



ISSN: 1545-679X

Information Systems Education Journal

Volume 6, Number 57

<http://isedj.org/6/57/>

December 15, 2008

In this issue:

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Recommended Citation: McDonald and Viscelli (2008). Does Information Systems (IS) Really Matter in Business Colleges? *Information Systems Education Journal*, 6 (57).
<http://isedj.org/6/57/>. ISSN: 1545-679X. (Preliminary version appears in *The Proceedings of ISECON 2005*: §2172. ISSN: 1542-7382.)

This issue is on the Internet at <http://isedj.org/6/57/>

The **Information Systems Education Journal** (ISEDJ) is a peer-reviewed academic journal published by the Education Special Interest Group (EDSIG) of the Association of Information Technology Professionals (AITP, Chicago, Illinois). • ISSN: 1545-679X. • First issue: 8 Sep 2003. • Title: Information Systems Education Journal. Variants: IS Education Journal; ISEDJ. • Physical format: online. • Publishing frequency: irregular; as each article is approved, it is published immediately and constitutes a complete separate issue of the current volume. • Single issue price: free. • Subscription address: subscribe@isedj.org. • Subscription price: free. • Electronic access: <http://isedj.org/> • Contact person: Don Colton (editor@isedj.org)

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Does Information Systems (IS) Really Matter in Business Colleges?

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ABSTRACT

This paper uses a survey of over 330 colleges of business to examine: 1) Whether an Information Systems core course is employed by the college? 2) What content this required course contains? 3) How many colleges are now requiring students to take a basic computer literacy course prior to taking any of the core sequence? From these three key questions, other related questions were posed for the survey.

Keywords: foundation course, computer literacy, Information Systems curriculum

1. INTRODUCTION

In his well-known Harvard Business Review (HBR) article, Nicholas Carr suggests that information technology (IT) no longer has real value in today's corporate world (Carr 2005). Although IS luminaries, such as Warren McFarlan, Richard Nolan, and Paul Strassman, have vehemently and publicly responded to the HRB article (Stewart et al. 2003), Carr's basic contention is that IT is now so prominent that it should be considered a commodity rather than as a means for competitive advantage. The focus of this article is not on the business world, but whether information systems (IS), a holistic counterpart of IT from the business world, matters as an integral component of a modern business school's curricula.

Complaints are heard from universities and businesses alike that IT spending is escalating each year, resulting in a much larger commitment in the stake of the technology budget to the success of the enterprise. (Gross 2005; Hoffman 2005; Moore 2005) The users of this technology, the argument goes, deplete more dollars away from other departmental resources. In fact, *CIO Magazine*, among others,

commonly state that many CEOs or CFOs do not see a real benefit from the CIO position as a whole (KOCH 2005; OVERBY 2005). Within a given company, or for that matter, any given industry, there is a lack of sufficient research to demonstrate whether we are offering the right courses to the students; i.e., the courses that will adequately prepare the students for their future employment. Consistently, when asked what skills are necessary from recent college graduates, the overwhelming reply is that businesses want: 1) students who can communicate, both verbally and in writing; 2) students who are able to speak "business speak." I.e., managers are looking for students that know the basic terminologies that are used cross-functional areas during the everyday operation of an enterprise; and 3) students who can solve problems (Bailey and Stefaniak 1999).

Are we preparing students for the future requirements of major enterprises' IT departments (Pratt 2005; Tennant 2005)? Educators and IT hiring executives constantly ask these and similar questions. For this research, a number of questions relate to IT personnel skills requirements as

well as the status of current information systems courses. This was accomplished by examining 330 major colleges of business (COB). Those schools considered as a major college were those that offered both graduate and undergraduate business degrees. This sampling was then used as a surrogate sample of primary business schools in the United States. Additionally, it is the authors' contention that universities which can support both graduate and undergraduate COB degrees are also those of that may be considered more technologically savvy than their counterparts from universities without COB degree programs. It is assumed that these major colleges have acquired the sufficient resources necessary to evolve a more sophisticated technology infrastructure for use by faculty, staff, and students. The sophistication of the Web sites found for these schools gives credence to this contention.

2. LITERATURE REVIEW

The entry level, introductory Information Systems course in most business colleges is responsible for generating substantial course credit hours for the colleges, but paradoxically, is referenced relatively few times in the literature. In a review of the literature, only one article was found that addressed this entry level, core course.

George, Valacich, and Valor (George et al. 2004), in "Does Information Systems Still Matter? Lessons for a Maturing Discipline", provided the only reference that the authors could find concerning the entry level course. In it they discuss the state of the field in the U.S. and the E.U. They discuss the drop in IS students and that departments must now begin recruiting students after being in an environment that had overflow course loads and a shortage of qualified instructors. They point to the entry level course as a major tool in the process. They make two recommendations for the course itself and provide a topic outline of what should be covered.

The rest of the literature addresses the COB curricula in general, but does not address the entry level course. Beginning with "The IS2002 Model Curriculum Guidelines for Undergraduate Degree Programs in Information Systems" (Gorgone 2004),

which has evolved over the years, but does not address the entry level course.

Bailey and Stefaniak, discuss the overall curriculum needs of the new millennium workforce in "Preparing the Information Technology Workforce for the New Millennium" (Bailey and Stefaniak 1999). Working with group of business from the Arkansas information technology community, they used a field study to collect data, drawing from web-research, site interviews, focus groups and web-based surveys. They identified eight job clusters, with twenty soft skills and twelve business skills. The results were used to modify curriculum at the University of Arkansas at Little Rock. While the paper identified skills, it did not make recommendations as to specific curriculum changes.

Kuras, Grabowski and Zajac, discuss the need for curriculum changes, but specific to the Polish University system. In "Changing IS Curriculum and Methods of Instructions," (Kuras and Grabowski 1999) these authors also cite the changes within the IS or IT industry itself as a driver of curricula change. They discuss the attempts that have been made for almost a decade without significant results. They suggest modeling the curriculum after other universities' 'best practices'. Drawing on the analysis of IT applications in organizations and employers' opinion, they proposed an outline of curriculum topics.

Noll and Wilkins, address the overall curriculum in their article, "Critical Skills of IS Professionals: A Model for Curriculum Development" (Noll and M. 2002). They specifically address the need for a curriculum revision process. Drawing on prior research review, job announcements and advertisements and IS literature, they developed a questionnaire that was mailed to all of the 380 companies that recruit at a Midwestern University and 100 companies listed on the Best 100 Places to Work in IT (Computerworld, 1999). They received 60 usable responses. The responses were analyzed using SPSS. They identified 5 major areas and used them to recommend Model Curriculum Matrix which addressed Core skill requirements and concentrations for graduates.

Alford, Carter, Ragsdale, Ressler and Reynolds, also propose a method for curriculum development an Information Technology definition and objectives for IT Graduates in "Specification and Managed Development of Information Technology Curricula"(Ilford and Carter 2004). They use the idea of recurring concepts to identify objectives. They identify essential questions and projects that teach the recurring concepts, which are then used to develop a curricular development methodology based in the use of three-course threads. The methodology allows curriculum to be developed that can be used in computer science and related cognate areas. They conclude that using their methodology allows for the development of curriculum that distinguishes the graduates of CS and IT.

3. RESEARCH QUESTIONS

This study was limited to those universities in United States, including those in Alaska and Hawaii. However, no Canadian or other North American universities were included. There were a number of question we wished to pose within this survey. Most importantly, we limited the data analysis to schools which maintained an entry level introduction to information systems (IS) course. The authors believed the health and importance of information systems discipline could best be summarized by the examination of the introductory IS course. Additionally, the authors were interested in whether the onset of the Internet has created an era where today's community of students is technologically more advanced. Therefore, we wanted to see if students now are more computer literate than they were five years ago (McDonald 2004). To this end, the authors examined whether students were savvier on technology integration in their academic careers by the implementation and use of tools provided to them by their respective schools or from those tools often packaged with the purchase of a home computer.

Therefore, one of ten key factors considered was computer literacy testing as separate from the introduction to information systems course. The authors also examined the content found in the core course of the typical business curricula offered in

undergraduate degree programs. Of primary interest was whether this introductory IS core courses focused on training, i.e., the use of tools such as those found in MS Office™ or whether these courses focused primarily on educational issues, such as providing students with a firm conceptual foundation of information systems. Moreover, this survey sought to answer the question as to whether we, as educators, provide *training* in our information systems core courses or rather do we provide a solid *conceptual foundation* for the Information Systems discipline.

The survey was also designed to answer other key questions. For example, have we made progress in undergraduate schools improving on the level of Bloom's taxonomy on knowledge acquisition (Bloom 1956; Krathwohl et al. 1973)? As a surrogate for whether faculty have improved in disseminating knowledge in our undergraduate programs, the content of introductory IS courses were viewed to determine if students were given problem-solving tasks over the course of a semester rather than merely given lists of topics to memorize and then regurgitate this list on exams. This type of examination methodology, if utilized by students to pass the IS course or any undergraduate courses in their degree programs does a great disservice to all our stakeholders. For this survey, the authors examined the introduction to IS courses to see whether cases studies, written essays, or research problems were regularly given to students. It is believed that these types of teaching tools better represented courses with problem-solving as a key course component than providing outlines for students to memorize in preparation for their exams. Institutions which condone and support freshman and sophomore courses that do not challenge students were considered to rank rather low on Bloom's hierarchical taxonomy.

For many years, the problem of academicians has been whether students graduate with the skills necessary for success in the business world (Bisoux 2003). Especially in the area of information systems, the hallmarks for successful competitive businesses are those who are able to adopt rapidly to change with the

assistance of the IT function. Information technologies that are the most critical are the ones which can support change as well as innovation to provide competitive advantage (Porter 1998). Again, the content of the core IS course syllabi were reviewed to determine whether the material covered matched the key concerns of today's business entities. One of the author's of this paper has been involved with his state's core courses content for the full state university system. The content of these courses has been closely monitored by the author to guarantee consistency of content across curricula to ensure transferability of the core course from one institution to another. In many cases, the introduction to IS course had, itself, not changed in five years. Although this assertion is true for the state in which this author resides, historically, changes in curricula are slow to occur, typically two full years for most institutions (Gardiner 1998).

For this survey the courses examined were predominantly sophomore-level courses. From these course syllabi in information systems, the number of topics was limited to certain key areas. These topics were by no means exhaustive or exclusive. Other research may develop topics of equal importance and interest to the IS/IT community at large. There were questions that were of interest that were purposely omitted to keep the scope of this survey manageable. Yet, some of the questions that were posed were scrutinized in greater detail. For example, in this study, the use of the Internet as a course topic was of critical importance. Although some may consider Internet content a more technically focused area – for example, what are the technical aspects of TCP and IP protocols of how does networking with the Internet fit into the OSI model or how traditional telecom technologies are affected by the Internet. Others may view the Internet from a management perspective. For this, the authors inspected each introductory course focusing on the business aspects of the Internet; i.e., whether there were e-Commerce content, (although it's now an outmoded term) such as the organizational use of the Internet as a tool to increase corporate revenues, or as an important endpoint in the channel of communication between suppliers and customers.

This study also sought to determine if the content of the core course required that students learn to use a programming language such as HTML, Basic, Java, or C++. In addition, the authors noted whether additional lab time was provided to the students for instruction in the basics of how to use the programming tool. Although we considered it training, not educating, when class-time is devoted to the use of Microsoft Office tools such as Microsoft PowerPoint or Microsoft Word, we did consider business tools, such as Excel and Microsoft Access appropriate for legitimate educational purposes. Thus, a fifth area we included in this survey was whether the various COBs were giving students sufficient database management system skills.

The sixth area surveyed was whether the introduction to IS core course included system analysis and design concepts. These concepts, similar to programming concepts, have long been the heart of CIS major. Nicholas Carr's assumptions may best be summarized in the importance today's IS degree programs' emphasis of these two areas. Does our traditional view of the essence of information systems from the past decades still hold?

Seventh, after "9/11" much more attention has been given to security issues within the United States (Anonymous 2005; Claburn 2005; Heck 2005; Vijayan 2005). At the authors' university, major corporations, a key stakeholder for our degree programs, now want students who are more knowledgeable on security and privacy issues. Our faculty have scrambled, post-9/11, to increase the emphasis given on security issues within both our undergraduate and graduate curricula. Not only have we increased the number of courses that are designed to specifically cover security and privacy issues, we are also ensuring these issues are incorporated throughout *all* the courses in our graduate and undergraduate curricula.

Other demographic questions surveyed were whether the university was on a semester or quarterly systems? Moreover, did the introduction to information systems course have and lab component? How many credit hours (depending on semester, quarter, and lab) did the introduction to IS core course earn for the respective college?

One of the most important questions in this survey was whether basic computer literacy was required before students could move on with their coursework in the college of business. Computer literacy, in this context, may be defined as having the skill-set represented by the Microsoft Office suite, i.e., PowerPoint presentations, Windows operating system basics, Excel basics, Internet navigation and email skills, and Microsoft Word processing knowledge. This question assumed the college demonstrated a completion of this basic computer skills course as a requirement before taking the introduction to IS course, or for that matter, any higher-level course within the college.

The next area the authors surveyed was for an ethics component (Stewart and Felicetti 1996; van Niekerk 2003). Many decades ago, when this author was still a student, ethics were traditionally mentioned as a general component for most introductions to IS courses. The authors decided to reconsider the amount of time given to ethics in today's curricula. Since, in the past, it was often given short shrift. Is this still the case, or are business schools now making a concerted effort in the area of ethics, especially now since the fiascos of Enron and Worldcomm resulting in the Sarbanes-Oxley Act. Do universities pay more attention to ethical issues in their IS foundation course?

In IS foundation courses, for the past decade, one of the most common topics covered is the use of traditional decision support systems and the importance of these systems to middle and upper management. For years, many believed decision support, rather than analysis and design, to be the substance of what comprises information systems. The decision-making model most colleges implement still follows the Herb Simon model. Many of us were brought up believing the gospel in our field was decision support. With the advent of the Internet, this concept has morphed into something much larger and more encompassing for the organization as a whole.

Finally, does IS really matter in today's business school curricula? With the tremendous drop in enrollments since the dot-com crash, the authors surveyed exactly how the IS discipline was placed within the

colleges we surveyed. We looked at the relative importance of the information systems degrees; i.e., majors and concentrations (minors). How is the information systems discipline viewed today by the major business colleges in the United States? To answer this question, the authors looked at college infrastructures and whether they supported information systems with separate majors and departments or if information system was offered as a concentration under the control of a different department within the COB (Alford and Carter 2004). If the latter, then in actuality the IS discipline was really under the domain of the accounting department and gives credence to Nicolas Carr's arguments. It should also be noted that in this survey, some schools use the computer science program to provide an information systems course. The content of the courses, offered by the college of businesses, were prefixed and named "computer science" where most readers would consider these to be part of the IS discipline. However, when the distinct difference between information systems in computer science was obvious, the computer science curricula were ignored unless the CS offering truly contained IS content. Information systems, computer science, and computer engineering were considered separate disciplines and this study focuses primarily on information systems (Gorgone 2004).

4. RESEARCH METHODOLOGY AND RESULTS

Data collection began in November of 2004 and continued through January of 2005. The *Computerworld* magazine list of the 348 top IS schools was used as the basis for the survey. The authors then used a search within each university's Web site to resolve the issues posed in the Introduction. The authors searched each Web site for the undergraduate degree requirements for the business school. Moreover, these degree requirements were analyzed to determine if computer literacy knowledge was a prerequisite for the bulk of the undergraduate business degree majors. Specifically, once an IS course was discovered as a core requirement, the search progressed to ascertain whether or not Information Systems was housed in a separate department as its own major or

whether it was offered as a concentration from a hosting department. Regardless, the search also sought a detailed syllabus from the core course from which to gather the answers to the queries posed. Eighteen schools were found not to have an IS foundation course (eight had only CS majors and ten had converted to graduate programs only) resulting in 330 schools used in this survey.

With 330 schools available for the analysis, table 1 (Authors' note: *all* tables are listed in the appendix) shows the percentages of subject matter in core course content. Half the schools surveyed (51.2%) included a systems analysis and design component. Similarly, 48.5% of IS core courses included education in decision support systems. Both these topics have, in the past, been a hallmark of basic education in information systems. The fact that both are still included in most core courses is not incongruous. Surprisingly though, the next subject most commonly incorporated was basic business skills (46.7%) which included some form of problem-solving activity with a written component. This is a marked improvement from the days when the core Information Systems course typically provided students with the skill-set necessary for using the Windows™ operating system and the tools provided in the Microsoft Office™ suite of applications. Yet, although the Microsoft Office™ suite as subject matter has been reduced, it has not been removed from the core course. 38.5% of schools in the survey still actively provide training in the use of these tools.

Conversely, the results of the survey indicate a scarcity of technically-oriented subject matter as indicated by the relatively low percentage of the inclusion of material on the technology behind the Internet (19.7%) or the use of programming languages/tools (17.6%). Similarly, security and ethics issues were present in approximately one fourth of the courses surveyed.

Tables 2 and 3 reference the structure of the IS core course within the college. Specifically, table 2 indicates the current credit hour value assigned to the core IS course. These data were attainable for 273 of the 330 schools in the study. The authors also noted as to whether the college

surveyed was on a quarterly or a semester system. The schools that assigned 1.0, 2.0, and 3.0 credit hours to the core course were all on the semester system. Likewise, all the 4.0 and 5.0 credit hour assignments were in colleges on a quarterly system. As indicated in table 2, the overwhelming majority of colleges now use a semester system (253 of the 273 schools).

The authors also tracked the relationship between tables two and three. The 1.0 credit hour course was not done in a lab environment. While only one of the 2.0 credit hour courses required a lab component (worth an additional 1.0 credit hour), ten of the 4.0 credit hour courses included a lab component. Those that were on the semester system gave 3.0 credit hours for the course and 1.0 credit hour for the lab. Those on the quarterly system gave 4.0 credit hours for the core course and 1.0 credit hour for a lab.

In addition to the 11 colleges that assigned a single credit hour to a lab course, another 34 colleges in this survey included a lab component as part of the core course content without separating out the lab credit hour. In total, 45 colleges or 13.16% of the surveyed schools included lab assignments as a component to the core IS course. Moreover, as shown in table 3, the authors found that 131 colleges had a *separate and distinct* course providing basic computer literacy skills (39.7%) to the student population. Oddly, 26 colleges offered a core course which taught MS Office skills while also requiring a separate, prerequisite computer literacy course. Insufficient data were available to determine if, in these instances, whether the duplication of tool instruction was due to out-dated core course material or whether the core IS course took advantage of the basic computer literacy skills by requiring students to use the MS Office tools utilizing a more sophisticated approach.

Lastly, the data in table 4 is presented to give the reader a better idea as to the current state of IS curricula in business schools. While surveying the colleges, the authors also gathered data in the current status of information systems degree programs. Specifically, was the core course offered by an IS department as part of its own major, or offered from a department

where IS was a concentration, or was the core course in IS used by a college without either an IS major or concentration? As indicated below, of the 330 colleges surveyed, IS remains in a fairly healthy state, even as enrollments have dropped in the last five years. 189 colleges have a separate IS Department offering their own major, while an additional 56 colleges offer an IS major offered by another department with IS-specific faculty housed within that department. Thus, for most of the major COBs in the U.S., 74.2% still think information systems is an important enough discipline to offer students an opportunity to graduate with either a major or concentration within the field.

For completeness, table 4 also illustrates the specific departments that typically house the IS concentrations. As might be expected, the majority of IS concentrations are offered by three departments almost equally, Accounting, Management, and Decision Sciences, each of which account for approximately one-third of the 56 colleges with an IS concentration. The remaining category included colleges that offered a Business degree with a concentration in Information Systems. The courses for these concentrations typically came from multiple departments within the college.

5. CONCLUSIONS

The traditional core course has for some years been focused on teaching 'tools' (MS Office). It was surprising to see how many schools had moved tools topics into a separate course (36.39%). The switch to a separate computer literacy course supports the need of businesses to hire students that are already versed in these skills. Just as many colleges are assuming that the students are coming to school with these skills out of high school, many businesses assume their future employees will already have these skills. It was good to see that many of the colleges are moving away from teaching 'tools' in their core course and are now teaching more conceptually-based technology topics.

Moreover, this research shows that the core Information Systems course is evolving while better preparing students for careers that use technology.

46.67% of the schools are using writing and problem solving in their core IS course, which hopefully is addressing the current business requirements that students enter the job market better able to communicate and solve problems. This finding is a major change from how previous IS core courses were structured and indicates that many business schools are receiving the same feedback that, in part, motivated this research.

The authors also found it of interest that traditional IS core content, such as systems analysis and design, is still taught in over 50% of those schools surveyed. With the rising concern over IT budgets, students are still receiving a good understanding of what it takes to bring a software project to completion. Perhaps, allowing these future employees to ask better questions of their IT departments....especially when projects are proposed and employees are expected or required to monitor the progress and spending requirements of these projects.

Additionally, new Internet-based business models (33.03%), the technology employed in the use of the Internet (19.7%), and the use of decision support tools (48.48%) topics indicate that many programs are cognizant of the necessity to prepare the student for the changing environment of business in the age of the Internet. It also gives them insight into the need for good, accurate business data to support strong business decisions. Students are also being introduced to security issues, although at a much lower rate than the authors anticipated. Security issues are becoming a more important element of information systems as an Internet-based world continues to encroach on businesses; yet our data does not indicate a large number of schools focusing on these issues.

Finally, the fact that 57.27% of the schools surveyed still offer IS as a major provides strong evidence that IS does still matter in academia. The question that remains is whether IS programs will continue to garner support from the colleges of business in which these programs reside. The precipitous drop in enrollments coupled with the practical requirement that universities are driven by credit hour production, does not bode well for the continued maintenance of an IS core course or, for that matter, the

continuance of information systems as a prospering major. Ironically, this occurs at a time when the importance of information systems has perhaps never been greater, yet it still remains to be seen what the future will bring for existing IS programs.

This brings us to a logical topic for future research. This same survey, repeated a year from now, would undoubtedly produce markedly different results. The effects of the economy, as well as the publicized demand for IT professionals in the marketplace, will greatly influence as to whether the trend over the next year will be one that is positive or negative. The results of a repetition of this survey in one year's time would provide a solid foundation as to the "state" of the information systems profession.

6. LIMITATIONS

The data employed for the survey questions were highly suspect with respect to content validity. The research methodology relied heavily upon the implied interpretations of the material found in the core course syllabi. Thus, the authors made a conscious effort to minimize as much bias as possible by attempting to merely report their findings. However, no matter how much attention was given to this issue of bias, the very nature of the study necessitated a certain degree of preconceived conclusions drawn by the authors.

Similarly, the two authors worked at the same institution, drawing from their own personal experiences and within a similar environment. One must wonder if the survey results would be the same if the authors were from two geographically dispersed schools.

The problem with large surveys of this type is that, out of necessity, the scope must be limited. Examining well over three hundred syllabi is very time consuming and required the authors to limit the number of items examined within each of the syllabi. Indeed, it would have been desirable to inspect the course courses with a finer level of granularity. Such questions as "what programming languages were used" or "what Internet topics were covered" would be worthwhile. However, we must leave this

level of detail as excellent topics for future research.

Lastly, the authors, themselves, brought their own world-views to this study. The examination of the syllabi from each of the 330 schools could significantly vary from one author's interpretation to that of the other author. These limitations, however, are minimal in that the purpose of this study is exploratory and descriptive in nature.

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APPENDIX - TABLES**Table 1: Percentages of subject content in IS core courses**

Internet (technical coverage)	19.70%
e-commerce (new business models)	33.03%
Programming – tools and languages	17.58%
MS Office Tools	38.48%
DBMS concepts	41.52%
Business skills – writing and problem solving	46.67%
Systems Analysis and Design	51.21%
Security	26.36%
Ethics	25.15%
DSS	48.48%

Table 2: Credit Hour Values

Credit Hours	Number of colleges
1.0	1
2.0	8
3.0	244
4.0	18
5.0	2
Total:	273

Table 3: Core Courses Requiring Tool Knowledge

	Core Courses Using Lab Assignments	A Computer Literacy Course Needed As a Prerequisite	Core Courses With MS Office Content AND a Computer Literacy Requirement
Number of Colleges	45	131	26
Percentage of Colleges	13.63%	39.69%	7.87%

Table 4: Emphasis Given to the IS Discipline

		N	%
Information Systems as a Major or Concentration	IS, CIS, MIS offered as a Separate Major	189	57.27%
	IS, CIS, MIS offered as a Concentration Within Another Department	56	16.96%
Breakdown of Information Systems Concentrations	Accounting Major offering an IS Concentration	19	5.75%
	Management Major (including Operations Mgt) offering an IS Concentration	18	5.45%
	DSc Major with an IS Concentration	14	4.24%
	Business Colleges offering the IS Concentration (i.e., Department Independent)	5	1.51%
No IS College Unit	Non-IS Majors offering the Core IS Course	85	25.75%