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December 2002

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Abstract

Just as IS educators teach about the undesirability of "silos of information" in organizations, it is equally undesirable to have silos of information in academic curricula. Unfortunately, most university curricula in the information systems area are built around the concept of three-hour classes, covering the traditional concepts of systems analysis and design, programming, database, telecommunications and networking, and so forth. However, just as the modern firm cannot function effectively with information systems that are not integrated, it is difficult to teach students the realities of systems development in a curriculum that is not integrated.

This paper describes two approaches to integrated curricula that were implemented at a university in the southwestern part of the United States. One approach was taken in the Information Systems department, the other in the MBA program. The Information Systems department has since gone back to separate 3-hour classes, but the MBA program has retained their integrated curriculum. The paper concludes with lessons learned and recommendations to anyone contemplating a similar endeavor.

Keywords: Curriculum innovation, curriculum integration

Introduction

Just as IS educators teach about the undesirability of "silos of information" in organizations, it is equally undesirable to have silos of information in academic curricula. Business today is done in a very interdisciplinary way, yet too often business schools still teach the various disciplines as separate functions and IS departments teach systems development the same way. In fact, the ACM/AIS model curriculum for MSIS programs (Gorgone and Gray, 2000) is structured around traditional standalone classes, with a single integrating capstone course at the end.

Unfortunately, most university curricula in the information systems area are built around the concept of three-hour classes, covering the traditional concepts of systems analysis and design, programming, database, telecommunications and networking, and so forth. However, just as the modern firm cannot function effectively with information systems that are not integrated, it is difficult to teach students the realities of systems development in a curriculum that is not integrated.

Integrating the curriculum is not a new issue in education. In 1918 Kilpatrick developed a "project method" of education where the educational process flowed from the interests of the students rather than a structured approach to the subject matter (Walker, 1996). An extensive eight-year study was conducted beginning in 1933 examined a curriculum alternative to one structured around traditional subjects (Ellis and Fouts, 2001). In this example, much of the instruction was interdisciplinary in nature. Many business schools have struggled with the question of how best to integrate their curriculum in response to calls from accreditation associations and industry advisory boards to deliver a curriculum that is as interdisciplinary as today's business world (Pharr, 2000). Various schools have taken different approaches to address this issue. Steiner and Wells (2000) list several approaches that various business schools have attempted in an effort to integrate their curriculum. They include: modules, term long projects, year long experiences, systems approach, and team teaching. This paper describes two different approaches to addressing this problem that were undertaken at a single university in two different graduate programs, one in the Information Systems department (utilizing team teaching in six-hour modules) and the other in the MBA program (a series of one-hour modules).

Integration of the Information Systems Department (ISY)
Master of Science in Information Systems (MSIS)

During the fall 1995 and spring 1996 semesters, the ISY department evaluated its information systems curriculum and designed a unique, integrated approach to its undergraduate ISY curriculum for the ISY – MIS major. During the evaluation process, it was discovered that a duplication of topics was occurring in several courses. For example, screen and report layouts were being covered in the introductory programming course and also in the analysis and design course. Database topics such as Entity Relationship Diagrams were being covered in the programming course as well as in the analysis and design course. Most the course textbooks included these topics so faculty covered the topics in their course. By removing the duplication, additional topics could be added to the curriculum without adding hours.

Another long running debate on the proper sequencing of topics was also held during the curriculum evaluation. Should database topics be covered before the first programming course or after the analysis and design course? Should design be taught before the first programming course or after all programming courses?

The faculty evaluation team worked hard on the topic sequencing and felt that by breaking courses into modules, the various topics could be covered in proper sequence. The team developed a "Just-in-Time" delivery approach. By proper delivery of the modules, sequencing of topics could be done in a more effective manner. For example, by exposing students to data concepts, data needs, and where data originates, students should be able to more quickly grasp file processing covered in the programming modules. By covering basic programming topics first and then presenting basic analysis tools, students could return to programming topics with a better idea of why certain programming procedures were done in a certain order.

By designing course material in modules, other advantages could be realized in addition to reducing duplicate coverage. The curriculum could be changed and implemented much quicker with the modular approach. Most of the time, some topics in a particular module could be modified without affecting the other modules. In one instance in the undergraduate program, the programming module as first taught included COBOL as the programming language. After the first year, recruiters and advisory board members felt that a switch to Object Oriented languages was necessary. So we changed the programming module to C++ with very little impact on the other modules.

Another big advantage was the ability to limit the number of faculty preparations. Before the change, a number of sections for a particular course were necessary which meant multi-course preps. By utilizing a particular faculty member to teach a module, the professor was limited to just preparing for that module. This allowed the professor to keep current in a particular area without having to concentrate in several areas. This proved to be a significant advantage to the department, especially during a time of tight faculty supply market.

Modules

The evaluation team's next task was to design the modules and how the modules could be delivered. Various course lengths were considered – one hour, two hours, four hours, and six hours – were evaluated and the team-taught, six-hour course was adopted. The major reason for selecting the six-hour course was peer acceptance. At the time, the administration, students, and other faculty had no experience with any thing other than the typical three-hour courses and sometimes a four-hour course that included a required lab. It was felt that the six-hour course would be accepted easier. It wasn't!

The curriculum developed for the undergraduate program included two six-hour courses to be taught in a modular concept, a typical three-hour telecommunication course, and a three-hour ISY elective. The plan was presented to the advisory board and recruiters as well as other stakeholders. The plan was enthusiastically endorsed and was implemented in the fall, 1996.

Adoption by the MSIS Program

The MSIS program was initiated in the Spring, 1998 semester using the six-hour team-taught, modular approach as shown in Table 1. The modules had been refined in the first few semesters in the undergraduate program. The basic materials covered in the modules were used as the foundation for the graduate courses, with the content of the modules beefed up for the graduate students.

Table 1. Course Breakdown for MSIS Integrated Curriculum

ISY 5601 – Seminar in Systems Development I		ISY 5602 – Seminar in Systems Development II	
Data Modeling	Systems Analysis	Database	Systems Design
Introduction to Programming		Advanced Programming	

Structured exit interviews are conducted individually with each graduate student just prior to graduation by the graduate advisor (who is not a faculty member in the ISY department). The successes and problems with the six-hour modular concept are documented by these interviews. In addition, for the first several years a final oral exam was required for students graduating from the MSIS program. One or both of the authors of this paper were on each of these oral exam committees. The outcomes listed below were derived from these two information sources.

Outcomes

Positive Feedback
- Some students responded that they really liked the concept. They were exposed to the best professors in the department, and got to know the professors a lot better
- Students developed stronger ties with their peers during the courses because of the lockstep nature of the six-hour courses
- Students were impressed that recruiters liked the program
- Some students felt that they learned the concepts and had a stronger foundation
- Some faculty like the modular teaching and the flexibility it gave them to spend time on other projects, like research. When a faculty member completed their modules, they had the rest of the semester off
- Some faculty felt like they got closer to the students

Negative Feedback
Some of the problems perceived by the students include:

- 3 hours with same professor gets to be boring
- Too many faculty members determining course grades
- One professor can have a huge negative impact on course grade
- Low grade in one six-hour course has a big impact on GPA and future employment prospects
- Communication between professors seem lacking
- Six-hour course made it difficult to take elective courses

Some problems perceived by the eight faculty members involved over time in this effort include:

- Communication among team teachers is difficult
- Little motivation – rewards – for teaching the modules, especially to spend time in coordination
- Because of the limited times several sections of six-hour courses can be scheduled, faculty teaching the modules are not able to get choice teaching times
- Module teacher may have to teach a five-day schedule instead of MWF or TTh
- Shortage of faculty resources lock you into only teaching particular modules
- Teaching load is hard to justify to administration
- Few champions emerged to continue the concept

Results

For a number of reasons the six-hour courses were discontinued in the spring, 2000 at the graduate level. Faculty support was waning, and the administration did not like the six-hour team teaching concept since it was hard to justify the teaching load.

The current program using three-hour courses has maintained many of the same topics and modular approach. The major difference is that only one professor teaches the course. The lessons learned have greatly impacted our current course designs and course delivery methods.

Curriculum Integration Effort in MBA Program

In the mid-1990s, the faculty of the various core MBA courses began meeting weekly with the express purpose of improving the MBA program. Their goal was to make the changes necessary to move the program into the top 50 MBA programs in the United States as ranked by the *US News and World Report*.

As the discussions progressed and research was conducted into other leading MBA programs, it became evident that an innovative integrated curriculum would be necessary as part of this process. While many schools have tried innovative ways to integrate their curriculum (Steiner and Wells, 2000), we decided to integrate the courses across our three "lockstep" semesters[1] by breaking topics into the business cycle of planning, implementation, and evaluation.

Of the core classes in the curriculum, six of them were broken into three one-hour modules, with one of the one-hour modules taught in each of the three lockstep semesters. Thus, a student took one hour of statistics, economics, finance, accounting, marketing, and strategic management each semester. Because of unique situations in the other three core classes (primarily semester-long projects involving local companies), organizational behavior, information systems, and operations management were retained as traditional three-hour classes.

As a result of these changes, our curriculum is broken down as shown in Table 2. Each of the one-hour classes (those with a one as the second digit in the course number) are taught for five weeks of the semester. Thus, in the first five weeks, students may be in Economics and Quantitative Business Analysis. The next five weeks may be Management and Finance, and the last five weeks would then be Accounting and Marketing. The sequence varies with each lockstep (finance is early in lockstep one, for example, so that students with a finance elective their first semester will have that initial background as quickly as possible; and QBA is before Economics the first semester so that they have a background in regression analysis before they need it in Economics).

Table 2. Course Breakdown for MBA Integrated Curriculum

Lockstep 1	Lockstep 2	Summer	Lockstep 3
ECO 5115 Demand Analysis	ECO 5116 Production and Cost Analysis	Internship, international study experience, or 2 electives	ECO 5117 Market Structure Analysis and Estimation
ACC 5121 Accounting Planning	ACC 5122 Accounting Implementation		ACC 5123 Accounting in a Changing Environment
MKT 5111 Seminar in Marketing Admin. - Planning	MKT 5112 Seminar in Marketing Admin. – Implementation		MKT 5113 Seminar in Marketing Admin. – Adapting
FIN 5161 Corporation Finance - Planning	FIN 5162 Corporation Finance - Implementation		FIN 5163 Financial Control
MGT 5186 Strategic Planning	MGT 5187 Strategy Implementation		MGT 5188 Strategic Control
QBA 5131 Quant. Techniques for Decision Making I	QBA 5132 Quant. Techniques for Decision Making II		QBA 5133 Quant. Techniques for Decision Making III
ISY 5325 Information Systems for Management	MGT 5310 Management of Organizational Behavior		BUS 5101 Focus Firm Case Competition
MGT 5320 Manufacturing and Service Organizations	BUS 5101 Focus Firm Case Competition		BUS 5295 Focus Firm
BUS 5101 Focus Firm Case Competition	2 electives		2 electives
1 elective			
16 hours	16 hours	6 hours	15 hours

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[1]Students move through the program as a cohort group, taking the same core classes as their cohort each semester.

Outcomes

Student Reactions

Each semester exit interviews are conducted with the students. Questions are asked on a wide variety of topics, including "high points in the program" and "low points." In addition, they are given the opportunity to make suggestions on how the program could be improved (most of the students buy into the idea of helping improve the program so that it can ultimately be ranked in the top 50 programs in the country, so they are eager to make suggestions). The following are some comments from the exit interviews from the past two years. Few of the students like the one-hour classes their first semester, but many of them begin to see the value in this approach by the end of their third lockstep, which is when the exit interviews are conducted.

With this approach, every five weeks students change from two core subjects to two news ones. The first semester, this change is particularly rough on the students.

> "Hard switching between the core classes for the one-hour courses for MBA's. I would say put the modules with all sections together. Put all the finance in one semester, all Accounting in one semester, etc. That way you don't loose continuity of ideas and stuff."

Many students have commented that they had to take out their notes from previous semesters to review prior to the beginning of a class in Lockstep 2 or 3. They also have noted that the work load is quite high, and that they tend to ignore the semester-long classes at times because projects and tests come very quickly in the 5-week modules.

> "Initially, I feel like the lockstep idea I didn't like. Since it wasn't a 3-credit course I wouldn't have to do so much work . . . but then I had to do a lot . . . but after awhile during lockstep 3 I began to really appreciate it. A very good idea. From UG I would take acct. and then totally forget it later on. The lockstep really helped us to integrate everything when we came to the end of the program."

> "Positive: It was very good for systematic knowledge. If you take just one class a program you probably can forget pretty much of that. With core you remember. Negative: Too many assignments . . . too much pressure so that if you are taking core classes you are not paying attention to your electives . . . More positive than negative."

By the end of the program, many of the students begin to see the value of this approach.

> "The lockstep system. It is great. Builds from semester to semester. The concept carries from class to class, you gain a real understanding of the concepts."

> "Understanding that everything comes together at the end . . . eco, acc, etc. It is actually useful . . . an academic value. Happened at the beginning of this year . . . when I realized that it was coming together."

Faculty Reactions

Change is always difficult, and changing from a traditional three-hour course to one-hour modules is no exception. Two faculty members have their modules sequenced such that they go from the beginning of their topic to the end each semester, but with a different group of students every five weeks. The other four faculty members who teach the one-hour modules have to teach their course content out of order, teaching the middle five weeks of material to Lockstep 2 before the first five weeks of material to Lockstep 1, for example.

Initially, faculty taught in each of the five week sessions. About a year ago a change was made to the schedule so that faculty would teach one module in one five week period, and two modules in another five week period. This gave them the third five week period off for research. This innovation will disappear with the Fall 2002 schedule, as the faculty members found that the work load was too much in the five week period when they doubled up.

The faculty are pleased to see the students retaining more of their knowledge from semester to semester, and to see them integrating that knowledge across the curriculum. It is not uncommon to have students in one course bring in concepts that they have learned in another class, whether it was earlier that same semester or an earlier semester.

Keys to Success

Key to the success of this integrated curriculum has been the coordination among the faculty. They are all housed in a special core-MBA faculty area, adjacent to the graduate business administrative offices and student lounge, computer lab, and study area. The core faculty members teach only MBA courses; in addition, they meet weekly for 90 minutes over lunch to discuss the program, course content, student issues, etc. It is not uncommon to hear conversations among the faculty like "how can I integrate what you are doing in your module with what's going on in mine?" In addition, the dean of the business school has provided a course release each semester for each of the faculty members to compensate them for this extra coordination that is necessary to make this program a success.

Lessons Learned

There have been many lessons learned through these two attempts at integration of our graduate curricula. They include:

- Integration is not easy; it will take a lot of planning and coordination before you actually implement.
- You **will** experience resistance to the changes from students, faculty, dean, and administrators.
- When done logically, recruiters and advisory board members will like the idea, as they will see that you are teaching business concepts much like they are actually practiced.
- Continued faculty coordination is critical, especially as course content shifts or as new faculty members are brought into the team. This is the key to the continued success of the MBA program, and a major part of why the six-hour classes in the MSIS program were abandoned. In both cases, many of the original team of faculty has moved on to other areas, and new faculty members came into the integrated curriculum in their place. For the MBA faculty, the office arrangement and weekly meetings have been critical to coordination of the course, and thus to the success of the program.
- Faculty commitment to the process is vital. If the faculty is committed, they will be willing to attend the many meetings necessary to work out the details of integration, they will devote the time necessary to re-organize their course materials, and they will spend time on an on-going basis to help assure the continued success of the integrated curriculum.
- Administrative support is important, given the resources required for integration to be successful, and for dealing with the unique problems that arise with an integrated curriculum – altered faculty work loads, different course structures, etc.

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