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ABSTRACT

This paper offers an assessment model approach for program assessment of Information Systems (IS) undergraduate programs. The paper presents the case example of results of program assessment for the B.S. in Information Systems at University of Redlands (UR). It demonstrates the usefulness of the approach to understanding the overall success of an IS degree program as well as details of program elements. The example points to many ways that the outcomes of assessment can be utilized for IS program improvement. Four tables include: knowledge attainment goals of BSIS major program; curriculum of bachelor of science in information systems (BSIS); correlations of important knowledge/competency areas for current BSIS; and correlations of career impact on alumni for important BSIS curricular areas. Also includes two figures. (Contains 18 references.) (AEF)

PROGRAM ASSESSMENT IN AN UNDERGRADUATE INFORMATION SYSTEMS PROGRAM: PROSPECTS FOR CURRICULAR AND PROGRAMMATIC ENHANCEMENT

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ABSTRACT

This paper examines the assessment of an undergraduate program in Information Systems. It presents an approach to program assessment that has proven beneficial to one institution. The data from program assessment can be useful to stakeholders and forms a baseline for program improvement.

INTRODUCTION

A major trend in U.S. higher education of the last ten years has been towards educational assessment. Universities, accrediting organizations, professional academic associations, and government review panels have requested and often demanded assessment information from schools, departments, programs, projects, and individual faculty. One example is the AACSB accreditation standards for business schools, which require for accreditation that a variety of assessment processes be in place. In the field of information systems, not much has been reported in the literature on program assessment, yet it is important because IS programs are growing in size and their success needs to be monitored and informed steps taken to improve the curricula.

This paper offers an assessment model approach for program assessment of IS undergraduate programs. It presents the case example of results of program assessment for the B.S. in Information Systems at University of Redlands (UR). It demonstrates the usefulness of the approach to understanding the overall success of an IS degree program as well as details of program elements. The example points to many ways that the outcomes of assessment can be utilized for IS program improvement.

The B.S. in IS at UR is a 14 year old program that had undergone three major curricula upgrades, with a fourth one planned in the fall of 2000. The prior curricula changes were effected in the years 1986, 1992, and 1997. The curricula were based on national model curricula, including the DPMA 90 curriculum, and the IS 97 curriculum (it was available in preliminary form two years prior to its final release in 1997.) The Redlands B.S. in IS is a degree completion program that includes only junior and senior undergraduate years, with the first two years of work done at another university or college. The Redlands 97 curriculum's knowledge attainment goals are shown in Table 1. The Redlands 97 IS curriculum consists of the IS major consisting of nine IS courses, as well as one humanities course, one upper division mathematics course, and four business courses (See Table 2). The nine IS courses encompass nearly all of the IS '97 model curriculum, with the exception of several introductory courses. However, since the students enter as working adults, many with IS industry experience and jobs, a more condensed curricular introduction was felt to be appropriate. The IS major is distinguished by two required courses that are not standard in IS '97: a course in geographic information systems (GIS) and a course in computer ethics. Both of these courses relate to strengths of the university: it is known for its strong GIS faculty and it has a liberal arts foundation that ethics relates to.

TABLE 1
KNOWLEDGE ATTAINMENT GOALS OF BSIS MAJOR PROGRAM

- Understand an apply structured programming techniques
- Be conversant in fundamental C language capabilities
- Understand the Graphical User Interface (GUI) principles
- Be conversant in fundamental Visual Basic language capabilities
- Understand the basic terms and components of the relational database model
- Understand and be able to apply database application development using Access in conjunction with the VisualBasic programming language
- Understand and apply the fundamental concepts and terminology associated with networking and telecommunications
- Understand and be able to build internet and web-based applications
- To appreciate the design and structure of geographic information systems as a decision_making tool
- To demonstrate knowledge of decision support systems, executive information systems, and expert systems including some hands-on applications
- To understand how the decision making process can be enhanced by modeling
- To appreciate the practical benefits of management support systems in real business settings and in society
- To obtain skills in spatial analysis
- To become knowledgeable of the ArcView GIS software applications. Be able to implement hands-on basic GIS functions using ArcView
- To appreciate how decision_makers in the public and private sectors can better assess and make

decisions on managerial problems through the use of GIS

- Understand the concepts and principles of structured and object oriented methodologies in systems development
- Be able to apply effective system modeling tools and skills including CASE
- Understand the perspective of complete life cycle activities, their value and application
- Understand information systems from the perspective of pieces of an organizational system
- Understand the magnitude of technological advances and their implications to ethical issues
- Understand the theoretical perspective of ethical philosophies as they relate to business and organizations
- Identify and understand examples of real world ethical dilemmas in information systems including the many sides of such dilemmas
- Be able to discuss and properly communicate the basic concepts of information systems
- Be able to design and build a business information system
- Be able to develop and implement software in a business project solution
- Communicate a complete systems project including verbally presenting and writing up and documenting the project

TABLE 2
CURRICULUM OF BACHELOR OF SCIENCE IN INFORMATION SYSTEMS (BSIS)

ISYS 312	Productivity with Information Technology
MGMT 310	Philosophical Foundations of Management
ISYS 219	Fundamentals of Structured Programming with C
MGMT 330	Managing and Leading Organizations
ISYS 317	Introduction to Programming Techniques: Object-Oriented Programming
MTHW 303	Mathematical Applications for Information Systems
BUAD 337	Political and Business Economics
ISYS 318	Database Concepts
BUAD 469	Accounting Information Systems
ISYS 425	Management and Decision Systems
ISYS 365	Geographic Information Systems:
BUAD 340	Principles of Marketing
ISYS 489	Applied Software Development Project II
ISYS 415	Computer Ethics
ISYS 404	Systems Analysis and Design
ISYS 488	Applied Software Development Project I

After the Redlands IS 97 curriculum had been run for two years, the IS faculty initiated a plan of program assessment that was carried out in early 2000. The assessment model consists of the following steps: (1) written survey of the 300 current students of the extent that their knowledge or competency of the program objectives and on their suggestions for program enhancements, (2) written survey of 700 alumni of the program on the extent that program objectives have helped them in their careers and on their suggestions for program enhancements, (3) focus group with the IS Degree Program Corporate Advisory Committee on their recommendations for curricular improvement, (4) focus groups with samples of current students about their suggestions for curricular improvements, and (5) IS faculty review and suggestions of current curriculum.

The approach is multi-faceted, i.e., it includes many stakeholders and several methodologies. In particular, it gathers data from current students, alumni, corporate advisors, and IS faculty. It utilizes the methods of written survey, directed focus groups, and discussion. All of this information is aggregated together to form part of the IS program assessment report. Other information required by the university is added to the report including for instance data on the program, current status of the curricular and support services, advising, and math and writing skills. Altogether, this larger amount of data than is ordinarily collected provides a more in-depth insight into the program successes and failures, strengths and weaknesses, and feeds information into design of the future curriculum.

Results of Assessment Procedures

Program. The BSIS program was assessed through three open-ended questions in two surveys, one of current students and a second of alumni. A third program assessment was conducted through two focus groups with BSIS students. In the hour and a half focus group sessions, the students were first presented with the results of the BSIS curricular survey. Then there was a segment of discussion of the curricular results. Finally, there was a 45 minute open group discussion of suggestions for the BSIS program and curriculum.

Only the survey responses responses from current BSIS students that made specific recommendations are included, i.e., a comment such as "great program" is not included because it does not inform the assessment process. Question 3 pertains especially to the program. There are several general points coming out of these comments regarding the program. On is that student would like to see the latest technology emphasized in the program. This implies that in program revision, attention needs to be given to the most current and important technical skills. Responses also support review for very recent and current textbooks underpinning the technical skills. There are several comments about workshop/tutorial preparation in math and writing skills as important. In general the administrative mechanics and support services of the program are not commented on, which would imply that they are working well.

The summary of the two BSIS student focus groups underscore several points regarding the program. One is that the pre-entry counseling and advertising materials need to correctly position the program balance. In particular, the BSIS program offers a balanced blend of managerial and technical content. However, some incoming students have mis-read the program as strictly technical. Students are not clear on the level of technical expertise that they will be expected to achieve i.e., will they be intermediate programmers or master programmers? The program needs to articulate its goals early on. One comment in response is that the survey numerical responses indicate a considerable range of incoming technical knowledge/competency in particular between 1 and 3.5 on a 1 to 5 Likert scale. Hence, part of the misunderstanding is that students technical mastery levels will remain different throughout the program and what can be standardized is the <u>minimum</u> level of technical knowledge/competency.

Overall, the student suggstions/recommendations are centered on the technical content of the program; they are seeking expanded technical coverage. They appear satisfied with the program administration and academic support and service elements.

Curriculum. The survey of current students measured Likert scale responses on the extent of current knowledge of 26 program objectives. For N=53 responses, the average current knowledge was 2.59 on a 1 to 5 Likert scale, with 5 being the highest value. This reflects an intermediate state of current knowledge, which is to be expected for the full spectrum of students over the two years of the program. The comparison of students in the first half of the program i.e., junior year to those in the second half i.e., senior year shows an average current knowledge of juniors of 2.45 and of seniors of 2.73, for an average gain of 0.28, or eleven percent. When juniors are compared with students who were seniors in the last six months or had just completed the program, the average gain in current knowledge was 0.57 or twenty three percent. These results provide confirmation of the learning value of the IS major. We interpret that the gains are not even higher because the student population consists of working adults students, most of whom come into the program as IS or technology professionals, so their starting knowledge base is higher than for traditional younger resident students.

The gains in current knowledge from the program can be further disaggregated by the sixteen program objectives. Comparing juniors to seniors in the last nine months and a few very recent graduates, the following are the ranked gains by program objective.

	Current BSIS Students	
Rank	***BSIS Program Objective***	***Av. Gain in Current Knowledge from Jr. Year to Last 9 Mos.***
1	Access in Development	1.06
2	Dec. Making with GIS	1.05
3	Communicate Project	1.03
4	Database Applications	0.98
5	Relational Database	0.94
6	Methods of Syst Analysis	0.94
7	CASE & Syst Tools	0.92
8	Visual Basic	0.79
9	Structured Programming	0.78
10	Syst Life Cycle	0.63
11	ArcView Software	0.57
12	Internet & Web Applications	0.56

13	GUI Interface	0.54
14	Communic. Basic Concepts	0.53
15	C Language	0.47
16	DSS/EIS	0.46
17	Decision Making	0.45
18	Design/Build an IS	0.43
19	Spatial Analysis	0.36
20	IS Project Solution	0.35
21	Ethical Dilemmas	0.33
22	Organiz. Systems	0.31
23	Ethical Philosophies	0.13
24	Ethic Implic of Techn.	0.13
25	Mgt Support Systems	0.10
26	Networking Concepts	0.04

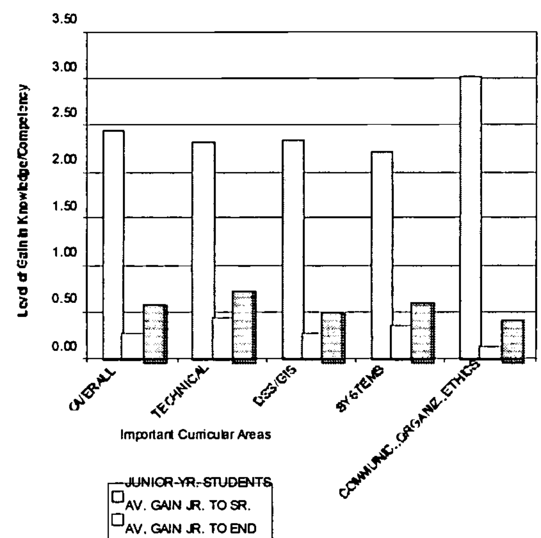
The information in the disaggregated table is valuable in determining where the most learning is taking place and where learning is not as effective, so future improvements can be focused in those areas. The results confirm extensive learning in GIS decision making, a new area for most students, in communication of project,

and in the mainstay areas of data-bases and systems development. Also, CASE tools and visual basic are high. Those are areas in the present curriculum that appear to be working well and are likely to be retained in the new BSIS 2000 curriculum although modernized.

On the other hand, areas that are not doing well as measured by the extent of knowledge gain are networking concepts, management support systems, certain aspects of computer ethics, organizational systems, and solutions with IS projects. These are pointing to areas in the BSIS 2000 curriculum in which to redesign courses and educational strategies and to seek major teaching and learning improvements. For instance, the low score for networking concepts may stem from the lack, until recently, of a hands-on networking laboratories for training on NT administration and configuration. Small practice networks have now been located in the Jones Center and all the major regional centers. Also, the networking course was in need of revision, a task which has recently been accomplished, but may need even more revision and attention in the new curriculum.

There are a number of gender differences in knowledge/competency by program objectives. The statistically significant gender differences for competency/knowledge of current students are for: structured programming and C language (p=0.05) and there are lesser differences for networking and ethical dilemmas (p=0.10). In all these cases, the knowledge competency of males exceeds that of females. The programming and networking differences may relate to occupational differences prior to entry, while the difference in knowledge of ethical dilemmas may related to differential prior exposure to ethical dilemmas in the real world.

The knowledge/competency results can be grouped by major curricular areas. For instance, the Systems curricular area comprises the knowledge/competency objectives of methods of systems analysis, CASE and systems tools, systems life cycle, designing/building an information system, and IS project solution. When the knowledge/competency of current BSIS students is grouped by major curricular areas (see Figure 1), the highest levels of knowledge/competency are in communications/organization/ethics, while the lowest levels are in DDS/GIS and systems, with technical in the middle. This emphasizes that the students have



NOTE: the values for "junior year students" are graphed in the range from 0 to 5, but actually are in the range from 1 to 5.

considerable knowledge of the softer sides of the curriculum. Figure 1 also demonstrates a gender gap overall and for the four major knowledge/competency areas. This mostly relate to the prior levels of experience and

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moderate to weak areas initially. On the other hand, the least learning gain occurs in communications/organization/ethics. This is the area of strongest initial knowledge. This may be explained by motivational factors i.e., that students are more motivated to learn about the technical and systems areas due for job and career related reasons.

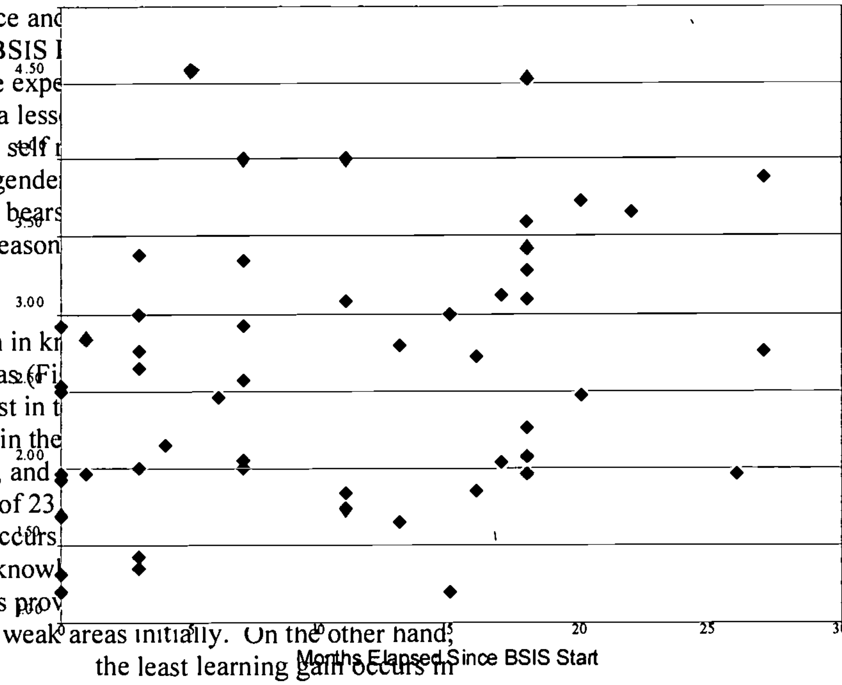

FIGURE 2
OVERALL KNOWLEDGE/COMPETENCY VS. TIME IN PROGRAM, CURRENT BSIS STUDENTS

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Correlation analysis for the aggregated knowledge/ competency areas and with elapsed program duration in months shows signficant correlations among the overall knowledge competency and the four important areas (see Tables 3 and 4). This implies that generally a student is higher or lower in knowledge competency in all the areas i.e., they vary up and down together among individuals. This points to a more generic set of knowledge/competency across areas. This may reflect the real world experience of adult students. For instance, a student who had worked in a systems analysis position for ten years before entering the BSIS would have built up knowledge in all of the four major areas, while an entering student without any IS job experience would be weak in the technical, systems, and DSS/GIS areas. It is somewhat less clear why he/she would be weak in communications/organizations/ethics as well, but that is the case.

The correlations also show the correlation with elapsed time in the program. There is a statistically significant correlations of overall and technical knowledge/ competency with elapsed time, but not with the other areas. This is seen in the scatter plot shown in Figure 2. What is clear in all these areas is that there is a large range of incoming competencies; again this relates to the population of adult students. For overall knowledge (Fig. 1) and technical knowledge, there is a significant trend of increase over the two years. Yet, at graduation, there is still substantial range of knowledge/competency. The trend line has moved up, but the high variation remains. This is helpful in explaining teaching challenges even late in the BSIS program of a large range of competencies in a single cluster group. We interpret this as continuation of incoming ranges. By contrast, for communications/organizations/ethics, the average incoming knowledge/competency is higher but with an even larger range and doesn't increase much with the same large range throughout the program.

The data from the alumni survey were equally revealing. The key question related to program objectives is different; it asked how well the IS degree had impacted the alumni's career advancement. The following were the ranked program objectives (on a 1 to 5 Likert scale, with 5 being the highest impact):

The alumni results point to the importance of the "softer" sides of the curriculum on career impact — areas such as communications, organizations, designing and building an IS project, and the "building block" areas of systems development and database. The top two objectives are the area of interpersonal communications. This result corresponds to other studies in the IS educational literature that stress the IS career advances of interpersonal skills and teamwork (see literature review in Pick and Schenk, 1993). In general, this literature points to the "softer" areas as ultimately having more impact on IS graduates careers in the long term. It is important to ask why these behavioral skills rise to such importance. One reason may be the rising career attainment of BSIS alumni, so that eleven percent of the alumni are in top management (President, VPs) and forty percent are in middle management or higher. In middle to top management jobs, the areas of communications, teamwork, and organizations are essential.

TABLE 3
CORRELATIONS OF IMPORTANT KNOWLEDGE/COMPETENCY AREAS FOR CURRENT BSIS

	Months	Overall	Technical	DSS/GIS	Systems	C/O/E
Months	1					
Overall	0.309*	1				
Technical	0.349**	0.923**	1			
DSS/GIS	0.273	0.863**	0709**	1		
Systems	0.251	0.923**	0.798**	0.732**	1	
C/O/E	0.186	0.891*	0.682**	0.771**	0.852**	1

* significant at 0.05 level
** significant at 0.01 level

TABLE 4
CORRELATIONS OF CAREER IMPACT ON ALUMNI FOR IMPORTANT BSIS CURRICULAR AREAS

	Year Graduated	Overall	Technical	DSS/GIS	Systems	C/O/E
Year Graduated	1					
Overall	-0.187	1				
Technical	-0.047	0.818**	1			
DSS/GIS	-0.287*	0.754**	0.436**	1		
Systems	-0.235	0.817**	0.579**	0.519**	1	
C/O/E	-0.202	0.746**	0.351**	0.560**	0.623**	1

* significant at 0.05 level
** significant at 0.01 level

	Alumni	
Rank	***BSIS Program Objective***	***Impact of BSIS Program Objective on Alumni's Career Advancement***
1	Communicate Project	4.08
2	Communic. Basic Concepts	4.04
3	Syst Life Cycle	4.00
4	Organiz. Systems	3.98
5	IS Project Solution	3.97

6	Design/Build an IS	3.92
7	Relational Database	3.84
8	Database Applications	3.79
9	Ethical Dilemmas	3.75
10	Ethic Implic of Techn.	3.73
11	Ethical Philosophies	3.69
12	Access in Development	3.63
13	Networking Concepts	3.53
14	Mgt Support Systems	3.50
15	Methods of Syst Analysis	3.36
16	Decision Making	3.31
17	Dec. Making with GIS	3.23
18	CASE & Syst Tools	3.22
19	GUI Interface	3.13
20	Visual Basic	3.12
21	Spatial Analysis	3.03
22	DSS/EIS	3.01
23	Structured Programming	2.98
24	Internet & Web Applications	2.88
25	ArcView Software	2.13
26	C Language	1.95

Systems life cycle is in third place, fifth, and sixth place interspersed between interpersonal communication and organizational knowledge. Database design and concepts are sixth and seventh. From the standpoint of curricular revision, this points to the need to put even greater emphasis on these behavioral, organizational, and ethical areas. These are long time mainstays of the systems field and model curricula. Systems develop-ment has proven to be a robust knowledge area over a number of iterations of national model curricula (DPMA, 1990, 1997). It is likely that systems development will be retained in the BSIS 2000 curriculum, although it will take a different form i.e., it will likely be more oriented towards rapid development in the context of the web and dynamically changing environments.

Database is the most valued technical curricular area for alumni career advancement. This again reflects an enduring mainstay feature of national model curricula. Databases have persisted in importance in IS. They remain so in the internet age, since database underlies many aspects of e-commerce and e-business.

Alumni rate the career impact of ethics in the upper moderate range. It may be that BSIS graduates, with rising career attainment and often managerial or high level systems status, run into ethical issues to an increasing extent.

At the lower end of perceived career benefits are a number of technical areas including C language, ArcView software, internet and web applications, and structured programming. By contrast, those technical areas were all in the middle range for current student's curricular knowledge gain. There are several explanations. First, some of these areas are so new (ArcView, internet) that most of the graduates could not have been exposed to them in the BSIS or outside of the university at the time of their BSIS schooling. The C language and structured programming may be less important because of the occupational rise of alumni towards management and senior systems positions that involve less hands-on programming. This is reflected in the respondent profiles which show that only eight percent of alumni are in programmer positions. At the same time, only two percent of the sample of current students are programmers.

The lower perceived career value of technical curricular objectives underscores the fast movement of technology, so future BSIS alumni may not be able to utilize the technical skills they are learning today on a career basis. This is contrary to the sometimes strongly stated desire of current students to master technical skills.

Generally, the alumni findings on specific curricular areas point to the importance of the "softer" behavioral elements in the curriculum as well as the long-time mainstays of systems development and database.

The results by gender indicate that alumni male BSIS students have greater career impact of the program. The only statistically significant difference is for the career impact of communicating the project, with males having higher impact. This is unexplained.

The results of the first open-ended question for current BSIS students provide valuable additional suggestions/comments on the curriculum. In particular, question 1 concerns improvements in the BSIS curriculum. The suggestions focus on (1) expanding and improving the technical content, (2) adding optional workshops, tutorials, and elective courses that might even include certificate training, such as Microsoft SCCE. In the technical realm, students are particularly interested in expanding the Visual Basic coverage, perhaps by adding another course.

The results of the second open-ended question concern the value of the non-major courses in the BSIS program. There seems to be diverse opinions about Mgmt. 310 (Philosophical Foundations of Management) ranging from strong support to dislike/request to eliminate it. Looking at the parts of Mgmt 310, the humanities segment seemed more supported than the portfolio part. There was also a suggestion to separate the course into two courses and move the portfolio part later in the curriculum. The student response on the Mthw 303 (Mathematical Applications for Information Systems) course was mixed. We can assume that this may depend on the extent of individual student preparation and particular instructors. Reflecting other responses, some students may need tutorials and workshops to enhance readiness to take Mthw 303. The responses on the Mgmt. 330, Buad 337, and Buad 469 courses were generally good.

Another aspect of the assessment of student work in the BSIS Program is the student experience with senior project. An evaluation was conduced by Jeff Kim of a random sample consisting of BSIS senior projects, with 3 project reports in 1998; 3 in 1999; and 4 projects from 2000. The findings indicated the following accomplishments in the senior project: (1) high level of systems implementation. (2) documentation report was visible, and (3) students followed the project report structure offered by the project guidelines. However, the evaluation pointed to the following areas of weakness or challenge. No analysis was done on the real world organizational context of the projects. This is important for several reasons. Studies are increasingly pointing to the organizational aspect as important to systems success. Second, the organizational context touches based as a capstone element with the organizational/ managerial side of the BSIS curriculum. The BSIS 3 year goals in section 9 point to this area. Secon, no analysis was done in the sample projects on workflow, except in the case of "Use Case" analysis. Again, this is an important concept today for the practical success of systems, and needs to be emphasized in project enhancements in the future. Third, each stage of the project design and implementation appeared to be disjointed. In other words, the project calendar of "piece work" assignments that are put together at the end may be discouraging an integrated series of project tasks that are coordinated together. This can be improved by modifying the BSIS project guide to stress returning sometimes to earlier concepts and prior activities and steps, and to generally being more holistic. Lastly, the project reports did not reflect enough of what the students had learned from the exercise of doing a project, with the exception of one report written in 2000. This is a part of "reflection," which correlates with missions and would add to the learning and experience of projects.

The goals and objectives later point to areas for improvement of the senior project. The project assessment also points to the need to assess the timing and sequence of the project and project related (e.g. ISYS 404) courses; this can be considered with the present curriculum, prior to the BSIS 2000 implementation. A final point is that the focus of knowledge and learning may need to be refocused. We need to think through the goal overall of the project. Is it to perform systems analysis, write up requirements, program, and evaluate the outcome? Is it keyed to preparation for jobs and hiring on graduation? Or is it to reflect on the principles of systems design? These need to be thought through more and articulated to students better, as well as practiced in the way decided upon.

As an example of the assessment findings, the survey of current students received Likert scale responses on the extent of current knowledge of 26 program objectives. For N=53 responses, the average current knowledge was 2.66 on a 1 to 5 Likert scale, with 5 being the highest value. This reflects an intermediate state of current knowledge, which is to be expected for an even distribution of students over the two years of the program. The comparison of students in the first half of the program i.e., junior year to those in the second half i.e., senior year shows an average current knowledge of juniors of 2.55 and of seniors of 2.79, for an average gain of 0.25, or about ten percent. When juniors are compared with students who were seniors in the last six months or had just completed the program, the average gain in current knowledge was 0.42 or about sixteen percent. These results provide confirmation of the learning value of the IS major. We interpret that the gains are not higher because the student population consists of working adults students, most of whom come into the program as IS or technology professionals, so their starting knowledge base is higher than for a traditional younger resident student.

The gains in current knowledge from the program can be further desegregated by the sixteen program objectives. Comparing juniors to seniors in the last six months or recent graduates, the following are the highest gains by program objective.

Doing the same comparison, the areas of lowest gains (or losses) were the following.

The information in the disaggregated table is invaluable in determining where the most learning is taking place and where learning is not as effective, so future improvements can be focused in those areas. For instance, the results confirm extensive learning in GIS, a new technology area for most students, in verbal communications, and in the mainstay areas of data-bases and systems development. Those are areas in the present curriculum that appear to be working well and will likely be retained in the new curriculum although modernized.

On the other hand, areas that are not doing well as measured by where learning is taking place are the world wide web, networks, organizational systems, certain aspects of computer ethics, and DSS/EIS. These are pointing to areas in the new curriculum to seek major teaching and learning improvements. For instance, the university has been behind schedule on implementing its high speed campus network, which until recently has reduced the potential for learning of world wide web skills. Given the importance of this area in industry, it is something that is urgently pointed to for the new curriculum. The low score for networking may stem from the lack, until recently, of a hands-on networking laboratory for training on NT administration and configuration. Also, the networking course was in need of revision, a task which has recently been accomplished, but may need even more revision and attention in the new curriculum.

Rank	Program Objective	Average gain in current knowledge from junior year to last 6 mos of curriculum plus recent grads
1	GIS	1.36
2	Communication of a major project	1.12
3	Relational Data-base	1.12
4	Systems Dev. Life Cycle	0.95
5	CASE tools	0.94
6	Data-base Applications	0.92
7	Verbal Communications	0.58

Rank	Program Objective	Average gain in current knowledge from junior year to last 6 mos of curriculum plus recent grads
21	Dec Supp Systems/ Exec Inf. Systems	0.13
22	Understanding the Implications of technology advances for ethical issues	0.12
23	Understanding the theoretical perspective of ethical philosophies as they relate to businesses and organizations	0.10
24	Organizational Systems	-0.12
25	Networks	-0.24
26	World Wide Web	-0.62

The data from the alumni survey were equally revealing. For instance, on the question of how well the IS degree had impacted the alumni's career advancement, the following were the ten highest program objectives (on a 1 to 5 Likert scale, with 5 being the highest impact).

Rank	Program Objective	Rating of Impact of Program Objective on Alumni's Career Advancement
1	Verbal Communications	4.04

2	Communication of a Major Project	4.04
3	Organizational Systems	3.96
4	Systems of Life Cycle	3.96
5	Senior Project	3.93
6	Relational Data-Base	3.89
7	Be Able to Design and Build a Business Information System	3.88
8	Data-Base Applications	3.84
9	Understanding the Implications of Technology Advances for Ethical Issues	3.72
10	Understanding Ethical Delemmas	3.72

The alumni results point to the importance of the softer sides of the curriculum on career impact — areas such as communications, organizations, conducting a project, and ethical issues. Systems life cycle is in between in "softness" and is ranked a high fourth. The more technical areas of data-base are present but ranked sixth and eighth. This confirms some other literature that have pointed to the "softer" areas as ultimately having more impact on IS graduates careers. From the standpoint of curricular revision, this points to the need to put even greater emphasis on these behavioral, organizational, and ethical areas.

The results from the focus group sessions with students and the discussions with the corporate advisory committee were equally informative, but are not covered in this extended abstract, but will be in the full paper. Suffice it to say that they delved into certain issues in even more depth and provide even greater knowledge of current status of curriculum and the recommendations for the new one.

In summary, this paper presents a new model for IS program assessment, with an emphasis on curriculum. Many stakeholders can be involved in a more extensive data-gathering process that provides more robust information on student learning, alumni career benefits from their education, and corporate advice for program and curricular improvement and change. The assessment process serves to set a baseline than can be re-tested longitudinally over time to benchmark longer term program advances. The methods can be adapted for a wide variety of IS undergraduate and graduate programs. In another paper we suggest more detailed steps that programs can take to instill a full program and curricular assessment process into their strategic planning and development.

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