Designing an MIS Major for a Liberal Arts College

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Abstract

This paper describes one effort to establish a Management Information Systems major, largely compliant with the recommendations of the IS 2002 Undergraduate Curriculum Report, by working within the constraints imposed by, and by taking advantage of the opportunities provided by, being a part of a liberal arts college.

Keywords: management information systems, curriculum design, liberal arts

1. INTRODUCTION

For reasons described below, we were motivated to review and revise our MIS program, housed in the business department at Luther College, a small private liberal arts college. As we began the review, we looked to the literature to see what similar institutions had published about their MIS programs. We found many general articles, but few specifically about curriculum design and revision.

Scime and Wania's (2005) comparison of computing curriculum models reinforced our decision to focus on MIS rather than CIS or IT. McGinnis and Slauson (2003) describe their experience with developing a CIS bachelor's program at a small (5000 students) state college. They attribute the success of their venture and approval of their program to following the IS model curriculum (Gorgone, 2002). While the article is interesting, their program includes twice as many courses as we can fit in our program. Rhodes (2001) describes an interesting interdisciplinary program at a small liberal arts college, but their program focused more on technology aspects than on business aspects, as we want ours to. Of more benefit was a report of survey results by Tesch (2002). She and her colleagues at Xavier University, Cincinnati, surveyed their alumni who graduated in the 1990s to determine the relative importance, to the graduates, of materials contained in Xavier's MIS curriculum. They found that the respondents placed most value on their senior analysis & design and systems development projects. They also found that their graduates highly valued experiences that built team interaction skills, database management skills, and design skills. Their findings reinforced our decision to include a senior design project as part of our curriculum. Mawhinney (1999) also described a survey he and his colleagues wrote to find what local employers wanted from graduates of their MIS program. Unfortunately, the article describes only the survey design, not the results.

The paper we found most valuable was one that presented a model Computer Science

curriculum for small liberal arts colleges. Walker and Schneider (1996) not only define the curriculum, but also, more importantly, discuss methods for addressing constraints inherent to small liberal arts colleges (e.g. small numbers of faculty, limited program size because of the emphasis on a liberal education, etc.). We saw many parallels between their discussions and our situation at Luther.

2. THE ACADEMIC ENVIRONMENT

The Management Information Systems program at Luther resides in the Economics and Business (E&B) Department. Luther College is a 2,500-student 4-year residential liberal arts college affiliated with the Lutheran Church (ELCA). The E&B department offers programs leading to the Bachelor of Arts degree in Accounting, Economics, Management, and MIS. Twelve faculty make up the department, with two, the authors, having primary responsibility for the MIS program. The program has about 30 majors at any given time and graduates between 8 and 14 majors per year.

As a college, Luther is committed to the liberal arts. While pre-professional programs are a significant part of the academic offerings, all programs are grounded in the context of the liberal arts. The MIS faculty at Luther feel the liberal arts background is a strong component of preparing students for an ever-changing work life, but we also seek to complement the liberal arts training with a solid set of MIS courses that will adequately prepare students for work in the field upon graduation. Developing a program with such balance seems at times like a lofty goal, as this program, designed to balance the major and the liberal arts, must also be designed so students can graduate in four years, as 99% of Luther's students actually do.

Like most MIS faculty, we recognize that MIS is, by its very nature, interdisciplinary. MIS professionals bridge the gap between the purely technical work of systems development and the understanding of business needs that is critical to successful systems design. Because of the breadth of knowledge MIS graduates need, our program combines MIS-specific courses, taught by the MIS faculty, with more technical computing courses, taught by the computer science faculty, and general business courses, taught by other E&B faculty. In addition, the prevalence of technology and systems in most work settings today has compelled us to offer our introductory MIS course as a service course for the other majors in our department, for students in museum studies, for students in arts, sports, and theatre management programs, and for a variety of other students interested in a useful introduction to MIS applicable to their career plans.

3. MOTIVATION AND CONSTRAINTS

Motivation for Change

While our previous major seemed to adequately serve students over the years, several factors led the MIS faculty to feel the time was right for a significant change in, with a corresponding improvement of, the program. Those factors were:

- In 2002, the Luther College faculty began planning a major revision to the college-wide curricular requirements. This, in turn caused the E&B faculty to bring their programs into line with the new curriculum.
- In 2002-2003, the E&B Department went through a self-study and external review of the department as a whole, including individual programs and offerings.
- As part of the program review, the MIS program was evaluated against the model curriculum described by Gorgone (2002) (hereafter referred to as *IS2002*) to identify topic areas needing updating or inclusion the program.
- After several years of faculty turnover, with visiting faculty filling tenure-track lines, both MIS faculty positions were filled with tenure-track individuals, bringing a sense of stability and commitment to planning for the future of the program.

The review of the program revealed the following general opportunities for improvement:

- Contact with MIS majors: Because the MIS faculty members do not teach computer science courses, and because of

the sequencing of CS courses in the previous program, we often did not see our majors in the classroom for three consecutive semesters (if they followed the schedule shown below). Since one of the goals at Luther is extensive contact between students and faculty, we needed to ensure that we saw our majors in class more often.
- The MIS curriculum was "back-loaded" in that most of the MIS-relevant topics were not presented until the students' junior year. This provided little time for the concepts to gel before they had to be applied in the senior project.
- Overall, the program was not as current as it could be, especially with respect to *IS2002*. For example, there was not an obvious place in the curriculum for a solid networking component.
- Because the introductory course was serving such a broad audience, it did not contain sufficient technical content to be a suitable introductory course for MIS majors. However, because the introductory MIS course was in fact created as a foundation course for MIS majors, it contained just enough technical content to be overwhelming for the non-MIS majors.
- The database systems course was taught too much from a computer science viewpoint, a viewpoint for which MIS majors were unprepared. The MIS majors felt they were not given sufficient information to incorporate databases properly in MIS assignments.

Constraints

The challenges created by having a program embedded within a liberal arts education include:

- The number of specifically-designated major courses is limited; we must adhere to the college's emphasis on a liberal arts education. At Luther, all students must take the typical courses in English, history, fine arts, social and natural sciences, religion, mathematics, and a senior project. To ensure a sufficiently broad education, 20 of the 32 courses required for the B.A. degree must be courses outside of the student's major requirements--not just the discipline-specific courses, but all courses required by the major program.
- Because of the previous challenge, we could not include all of the courses recommended in IS 2002, much less dedicate one course per topic, such as one course for database, one for networks, one for e-commerce, etc.
- As part of the liberal arts thinking, students are encouraged to "explore" disciplines in their first two years, and often, it is through this exploration that students find their way into MIS (a good thing, we think). However, such a student often might not decide upon the MIS major until the second semester of his/her second year, but would still expect to graduate within four years.
- Major programs must incorporate the college-wide commitments to writing, presentation, ethics and research. Because these are also recommended in IS2002, we found need for additional learning and application of technical writing skills, for addressing ethical issues, and for encouraging student research.
- Small class sizes (20 to 25 students) and a three-course per semester teaching load. This hardly sounds like a constraint (we're not complaining), but the number of sections of our introductory course is determined by the number of new business majors. When that number increases, we have to add sections of the intro course, which reduces the opportunity for us to offer MIS elective courses.
- Only two faculty members teach the MIS courses, and the department must be able to offer all of the required MIS courses every year.

Goals for the Revision

Given the findings and challenges, above, our goals in redesigning the curriculum became:

- To update the curriculum to incorporate IS2002 recommendations, as well as recommendations from our program review.
- To spread the MIS-specific courses more evenly across a student's four years of study so we would see each MIS major in at least one class each academic year.

- To provide a stronger technical foundation for MIS majors, while improving the introductory course as a service course for non-majors.
- To identify the specific courses in which we would satisfy Luther's all-college requirements of significant components of writing, speaking, ethics and research.
- Because we did not have the luxury of dedicating one course per topic, we sought to combine topics in ways to ensure that students got the necessary content, but that would interweave them throughout the seven courses. We decided to introduce material in courses following the examples of Phillips (2003) and Walker (1996), only in the amount and at the level needed in each particular course. Thus, for example, new database topics would be introduced throughout the curriculum, not in just one course on database.

With our goals established, we began redesigning our curriculum.

4. CURRICULA: THE OLD AND THE NEW

The Previous Curriculum

The following 12 courses comprised our original MIS curriculum: (There are 13 courses listed, but completion of a senior project is a college-wide requirement, and is not counted as a course specific to the major)

MIS-Specific Courses (taught by MIS faculty)
- Introduction to MIS
- Business Programming Languages
- Computer Information Systems (the principles of managing MIS)
- Systems Analysis and Design
- Senior Project (a semester-long project-implementation course)

CS-shared Courses (taught by CS faculty)
- Introduction to Computer Science I
- Introduction to Computer Science II
- Database Systems

Business Foundation Courses (taught by non-MIS faculty from E&B and by faculty from mathematics)
- Financial Accounting I
- Managerial Accounting
- Principles of Economics
- Statistics
- Calculus

Ideally, our majors took these courses as follows:

First year: Introduction to MIS and Computer Science I
Second year: Computer Science II and Database Systems
Third year: Business Programming and Computer Information Systems
Fourth year: Systems Analysis and Design and Senior Project

However, many of our majors took the third-year courses concurrently with their fourth-year courses, usually because they did not decide to major in MIS until their second year.
The business foundation courses are taken throughout the student's first four or five semesters, wherever they best fit a student's program of study.

Designing the New Program

Of the 12 classes we could work with, we felt the five general business courses, already required of MIS students, continued to serve our graduates well. They provide a fundamental understanding of the business environment, and allow us to utilize faculty from other disciplines to provide that foundation.

This left us with 7 classes that we could designate specifically as MIS-major courses. We initially defined those courses by using the presentation areas from Figure 5, IS Curriculum Presentation Areas and Courses, from *IS2002*, as our first approximation. We then allocated the appropriate concepts of each Learning Unit Goal, listed in Appendix 6 of *IS2002*, to one of the seven courses, in keeping with our specific goals for the program. With only seven classes we did not have room to include all of *IS2002*'s topics in-depth, so we sought to cover fundamental topics, and minimize those topics that, based on feedback from our graduates, were not as strongly required or that our graduates could learn on the job.

We moved analysis and design topics earlier in the curriculum, to give a foundation upon which to build, and followed those with im-

plementation and maintenance/management topics. We next put in management topics and then the senior project. Then, we distributed "large" topics, database for example, across the courses. Instead of dedicating a course to database topics, we introduce the use of a database in the intro course, logical database design techniques in an analysis and design course, realizing the physical database in an implementation course, securing a database in a management course, and tie it all together in the senior project.

The New Curriculum

After more discussion and rearranging of topic sequencing, we settled on the following for the major:

MIS-Specific Courses
- MIS 130: a broad non-technical view of MIS in business
- MIS 140: the technical foundations for the MIS major
- MIS 210: principles of analysis and design
- MIS 310: IS implementation methods
- MIS 320: management of information systems and of their development
- MIS 490: senior project (again, this satisfies the all-college requirement, and is not counted as an MIS major course)

CS-Shared Courses
- CS I: Intro to Computer Science I
- CS II: Intro to Computer Science II

Business Foundation Courses (unchanged)
- Financial Accounting I
- Managerial Accounting
- Principles of Economics
- Statistics
- Calculus

The first number of the course (1-4) indicates the year in which students would ideally take each course. MIS majors will be advised to take CS I and II concurrently with MIS 130 and 140, so they obtain a good foundation in basic software development. These two computer science courses cover much of the material from IS 2002.5.

Course Descriptions

As shown above, we split the old introductory course into two courses, MIS 130 and MIS 140, to address student concerns about the old course, and to add technical foundation material early in the program. The new MIS 130, required for all business majors, covers the material found in most introductory MIS courses: an overview of hardware, software, networking, database, data warehousing and mining, decision support systems, enterprise computing (CRM, ERP, SCM, HRM, SFA, OLTP, OLAP, etc.), e-commerce, IT planning, development, integration, ethics and security. The contents of this course match the material recommended in IS 2002.1 and IS 2002.2, thus serving MIS majors, as well as being relevant for non-MIS majors.

In MIS 140, which is for only MIS majors, we present technical foundation material. In it, we delve into the basics of system and network hardware and software, protocols, development and configuration of decision support systems, and design and implementation of IS systems and IS infrastructure. This course includes much material from IS 2002.4 and IS 2002.6, and fills a significant hole in our previous program with respect to technical content.

As sophomores, MIS majors will finish the CS I and II course sequence and will take MIS 210, Systems Analysis and Design. Here they will learn to develop the requirements for, and the architecture of, information systems. Topics include structured and object-oriented techniques, prototyping, E-R diagrams, database relation creation and normalization, graphical user interface (GUI) design principles, verification and validation approaches, and all of the documentation that goes along with these methodologies. Additionally, students will learn to define hardware and networking requirements, and the high-level architecture for a system. Because documenting the specification and design is so critical, this class contains a significant technical writing component, and is designated as the one that satisfies the all-college writing requirement. This course will be our implementation of IS 2002.7.

Because MIS 210 is an ambitious course, given the amount of material we want to

introduce to the students, we will present just the foundations of the topics and allow the students to refine the concepts in later courses, especially in the senior project.

As juniors, the students will take MIS 310 and 320. In MIS 310, they will learn about mid- and low-level design methods, custom development versus outsourcing versus integration of off-the-shelf packages, database implementation and configuration, programming language selection, hardware and software integration, and component and system testing. This class will include relevant material from the old database and programming language courses (including programming and query writing), as well as technical content, such as networking, that was lacking in our previous program. Again, we feel that the students are better served by an incorporation of these latter topics in an implementation course, one that it presents them as part of a bigger process, than by learning the material in separate, dedicated courses. MIS 310 will be our equivalent to IS 2002.8 and parts of 2002.9.

MIS 320 focuses on the managerial aspects of IS development and administration. Topics will include project planning, budgeting and staffing, writing RFPs and managing outsourcing, administering IS infrastructure, recognizing and addressing social, ethical, and security implications, managing data, and planning for all the "-ilities". This course will cover many of the concepts in IS 2002.3 and 2002.10, and some from IS 2002.2. In this course, too, the students can expect significant technical writing assignments and presentations, especially plans, procedures and analyses of case studies.

Finally, in their senior year, the students will work on a two-semester project in which they will apply, and build upon, much of what they have learned in their previous classes. This will be the practical application of material as in IS 2002.9 and 2002.10. Although we would prefer that the projects be ones that benefit organizations in the local community, maintenance concerns will likely cause us to focus on projects sponsored by the campus IT office. That office has been willing in the past to take over completed, or mostly-completed, projects at the end of the course, as long as they were involved as customers or consultants during development of the project.

We chose to run the project over two semesters because we saw many projects not completed simply because the students ran out of time. Defining requirements and building the initial design always took much longer than the students thought it would. Having the extra semester will greatly increase the probability of successful project completion and will provide time for the students to explore alternative ways of satisfying project requirements. Additionally, Luther is encouraging faculty to enhance senior projects, to make them larger, more research intensive and more comprehensive. Therefore, the college supports our move to a two-semester project that allows students more opportunity to experiment with and to build upon what they have previously learned.

Other Considerations

The final question we had to answer was "Can two faculty members actually offer these courses in a way that MIS majors can finish in four years?" The following example of a teaching schedule shows that we can indeed fit in all of the courses, plus one MIS elective per year:

Fall Semester	
Course	**Instructor**
MIS 130 (2 sections)	Faculty-1
MIS 130	Faculty-2
MIS 140	Faculty-2
MIS 310	Faculty-2
MIS 490	Faculty-1

Spring Semester	
Course	**Instructor**
MIS 130 (2 sections)	Faculty-2
MIS 210	Faculty-1
MIS 320	Faculty-1
MIS elective	Faculty-2
MIS 490	Faculty-1

The two faculty members will switch the roles of Faculty-1 and Faculty-2 every two to three years so both will stay current in all of the courses. The schedule additionally provides each faculty member with one semester per year with just two preparations,

which will allow extra time for professional and service activities.

5. CONCLUSION

We have designed an MIS curriculum that contains most of the recommendations of *IS2002* and that satisfies Luther's emphasis on the liberal arts. The curriculum was approved in May, 2005, and we offered the first course in fall, 2005. This redesign addressed issues of consistent contact between MIS majors and faculty across four years and of time for cyclical learning so that students can revisit topics with increasing depth in each new course. Our new introductory course better serves the MIS and non-MIS majors in our courses, by recognizing the interdisciplinary nature of MIS and by not trying to serve multiple audiences with a single course. Finally, this design allows us to continue to provide a strong pre-professional major that creates opportunity for writing, presentation, ethics discussion, and research, all within the context of a liberal arts education.

In summary, the revisions we have made to our MIS major will bring the curriculum into agreement with recommendations from *IS2002*, our external review and our graduates, and will more than adequately prepare our majors for the workplace and graduate study.

6. REFERENCES

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