at this stage will reveal the courses useful for taking the CIA certification examination.

Table -1: A Sample MIS curriculum (core and optional courses) used in the Paper

Course Code	Course Name
MI375	Management Information Systems
MI410	Business Database Systems
MI420	Telecommunications Management
MI430	Knowledge-Based Decision Support Systems
MI439	Electronic Commerce
MI440	Web Design for Electronic Commerce
MI445	Systems Analysis and Design
MI464	System Implementation and Practice
MI574	Information Technology Management
IS130	Visual Basic Programming I
IS330	Visual Basic Programming II
AD339	Network Support Systems

However, in reality, the model curriculum courses are not used as they are in actual MIS and CIS programs. Instead, the MIS and CIS programs are designed around the model curriculum and have their own courses. In other words, the model curriculum is a standard and the actual MIS and CIS programs are IS2002 model-compliant implementations. For instance, IS2002.7 (Analysis and Logical Design), IS2002.8 (Physical Design and Implementation with DBMS) and IS2002.9 (Physical Design and Implementation in Emerging Environments) are rarely implemented as three courses. Usually the Analysis and Design (Logical and Physical) are combined into one course for practical reasons. Further, there are separate database courses that may address DBMS and Web courses involving server side DBMS. This situation thus leads to the need for a second level mapping for a proper topic match analysis.

At the second level, the topics offered in the various CIS or MIS courses within the IS2002 framework are examined. Specifically, the MIS courses that correspond to the model courses (in the second column) are identified and recorded in the third column of the table. In addition, the instructors who offer these courses are consulted to determine the levels of competence their courses are intended to develop in each of the matching topics in the second column.

The table now provides a reasonable framework to carryout an analysis that leads to the selection of courses in the MIS or CIS programs that would be of relevance to the accounting majors intending to pursue CIA certification. The analysis also reveals IT related topics in the CIA syllabus that do not receive adequate coverage. Such deficiencies may be addressed with supplementary courses. Results pertaining to an analysis based on the above methodology are discussed in the next section.

4. RESULTS AND ANALYSIS

The CIA syllabus has four major parts. The IT components appear in Part II: Conducting the Internal Audit Engagement and Part III: Business Analysis and Information Technology. All the IT topics in Part II are examined for level P competence (thorough understanding and ability to apply concepts are tested) and all IT topics in Part III are examined for level A competence (knowledge of terminology and fundamentals are tested). In both Parts II and III, the topics appear to be the same, except for some minor variations.

Appendix A has three major columns which are concerned respectively with, the CIA syllabus, IS2002 Curriculum, and the MIS program offered in the authors' institution. The first column is further divided into two separate sub-columns. The IT topics in the CIA syllabus are listed in the second sub-column, while the first column provides references to topics in the syllabus. Under the second major column in Appendix A, the corresponding IS2002 Model Curriculum course codes and the matching topics for the topics in the first column are recorded. Since the IT topics in the syllabus are at a macro level, all relevant subtopics from the model courses need to be considered. As a result, for a single syllabus topic, there may be more than one model course that offers matching subtopics. For instance, IS2002.1, IS2002.3, IS2002.5 and IS2002.7 collectively cater to the syllabus topic Application

Development. Certain management topics like control frameworks and IT investment evaluation are not mentioned exclusively in the model curriculum courses. However, such topics and others like ERP may be taught in some of the actual MIS courses. Only limited (rather narrow) subtopics in model curriculum courses are found for syllabus topics like Data Center Operations, Web Infrastructure and Software Licensing. The first level analysis thus provides some indication for the need for supplementary courses not mentioned in the IS2002 model curriculum.

The last major column also has two sub-columns. The second sub-column shows the corresponding MIS program courses (Table-1) that match with the model curriculum topics mapped in the previous step. In some instances, there are no matching model curriculum topics corresponding to some of the topics in the syllabus. However, it may be possible to find matching optional courses in the MIS programs in which such syllabus topics are taught. Optional courses like AD339 (Network Support Systems) and MI575 (IT Management) do include some of the topics required in the CIA certification syllabus.

The required competence level for each of the topics in CIA certification syllabus is indicated by, as noted earlier, either Level P or Level A. A candidate must exhibit a thorough understanding and ability to apply concepts in Level P topics and knowledge of terminology and fundamentals in Level A topics. From these descriptions, it appears that someone who is able to demonstrate Level P competence in a topic would not require additional preparation for demonstrating Level A competence in that topic.

All the IT related topics listed under Part II of the CIA syllabus are tested for Level P competence, and those under Part III, for Level A. In Appendix A, the first 15 topics are tested for both Level A and Level P competence and the remaining two are tested for Level A competence only.

By examining these courses for their content and delivery, the authors were able to determine the competence level for which the respective courses can prepare the participants in various topics listed in Appendix A. A quick examination of these findings (listed under Competence) indicates that the pre-sent MIS courses collectively can prepare a candidate adequately in both the topics requiring Level A competence and in 12 of the 15 topics requiring Level P competence. The topics that the MIS courses fail to address to the required level of competence are: System Security, Information Protection, and ERP. In addition, the MIS courses do not seem to include the control framework topic.

Relevant Courses

MI375 is a required core course for all majors in the school of business (including accounting majors). In addition, the Accounting program includes an Accounting Information Systems course. In this course, the following certification related topics are included: systems analysis tools, current hardware and software, microcomputer and end-user accounting, data communication systems, systems development, internal controls in EDP systems, AIS in revenue, expense, procurement, financing, payroll and production cycle, executive information and decision support systems, electronic commerce, and global internet communication and ethics. However, the predominant focus on these topics is on awareness or knowledge rather than on proficiency or application.

From Appendix A, the following courses seem to contribute significantly to preparation for the CIA certification: MI375, MI410, MI420/AD339, MI445, and MI439/MI440. Since MI375 is core course in all business programs, accounting majors could consider the following four courses to support CIA certification: Business Database, Network Support Systems, Electronic Commerce, and Systems Analysis and Design.

A Few Implementation Strategies

A simple approach would be to develop a minor in MIS that requires these four courses. At present, the accounting program does not require a minor so this approach would impose more hours on the typical undergraduate program. However, the minor could be promoted as part of the 150 semester hours candidates are required to take to sit for the CPA examination. Alternatively, two new customized courses could be designed to cater to the certification requirements: one of them (say, IT Infrastructure) dealing with networks and e-commerce and the other dealing with data-

base and their analysis and design (say, IT Application). In both courses, only the relevant topics from these four MIS courses would be covered. The CIA syllabus topics that are not considered in the MIS course could also be included in the appropriate places. For instance, the control framework could be included in the IT Application course. Alternatively, such accounting specific topics could be included in the Accounting Information Systems course.

Another possible alternative for addressing the IT needs of the CIA certification would be to provide an IT certificate program consisting of short courses covering the missing topics. With this alternative, the accounting program would not need to add a minor and a designation could be placed on students' diplomas regarding the satisfactory completion of the additional certificate. The courses could also be offered to accounting professionals in order to enhance their skills and to provide continuing education credit for various professional certifications as well as improve the enrollment numbers.

5. CONCLUSION

One of the strategies suggested for coping with declining enrollments in computing programs is to consider the possibility of offering support courses for other majors or professionals. Increased enrollments in accounting programs, the 150-semester hours requirement for sitting for the CPA examination, the increased demand for certified internal auditors, and the growing popularity for other technology-related professional certifications would seem to provide fertile development opportunities. Professional accounting certification requirements cover several IT related topics, thus, the provision of IT short courses should be mutually beneficial to both accounting and IT programs. In this paper, the authors present an effective approach for identifying MIS courses that could support CIA certification. This process involves consideration of IS2002 model curriculum to address variations in actual MIS programs. By adjusting the certification requirements to cover a different accounting certification, this approach can easily be extended to the analysis of other accounting related certifications. It is to be noted that such a mapping technique is not new. Exhaustive learning unit approach (Daigle et al, 2004) was used to map an MIS

curriculum from the IS2002 model. However, in the present paper topic matching is considered in place of learning units.

The probability of success for the type of program suggested by the authors is dependent upon the cohesiveness of the two departments. In the authors' institution, the faculty members in MIS and Accounting areas are in the same department. Thus, this situation offers a very conducive environment for considering such enrollment enhancing initiatives.

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Appendix A: Framework Relating CIA Syllabus, IS2002 Curriculum and an MIS Program

IT Related Topics in CIA Examination		IS2002 Model Curriculum Components		MIS Curriculum in Use	
Part-Task-Area..	Topic	Course	Topic	Competence (Aware/Proficient)	Course Code
II-B-1k-1 III-E-11	Operating Systems	IS2002.4	Operating systems functions and types, operating system modules	Proficient	MI375/MI420 AD339
II-B-1k-2	Application Development	IS2002.3	IS development process	Proficient	MI375MI445
		IS2002.1	Developing a solution using database software	P Proficient	MI375, MI410, MI464
III-E-12		IS2002.5	Algorithm development; programming structures, programming in traditional and visual development environment	Proficient	IS130/ IS330, MI440
		IS2002.7	Life cycle phases, methodologies	Proficient	MI445
II-B-1k-3	Data and Network Communications	IS2002.6	Network and web applications, topologies, protocols, network performance	Proficient	MI375/MI420/AD339/
III-E-2		IS2002.1	Networks and applications	Aware	MI420/ AD339
II-B-1k-4	Voice Communications	IS2002.6	Telecommunication configurations	Aware	MI420 AD339
III-E-13		IS2002,1	Telecommunications systems	Proficient	MI375/MI420/AD339
II-B-1k-5	System Security	IS2002.6	Privacy, security, firewall, reliability	Aware	MI375/MI420/AD339
III-E-15		IS2002.1	Information security and crime	Aware	MI375/MI420/AD339

| IT Related Topics in CIA Examination | | IS2002 Model Curriculum Components | | MIS Curriculum in Use | |
Part-Task-Area..	Topic	Course	Topic	Competence (Aware/Proficient)	Course Code
II-B-1k-6 III-E-14	Contingency Planning	IS2002.2	Disaster recovery planning, information accuracy and error handling	Proficient	MI375/ MI464
II-B-1k-7	Databases	IS2002.8	Models of databases, data dictionaries, data warehousing and data mining, database implementation	Proficient	MI375/ MI410
III-E-16		IS2002.1	Database features, functions and architecture	Proficient	MI375/ MI410/MI464
II-B-1k-8 III-E-6	Data Center Operations	IS2002.1	IS Professional career path	Proficient	MI375 MI575
II-B-1k-9	Web Infrastructure	IS2002.0	Web page design and publishing,	Proficient	MI375/MI439/MI440
III-E-18		IS2002.2	Design of solutions for the internet, intranets, and extranets.	Proficient	MI439/MI440
II-B-1k-10 III-E-17	Software Licensing	IS2002.3	Societal and ethical issues related to information system use	Proficient	MI375/MI440
II-B-1k-11 III-E-3, -5	EFT and EDI	IS2002.2	EDI, payments systems, support for inbound and outbound logistics	Proficient	MI375/ MI439
II-B-1k-12 III-E-4	e-Commerce	IS2002.2	E-commerce economics, consumer behavior, technology architectures of e-commerce	Proficient	MI439/MI440

| IT Related Topics in CIA Examination | | IS2002 Model Curriculum Components | | MIS Curriculum in Use | |
Part-Task-Area..	Topic	Course	Topic	Competence (Aware/ Proficient)	Course Code
II-B-1k-13	Information Protection (against Viruses; privacy)	IS2002.2	Information privacy and security	Aware	MI375/ MI420
III-E-8		IS2002.6	Privacy and security	Aware	MI375/ MI420/ MI439/ MI440
II-B-1k-14	Encryption	IS2002.2	Information privacy and security	Proficient	MI375/ MI420/ MI439/
III-E-7					
II-B-1k-15	ERP software			Aware	MI375/ MI464/ MI575
III-E-10					
III-E-1	Control Framework (eSAC, COBIT)				
III-E-9	Evaluate investment in IT (Cost of ownership)			Aware	MI575