

The Evolution of an Accounting Information Systems Concentration: Concepts and an Example

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Abstract

There is no doubt accounting educators need to better prepare students for the information age. However, when accounting faculty begin to address the improvement issues, they realize two daunting truths. First, there is a shortage of talent in the area lying between the fields of MIS (whose professionals often know little accounting) and accounting (whose professionals are not always proficient in systems development and design), especially when it comes to integrating MIS and technology concepts with accounting material as required by an AIS program. Second, the demand for such hybrid expertise is higher today than ever in the past. The demand creates wonderful opportunities for institutions seeking to improve their program and market their students to the accounting and MIS professions. But the lack of expertise means that assembling a qualified faculty to achieve such improvement may prove a daunting task. This article describes one approach which has been successful in developing an Accounting Information Systems program at an institution in spite of such problems.

Introduction

It was not many years ago that accounting educators could safely ignore the details of computer systems and their development. However, that is no longer true given the astounding rate of change in information technology. In the last ten years, the accounting field has been transformed from an environment dominated by expensive mainframe computers programmed by specialized management infor-

mation system (MIS) staff to one of networked microcomputers often operated by accountants themselves. Businesses are coming to rely on the next generation of accountants to be familiar not only with the systems of today, but to prepare for the systems of tomorrow, whatever they may be.

Today's accounting graduates should be more than merely reactionary to technological change. They should be prepared to actually help *shape* the systems of tomorrow. To accomplish this, they must possess both technical skills

Comments and questions concerning this article should be sent directly to the authors via e-mail.

and conceptual knowledge of accounting information systems. Students need to know what makes a good accounting system today, and what will make a good accounting system tomorrow. This paper discusses concepts relevant to the implementation of an accounting information systems (AIS) concentration, including some of the problems facing institutions who wish to implement such a program. The authors use the AIS program at James Madison University as an example of the evolution of an AIS program.

An AIS Concentration

One method of preparing students for accounting in the information age is to establish of an AIS concentration within an accounting curriculum.¹ Almost all of today's accounting majors take an elementary computer literacy course wherein they learn fundamental computer principles and perhaps some elementary productivity software. Most also receive a "systems" course introducing them to the concepts of integrated accounting systems. However, an AIS *concentration* offers an opportunity for students to go beyond elementary exposure to accounting systems. In an AIS concentration, students obtain a mastery of today's technological tools, and just as importantly, a conceptual basis for understanding and evaluating the tools of tomorrow.

An AIS concentration possesses three characteristics. First, the concentration is a blend of accounting and management information systems (MIS). It examines information systems problems within an *accounting* context. Programs that rely exclusively on MIS courses for the technological part of the program are not a true *Accounting Information Systems* concentration. Such programs do not achieve the synergy necessary for students to relate the more advanced MIS concepts to complex accounting problems.

Second, an AIS concentration is computer-based. AIS must be a hands-on concentration. In order to master technology, one must *use* technology. For example, conceptual study of database design without experiential applica-

tion of those concepts does not lead to a complete understanding of the nuances and details of a well-designed relational database system. Lecturing on the problems inherent in a systems development life cycle is not as effective as having the students experience such problems and develop solutions by actually engaging in a systems development project.

Third, and most important, an AIS concentration should be created and directed by accounting faculty. In order for an AIS concentration to offer maximum benefit for *accounting* students, it must integrate the MIS concepts into the *accounting* environment. This integration can only be done by faculty thoroughly familiar with the specialized knowledge of accounting and the needs of users of accounting information systems.

Development and implementation of an AIS concentration can be viewed as four steps: (1) establishing the concentration; (2) building the demand; (3) enhancing the curriculum; and (4) planning for the future. Each of these steps will be discussed, with examples of how James Madison University followed these steps to implement an AIS concentration within its accounting curriculum.

The First Step: Establishing the Concentration

Concept A: Establishment of an AIS concentration is an evolutionary process.

Concept B: Resource acquisition is critical to the success of an AIS concentration.

Concept C: Selection of the AIS curriculum should match the institution's mission.

Creating an AIS curriculum requires imagination and creativity and does not happen overnight. The most practical approach is to take a long-run view. That is, realize that establishment of an AIS concentration takes time. Implementation of such a program may take place over a period of years, often beginning

with a single instructor, perhaps using some MIS courses initially, and growing into a full-scale AIS program as demand dictates.

A school must also consider the availability of both institutional and instructional resources. One of the major obstacles in instigation of an AIS concentration is the short supply of qualified accounting faculty. As previously stated, MIS faculty often are not intimately familiar with the details of accounting and auditing. By the same token, most accounting faculty are not familiar with information systems design or the application of advanced technology. Further, many traditional MIS programs are geared more towards the traditional mainframe environment than today's information environment. Accounting educators are often too busy keeping up with accounting rules modifications, tax changes, and even changes in education to stay abreast of technological innovations. Employing accounting faculty trained in accounting information systems is critical to the success of the AIS program.

In addition to seeking and hiring qualified AIS faculty, other costs include faculty computers, software and ongoing faculty training. AIS faculty should ideally have state-of-the-art hardware and software, although this goal is not always practical given budget constraints. Additionally, given the dynamic environment of AIS, resources should be allocated for regular faculty training (and retraining) in order to ensure that faculty are as current as possible.

Instructional resource considerations include such issues as which courses will be required, how to establish a student computer lab, what kind of network to run in the lab, and what kind of computer requirements to institute for students in the AIS concentration. For example, how big should the lab be? How many computers can the department or college afford? Which software packages will be put on the network? What kind of operating system will be run? Some schools bypass the issue of student labs by requiring all AIS students to own their own computers. If this requirement is to be instituted,

what will the acceptable standard for a student's computer be? These are the resource issues a school will be confronted with in implementing an AIS concentration.

When considering the choice and design of courses to include in the AIS concentration, it is important to match the curriculum to the institution's mission. Some schools aim their programs at fairly narrow recruiting targets, while others try to serve a broad range of employers. The education required by the AIS student will be dictated by the choices of career paths an institution envisions for its graduates.

There is no question that AIS students have a wider choice of career paths open to them. Completing an AIS concentration in no way diminishes or detracts from the students' abilities in traditional accounting careers. On the contrary, AIS students are often more capable and able to progress faster in traditional accounting careers. In addition, AIS graduates are frequently offered positions for which traditional accounting majors are not qualified. For example, AIS majors frequently find employment as part of systems development teams or consulting teams, in EDP auditing, and in other positions that previously had been reserved almost exclusively for MIS majors. Institutions considering the addition of an AIS concentration should examine carefully how the AIS concentration will complement the existing placement opportunities. The curriculum can then be designed around the long-term needs of the prospective employers.

Application: JMU's establishment of an AIS program.

James Madison University established its AIS concentration in 1988 with only one AIS faculty member. We had neither the faculty expertise nor the computer resources to establish a concentration completely within the School of Accounting. We began by surveying the campus for computer-based systems courses that might be useful to accounting majors. When we located courses, we negotiated with the offering departments for space for accounting students.

In designing the AIS curriculum, we decided not to drop any of the existing accounting course work because the goal of our concentration is to *add* to the education of accountants. Instead, the first AIS students completed four-and-one-half years of study consisting of the regular 128 hours required for the standard accounting bachelor's degree, plus 15 additional credit hours in AIS concentration courses.

An informal survey of our major recruiters indicated that there was significant demand for accountants specializing in AIS among the companies already recruiting on campus. Working primarily from recruiter recommendations, we identified the following technical goals for the AIS student: (1) Obtain a thorough understanding of the way computers operate, store, and convert data into information; (2) Obtain a deeper understanding of relational database concepts, especially the relationships between data elements and the real-world activities they represent; (3) Develop stronger competence with technological tools; (4) Gain a more thorough understanding of systems analysis and the systems development life cycle, and appreciation for the problems in these functions, especially in understanding what constitutes reasonable and unreasonable demands on information systems, development staff, and operations; and (5) Obtain a deeper understanding of computer security issues, data communications, and other MIS-related topics. By matching these initial needs with the available courses, we developed a collection of five courses that formed our initial AIS curriculum (see Table 1).

This curriculum represents a number of

short-term compromises. For example, students had to choose between computer security, data communications, or computer auditing, although all three topics were considered important. Additionally, of the five courses, only one course was taught by the accounting department, a capstone courses whose primary purpose was to synthesize the material from the MIS courses into an accounting context.

Other resources issues also had to be addressed. A concerted effort was begun to lobby the university administration for updated equipment in the College of Business computer lab. Within a year of the commencement of the program, the College had named a full-time technology coordinator who worked closely with the AIS faculty member (as well as other departments) in helping design and furnish a new student computer lab.

With the initial AIS concentration in place, JMU moved into long-range planning for the program. The long-term plan was simple. We needed to create both student and employer demand for the program. As the demand increased, the School of Accounting would seek to acquire the resources needed to shift the courses from MIS to the School of Accounting.

The Second Step: Building Demand

Concept D: Demand consists of two mutually interdependent components: student demand and employer demand. The relationship is circular. One cannot exist without the other.

In building an AIS concentration, it is

Table 1	
Original Curriculum Courses (1988) for JMU Bachelor's Degree with AIS Concentration	
Course	Offering Department
COBOL Programming	MIS
Database Design and Application	MIS
Computer Security or Data Communication or Computer Auditing	MIS
Systems Analysis and Design	MIS
Advanced AIS (ACTG 491)	Accounting

important to stimulate both student demand and employer demand. Student demand involves answering the question: Why would a student want an AIS concentration? In other words, what can this option offer them that a traditional bachelor's degree in accounting cannot? On the other hand, employer demand involves answering the question: What do AIS accounting students have that traditional accounting majors do not? In other words, how is an AIS accounting graduate different from the traditional accounting graduate?

These two types of demand are mutually interdependent. In a sense, they drive each other. Employers will demand AIS graduates if they perceive a value added by the AIS concentration, e.g., accountants who are more highly trained than the average accounting graduate. Accounting students will demand the AIS concentration if they perceive a value added, e.g., higher paying accounting jobs and/or additional job opportunities. Thus, the relationship is circular in nature. (See Diagram 1)

Application: How JMU created both student demand and employer demand.

The initial students who completed the AIS concentration gained the benefit of the addi-

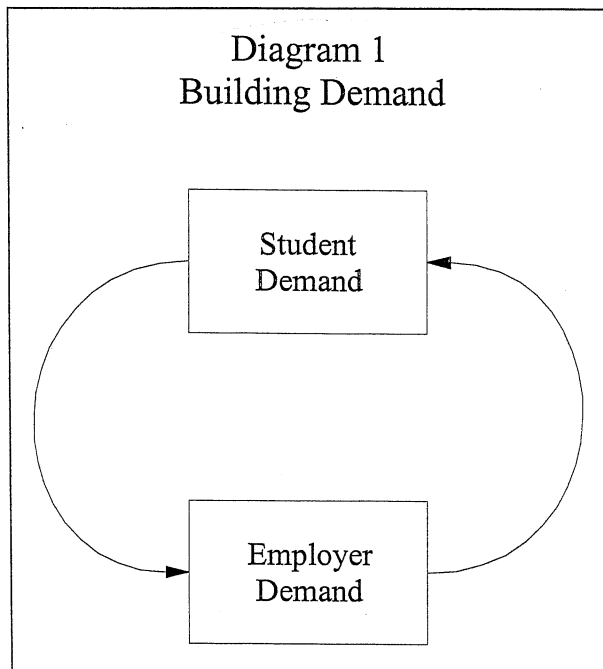
tional specialty courses, hands-on skills training, and especially the integration of concepts with skills presented in the capstone course. As expected, these students performed very well on their jobs after graduation. We kept close contact with these students and their employers, and used them as examples in introducing the program to other employers. Faculty made an effort to inform existing recruiters of the availability of these specialized students, offering the initial set of employers as references.

Word soon spread among the employers that the AIS graduates were especially skilled and adept at using, developing, and working with technology and innovative systems and employers began requesting students specifically from the AIS concentration track. By 1993, employer demand for AIS concentration accounting graduates far surpassed the supply of students choosing the concentration, and we began to focus our efforts on increasing student demand.

One of the reasons often cited by traditional accounting majors for not choosing the program was the extra semester required to complete the five additional courses. In 1993 changes occurred that allowed students to complete the curriculum in four years, thus eliminating the extra semester requirement. Additionally, two graduate AIS courses were added, which allowed graduate students an AIS concentration. With the barrier of an extra semester removed from the AIS bachelor's program and the new availability of a graduate degree concentration, enrollment in the AIS concentration jumped from seven students in 1993 to seventy-eight students in 1996. With this increase in enrollment in the program, it was a simple matter of justifying the shifting of resources to meet the increased demand.

Step Three: Enhancing the Curriculum

Concept E: As demand grows, resources can be shifted into hiring more faculty and ultimately moving AIS concentration courses into the accounting department.



Concept F: An annual review of the AIS curriculum is essential to incorporate technology changes as they occur, and to be responsive to the dynamic nature of the field of accounting information.

Many AIS programs start with a limited number of faculty and thus a small number of courses taught in the accounting department. However, to achieve maximum effectiveness, students need the synergy that can be obtained only by teaching the AIS material within an accounting context. Further, in order for the AIS concentration to mesh seamlessly with the existing accounting program, it is critical that control of the curriculum lie with the accounting faculty. Thus, the overall goal should be for all AIS courses to be taught within the accounting department. This goal can only be realized after sufficient student and employer demand is stimulated.

Stimulating demand sufficient to justify a complete AIS faculty in the accounting department may take several years. At this stage it is important to again remember the evolutionary nature of implementation of an AIS program. Resources can be moved incrementally. Instructors can be hired as needed. Computers can be purchased as demand dictates. Courses can be moved into the accounting department as faculty become available.

In recognition of the dynamic nature of information technology, an annual review should be conducted to ensure current changes in technology are integrated into the curriculum in a timely manner and to evaluate the needs of the profession and the resources available. The review should answer such questions as: What changes in technology have taken place in the last year? What trends have become apparent? Have employers stated a specific need or preference? Do changes in the profession require attention? Are the current course offerings sufficient? Is it time to move courses from MIS to accounting? Are the faculty sufficiently trained in the latest technology? While the review does not necessarily have to be an annual review, it

should at least be made at regularly scheduled intervals.

Application: JMU's enhancement of the AIS curriculum.

The recent rise to dominance of networked microcomputers over mainframes, the popularity of the Windows environment, and the increased importance of telecommunications called for major changes in JMU's program in the few short years of its existence. Accordingly, the program has been modified annually to respond to the changing environment. A major overhaul was undertaken in 1993 coincident with the changes in the number of courses and the introduction of the graduate program.

To assist in designing the changes required, we solicited the advice of the sizable number of AIS graduates who by now were in corporate administrative and policy-making positions, and mid-level positions with public accounting firms. Interviews with these graduates revealed that they felt the MIS portion of the curriculum was too narrow and too deep. For example, the program allowed students to take computer security *or* telecommunications *or* computer auditing. Because all three of these courses were designed in the MIS department primarily for MIS seniors, they were exceptionally technical and the examples dealt with non-accounting applications. More important, students had to choose between them. The feeling among the alumnae was that *all three* topics were essential, but systems accountants did not need a full three-hour course in each one.

The solution was to combine several topics into a single new technology course to be taught in the School of Accounting. Demand by this time justified the addition of a second systems professor. The new faculty member had an extensive background in systems development and advanced technology, as well as practical experience as an accountant and controller. With the additional faculty resource, the necessary material could be tailored to accounting students rather than MIS majors. The new course cov-

ered modern technology, data communications, networking, computer security, and EDP auditing, all from an accounting perspective. Technical details were omitted as unnecessary for accountants, allowing room for application exercises structured within an accounting context.

Another curriculum debate centered around the programming language requirement. We considered dropping the language requirement altogether in light of the increasing use of "canned" and turn-key systems coupled with the decreased use of in-house mainframe systems development. Feedback from students and alumnae quickly changed our minds. The reaction was strong and unanimous: learning the basics of a structured programming language was indispensable in understanding the fundamental logic behind computer operation, and learning the techniques of structured programming was essential for comprehending the complex nature of modern modular software systems. We decided to keep the language requirement as an essential part of the *conceptual*, rather than technical, part of the program. Because of the popularity of C++ in industry, we decided to allow it (as well as any of the other major third- or fourth-generation programming languages) to count for the language requirement, since the primary purpose of the language was to provide a conceptual and experiential framework rather than to "teach students how to program a computer".

Table 2 reflects the 1997 curriculum for AIS track majors. The programming language and database courses are both hands-on skills training. However, they are in the program primarily to provide an *experiential foundation* for

conceptual understanding that is gained in the capstone course (Advanced AIS). The systems technology accounting course (ACTG 440) rounds out the education by covering networking, technology, telecommunications, security issues, and true EDP auditing-- topics that are also integrated with the other material in the capstone course (ACTG 491).

The capstone course might be better described as the "keystone," for it is the course that synthesizes all of the other courses into an integrated conceptual framework applied directly to the field of accounting. And although the course is most definitely a conceptual course, students continue their hands-on practice through assignments and projects, most of which have been adapted from other areas of accounting such as auditing, cost, and tax.

Concomitant with these changes, modifications were being made within all of the AIS courses taught in the accounting department to incorporate new teaching methodologies and improvements called for in mainstream accounting education. For example, when the School of Accounting adopted a "writing across the curriculum" program, the technology and capstone courses both adopted written projects, graded on writing ability and style as much as on content. Following suggestions from employers, projects were restructured to allow more group-based work, and specific "consulting sessions" outside of class were built into the curriculum to assist students in handling the dynamics of personal interactions, organizing and controlling group-based work, and dealing with the problems inherent in group settings, including performance assessment. Critical thinking skills were also in-

Table 2
Current Curriculum Courses (1997) for JMU Bachelor's Degree with AIS Concentration

Course	Offering Department
Programming Language	MIS
Relational Database Design	MIS
Systems Technology for Accountants (ACTG 440)	Accounting
Advanced AIS (ACTG 491) (capstone course)	Accounting

corporated into the course work and assignments. Creativity, problem recognition, structure, and solutions are hallmarks of the capstone course. The curriculum is continually enhanced to incorporate independent student-led problem solving that will serve the students in the real world.

Step Four: Plans for the Future

Concept G: The AIS concentration should be flexible enough to easily integrate changes into the curriculum.

Concept H: The emphasis is always on the dynamic, evolutionary nature of the process.

The final step is planning for the future. This step entails both short-range and long-range planning. A written plan will help establish and solidify the goals and objectives of the program. What does the department want to accomplish this year? How about in five years? This approach might be viewed as the "master plan" for the program. In committing to goals, it is important to allow for changes in the curriculum. Often advances in technology happen so quickly that they are impossible to anticipate. In this case, changes must be incorporated quickly and with as little disruption as possible. A well-designed AIS program will recognize the importance of allowing for flexibility.

Application: JMU's plans for the future.

With the addition of the third systems professor in 1996, plans are being made to bring the database course into the School of Accounting. This addition will allow further integration between the systems design and accounting areas. As of Fall 1997, the programming course will be the only AIS concentration course students will take in the MIS department.

We continue to conduct annual evaluations of the program. Questionnaires are circulated to students and alumnae. The opinions of current and potential employers are solicited in an effort to ensure our graduates are meeting the needs of those constituents. The School of Ac-

counting makes extensive use of an Executive Advisory Council composed of major employers who offer valuable insight into the future needs of the profession. Most of the faculty are involved in research into education issues, methods, and techniques. In short, an effective AIS concentration is one that changes as often as the technology that it teaches.

JMU's AIS concentration has been quite successful. Since inception of the program in 1988, over 50 students have been graduated from the program. Job placement is 100%. Our students have been hired by such companies as Marriott, Gannett, State Farm, AT&T, EDS, several national consulting firms, numerous government agencies including the FBI, GAO, Secret Service, Department of the Treasury, Naval Audit Service, state agencies, and all of the Big Six public accounting firms (in both business consulting and computer systems divisions, as well as traditional accounting and auditing services). A survey taken in 1996 shows that starting salaries for our AIS graduates are several thousands of dollars above the average starting salary for graduates in both accounting and MIS. As of January 1997, we expect to have over 75 students enrolled in the program.

Summary

An AIS concentration is a valuable addition to an accounting curriculum. This article outlines four steps in establishing an AIS concentration. Eight concepts are essential for success:

Concept A: Establishment of an AIS concentration is an evolutionary process.

Concept B: Resource attainment is critical to the success of an AIS concentration.

Concept C: Selection of the AIS curriculum should match the institution's mission.

Concept D: Demand consists of two mutually interactive components: student demand and employer demand. The relationship is circular. One


cannot exist without the other.

Concept E: As demand grows, resources can be shifted into hiring more faculty and ultimately moving AIS concentration courses into the accounting department.

Concept F: An annual review of the AIS program is essential to incorporate technology changes as they occur, and to be responsive to the dynamic nature of the field of accounting information.

Concept G: The AIS program should be flexible enough to allow changes in the curriculum.

Concept H: The emphasis is always on the dynamic, evolutionary nature of the process.

The program at James Madison University is used as an example of implementation and evolution of a successful program. Such a program will arm students with the tools to do more than simply react to technological changes; rather students can become active participants in shaping the future of technology. 

Endnotes

1. There are other methods for preparing students for the information age. For example, when the University of Southern California accounting faculty was asked to approve a second required systems course for their students, they decided to completely revise their curriculum. Using what they called the “systems approach to curriculum development,” the accounting faculty stood “...the traditional approach to accounting on its head” (Mock *et al.* 1991, 121).

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