Measuring The Effectiveness Of Course Content And Learning Goals Of The Core Undergraduate Information Systems Course

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ABSTRACT

The Association to Advance Collegiate Schools of Business (AACSB), text books, and the IS 2002 Model Curriculum and Guidelines for Undergraduate Degree Programs in Information Systems (IS 2002) recommend standards and provide guidelines for course content and learning goals for the core undergraduate Information Systems (IS) course. However course content and learning goals often need to be revised due to high pressure on academic institutions from a rapidly changing Information Technology (IT) market. In order to constantly refine the IS course curricula to meet the needs of industry and government, it is imperative that there be proven methods to measure the effectiveness of course content and learning goals. Analysis of such data should ultimately feed into designing the curriculum of the core undergraduate IS course.

This paper focuses on the role of surveys as a tool for measuring the effectiveness of course content and learning goals for the core undergraduate IS course. First, the role of IS 2002 is reviewed in setting standards for the course content and learning goals for this course. Next, data from three surveys conducted to measure the effectiveness of course content and learning goals is analyzed. The paper then assesses surveys' implications for refining course content and learning goals of the core undergraduate IS course. Finally, recommendations along with a framework for conducting future surveys are presented.

STANDARDS AND GUIDELINES FOR THE CORE UNDERGRADUATE IS COURSE

The core undergraduate IS course is typically offered in the junior year of four-year undergraduate programs and in the second year at two-year institutions. This course is especially important for business schools that seek to be accredited or wish to continue their AACSB accreditation. The latest *Eligibility Procedures and Standards for Business Accreditation*, adopted in April, 2003, and revised in January, 2005 by AACSB, require that business schools offer subject matter in IS at undergraduate and graduate levels.

The Joint Task Force for Computing Curricula, comprised of the Association for Computing Machinery (ACM), the Association for Information Systems (AIS), and the Computer Society (IEEE-CS), provides curriculum guidelines in the following five computing areas: Computer Engineering, Computer Science, Information Systems, Information Technology, and Software Engineering. For the Information Systems computing area, it recommends the IS 2002 curriculum model and guidelines (Gorgone et al., 2003), which provides curriculum guidelines for undergraduate IS programs in business schools and also recommends the scope, topics, learning goals, and objectives for individual courses in its curriculum model. In particular, IS 2002 recommends the core undergraduate IS course (IS 2002.1) for undergraduate degree programs in IS. Most business schools require that students take IS 2002.P0 (a personal productivity course) as a prerequisite to IS 2002.1.

The IS 2002 model curriculum was revised from previous IS curriculum guidelines, namely, IS 1997. This revision was minor and focused on the undergraduate IS program in its entirety rather than on revising the content of existing courses. In particular, learning goals for the core undergraduate IS course remained unchanged between the IS 1997 and the IS 2002 guidelines. Moreover, the course content area did not change from those recommended for

IS 1997, except for the addition of four new topics. The task force responsible for setting the IS 2002 curriculum guidelines conducted surveys and analyzed survey data to recommend changes to the undergraduate IS program. The next section presents data analyses of three surveys conducted over two decades.

SURVEYS AND TREND ANALYSES

The first survey was conducted by McLeod (McLeod, 1985) for the core undergraduate IS course offered in AACSB schools. Inclusion of this survey provides an historical perspective on trends in course content coverage in the core undergraduate IS course. Other salient factors for choosing the survey include:

- The survey was conducted in 1985, much before the advent of many new technologies including the World Wide Web.
- It was administered to business (IS and non-IS) faculty teaching or involved in the curriculum development of the core undergraduate IS course.

The second survey presented in this paper was conducted by Salisbury, et al. (Salisbury, Huber, Piercy, and Elder, 2004). This survey was chosen for following reasons:

- Its aim was to measure the effectiveness of content coverage and learning goals as specifically recommended by IS 2002.
- The survey's recent date of administration (2003).
- The survey's target population was IS course coordinators/course instructors.

The third survey presented in this paper was conducted at the author's university. Participants in this survey included students in the core undergraduate IS course. This survey was chosen for following reasons:

- The data was collected in 2005 and hence is current.
- The survey focuses on gauging students' perspectives on the effectiveness of content and learning goals for this course.

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ANALYSIS OF SURVEY 1

The first survey presented here was a mail survey conducted by McLeod (McLeod, 1985). McLeod conducted a survey of 145 AACSB schools of which 113 schools with undergraduate programs responded. Of the 113 schools that responded, 62 offered a core undergraduate IS course.

Survey respondents were asked to check topics included in their courses from a list of 13 topics selected from then-popular Management Information Systems (MIS) texts. Figure 1 is a plot of content coverage of the core undergraduate IS course at various institutions. From Figure 1, we observe that heavy emphasis was laid on systems analysis and systems theory, followed by hardware and database theory. As stated by the author, "The MIS course has a definite systems analysis, rather than management, emphasis" (McLeod, 1985). Topics receiving lightest coverage included management theory and data communication. Poor coverage of management theory could possibly be due to the then-existing understanding that MIS majors would end up as systems analysts rather than managers. Low emphasis on data communication could reflect the lack of proper understanding of the potential of the internet and the World Wide Web that was yet to make its mark in the IT world.

An interesting point to be noted is that computer security, which received a mediocre score, was still considered important but certainly did not enjoy the attention that it currently does.

ANALYSIS OF SURVEY 2

The second survey presented here is by one of the panels at AMCIS 2003 (Salisbury, et al., 2004) that involved discussion of the IS 2002 recommended guidelines for course content and learning goals for the core

undergraduate IS course. The authors conducted a survey of faculty members who teach this course or who are involved in its curriculum development. The survey was submitted to IS World readers with the objective of gauging if respondents were familiar with IS 2002 curriculum guidelines and if they had taught the recommended topics mentioned in the IS 2002.1 course guidelines. The survey also attempted to measure if the learning unit goals for IS 2002.1 course were met.

Background of the 60 survey respondents are displayed in Figure 2a. Analysis of Figure 2a underlines the fact that a high percentage of respondents are the faculty (75% tenured track/tenured) who are delivering and/or influencing the course content (77% current course instructor/coordinator and 92% past instructors/coordinators).

Figure 2b presents results of the content coverage of IS topics. For each of the IS 2002.1 content areas, a questionnaire asked the respondents to rate on a Likert scale from 0 to 5 (N/A to Heavy Coverage) the extent to which each element was covered. The authors categorized responses of 0 to 2 as "low" and responses of 4 or 5 as "high." Salisbury, et al. did not include survey responses of 3 in their survey. They decided to drop a response of 3 from their analysis, reasoning that it was unimportant because a respondent would tend towards "a neutral answer" when he/she was uncertain. From the analysis of survey data, Salisbury, et al. concluded that systems concepts and system components and relationships seem important to IS instructors and course coordinators.

The survey data from Salisbury, et al. (Salisbury, et al., 2004) was analyzed in this paper. For this analysis, the paper followed Salisbury, et al.'s methodology and categorized responses of 0 to 2 as "low" and responses of 4 or 5 as "high." However, unlike Salisbury, et al., this paper considered a response of 3 to be important in the analysis and categorized responses of 3 as "medium." This paper critically revisits Salisbury, et al.'s contention regarding the elimination of data related to a response of 3 on the Likert scale. Figure 2b clearly shows that almost a third of the participants (21.67% to 36.67%) gave a medium ranking of 3 to most topic areas covered in the IS course with the exception of two content areas (~6.67% and 11.86%). Our belief is that it would be erroneous to drop these data from a meaningful analysis.

An analysis of survey data (Figure 2b) further shows that less than 50% of the total respondents believe that "high" coverage is given to systems concepts and system components and relationships topics. For systems concepts coverage, less than half (~45%) of the respondents categorized it as "high." Interestingly, about one-third of the respondents (~37%) felt that the coverage given to systems concepts is moderate (category "medium"). Looking back at respondents backgrounds, almost three quarter are current IS faculty. It is evident from this analysis that more than half the IS faculty involved in coordinating or teaching the IS course do not exhibit "systems focus." Further, greater than one third of the IS faculty thought that only moderate coverage is being given to systems concepts. The findings of this paper are in contradiction to Salisbury, et al.'s contention that systems theory is considered important by respondents. Analysis also shows that, with the exception of database, no other course topics have "high" coverage judged as more than 50% in the "high" category.

Even though Salisbury, et al. (Salisbury, et al., 2004) mention that a survey on learning goals was conducted, no such results were presented in their paper.

COMPARISON OF ANALYSES OF SURVEY 1 AND SURVEY 2

In this section, the analysis done in Salisbury, et al.'s paper is compared to that in McLeod's paper to gain an historical perspective of the coverage given to various topics in IS courses. The two surveys are separated by a period of 20 years, a period marked by the emergence of the World Wide Web. The following points are observed from the comparison of the two survey analyses:

The course content area for the core undergraduate IS course does not appear to have changed considerably over the past twenty years. A cursory review of a majority of currently popular textbooks for the core undergraduate IS course shows a content coverage similar to the one in McLeod's paper (McLeod, 1985) that based its survey on contents from popular textbooks during an earlier period. This similarity in course content exists despite several major technological changes that occurred in the intervening period of two decades between the two surveys.

What appears to have changed most is the emphasis on course topics. McLeod's survey showed that almost 87% of the respondents considered systems theory coverage to be "high" compared to less than half the respondents in Salisbury, et al.'s survey. This is despite the fact that in McLeod's survey most instructors surveyed were management faculty compared to almost 75% of the respondents being IS faculty in Salisbury, et al.'s survey.

Database as a course content area enjoyed the same high importance in both the surveys, pointing to the fact that management of data has historically been considered essential for the IT industry.

Object oriented theory is one of the four new content topics updated in the IS 2002 curriculum model. Interestingly, most IS faculty surveyed give this topic the least amount of coverage when teaching the core undergraduate IS course, (please refer to Figure 2b).

ANALYSIS OF SURVEY 3

The third survey presented in this paper, conducted at the author's university, attempted to measure the effectiveness of course content and learning goals for the core undergraduate IS course. In this survey, a special emphasis was placed on measuring students' responses to the effectiveness of learning goals used in the core undergraduate IS course. The survey approach taken here is slightly different from the above-mentioned surveys. Whereas the previous two surveys were administered mostly to faculty involved in teaching or coordinating the core undergraduate IS course, this work seeks to gain the students' perspective. The reason for this approach is that students are the end users and any survey without their point of view will at best be incomplete.

Survey data are presented in Appendix A in Table 1. The survey asked students to rate each of the learning goals on a Likert scale from 1 to 5, with 1 being least effective and 5 being most effective. For analyzing survey results, responses of 1 or 2 are categorized as "low," responses of 3 as "medium" and responses of 4 or 5 as "high."

The survey comprised a total of 20 respondents. The background and the class standing of respondents are shown in Figure 3a. Almost 90% of students surveyed were non-MIS majors, despite the fact that this course is offered by the MIS department. The sample consisted of the following majors: 40% business management majors, 20% accounting and finance majors, 10% marketing majors, and 10% MIS majors. The remaining 20% of the respondents are non-business majors. Also, the majority of the respondents were in their senior (52%) or junior (43%) years, with only 5% of the respondents being sophomores. Another aspect of the study was to correlate students' enthusiasm with students' class standing. Though an upper-division course, students have not been required to take it in their junior or senior years. It was observed that even though students' satisfaction was high for all assignments of the course, those who waited to take the course in the beginning of their senior year or the last semester before graduation were less motivated and enthusiastic in completing the projects.

Figure 3b shows students' perception of the effectiveness of the IS 2002.1 recommended learning goals. Analysis of Figure 3b suggests that overall the students felt that the core undergraduate IS course taught at the author's university met the IS 2002 recommended learning goals. The learning goals for which students response was "high" included professional and ethical responsibilities of the IS practitioner, application of information technology to design, facilitate, and communicate organizational goals and objectives, and IT concepts.

Course content coverage at the author's university is shown in Figure 3c. It corresponds closely to McLeod's course content coverage. The course topics for Figure 3c were taken from a customized version of a popular MIS text that is used at the author's university. When compared to McLeod's course content coverage (refer to Figure 1), there is a higher emphasis on systems concepts and database but no emphasis on hardware. There is also a higher emphasis on information security, crime and ethics, and the competitive advantage of information systems.

In addition to measuring students' perceptions of the effectiveness of the IS 2002.1 learning goals, the survey conducted at the author's university also measured the effectiveness of the assessments used in the course. Students were asked to qualitatively appraise IS course assessments. These included three projects, case discussions,

homework, and two exams. The results of this analysis are shown in Figure 3d. Survey results indicate high levels of students' satisfaction towards the assessments.

CONCLUSIONS AND RECOMMENDATIONS

The guidelines recommended by IS 2002 should be used to standardize course curriculum across various business schools offering the core undergraduate IS course. Standards bodies like IS 2002, for their part, should look at continuously revising the IS course curricula to keep pace with the rapidly changing technology market in order to meet the needs of industry and government. It is understandable that a great commitment in terms of time and resources is needed for this kind of effort and may not always be feasible. However, the importance of incorporating such changes cannot be over emphasized – case in point being security issues and outsourcing in the current IT environment.

A literature review has shown the unequaled importance of survey methodology for measuring effectiveness of course content and learning goals for the core undergraduate IS course. The survey methodology has been, and is being, used by both academia and standards bodies as a tool to measure the effectiveness of course content and learning goals for the core undergraduate IS course. However, drawbacks in existing surveys include a neglect of several critical variables that are required for curriculum modification and limited sample data obtained from such surveys. For example most existing surveys have focused largely on just measuring the effectiveness of course content and learning goals for curriculum modification but have excluded another very important factor, namely teaching methodology from the survey. Further, such surveys have typically been conducted by either individual course coordinators/instructors or a panel with limited participants. This paper recommends that a major effort be initiated by standards bodies like IS 2002 to conduct comprehensive surveys that provided a standardized questionnaire to all participants across the globe. Trend analysis of data obtained from such surveys will greatly improve IS course curriculum modification. IS 2002 should consider application of web based surveys that are both easily accessible and less time consuming. Further, to encourage participation, IT related conferences should be used as venues for educating course coordinators, instructors, students, and industry professionals.

Figure 4 is a schematic of survey design proposed by the author. This paper recommends that a survey used to ultimately update IS course curriculum should not just focus on "what is being taught" but also focus on "how the subject matter is taught." The paper further suggests that such surveys need to be comprehensive and should focus on course content, learning goals, and teaching methods alike. Standards bodies like IS 2002 should also include effectiveness of teaching methods in surveys conducted to update IS curriculum and should incorporate these findings in teaching guidelines for IS courses.

Updating the course curriculum for the core undergraduate IS course can be envisioned as a feedback cycle in which academia, industry, and standards bodies continuously feed information to each other. Thus, this paper recommends that when updating the course curriculum for IS courses, surveys conducted to measure the effectiveness of critical factors should include feedback from both academia and industry.

Finally, the central role of standards bodies like IS 2002 in defining curriculum guidelines and in continuously updating course curriculum is emphasized. Standards bodies like IS 2002 can be considered more like central processing units (CPU's) that should continuously inspect information from both instructors (the course creators) and students (the end users). Standards bodies should process the data obtained from both instructors and students and publish guidelines for IS course curriculum that meets the industry and government expectations. Popular IS course text books should formulate content in unison with the IS 2002 published guidelines for IS course curriculum. The users of these textbooks, the students, in turn should provide feedback to standards bodies like IS 2002 as to the relevance of course contents covered in standard texts.

Subjects can be classified as current students (those currently attending academic institutions), entry level professionals (students that recently transitioned from academia to industry), and experienced professionals (those that have spent considerable time in the industry). Any survey conducted to update IS course curriculum should

include all three categories. Ideally the survey should have a longitudinal design and be administered to the same cohort of students as they progress in their careers.

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Figure 1: McLeod Survey

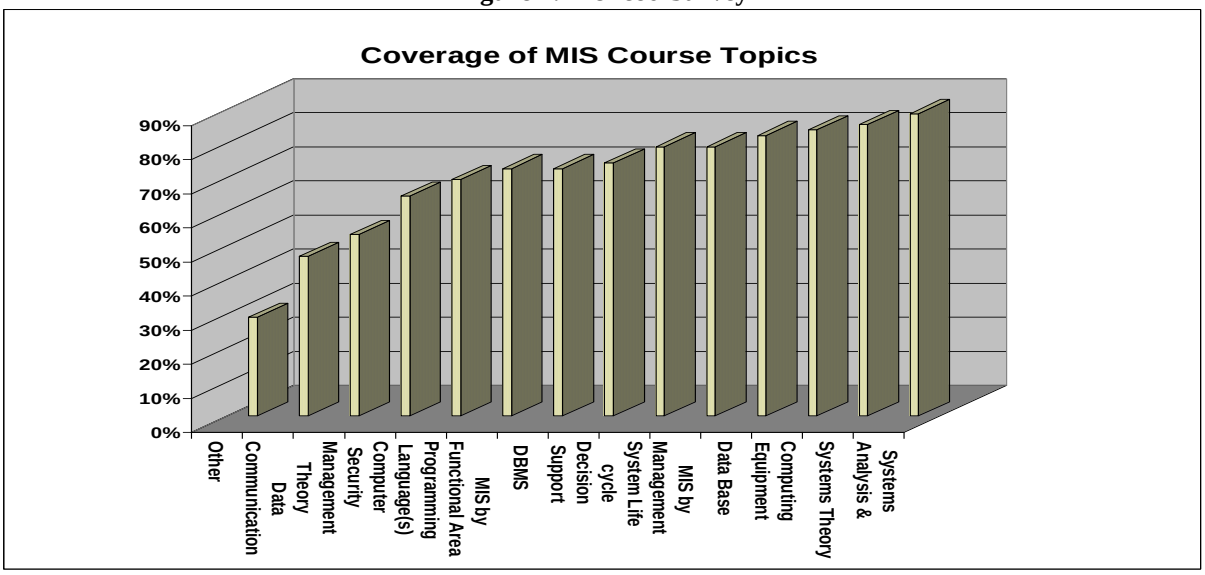


Figure 2a: AMCIS 2003 Panel Survey

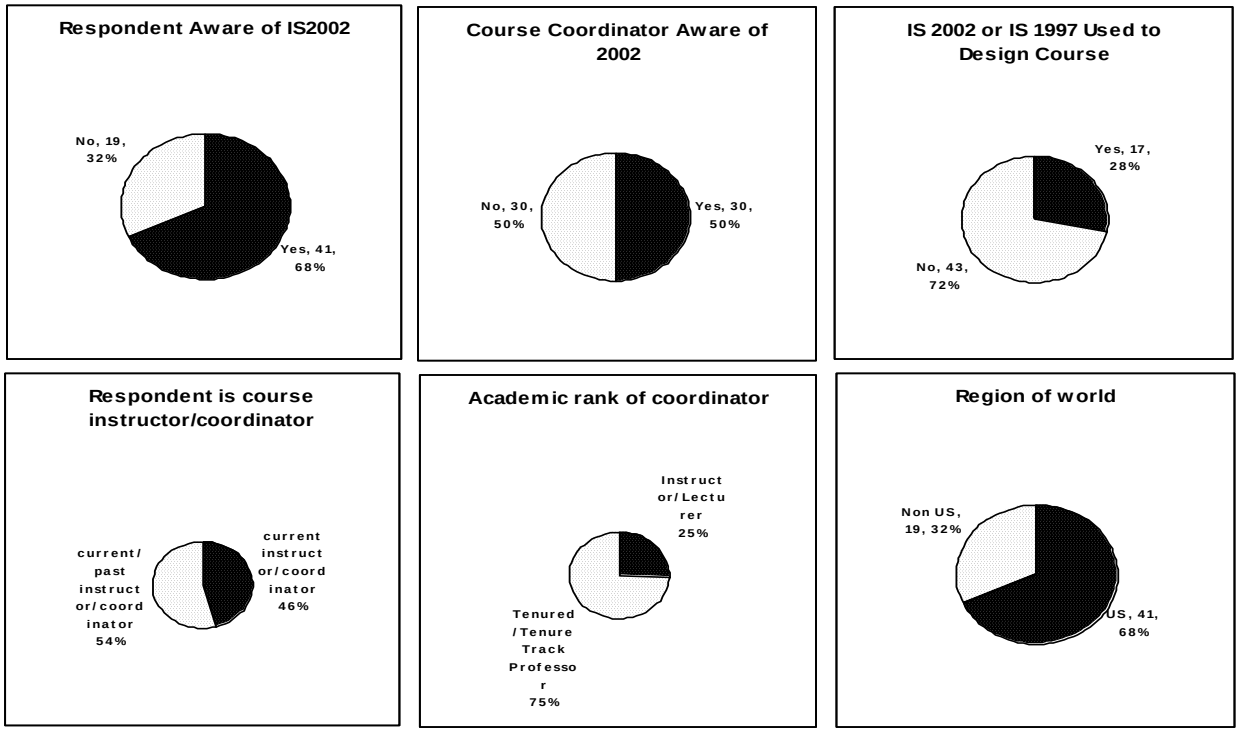


Figure 2b: AMCIS 2003 Panel Survey

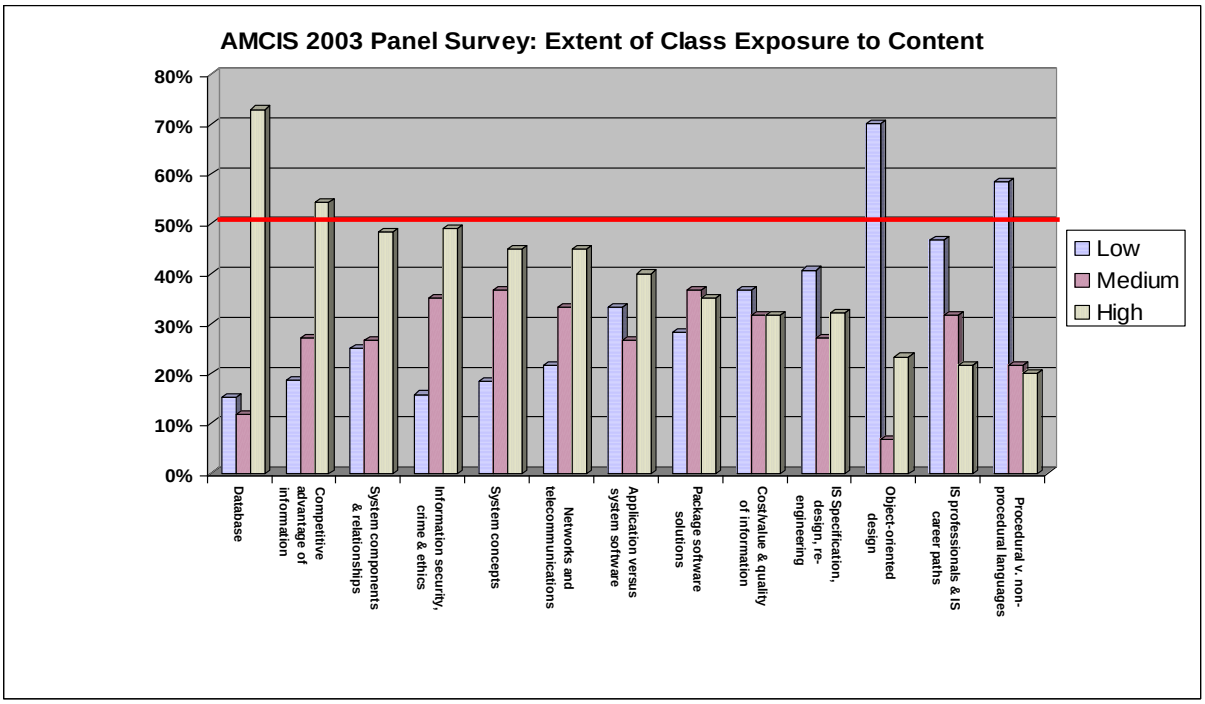


Figure 3a: Author's University Survey

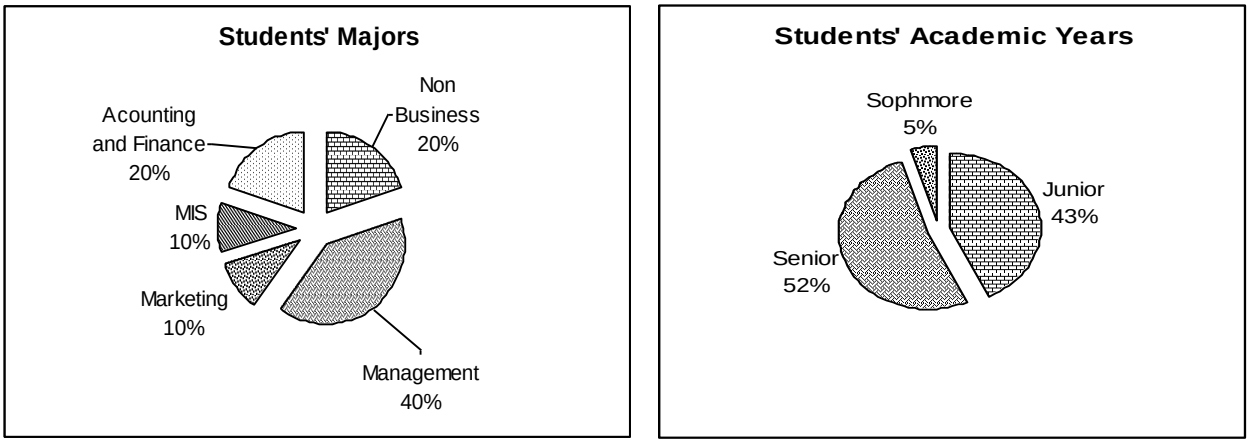


Figure 3b: Author's University Survey

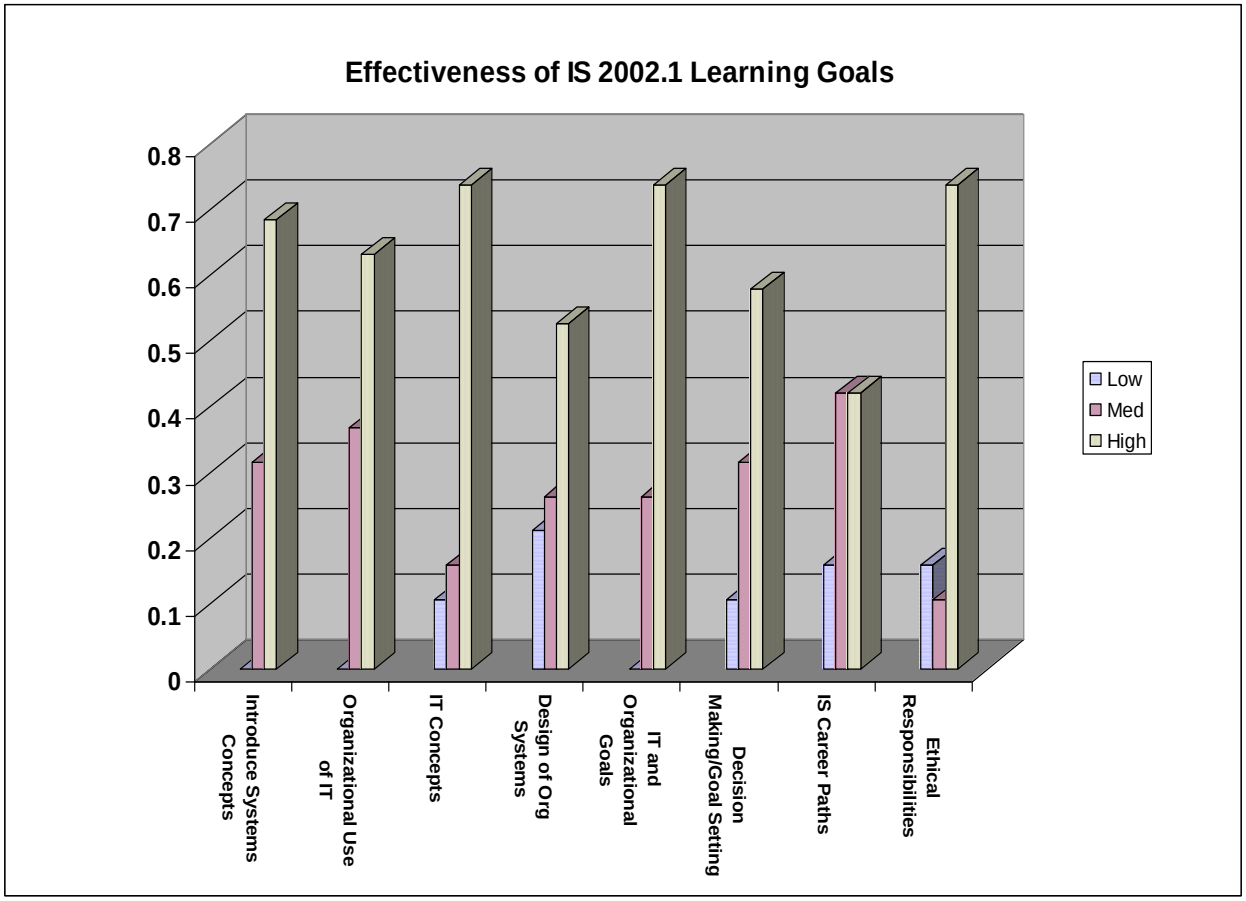


Figure 3c: Author's University Survey

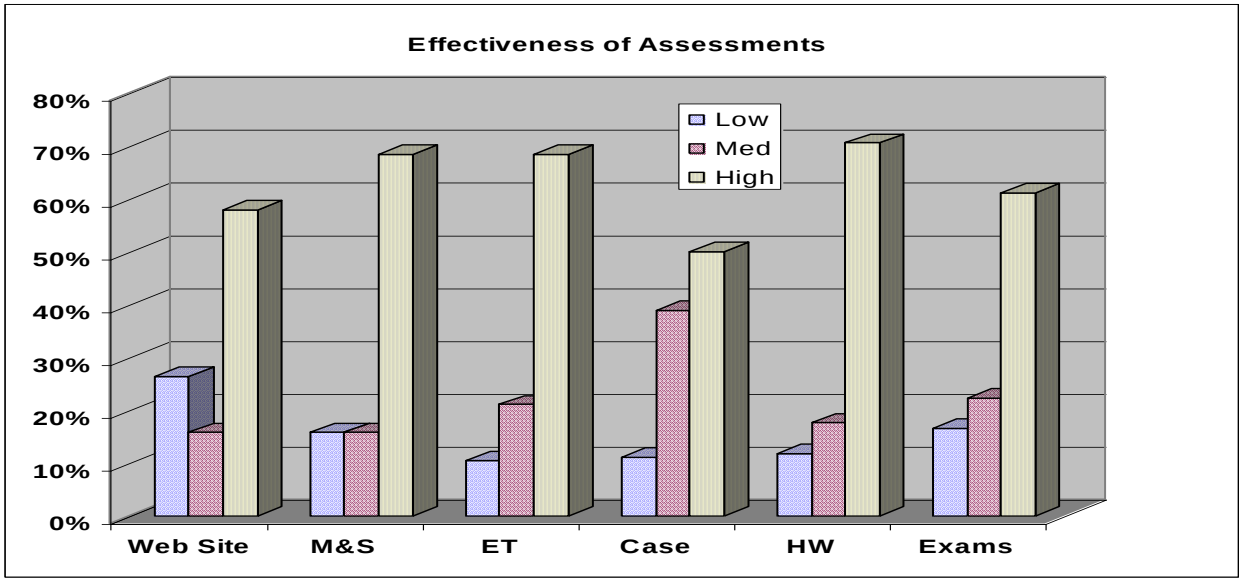


Figure 3d: Author's University Survey

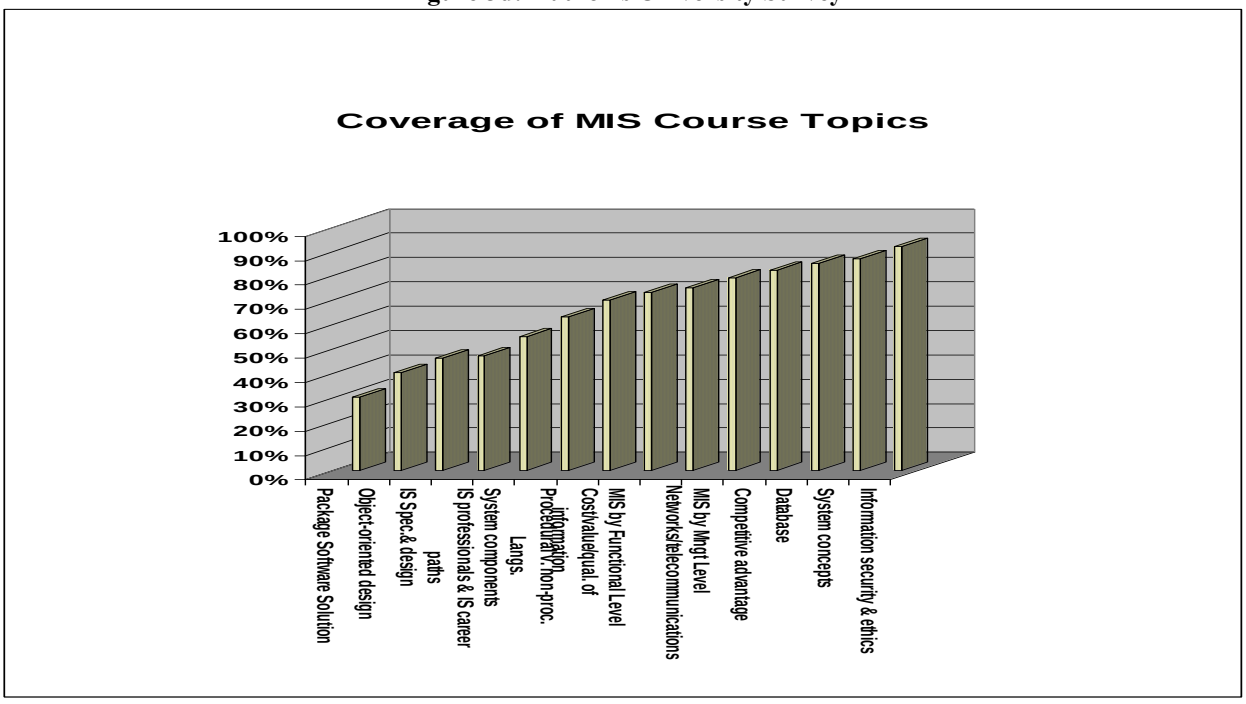
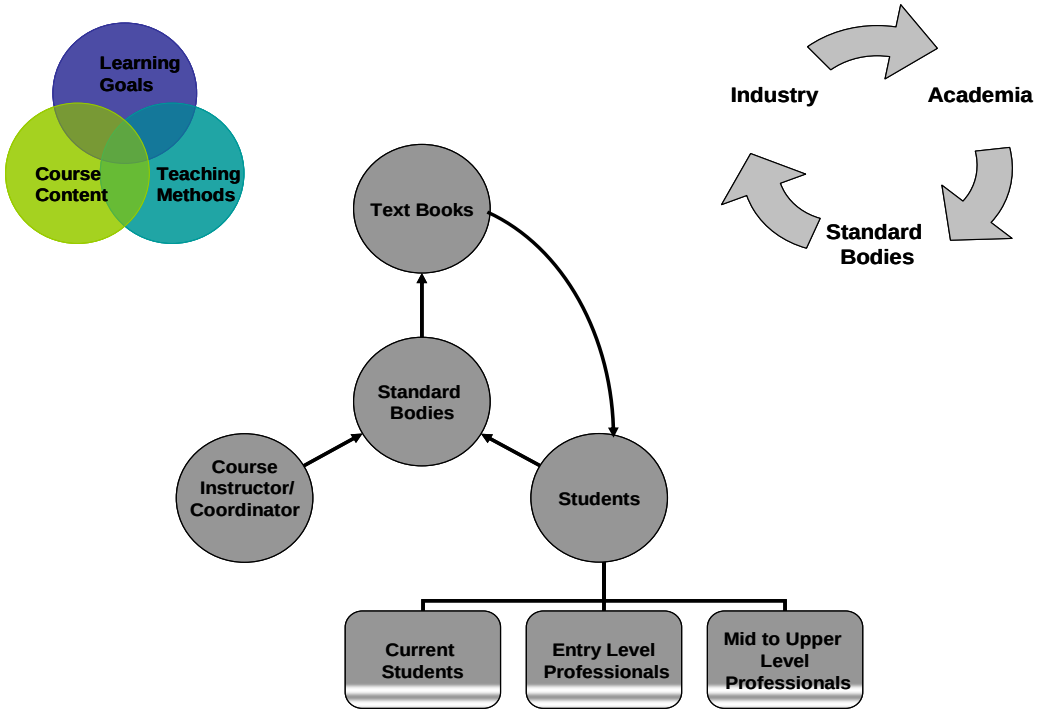


Figure 4: Proposed Survey Plan



Appendix A
Table 1

Students' perception of the effectiveness of IS 2002.1 recommended Learning Goals at the author's college	**1**	**2**	**3**	**4**	**5**
to introduce systems and quality concepts	0	0	6	6	7
to provide an introduction to the organizational uses of information to improve overall quality	0	0	7	6	6
to present information technology concepts	0	2	3	7	7
to provide concepts and skills for the specification and design or the re-engineering of organizationally related systems of limited scope using information technology	1	3	5	4	6
to show how information technology can be used to design, facilitate, and communicate organizational goals and objectives	0	0	5	6	8
to explain the concepts of individual decision making, goal setting, trustworthiness, and empowerment	0	2	6	6	5
to show career paths in Information Systems	0	3	8	3	5
to present and discuss the professional and ethical responsibilities of the IS practitioner	0	3	2	8	6