

How Useful is IS 2002? A Case Study Applying the Model Curriculum

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ABSTRACT

IS 2002 is the most recent iteration of the Information Systems (IS) model curriculum. After many years of effort, there is little consensus on the definition and core requirements of IS, or the appropriate use of the model curriculum. This paper reports on our recent experience using IS 2002 to revise an undergraduate IS curriculum. This work exposed similar disagreements and uncertainty among our students and faculty. Focus groups with juniors and seniors presented a variety of opinions on the nature of IS. A survey of faculty about the fundamental objectives of IS 2002 was used to determine faculty ranking of overall goals. We found that IS 2002 provided a useful, practical framework for discussion and structuring of IS course topics, goals, and sequence. The culture of the IS academic field seems to resist conformity to a single curriculum, yet IS 2002 proved in our experience to be a flexible resource easily adapted to our institution's vision of an IS undergraduate degree.

Keywords: IS 2002, Information systems education, curriculum, model curriculum, focus groups

1. OVERVIEW

This paper will describe one institution's use of IS 2002 as a resource in curriculum revision. In section 2 we discuss the history of model curricula in the IS academic field. Next we discuss the history of the IS program at our institution. This is followed by a description of the curriculum revision process, with a focus on our use of IS 2002. We describe how the curricula materials available at <http://www.is2002.org> were embedded into our program. We also describe how the overall goals and objectives of IS 2002 were used to create a framework for querying students and faculty about the new curriculum. We surveyed faculty and asked them to rank the overall goals and objectives of a program modeled on IS 2002. We also used these goals and objectives to prompt feedback in student focus groups. The final section discusses our conclusions about the benefits and challenges of using a model curriculum and suggestions for future research.

2. HISTORY OF IS MODEL CURRICULA

The development of model curricula for both Computer Science (CS) and IS has been a major goal for the Association of Computing Machinery (ACM) and other professional societies for more than 30 years (Gorgone, et al., 2003). The earliest proposal for an IS program appeared in 1973. A version begun by the Data Processing Management Association (DPMA) (now the Association for Information Technology Professionals (AITP)) was combined with an ACM version and published as IS'95 (Couger, et al., 1995). Presentations were made at Americas Conference on Information Systems (AMCIS), International Conference on Information Systems (ICIS), and Information Systems Education Conference (ISECON), to provide the opportunity for input and review. Suggestions and feedback were incorporated into IS '97 (Davis, et al., 1997).

Some implementation of IS'95 did take place (Froneman and Roode, 1997) but as Landry et. al. found (Landry, et al., 2001), full scale adoption of IS '97 was not widespread. Only 18% of surveyed faculty members

reported their institutions adopted the curriculum. Seven percent reported that IS'97 was used but had been discontinued. Many reasons were given for not using IS'97, including the perception that "the benefits of use are not clearly visible" and that the model curriculum "provides little or no advantage for me." However, faculty members indicated an interest in "learning how to map IS'97 learning units to my courses," and the use of "web-based tools to support/automate the mapping."

Respondents indicated they believed that accreditation would provide the greatest incentive for adopting a model curriculum. 61% of the respondents "strongly agreed" or "agreed" with the statement "Now that IS '97 is a basis for IS curriculum accreditation criteria, I would be more likely to adopt IS '97 for use in evaluating my course/curricula."

Some have argued that a model curriculum, by its very nature, removes diversity from the discipline (Atchison and Gonsalvez, 2001), edging out differing perspectives that historically have enriched IS. A discipline that changes rapidly might not be a candidate for a "model curriculum." Atchison and Gonsalvez (2001) argue for a taxonomy of approaches to IS curricula, similar to what is done for IS research. Lee, Trauth and Farwell argue that IS curriculum should be "driven by a clear vision of the career path for the graduates (Lee, et al., 1995, p. 339)." They also argue for a diversity of curricula, rather than a single curriculum.

IS 2002 contains this description of its purpose:

The availability of curriculum models enable local academic units to maintain academic programs that are consistent both with regional and national employment needs and with the common body of knowledge of the IS field. .. Professional society curriculum reports serve several other objectives. One important use is to provide a local academic unit with rationale to obtain proper resources to support its program. .. Finally, the administration might not recognize the rapid turnover of knowledge in the field and the need for resources to support constant retooling of faculty. Curriculum reports provide recommendations in these resource areas as well as recommended content for the body of knowledge to be taught. (Gorgone, et al., 2003, p. vi)

A model curriculum provides a basis for evaluating both a school's curriculum and a school's use of, and need for, resources. In the information systems field the curriculum needs constant attention so as to keep the material current. IS 2002 attempts to provide a mechanism to assist faculty in maintaining currency as well as a rationale to justify the resources needed to do so. In the current climate of fiscal restraint, this is

particularly important as department chairs battle to obtain a share of scarce resources.

3. HISTORY OF THE IS PROGRAM AT PACE UNIVERSITY

Pace University is made up of five independent schools, including a separate school of Computer Science and Information Systems (CSIS) and a business school. A Bachelor of Science in Information Systems is offered through CSIS and a Bachelor of Business Administration in Information Systems is offered through the business school. All courses are only taught by CSIS faculty. There are no information systems faculty members in the business school. To add to the complexity, Pace University has locations in a downtown urban area (graduate and undergraduate IS), a suburban area (graduate only), and a rural area (undergraduate only). Campuses are approximately 35 miles apart.

The Information Systems Curriculum Committee is responsible for IS programs across the two schools in the university. The committee is a "committee of the whole," that is, any and all IS faculty are invited and encouraged to participate. Because business students take IS courses, changes to IS curriculum must be negotiated with two curriculum committees in the business school, one at the graduate level and one at the undergraduate level.

A longstanding policy at Pace University has been to seek accreditation for any program with an accrediting agency available. Therefore, when the Accreditation Board for Engineering and Technology, Inc. (ABET) was named as the accrediting body for IS programs, our BS in IS program went through the process and became ABET accredited. Moreover, the school's IS program was the first in the country to receive ABET accreditation.

4. THE CURRICULUM REVISION PROCESS

The recent accreditation process spurred a review of the bachelor of science in information systems program, resulting in a major revision of that undergraduate degree program. The changes included new courses, significant alterations of existing courses, and a new course sequence.

Throughout the revision the content, courses, topics, and sequence of IS 2002 were referenced, debated, and, in many instances, adopted in the new curriculum. We will describe how the Curriculum Committee applied IS 2002 as a both a tool and a resource throughout the curriculum revision process. This includes its use as an aid for framing discussion and obtaining feedback from faculty and students on the proposed curriculum. It was also a valuable resource for managing changes to course content and sequence.

The most significant changes the Curriculum Committee made in the undergraduate program was to convert all required major courses to four credits instead of three. This has been motivated by a number of factors.

First of all, research suggests that undergraduate students have a deeper learning experience if a curriculum provides more depth than breadth (Austin, 1998; Gardiner, 1994). The Curriculum Committee believes that by delivering the curriculum in four-credit courses we can provide the depth required for deep learning. Other departments in the School of Computer Science and Information Systems had already converted to all four-credit courses. In addition to the benefits of providing undergraduates with more depth, this conversion resulted in fewer courses to staff and schedule, easing the strain on faculty and space resources.

With a mandate to obtain accreditation for a program under constant pressure to stay current, the Curriculum Committee was compelled to review its curriculum. Although there was initially little support among our faculty for IS 2002, these pressures forced a confrontation on the issue. As described in section 2, faculty resistance to model curricula is documented elsewhere. But the intense time pressures that came to bear made it clear that we could leverage IS 2002 and speed up the process. By using IS 2002 as scaffolding for our new curriculum, we were able to accelerate the revision process, and complete the revision in 6 months, a sharp reduction from the average revision time at our university of 18 months.

5. HOW IS 2002 WAS APPLIED DURING THE REVISION PROCESS

As IS curricula developed in the 1990s, Pace faculty monitored the establishment of a national model curriculum, attending workshops and conferences as each version was introduced. In 1996 the Committee carefully reviewed IS '95 and voted not to adopt it since the information systems program at Pace is housed in a computing school rather than a business school. This initial lack of support at Pace University for the information systems model curricula is consistent with findings in the literature (Atchison and Gonsalvez, 2001; Landry, et al., 2001).

Because of lingering perceptions of the inefficacy of earlier model curricula, the Curriculum Committee began revision efforts without any reference to IS 2002. The goal was to revise the curriculum in a six-month time frame. This time frame would allow for the necessary administrative approvals, and allow for the introduction of the new curriculum in the Fall 2003 semester. Given the enormity of the effort required in a compressed time frame, committee members began to examine IS 2002 with an eye toward using it as a resource. It quickly became apparent that there was

already a connection between our curriculum and IS 2002, and that IS 2002 had elements that could ease the difficult job of revising courses. Starting slowly, we examined the underlying assumptions of IS 2002 to see if our curriculum was based on these same premises.

We then mapped our new courses to the IS 2002 representative course sequence. This was accomplished not through any sophisticated mapping software but with a simple Word document and embedded links. A diagram of our course sequence was linked to course descriptions from IS 2002. The publication of IS 2002 as a hyperlinked document (<http://www.is2002.org>) made this a simple task. Once connections between IS 2002 courses and our new IS courses were made, descriptions, goals, and topics for IS 2002 courses were compared, applied, and adopted into our new curriculum.

As the Curriculum Committee discussed course goals and topics, we referred both to IS 2002 and course outlines from our old curriculum. Referencing IS 2002 helped us identify topics to either add or eliminate from courses. We noted topics that were taught in our courses but not included in IS 2002, and topics that were included in IS 2002 but not included explicitly in our courses. Based on this comparison, the Curriculum Committee added a new course, IS 110, Fundamentals of Information Systems, and inserted project management content into IS 441, Systems Implementation.

Table 1 describes the relationship between IS 2002 and our new curriculum. Notice there is quite a variety of mapping relationships between the courses. For example, two IS 2002 courses were combined into one new course, as IS 2002.1 and IS 2002.3 became IS 110, Fundamentals of Information Systems, and IS 2002.5 was split between our IS223 Introduction to Programming and IS323 Object Oriented Programming. IS 2002.2, Electronic Business Strategy and Design is still under development, and one course offered by Pace University, IS 416, Distributed Computing has no corresponding course in IS 2002.

Table 1 shows that although IS 2002 was by no means adopted "whole cloth," there is a strong association between IS 2002 and our new curriculum. Half of the courses in our new curriculum have a one-to-one correspondence with IS 2002, and 30% have some correspondence. Only 20% have no correspondence. These relationships are consistent with the design principles of IS 2002, especially the tenet that IS 2002 "should guide but not prescribe. Using the model curriculum guidelines, faculty can design their own courses (Gorgone, et al., 2003)."

| IS 2002 Course | <<->> | PaceCourse |
|---|-------|--|
| IS 2002.P0 Personal Productivity with IS Technology | 1:1 | CIS 101 Introduction to Computing |
| IS 2002.1 Fundamentals of Information Systems IS 2002.3 Information Systems Theory and Practice | 2:1 | IS 110 Fundamentals of Information Systems |
| IS 2002.2 Electronic Business Strategy, Architecture and Design | n/a | |
| IS 2002.4 Information Technology Hardware and Software | 1:1 | IS 112 Computer Organization and Programming |
| IS 2002.5 Programming, Data, File and Object Structures | 1:2 | IS 223 Introduction to Programming IS 323 Introduction to Object Oriented Programming |
| IS 2002.6 Networks and Telecommunications | 1:1 | IS 351 Global Data Communications |
| IS 2002.7 Analysis and Logical Design | 1:1 | IS 241 Systems Analysis and Design |
| IS 2002.8 Physical Design and Implementation with DBMS | 1:1 | IS 481 Database Management and Organization |
| IS 2002.9 Physical Design and Implementation in Emerging Environments IS 2002.10 Project Management and Practice | 2:1 | IS 441 Systems Implementation |
| | None | IS 416 Distributed Computing |

Table 1: Relationship map showing how IS 2002 courses were combined or split to form Pace University courses

6. DESCRIPTION OF IS 2002 FACULTY SURVEY AND RESULTS

Another way IS 2002 was useful was as a resource for initiating faculty discussion of overall goals and objectives for the new curriculum. Since the question "what is IS?" prompts such a variety of responses, we hoped to build a stronger faculty consensus on the new direction of the undergraduate program.

We accomplished this by using IS 2002 to construct a faculty survey on the relative rank of IS goals and objectives. This survey was based on a section of IS 2002, "Guiding Assumptions About the Information Systems Profession" (Gorgone, et al., 2003, p.6). This material was used to create a list of 11 overall goals and objectives for an IS program (see Table 2).

| IS 2002 Goals and Objectives | |
|------------------------------|---|
| • | Topics and concepts explained using a broad business and real world perspective |
| • | Development of critical thinking skills |
| • | Appreciation and discussion of ethical issues |
| • | Development of good interpersonal skills |
| • | Improvement of communication skills (oral, written, listening) |
| • | Emphasis on team/collaboration skills |
| • | Understanding and modeling organizational processes and data |
| • | Defining and implementing technical and process solutions |
| • | Development of system integration skills |
| • | Understanding project management |
| • | Development of skills in the application of information technology for helping individuals, groups, and organizations achieve their goals |

Table 2: Overall IS Objectives Based on IS 2002 Guiding Assumptions

Using the survey instrument included in the appendix we asked all IS faculty members to rank the five most important objectives. 15 information systems faculty replied, representing 33 1/3% of potential responses. Results were collated and the perceived importance was measured by applying a Borda count for tallying votes. The Borda count is an algorithm for determining rank order voting dating back to the 1700's (Brams and Fishburn, 1991). For the calculation of a rank order vote, each alternative is given a count. For n alternatives n-1 points are assigned for each first place vote; n-2 points for each second place vote; and so on, down to one point for the second-to-last and zero for last place. The alternative with the highest count wins. For this survey, then first place votes earned ten points, second place votes earned nine points, and so on down to zero.

Using the Borda count, the top five objectives among faculty are:

- 1) Understanding and modeling organizational processes and data
- 2) Development of skills in the application of information technology for helping individuals, groups, and organizations achieve their goals
- 3) Defining and implementing technical and process solutions
- 4) Topics and concepts explained using a broad business and real world perspective
- 5) Improvement of communication skills (oral, written, listening)

Table 3 displays the results of faculty ranking of all objectives on the survey:

| Overall rank of IS 2002 Objectives | |
|------------------------------------|---|
| 1 | Understanding and modeling organizational processes and data |
| 2 | Development of skills in the application of information technology for helping individuals, groups, and organizations achieve their goals |
| 3 | Defining and implementing technical and process solutions |
| 4 | Topics and concepts explained using a broad business and real world perspective |
| 5 | Improvement of communication skills (oral, written, listening) |
| 6 | Development of critical thinking skills |
| 7 | Emphasis on team/collaboration skills |
| 8* | Understanding project management |
| 8* | Development of system integration skills |
| 10 | Appreciation and discussion of ethical issues |
| 11 | Development of good interpersonal skills |
| *indicates a tie | |

Table 3: Faculty Ranking of IS 2002 Objectives

Distribution of Scores

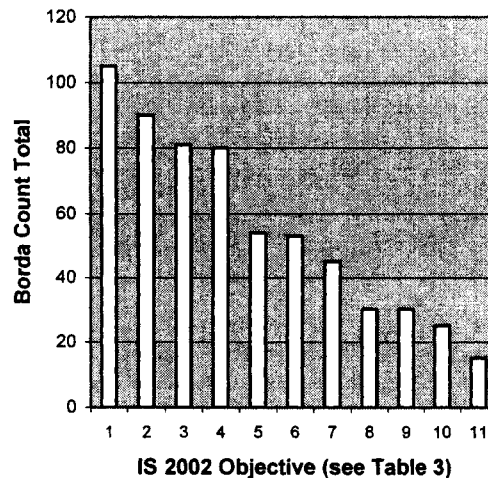


Figure 1. Distribution of Weighted Borda Count Scores of Faculty Rankings

Figure 1 shows the distribution of the weighted Borda counts. This graph indicates that there is faculty consensus about the most important objectives. The top four weighted scores are closely grouped and the remaining scores drop off quite suddenly. For example, the distance between the weighted count of objectives three and four is only one, while the distance between the weighted count of objectives four and five is 26. Additionally, the data appear to be grouped in three clusters: 1-4, 5-7, 8-11.

The results indicate that our faculty consider the technical objectives to be more important. These include modeling, applying information technology and implementing technical solutions. In contrast, the faculty rank the less technical objectives lower, i.e., team/collaboration skills, interpersonal skills, ethical issues. This ranking reflects the technical orientation of the faculty and the fact that we are a school of computer science and information systems and not a business school.

Notice the relatively low ranking of project management and systems integration skills. Surveys of employers have indicated that these are highly valued skills (Noll and Wilkins, 2002). This disparity raises questions about the disconnect between faculty perceptions and professional expectations.

As we will describe in the following section, our students' perceptions of an information systems program include an emphasis on "soft" skills. Noting the difference between student perceptions and faculty emphasis is an important part of the process of revising curriculum.

7. APPLYING IS 2002 TO STUDENT FOCUS GROUPS

With major changes underway, it made sense to communicate our intentions to current students and solicit their feedback. We wanted to identify student expectations of the information systems field and the information systems program and to clarify their goals in choosing the program. To collect this information, we conducted focus groups targeted at current information systems students. Focus groups have been shown to be a good collection tool of student attitudes and interests (Feather, 2001; Greenbaum, 2000).

Four two-hour focus groups consisting of junior- and senior-level BS in IS students were scheduled, two for each undergraduate campus location. The focus groups began with a review of the current information systems program and then described the planned revisions. We provided participants with course descriptions for the revised curriculum and asked for comments.

This was followed by an open-ended discussion, led by a facilitator, on what students liked and didn't like about their experience as information systems majors. Students said they did not want theory; they wanted more "hands on" courses. One student suggested "if you are going to have four credit courses, one hour should be held in the lab." Another student felt that "we learn better by doing" and he wanted more "hands on" classes. When asked what they liked about information systems, many of the students said that they liked solving problems. One of the students described himself as a "mechanic with computers" saying he enjoyed solving hardware and software conflicts. Another student liked IS because he "likes to design stuff for people to use."

Students from all sessions stressed the importance of group work, and emphasized that it was important to have the professors "take the group work seriously." Students across the focus groups also felt that a project management course needed to be added to the program. Largely based on this feedback, topics and material from IS 2002.10, "Project Management and Practice," was added to our capstone course IS441.

Some students felt an introductory information systems course was not needed. One of the students said the material "could be done in two weeks." The Curriculum Committee strongly disagrees with this perspective. The first new course developed and added to the undergraduate curriculum is IS110, Fundamentals of Information Systems, based on the material from IS 2002.1 and IS 2002.3.

Student comments reveal the underlying tension between acquiring a present-day "skill set" versus the long-term professional requirement to stay current in the field. In such a dynamic and rapidly changing industry, the goal

for faculty has to be to teach students how to learn. In teaching a programming language, instructors must focus on the process of learning, hoping to teach students how to learn new languages. Students by contrast often focus on skill acquisition.

An analysis of student comments revealed a wide spectrum of opinions about what an information systems program should include. Some students wanted more programming, some wanted more emphasis on communication skills. One student felt that it is important to be able to make presentations saying "if you don't know PowerPoint here, you are dead," but that same student also said, "If I had to sit through (a class) on Microsoft Office I'd be bored to tears." The divergent student opinions are consistent with the diversity among IS educators and programs.

8. CONCLUSIONS AND SUGGESTIONS FOR FUTURE RESEARCH

After studying IS 2002, talking to students and surveying faculty we found different interpretations of what the emphasis should be in a undergraduate information systems program. Some of these differences were moderated by how we revised the curriculum. Some still exist because faculty and students have varying perspectives and expectations. It may be impossible to create a curriculum to serve all stakeholders.

Research has consistently demonstrated a fuzziness and lack of precision in the definition of IS (Baskerville and Myers, 2002). This is, perhaps, to be expected from a composite discipline that is rapidly evolving. In IS, then, what will be the role of the model curriculum? It may never fulfill the same role as the ACM Computer Science curriculum, adopted "as is" in most computer science programs across the country. Instead, IS 2002 describes itself this way (Gorgone, et al., 2003):

- 1) The model curriculum should represent a consensus from the IS community.
- 2) The model curriculum should be designed to help IS faculty produce competent and confident entry level graduates well suited to work-place responsibilities.
- 3) The model curriculum should guide but not prescribe. Using the model curriculum guidelines, faculty can design their own courses.
- 4) The model curriculum should be based on sound educational methodologies and make appropriate recommendations for consideration by IS faculty.

It is clear from this excerpt that IS 2002 is not dogma but more of a template for curriculum design. Taken in that spirit, our experience taught us that IS 2002 can be useful in many ways. We used some parts sparingly, and applied others nearly unchanged. It served as a reference, defined a common language and assumptions, and provided blueprints for new courses.

This research can be extended by having students rank the objectives of IS 2002 to better understand student expectations of an information systems curriculum. A comparison of student ranking and faculty ranking would provide indicators of those areas of difference that might be addressed before students started an IS program. Students whose expectations match the objectives of a program may be more likely to finish the program and to be satisfied with the program.

Graduates can also be surveyed and asked to rank the objectives from the perspective of their work experience. In this way we might learn which objectives have the greatest practical application for students starting their careers in information systems.

In the title of this paper we ask the question "how useful is IS 2002?" This is, in many ways, a loaded question. Our faculty had reservations about using IS 2002, and other papers demonstrated that opinion was by no means unusual. The answer, in the final analysis, depends on your concept of a model curriculum. If you expect a tightly integrated required sequence of courses, you will not find it. But you will find a thoughtful, flexible, and practical resource that made the difficult job of revising curriculum under extreme time pressure that much easier. In our experience, it was a great help. IS 2002 provided a vehicle for us to identify the explicit objectives of our program. In addition, IS 2002 proved to be a flexible, useful framework for adapting our program to the continuing strain of competing accreditation requirements and the rapid evolution of the IS industry and discipline.

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APPENDIX
The Survey Instrument

The instrument was a simple ranking, as shown below:

For the new curriculum, from these 11 goals, select the 5 goals you consider most important and rank them from 1 (most important), to 5 (least important). Please note: label only your top 5 goals, leave the others blank.

1. Topics and concepts explained using a broad business and real world perspective _____
2. Development of critical thinking skills _____
3. Appreciation and discussion of ethical issues _____
4. Development of good interpersonal skills _____
5. Improvement of communications skills (Oral, Written and Listening) _____
6. Emphasis on team/collaboration skills _____
7. Understanding and modeling organizational processes and data _____
8. Defining and implementing technical and process solutions _____
9. Development of systems integration skills _____
10. Understanding project management _____
11. Development of skills in the application of information technology for helping individuals, groups, and organizations achieve their goals _____



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