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Does Information Systems Still Matter? Lessons for a Maturing Discipline

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DOES INFORMATION SYSTEMS STILL MATTER? LESSONS FOR A MATURING DISCIPLINE

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Abstract

The information systems academic discipline has faced a sharp reduction in student enrollments as the job market for undergraduate students has softened. This essay examines the recent and rapid rise and fall of university student enrollments in information systems programs and describes how these enrollment fluctuations are tied to the job opportunities of graduates. Specifically, the role that global outsourcing is playing on the employment opportunities, both in the United States and Europe, is examined. This analysis concludes that the demand for information systems graduates within the United States has likely bottomed out and slow growth is now occurring. Within Europe, general conclusions are limited, but it appears that global outsourcing is playing much less a role in Europe than in the United States. Nevertheless, although global outsourcing is indeed a factor influencing the U.S. employment picture, it is only one of several factors that have negatively impacted the U.S. job market for information systems graduates over the past few years. After examining the future macro job opportunities for information systems graduates, the paper then provides recommendations for improving student recruiting to the information systems major, for attracting potential employers of graduates, and for managing the production of Ph.D. graduates to match the flow of undergraduate demand. The essay concludes that, although shaken, the information systems academic discipline is strong and will continue to strengthen as it moves into a state of maturity and relative equilibrium.

Keywords: Information systems education, curriculum, enrollment, workforce, globalization, outsourcing

Introduction

When *Harvard Business Review* published Nicholas Carr's article entitled "IT Doesn't Matter" in May 2003, it created quit a stir in both the academic and professional communities. Carr argued that as information technology (IT) becomes more pervasive it will become more standardized and ubiquitous, more of a commodity that is absolutely necessary for every company. He reasoned that companies should focus their IT strictly on cost reduction and risk mitigation and that investing in IT for differentiation or for competitive advantage is futile. Many experts in academia, in the popular press, and within technology companies not only disagreed with that argument but felt that, if taken literally, that line of thinking could hurt companies'

competitiveness. Given the debate that this article caused, in May 2004, *CIO Magazine*'s Editor-in-Chief, Abbie Lundberg, published an interview with Carr on the subject along with an invited counterpoint essay entitled "The Engine That Drives Success: The Best Companies Have the Best Business Models Because They Have the Best IT Strategies" by noted technology and business strategy author Don Tapscott. In this response to Carr, Tapscott argued that companies with bad business models tend to fail, regardless of whether they use IT or not. On the other hand, companies with good business models that utilize IT successfully to carry out those business models tend to be very successful. To emphasize his position, Tapscott used several examples across a variety of industries—e.g., Amazon.com, Best Buy, Citigroup, PepsiCo, Herman Miller, Cisco, Progressive Casualty Insurance, Marriott, FedEx, GE, Southwest Airlines, and Starbucks—where firms dominate their respective markets, have superior customer relationships, business designs, and differentiated offerings, and are well-known for their superior use of IT in supporting a unique business strategy.

The timing of this debate on the strategic value of IT within organizations is occurring at a time when most information systems academic programs throughout the world are experiencing significant downswings in enrollments (from 25 to 75 percent reductions). This reduction has not been a gradual decline, but instead it has been a sharp drop from the heyday of the dot-com and Y2K boom of the late 1990s. These enrollment drops are likely an outcome of the sharp declined in the number of IS related job opportunities for IS graduates. During the IS boom of the late 1990s, it was often joked that any graduates that could spell MIS could get a high paying job, and most universities could not find enough faculty to cover courses as enrollments skyrocketed. Today, the academic job market, for both IS graduates and IS faculty, is quite soft. This rapid change from feast to famine is sending shockwaves throughout the high technology industry as well as throughout technology-related programs within higher education. Given this backdrop, we address the following question in this short essay:

> *Given the current changes in the IS profession, particularly the trend toward offshore outsourcing, what is the future nature of the IS profession and what are the educational/curriculum implications that ensue from these changes?*

We strongly believe that information systems as an academic discipline, while affected by changes in the IT profession, will continue to not only exist but to prosper. We believe Tapscott is right, and that a strong business model accompanied by the successful use of IT is a powerful combination. We also believe, however, that we as IS academics need to understand the changes that are occurring in industry and how they affect us. To that end, in this paper, we begin with an analysis of current enrollments in IS courses and major programs, focusing on economic and workforce factors that are affecting our enrollments. We look at where things are now and where they are likely to be in the near future. Based on our analysis, we then make a series of recommendations regarding what we as a discipline need to do to adjust to current changes and to be better prepared for our future.

Factors that Influence the State of the Field

In order to make recommendations to the field on how to best move forward, we first briefly examine several factors that have influenced or are currently influencing the information systems profession. We begin with an assessment of the past and current student demand for IS in our colleges and universities. We will then look at the indicators of where things stand now in terms of plans to hire IS personnel. Then we will examine economic and workforce factors related to the demand for IS graduates in the workplace. One of the key factors is globalization and outsourcing, which we will examine from both a U.S. and an E.U. perspective.

Demand for Information Systems in U.S. Colleges and Universities

As an applied academic discipline typically located in business schools, IS produces an educated individual with a unique skill set. At the heart of IS is the development of information systems designed to solve business problems (Nunamaker 1992). Through our curriculum, we produce employees who can analyze business problems and design information systems tailored to solve those problems. Although the titles vary, we generally refer to the positions our students take as systems analysts. Although it varies from geographic market to market, most of our students are hired by consulting firms.

Anecdotal evidence from colleagues and other interested parties such as textbook publishers indicates that demand for IS students has fallen dramatically in the past three years. Although personal estimates vary, the modal estimate for the decline is about 50 percent. Data from one of the author's institutions, Florida State University, supports this estimate (Figure 1). While the numbers of IS majors gained and lost differ dramatically from school to school, we believe the curve in Figure 1 is typical of most IS programs in the United States By and large, the number of IS majors now is about the same as in 1995 or 1996.

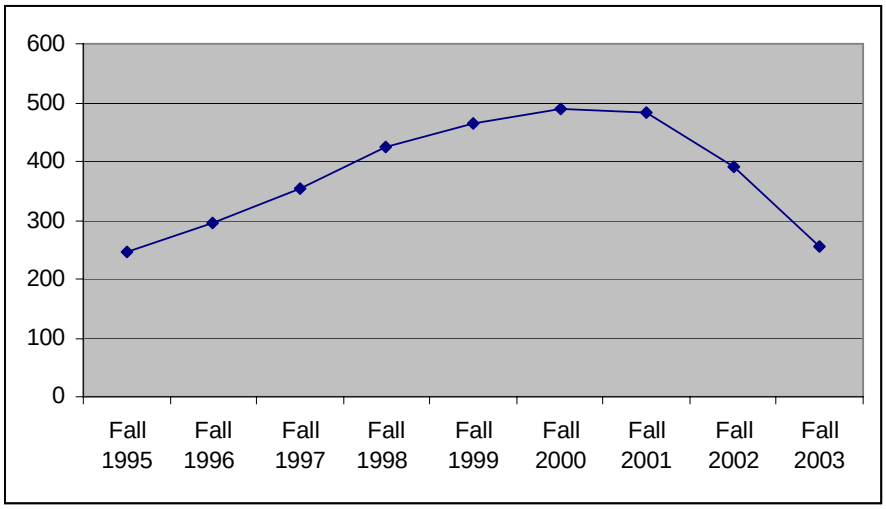

Figure 1. Numbers of MIS Majors at Florida State University, 1995–2003

The obvious question to ask is: What happened to cause the decline? Maybe the correct question is: What happened to cause the incline? Everyone in IS knows the answer: (1) the rapid build-up in the implementation of ERP systems, (2) the Y2K problem, and (3) the rapid build-up in demand for anything related to the Internet (Ives et al. 2002). Recruiters who hired IS graduates began to show up at the colleges where they recruited with greatly increased quotas of new hires they had to make. Recruiters went to colleges they did not typically frequent to hire students with whom they would not otherwise have talked. Companies that never hired right out of college began to show up at colleges and universities to hire whoever they could find. The competition for IS personnel of course led to higher salaries, and students outside of IS heard about the demand and the high salaries and changed majors. Anecdotal evidence in this regard shows that maybe as many as one-third of the new converts to IS had little interest in the field or even in computing. When the *Fortune 500* finally finished their ERP implementations, when the Y2K problem was expertly resolved, and when the Internet bubble finally popped, these new converts were the first to desert the ranks of IS majors. Increasingly frequent news of rescinded job offers and layoffs of IS personnel drove others away.

When the demand for IS courses increased, demand for IS instructors, most notably professors, also increased. It looked to many of us as if we would not be able to produce enough new Ph.D.s in IS to keep up with the demand. We hired as many of the newly minted IS Ph.D.s as we could find, and we lured assistant professors from other schools to our campuses. Salaries for IS faculty increased dramatically. And then, of course, as demand for our courses declined, so did demand for IS faculty. Course section sizes changed from overflowing to small and intimate. The market for IS faculty softened considerably.

Now, almost 10 years after 1995, we have returned to the same level of demand for IS in our colleges and universities that we faced then. In some ways, this is not necessarily a bad thing, as we know for certain that the remaining students are dedicated to the field. However, students thinking about majoring in IS are now hearing about how many IT jobs are being outsourced to countries like India, China, and Russia, and they are hesitating. Also, as was the case in 1990-1991, we have more IS doctorates searching for jobs as IS professors than we have openings for them. We know what the past looked like, and what is going on now, but what does the future hold?

Demand for Information Systems in the Workplace

So, how does the situation look now, and what kinds of forecasts can we make for the future? Let's look at some statistics. The ITAA (Information Technology Association of America), in their Workforce 2003 report, find that the IT industry bottomed out in 2002, and that the number of IT jobs in the United States at the beginning of 2003 was 10.3 million, up 4.2 percent from 2002. The Bureau of Labor Statistics predicts additional increases in the numbers of IT jobs from 2002 to 2012 (Coy 2004). There should be an increase in the number of software engineers of 179,000 and of management consultants of 176,000 (and there should also be an increase in the number of college educators of 600,000). One current announcement is very encouraging in this regard. On August 12, 2004, IBM announced it was adding 8,800 jobs to its previous forecast of 10,000 (Mark 2004). IBM plans

to employ approximately 330,000 people by the end of 2004, the largest number since 1991. Only about a third of the new jobs are expected to go to new college graduates, but the announcement is still good news. It looks as if things have bottomed out, and we can expect growth in the demand for IS to resume, although slowly.

Outsourcing and Globalization: The View from the United States

Even though domestic demand for IS graduates and IT workers in the United States seems to be increasing, the large amount of press on outsourcing serves to discourage students who may want to major in IS. There is no question that the outsourcing of IT jobs is a real issue, but to what extent should we be concerned about it? Outsourcing is on the rise for all aspects of business and many of these outsourced jobs are within the information systems function. Fifty IT executives interviewed in a recent Forrester study of offshore outsourcing say they spent an average of $8 million on these services in 2000—roughly 12 percent of their IT budgets. The research firm projects that the average outlay will jump to $28 million, or 28 percent of IT budgets, in 2003. *CIO Magazine* reported that, in 2004, U.S. spending for IT services that were shipped overseas was approximately $16 billion, and spending was expected to rise to approximately $46 billion in 2007 (*CIO Magazine* 2004).

U.S. executives are becoming increasingly comfortable with outsourcing projects to companies that do the work in remote locations at lower prices than can be found domestically. "A 25 percent cost savings on an outsourcing contract is a realistic goal when working with an offshore provider," according to Forrester analyst Christine Overby (Greenemeier 2002). However, as the labor costs in India continue to rise, companies might look to countries such as China when thinking about offshoring their work. To mitigate risk, many offshore companies have management personnel in the United States who act as liaisons with overseas staff. The continued reliance on offshore talent by well-known service providers, such as Accenture, EDS, and IBM Global Services, also lends credence to the offshore model. What began more than a decade ago as a cheap way to supplement overworked internal application developers with workers from India has grown into a worldwide search for the right mixture of talent, resources, and cost savings to create and manage today's most complex IT environments (Greenemeier 2002).

But how much of a threat to IT jobs is outsourcing? According to Forrester Research, of the 2.7 million jobs lost in the United States over the past 3 years, only 300,000 have been lost to outsourcing (Forrester Research as cited in Nussbaum 2004). Also, few economists believe outsourcing to be a major cause of slow job creation in the United States. While there were 58.6 million layoffs in IS from 2001 to 2003, most of these job losses were offset by new hiring elsewhere in the economy, so the net loss was 2.3 million jobs. Only 690,000 of those jobs were lost to outsourcing, and of those 690,000, only 188,000 were in services (Hagerty and Hilsenrath 2004). Additionally, not all U.S. firms are outsourcing IT personnel: Some, like cMarket in Boston, are succeeding by hiring American programmers at the same rates others pay Indian programmers (Gumpert 2003).

Although the outsourcing of IT is real, and it receives a great deal of play in the U.S. popular press, it may not be the huge threat that it is so often portrayed. Outsourcing is not ***the*** cause of the decline in the demand for IS graduates in the United States—it is just one of many factors that have contributed.

Outsourcing and Globalization: The View from the European Union

In the European Union, the computer and software industries do not have as much impact in the GNP as they do in the United States. This implies that E.U. countries are not subject to the big oscillations the United States might be seeing. When technology sales were down in the post-Internet bubble, companies like Sun and Cisco had to downsize thousands of jobs in the United States, whereas in Europe the losses where almost imperceptible as all their employees were in sales and service, probably the departments with research and development that were hit the least.

Nevertheless, Europe is going through a slight slowdown in ICT (information and communication technology) employment, from a vigorous growth in the period 1995 to 2000 where ICT employment reached, in some countries like Finland, 10.9 percent of total *business* employment, to 4.3 in Spain (OECD data). As a comparison, the same statistics show ICT employment in the United States to be 6.2 percent of employment. The period to 2002 has seen a steady decline in all countries except in the new Eastern European member countries. As an example, the percentage of ICT over *total* employment (and therefore not comparable to the previous data) in Hungary has jumped from 0.9 percent of total employment in 1999 to 1.2 percent in 2002. Likewise, Poland has sprung from 0.6 to 0.9 percent and Slovenia from 0.8 percent to a staggering 1.3 percent. This is prompting a surge of offers of very proficient and competitive hardware and software development firms from the former Eastern Block. Anecdotal evidence points to the big flux of work expected to be sent to countries in Eastern Europe rather than to India.

A number of IT companies are taking their operations offshore from the European Union in the same way they left the United States in the 1980s. Southern Europe is being hit now with the realities of free trade with countries that can offer reasonably educated labor at much cheaper prices. Nevertheless, this does not seem to have much effect on jobs requiring higher education, as these companies seem to leave behind high value-added operations like marketing and research and development.

Making generalizations about the evolution of university enrollment in the European Union is very difficult, as we observe great variations across countries. According to the Eurostat database, Ireland has 11.52 percent of all its students in computing, whereas the United Kingdom has 5.67 percent, Spain 5.13 percent, Germany 2.08 percent, and Italy only 1.38 percent. These percentages have been holding steady in the last few years, and being considered low, are a source of worry for European governments. The European Commission has recognized that most of the productivity gains of the United States in recent years, which have widened the gap with Europe, are due to the effective use of IT by American organizations. In 2003 the European Commission launched a massive program named "e-Europe 2005: An Information Society for All," geared specifically to increase the use of ICT at all levels, from multinationals to SMEs and individuals. Some of the first programs aim at the government itself, trying to bring all levels of the administration to the "e" era. eHealth and eGovernment are the two prime examples. These programs, funded with billions of dollars during the next 5 years, will generate many opportunities for IS graduates that understand the possibilities of ICT in organizations, both public and private.

Summary

In the United States, we have seen a dramatic decline in the demand for graduates of IS programs on the part of recruiters. In the European Union, demand has also slipped, but not as dramatically. We have also seen a commensurate decline in the demand for IS courses and majors on the part of university students. The decline is largely due to the end of massive ERP implementations, the resolution of the Y2K problem, and the bursting of the Internet bubble, but the decline is also due in part to a worldwide economic slowdown, since the Internet bubble popped, and due to the continued movement of IT jobs to locations where talented labor can be obtained at greatly reduced costs: India, Russia, China, and Eastern Europe. Yet, domestic demand in the United States for IT workers seems to have bottomed out, and demand is slowly growing again, and outsourcing, while real, does not seem to be the huge threat to U.S. and E.U. IT jobs as it is commonly portrayed. We believe demand for IT jobs, and for IS majors, will continue to grow, although slowly, but we also believe the heyday of 2000 and 2001 will most likely never be repeated. The IS academic discipline is in no danger, we believe, of disappearing, but we must recognize the reality of slow growth, and act accordingly. Our recommendations for the field, which are listed and explained in the remainder of this paper, are rooted in our view of the current reality for the IS discipline.

Recommendations for the Future

For the first time since IS began breaking away from management, accounting, and management science departments, we once again have to focus on recruiting students to our major. Recruiting is a multifaceted task, demanding many different tools and skills, but one of the keys to successfully recruiting undergraduates into IS programs is the introductory IS course offered in most college curricula. We believe this course is so important to our recruiting efforts that it forms the basis for two of our four recommendations discussed below. Our third recommendation focuses on curriculum design to help attract industry recruiters. Our fourth recommendation deals with our doctoral programs and how they are affected by the reduced demand for IS faculty.

Improving Our Recruitment of Students

Most IS programs within business schools teach an introductory IS class that is taken by all students intending to enroll in a business program. In this course, it is typical that both information systems concepts are discussed as well as basic training is provided on how to use the basic computer applications like Microsoft Excel, Word, and Access. Often, this class is the first formal exposure a student may have to information systems topics. As these introductory courses are extremely important for recruiting new students to IS, we believe that IS programs should carefully choose both the instructor(s) as well as the content for this course. Choosing the "wrong" instructor or topics will likely reduce the efficacy of this course as a mechanism for recruiting high quality students. So, who should teach the introductory course? On what content should this course focus?

Before answering these questions, a brief discussion of relevant changes in students and society is warranted. Over the past several years, due to the widespread availability of the Internet, improved applications, and low cost computers, tremendous

changes are taking place in terms of computer literacy and computer ownership. Additionally, according to the Pew Internet and American Life Project, college students are the heaviest users of the Internet when compared to the general population. Using computers and the Internet has become a part of virtually every student's daily routine. Additional factors to consider include (Jones 2002, p. 2):

- One-fifth (20 percent) of today's college students began using computers between the ages of 5 and 8. By the time they were 16 to 18 years old, all of today's current college students had begun using computers—and the Internet was commonplace in the world in which they lived.
- Eighty-six percent of college students have gone online, compared with fifty-nine percent of the general population.
- College students are frequently looking for e-mail, with 72 percent checking e-mail at least once a day.
- About half (49 percent) first began using the Internet in college; half (47 percent) first began using it at home before they arrived at college.
- The great majority (85 percent) of college students owns their own computers, and two thirds (66 percent) use at least two e-mail addresses.
- Seventy-eight percent of college Internet users say that at one time or another they have gone online just to browse for fun, compared to sixty-four percent of all Internet users.
- College Internet users are twice as likely to have ever downloaded music files when compared to all Internet users: 60 percent of college Internet users have done so compared to 28 percent of the overall population.
- College Internet users are twice as likely to use instant messaging on any given day compared to the average Internet user. On a typical day, 26 percent of college students use IM (instant messaging); 12 percent of other Internet users are using IM on an average day.

Note that these data were collected over 2 years ago; it is very likely that these high adoption rates and usage patterns are being exceeded by today's students. The key conclusion that should be taken from these statistics is that we are teaching students who have long used technology; some students are likely to have deep rooted beliefs on what is valued and how to use information technology and the Internet. In other words, many of our students in the introductory class have been longtime users of technology. Consequently, teaching a course that focuses on elementary computer concepts will likely increase the risk that students negatively view information systems as a potential area of study.

So, who is the right person to teach the introductory course? The changes in basic computer literacy suggest that the instructor needs to be very savvy at not only using contemporary applications, but also well versed in many of the issues relevant to these students (e.g., instant messaging, spyware, spam, MP3 file sharing, and so on). In addition to basic content knowledge issues, it can be argued that this instructor not be a stereotypical "computer instructor" but someone very business savvy and not perceived as "geeky" by the students. Such a person will act to lessen possible preconceived notions that computer people are not "cool" or that this major is "just for geeks." Additionally, at one of our institutions, Washington State University, we had very few females majoring in our program relative to gender mix within the entire college. To address this, we assigned a woman to teach our introductory course, resulting in a dramatic uptake in the number of females majoring in IS. This suggests the following:

> *Lesson 1: Programs can positively influence not only how many majors they attract, but also the demographics of those majors, by the characteristics of the person selected to lead this class.*

Regarding the right content for the introductory course, this is often a balance between "concepts" and "applications." Regarding concepts, Ives et al. (2002) outlined "what every business student needs to know about information systems." In this essay, the authors argue that students need to understand that IS is much more than technology, that it is a key *organizational* function that enables strategic objectives and organizational effectiveness. Key topics in the introductory course are summarized in Table 1.

As important as the discussion of what should be included in this course is what *should not* be its focus. Specifically, many schools continue to focus too much on low-level computer concepts (e.g., components of a computer) rather than on the business value that information technology can enable. Such a focus leads to two serious problems with successfully recruiting students

Table 1. Key Information Systems Concepts and Learning Objectives

(Adapted from Table 1. Core Information Systems Requirements for All Business School Students, B. Ives, R. Valacich, R. Watson, R. Zmud et al., "What Every Business Student Needs to Know About Information Systems," *Communications of the AIS* (9), 2002, pp. 471-472. Copyright © 2002 Association for Information Systems; used with permission.)

What are Information Systems? • Explain the nature and interaction of technology, people, and organizational components • Distinguish between data, information, and knowledge • View the organization as an information processing system designed to manage environmental uncertainty • Introduce elements of systems thinking—boundary, environment, scope, hierarchical decomposition, decoupling, etc.
How do information systems influence organizational competitiveness? • Discuss the use of IS for automation, integration, organizational learning, reengineering, and strategy • Understand the need to align IT investments with strategic plans • Understand how IT can be used to achieve and sustain competitive advantage • Discuss how IS can both constrain and enable organizations.
Why have databases become so important to modern organizations? • Understand the nature, importance of, and uses for an integrated database • Understand the concept of, and means to ensure, data integrity • Describe database management systems and how they work • Explain the value of data warehousing and data mining concepts
Why are technology infrastructures so important to modern organizations? • Explain the nature of, and organizational dependence on, technology and business platforms • Explain concepts of interoperability and scalability as well as the role of standards • Compare open versus proprietary architectures • Understand the problems in justifying investments in infrastructure • Recognize total cost of ownership for technology investments, e.g., desk-top computing
What is the role of the Internet and networking technology in modern organizations? • Discuss networking concepts, components, capabilities, and trends • Distinguish among the Internet, intranets, extranets • Describe the evolution of e-business and how e-business is transforming organizations and markets • Explain organizational implications of the pervasiveness of the Internet • Describe the development and impact of wireless networks and ubiquitous computing
What are the unique economics of information and information systems? • Understand the economic characteristics of the information economy • Understand the cost structure of information systems and technology • Describe unique features of information economics—network effects, versioning and pricing of information products, lock-in, positive feedback, tipping points, and so on
How do information systems enable organizational processes? • Explain the importance of enterprise-wide business processes and associated IS roles • Explain the importance of extra-enterprise processes, e.g., supply chain and CRM, and associated IS roles • Describe the various types of IS in support of operational, managerial, and executive-level processes.
How do organizations develop, acquire, and implement information systems? • Understand how to manage complex, technology-based projects • Understand the difficulties in designing and building IS well as the strength and weaknesses of alternative development processes • Understand the trade-offs involved in developing software in-house, using a domestic or offshore provider, and buying off-the-shelf packages • Understand how to formulate and assess a request-for-proposal • Understand the difficulties in implementing IS and in leveraging the full potential of installed IS

What is the nature of IS management? • Discuss the evolving and current roles of enterprise IS management • Explain the operating, managerial, and strategic processes associated with IS management • Discuss advantages and disadvantages of alternative governance structures for IS management • Discuss IT sourcing and contractual and relationship management with third-party service providers • Consider the unique problems of managing IT in globally dispersed organizations
What ethical, criminal, and security issues do organizations face when using information systems? • Describe the ethical concerns associated with information privacy, accuracy, intellectual property, and accessibility • Introduce the nature (and increased potential of) computer crime • Explain what is meant by computer security and describe methods for providing computer security • Consider cross-border implications regarding privacy of data and integrity of the Internet

into information systems majors. First, a focus on computer concepts focuses too much on *what* technology is and *how* it works (e.g., what is a pointing device, what is a printer, what is a mainframe) and not on *why* a technology is valuable to an organization (e.g., why is the Web useful for improving customer support). In other words, focusing on "what and how" acts to undervalue the role of technology as a major business function within modern organizations. Simultaneously, this acts to make students believe that majoring in IS would be technology focused, not business focused. Although this may attract some students, it most likely will not attract students who see themselves as business professionals. Second, programs that focus on low level concepts are also in jeopardy of losing students due to irrelevancy. Given the likelihood that most students are quite computer literate, focusing on low level "what and how" topics will more likely make students feel that course is irrelevant rather than crucial to their to their future success. This suggests the following:

> *Lesson 2: Programs can influence the number of majors they attract by focusing more on why information technology is valuable to an organization rather than on what the technology is or how it works.*

Regarding applications, courses must continuously push the usage skills further and further as students are becoming more and more skilled as application users. Today, for example, most university students know how to use a browser and how to perform basic word processing operations. Therefore, university credit should not be given for basic usage of computer applications. (Of course, there will be students with little or no background; for these students, online, self-paced tutorials should be provided.) Graded activities should be highly coupled to business reports and analyses (e.g., cost-benefit analysis in Excel), rather than on features and operations of the software.

Recruiting Industry Recruiters

Beyond the introductory class, what other things can be done to attract majors? An easy answer to this is question is the primary lesson of the late 1990s: Where there are jobs, there are majors! Therefore, all activities that help in job placement of graduates—e.g., close ties with industry advisors, well equipped laboratories, high-quality curriculum, skilled instructors, etc.—will help to aid placement and gain additional students. Another mechanism to attract employers is by the extent to which the overall curriculum meets their needs. Many programs teach a variety of distinct courses with little or no integration across courses or topics. We feel that our curriculum must evolve to show the true interrelatedness across courses in order to be viewed as valuable to potential employers of our students. For example, most information systems programs teach a standard telecom, database, and/or programming class(es); many (most) do not tightly integrate these courses. However, all of these topics are highly related in the real world. For example, the telecommunications infrastructure of an organization influences how data are shared and accessed. Database design influences network requirements, security, and application design. Likewise, programming is not just client applications, but enterprise computing that can span databases, devices, and networks. A curriculum that better meets the needs of employers will lead to improved placement of graduates. This suggests the following:

> *Lesson 3: Programs can influence the number of majors they attract by focusing on improving student placement through better relationships with employers, effective instructors, and a high-quality (relevant) curriculum.*

Size of Doctoral Programs in Information Systems

A recent report by the Association to Advance Collegiate Schools of Business forecasts a coming shortage of Ph.D.s in all business disciplines (AACSB 2003). This shortage will be fueled by a variety of factors. From a demand standpoint, focus on national rankings, the globalization of MBA programs, retirements, and other factors are expected to keep demand high for Ph.D. graduates in all business disciplines. Simultaneously, production of Ph.D. graduates has been declining. Factors fueling the reductions in the production of graduates include an increasing focus by large doctoral granting institutions on MBA programs and the lack of high-quality applicants to Ph.D. programs. The report concludes that there will be a growing shortage of approximately 1,142 Ph.D.s within 5 years and nearly 2,500 within 10 years in the United States. Regarding IS, it was reported that demand for "CIS/MIS faculty is strongest, with 292 schools recruiting to fill 206 open doctoral positions (14.5 percent of all doctoral positions), close to 2.5 times the number of MIS doctoral graduates in 1999-2000" (AACSB 2003; p. 24). When making these forecasts, it is acknowledged that such a demand shortage will likely result in new entrants into the industry (for-profit, distance, and global developers of Ph.D. programs) or additional pressure on existing sources in order to lessen these shortages.

Although the AACSB data may forecast macro market conditions over several years, it clearly does not reflect the yearly ebb and flow that occurs within a particular discipline. For example, when IS undergraduate enrollments dropped in 2001, the overheated demand for IS faculty also fell off. This drop in faculty demand has spanned at least 3 years, with no clear indication of a turnaround any time soon. To contrast the 1999-2000 AACSB numbers above, the Association for Information Systems placement database reported 125 university positions were posted between May 1, 2002, and April 30, 2003, with 127 applicants posting resumes. For the 2003-2004 cycle, 129 universities posted positions, while 344 applicants posted resumes. Thus, the empirical data of the actual marketplace is currently in sharp contrast with the rosy AACSB forecasts.

Although we believe that the field is fortunate that we are no longer in the overheated job markets of the late 1990s, the current job market for Ph.D. graduates is equally challenging. In particular, it is not viable to dynamically ramp-up and down the production of Ph.D. graduates to anticipate market fluctuations. We strongly believe that a high quality doctoral program requires continuity of faculty and focus. In contrast, during the height of the IS market, most institutions were losing two or three faculty per year as schools cannibalized each other to meet increasing student demand. This flux in faculty (and in most instances shortages) negatively impacted the continuity, viability, and overall quality of many Ph.D. programs. Many programs attempted to ramp-up production while at the same time losing high quality faculty to greener pastures at other institutions.

The current market conditions have acted to stabilize the roster of faculty at most institutions. For example, Florida State University had the same faculty on staff from 2001 to 2004 (three academic years). Such stability was unheard of during the job market boom of the late 1990s. Stability will likely help to enhance the quality of our graduates but at the same time discourage quality applicants if the industry is unable to absorb these graduates into quality faculty positions. Nevertheless, we believe that the IS academic discipline is moving into a state of relative equilibrium, both in terms of the number of undergraduate students as well as the overall faculty size within our programs.

So, in the short term, we are clearly in a state of overcapacity due to the fast ramp-up in Ph.D. graduates during the shortages of the late 1990s. This will act to create a short-term buyer's market and adversely impact those programs that are unable to adequately place graduates into quality programs. In the long run, however, the AACSB data suggest that market factors will eventually shift to greater demand. To be successful longer term, programs will have to carefully monitor market conditions and balance the need to retain a critical mass within their program versus the desire for high quality placements of graduates. This suggests the following:

> *Lesson 4: Programs should carefully consider both macro market factors as well as program size and continuity factors when determining the Ph.D. program size.*

Conclusions

We are currently facing a decline in enrollments in IS, due to a decline in the demand for IS personnel in industry. One key factor in the decline, although not the only one, is the well-publicized outsourcing of IS jobs to countries with skilled individuals who work for less than their U.S. and E.U. counterparts. The decline in enrollments has resulted in less demand for IS courses, meaning less demand for IS faculty, and less demand for the product of our doctoral programs. We believe all of these drops in demand are temporary—indeed, they may already have bottomed out. Already we see signs of increased demand for IS personnel in industry. This increase will be followed shortly by an increase in demand for IS courses and an accompanying demand for IS

faculty. We foresee slow but continued growth in IS enrollments for some time to come. We may never see the feverish demand of 2000-2001 again, but the current situation is not the first time we have had reductions in demand for IS. We suffered through the global economic downturn in 1990-1991, but we came back and prospered. We believe IS is already starting to come back and will prosper once again. To help nurture and promote this slow but steady growth, we recommend attention to the IS introductory course, to the attraction of industry recruiters, and to the careful management of our doctoral programs. The foundation of IS as an academic discipline is strong and will continue to be so.

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