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Where have all the students gone?

Strategies for tackling falling enrollments

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Abstract

As most of us are well aware, enrollments in information technology-related academic programs have declined sharply since the late 1990's. This paper addresses possible causes of the enrollment decline, and dispels "myths" regarding IT-related careers. The authors report on a number of efforts underway at various universities to redesign core curriculum and develop secondary programs. They also describe marketing and promotion approaches undertaken by universities and professional organizations in the field. Finally, the authors call for more cooperative and coordinated efforts to address the underlying problems that have led to the current enrollment declines.

Keywords: *curriculum, declining enrollments, IT/IS careers, marketing IS programs.*

Introduction

As we approach the latter part of the new millennium's first decade, an interesting, and troubling set of seemingly contradictory events is occurring. As most of us are well aware, enrollments in information technology-related academic programs have declined sharply since the late 1990s. Reports of enrollment declines of 70 percent and more are not uncommon. At the same time, however, employers are increasingly bemoaning the dwindling supply of information systems (IS) professionals (Lemke 2006). To make the situation even more confusing, the popular press is rife with articles (Brandel (2006) or Rossheim (2006)) about how IS jobs are "going overseas." There is comment too on the impact of this on workers in developed countries (Shao and David 2007)

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To say that this is a frustrating time for IS educators would be a gross understatement. There are college and university administrators pushing us to increase enrollments, students expressing great apathy towards the field, and employers demanding that we produce more graduates. What's a professor to do?

The purpose of this paper is twofold. First, we report on a number of efforts underway at various institutions to increase enrollments in IS programs. This may provide examples for other universities, or generate additional suggestions. Second, we wish to bring about discussion and debate with the hopes of helping to promote more cooperative and coordinated efforts. By working together the IS community may be able to address the underlying problems that have led to the current enrollment declines.

We begin by briefly discussing the enrollment challenge facing us, and identify and try to understand the possible causes of this decline. A number of "myths" regarding careers are also addressed. It appears that we have been in a similar situation before. Cale, Mawhinney, and Callaghan (1991) predicted serious shortages of entry-level IS personnel in the early 1990s. It is likely that this shortage contributed to increased starting salaries for graduates, encouraging students to enroll in IT-related programs.

The Challenge

Enrollment in IS-related academic programs has declined dramatically since the heady days of the dot-com boom. According to the Bureau of Labor Statistics, "the number of total incoming freshmen planning to seek an IS or computer science degree is 1.1 percent, down from 3.7 percent in 2001" (Tucci 2007). One of the challenges faced by the authors in preparing this paper was determining an accurate figure. The figures available do not clearly identify what is being counted: graduate or undergraduate enrollments; computer science, information technology or information systems; full-time equivalents or numbers of students; graduating students or numbers enrolled in majors; where students are located geographically; and whether or not students enrolled in compulsory core units are included. Nevertheless, it is safe to say that throughout large portions of the world, the number of students majoring in information systems and related computing areas has declined sharply. It is not unusual to hear cases of enrollment declines of over 70 percent (ISWorld 2006; McGettrick, Cassel, Guzdial and Roberts, 2006).

George, Valacich, and Valor report data for one institution that they believe to be "typical of most IS programs in the United States" (2005, p. 221). Their data reflect an enrollment peak in fall 2000 followed by a steady and significant decline to a point in fall 2004 that is below 1995 levels. This is significant because some believe the enrollments between 1996 and 2000 were an anomaly, driven by the dot.com boom, and that only a drop below 1995 levels would indicate a problem (ISWorld 2006).

One question that must be addressed is whether the declining enrollments are the problem or the symptom. It may be that the decline in the number of majors is indicative of other, more fundamental problems. For example, it is possible that our IS curricula do not reflect the evolving demands of today's (and tomorrow's) IS professionals. For many years the entry point into the IS profession was application programming. A combination of outsourcing and modern development tools may have greatly reduced the need for traditional application programmers. If this is the case, and if IS programs do not reflect this evolution, then perhaps we need to rethink how we are educating our students.

Another interesting question is whether the decline in enrollments is simply cyclical. Other more established professions have periodically experienced surges and declines in enrollment and employment. There is disquiet among our sister disciplines too – computer science and the more recently formed information technology schools are concerned with similar issues (Carter 2006; McGettrick *et al.* 2006; Remington 2004)

Identifying Root Causes

An interesting and critical set of efforts is aimed at identifying the underlying, root causes for the shrinking interest in IT-related programs, not only IS. Why is it that students are no longer attracted to the field? In order to build

positive perceptions of information systems as an exciting, rewarding profession we should first understand how potential majors currently view our field. At least three interesting studies, one published and two ongoing, use somewhat different, but overlapping perspectives on how to answer this question.

The published study (Lomerson and Pollacia 2006) investigated reasons students did not choose IS as a major. Interestingly, only 13 percent of the students who reported considering, but not choosing, a computer-related major cited poor employment prospects as a reason. In contrast, 50 percent cited the nature of the work as being either too hard (24 percent) or too technical (26 percent). Interestingly, the most frequently chosen reason for not choosing IS as a major (cited by 45 percent of respondents) was that the students didn't think they would like the work. Students who did not consider computer-related majors overwhelmingly cited a lack of interest in technical careers as the reason.

The first in-progress study examines the sources that influence students in their selection of a major. The possible sources of influence are many: peers, secondary school counselors, university advisors, parents, and the popular press, to name a few. However, a systematic examination of which of these sources are the most important may help focus marketing and promotion efforts. Without this knowledge, we could quite easily direct our efforts at the wrong audience. This study also investigates students' impressions of information systems as a career. There is some evidence to suggest that college freshmen may believe that a career in IT means a career as an application programmer. This may be the result of outdated curricula (high school and/or university level) that do not reflect the mix of business and technical skills expected for employment. Students need to be made aware of the broad range of knowledge and skills required in the IT field and of the many different, exciting career paths available.

The second in-progress study takes a different approach to understanding students' perceptions of information systems as a profession. This study uses both focus groups and a survey to investigate students' perceptions of various aspects of the culture of the IT field, including normative, affective, and continuance commitment. When complete, this study may provide valuable insights into the minds of students, enabling us to improve the image of IT-related professions.

Programs with a significant international student population saw a decline following the events of September 11, 2001, as some Middle Eastern students returned to their home countries and student visas to the US became harder to obtain. A number of these students did not return to the US, and at least one embassy redirected scholarship dollars from the US to Canada.

Some of the enrollment decrease may also be attributed to a number of "myths" regarding careers in IT ("Five Myths about Future Employment in IT" n.d.). By identifying and understanding these myths we can begin to develop strategies to address them.

- The first myth is that there are no jobs in IT; the fact is that the IT job market in the US is very healthy (see Table 1). When asked to list their top concerns regarding IT staffing in 2006, 53 percent of CIOs surveyed replied finding and hiring needed skill sets (Overby 2006). According to one survey, 50 percent of organizations are increasing their IT staff by at least 5 percent in 2007, and 25 percent are increasing their staff by at least 15 percent (McGillicuddy 2007). In April 2007, Dice.com listed over 96,000 technology jobs, an increase of almost 38 percent in the past two years.
- A second myth is that there will be no IT jobs when the student graduates. In fact, IT in the US is among the fastest growing occupations, with six IT job categories projected to grow more than 36 percent between 2004 and 2014 (Table 1). Couple this with the fact that the first baby boomers reach retirement age in 2011, and it can be expected that the IT job market will be healthy for some years to come.
- A third myth, which has drawn much media attention, is that all IT-related jobs are going off shore. This may be complicated by students not understanding the difference between off-shoring and outsourcing. While it is true that some IT jobs (e.g. help desk, operations, some programming) are going overseas, the more highly skilled jobs relating to a company's core competencies or products remain very much on-shore. These jobs involve functional and process knowledge, business process management, and industry and company knowledge ("Is there still life" n.d.).

- Fourth is the myth that IT salaries are depressed due to competition with cheaper labor abroad. In fact, undergraduate starting salaries in IT-related fields are among the highest (Table 1). The scarcity of qualified workers has driven salaries up, with the average IT salary in 2007 projected to increase by 3.8 percent, following a 3 percent increase in 2006 and 2.5 percent in 2005 (McGillicuddy 2007). Current factors (e.g. job growth, enrollment declines, retirement of baby boomers) can be expected to continue to exert upward pressure on salaries.
- Yet another myth is that IT-related educational degrees are worthless. However, as can be seen from Table 1, the demand for computer science and engineering skills is expected to increase at a rapid rate at least until 2014. While technical skills are still important, job candidates today are also expected to have a solid understanding of business fundamentals, including project management expertise as well as enterprise and industry knowledge (Overby 2006). Additionally, the skills possessed by an IS graduate are very valuable – systems thinking, ability to analyze business problems, a sound technical knowledge, and communications skills. These put the graduate in an extremely strong position for a number of positions.

Table 1. Information technology jobs in the US
(Source: online.onetcenter.org)

Occupation	Projected additional workers needed 2004-2014	Percent growth 2004-2014	Median wage 2005 (US dollars)
Computer Software Engineers, Applications	268,000	36+	77,090
Computer Software Engineers, Systems Software	180,000	36+	82,120
Network Systems and Data Communications Analysts	153,000	36+	61,750
Network and Computer Systems Administrators	138,000	36+	59,930
Computer Security Specialists		36+	59,930
Database Administrators	51,000	36+	63,250
Computer Systems Analysts	208,000	21-35	68,300
Computer Support Specialists	183,000	21-35	40,610
Computer and Information Systems Managers	124,000	21-35	96,520
Computer and Information Scientists, Research	8,000	21-35	91,230
Mechanical Engineers	87,000	10-20	67,590
Sales Engineers	32,000	10-20	74,200
Computer Hardware Engineers	20,000	10-20	84,420
Computer Programmers	117,000	0-9	63,420

Systematic investigations into the underlying reasons students choose or do not choose IT-related majors may yield important information that may help us address the enrollment issues. More such studies are needed. Perhaps we need to look at our own performance and offerings too. Again anecdotally, it seems that many of our courses are boring to the students, particularly in the early years. We need to examine the diversity in what we teach and how the curriculum might be able to be changed to provide an interesting and stimulating student experience. Perhaps at some time in the future we may look back on this as a temporary difficulty that led us as a discipline to re-examine what we teach and how we present it.

Approaches

In early 2007, the authors posted a request to ISWorld, asking faculty to let us know how their universities have approached the declining enrollment issue. We received a number of interesting responses. The discussion in this section, coupled with our personal experiences and knowledge, is based on these responses. We would like to express our deep appreciation to those who so willingly shared their experiences. It is through this sort of cooperative effort that we will overcome our current challenges.

Curriculum-oriented approaches

Some institutions have taken curriculum-based approaches to improving enrollments. The current challenge may actually represent an opportunity to engage in thoughtful study of IT-related curricula. The face of IT has changed, and perhaps our curricula must change as well. The first step is to determine what desired learning outcomes and objectives are appropriate (e.g. what knowledge and skills our graduates should have). “While technical proficiency is still important, CIOs are desperately seeking employees with project management expertise, enterprise and industry knowledge, and the business skills necessary for customer-facing roles” (Overby 2006, p.41). Defining appropriate outcomes and objectives enables us to determine what courses are necessary and what should be taught in those courses. In addition, links between courses can be better understood and unnecessary redundancies can be eliminated. Ohio University engaged in such a long-term examination and redesign of their curriculum. Their efforts were rewarded in sharply increasing enrollments and placement rates (McGann, Pike, Huang and Matta 2005). We believe that other programs could benefit from similar curriculum reassessments.

Some departments have taken an interesting curriculum-related approach to increasing credit hour production. These efforts involve increasing the presence of IS in the college core requirements. For example, one department was successful in adding an additional course to the core. Another department, as part of an overall restructuring at the college level, added one credit hour to the core IS course. In the latter instance, the additional hour is sufficient to justify an additional faculty line. This type of action may affect enrollments in several (albeit relatively minor) ways. First, the increased exposure will hopefully help students see IS as an integral part of a business degree and consider IS for a major. Secondly, the increased credit hours mean more faculty, thereby enabling more diversity in the programs and probably smaller classes in senior years. Both of these initiatives could be expected to make the discipline more attractive and have a positive effect on enrollments.

Variations to Course Offerings

Another approach is to leverage current course offering into what might be called secondary programs. We define secondary programs as academic programs that are designed to appeal to students who are not enrolled in our major. Examples include minor and certificate programs. In some cases, existing courses can be repackaged to create programs that are attractive to non-majors. For example, the University of Central Florida recently packaged three enterprise-systems-related courses into a certificate program. Although it is too soon to assess the success of this effort, early indications are positive.

The secondary programs approach has the potential for a dual benefit. In the short term, these programs can add to the number of students in a class section. If existing courses are used for secondary programs, additional students may enroll in sections that are already being offered. This is a low-cost way to generate additional credit hours. (Whether we like it or not, many universities are credit-hour driven.) A longer-term benefit comes from attracting students to our majors. Some students who participate in secondary programs may find IS attractive and choose to major in it. Additionally, such programs may offer opportunities to correct misimpressions regarding the nature of IS work.

Another benefit of secondary programs is that they can leverage inherent competencies of individual departments. This allows a department to build a “personality” that may be an important component of ongoing marketing efforts.

For example, a blended IS and decision sciences department may be able to repackage courses to build supply chain management or business intelligence certificate programs or minors.

Some departments take a slightly different approach. These departments partner with other disciplines, particularly at the master's level to create cross-disciplinary programs, such as accounting information systems (George State University), information security (Marymount University), health information management (Claremont Graduate University), geo-spatial information systems (University of Texas at Dallas), or business process innovation (Georgia State University). These types of partnerships hold considerable promise, especially when directed at areas where there is much employer demand, such as healthcare.

A significant benefit of partnerships and secondary programs is that they may help smooth out seemingly inevitable peaks and valleys in the number of majors. As one respondent to our ISWorld query pointed out, the number of majors in an area is often cyclical. Majors become more or less popular in response to cyclical changes in job markets. Overall enrollment in universities may be more stable. By offering secondary and joint programs, IS departments can attract students from other programs. If these areas are sufficiently diverse, the total number of students in secondary and joint programs may be relatively static, offering much-needed stability in the overall enrollment in IS courses. Secondary and joint programs may also help address the need for IT-knowledgeable professionals in other areas, such as accounting and healthcare.

A similar approach might be for IS to become a "minor of choice". In other words, students majoring in other disciplines could be encouraged to take enough classes in IS (3-4 in most cases) to provide them with a solid grounding in general IS knowledge, thus making them more attractive to potential employers. Carefully chosen combinations of classes might lead to job opportunities in one of the current IS growth areas: risk assessment, audit, IT governance, etc.

Marketing and promotion approaches

Marketing and promotion, the third category of approaches, seems to be quite popular, judging from the responses to our ISWorld query. As incoming Association for Information Systems President Dennis Galletta pointed out in an ISWorld posting, marketing the field is of critical importance to AIS.

Many departments are engaging in marketing and promotion efforts. These vary in their level of complexity and in the amount of resources required. However, most seem to have one of two goals: building awareness of a department's programs or changing the image of the profession. Of course, some marketing programs are directed at both.

Reaching out to influential groups was a recurring theme in the responses received. A number of respondents indicated that their departments were making concerted efforts to reach "feeder" institutions, such as secondary schools, junior/community colleges and regional campuses. There is anecdotal evidence that high school counselors are still under the impression that the IT-related job market is poor. Educating counselors and even our own admissions officers on the glowing prospects in the IT profession may lead to more capable students being advised to consider IT-related programs. A more serious education problem is that many high school teachers and counselors may not have a good understanding of the nature of information systems jobs. Many may equate IS with computer science and think that IS professionals spend their days programming. It will take considerable effort to correct these misimpressions, but the effort is likely to pay off in the long run. One department that has engaged in outreach efforts to feeder institutions reports stable enrollments, providing evidence to support the efficacy of this tactic.

More comprehensive marketing efforts are also underway. The MIS department at the University of Georgia developed a multi-phase marketing plan. This plan included various components such as developing and distributing marketing materials, contacting employers and alumni for assistance, and holding social events for prospective students. According to the chair of this department, these efforts have yielded results. In less than a year, preliminary figures indicate that the number of MIS majors will more than double. The well-thought-out, comprehensive nature of this marketing plan is likely one reason for its success. Efforts that are well planned are much more likely to bring success than haphazard, "shotgun" approaches.

One promising and socially beneficial approach is to market the profession to underrepresented groups. For example, the literature has documented the under-representation of women in IT-related fields (Chabrow 2007; Cone 2007; Reich 2006). These groups represent a large and potentially fruitful pool of potential majors. Efforts are underway to recruit those in underrepresented groups. For example, Saint Louis University, Claremont McKenna College and the Claremont Graduate University are collaborating on the “Workshop for Women in IT -Emerging Leaders,” which provides an opportunity for young women to explore opportunities in IT-related fields. Similar efforts have been made in other fields, such as engineering.

A number of departments are using the core course (such as Introduction to IS) as a means for changing students’ perceptions of IS-related careers. Traditionally, some departments have relegated the introductory course to “second-rate citizen” status. This course was often viewed purely as a service course to be taught by graduate students or other less experienced faculty. More recently, however, many have realized that the introductory course offers an opportunity to educate and excite students about IS. We have heard of several universities that have effectively used the core course to attract students to the major and/or secondary programs. This approach may require careful redesign of the core course to make it interesting and informative, while at the same time achieving educational objectives. In addition, the most successful efforts put the “best and brightest” instructors in this course. This approach takes considerable effort, but may prove to be an effective tactic for many programs.

IT-related professional organizations are also lending their support to promoting careers in IT. Microsoft and the Society for Information Management (SIM) have partnered in developing a program whose goals include dispelling the myths about the IT field, increasing the number of students enrolled in IT programs, and creating meaningful opportunities for future IT professionals through mentoring, internships, and scholarships. To date, the program has been presented on about a dozen campuses across the US. One SIM chapter, in an effort to reach teens early, has partnered with their local library to sponsor a weeklong summer IT camp for youth ages 12 to 15. The program, which is now in its third year, includes an orientation session for the campers and their parents during which the sponsors lay out the curriculum and promote careers in IT (Tucci 2007). The Association for Computing Machinery Education Board has developed an information brochure to promote opportunities in the computing field (computingcareers.acm.org). This brochure addresses various computing fields: computing engineering, computer science, software engineering, and information systems. The National Workforce Center for Emerging Technologies, the National Science Foundation, and IEEE are working together on CyberCareers, a project to provide resources for students, faculty, and counselors regarding IT careers (www.nwcet.org/programs/CyberCareers/default.asp).

Visibility of IS within the university

Marketing efforts may also need to be directed to faculty in other departments who do not understand or who downplay the significant role of IS within organizations. If students are made aware of the importance of IS to an organization, in any field, this awareness may positively impact enrollments. At George Washington University, students in a sophomore-level core course completed team projects on assessing the impact of IS on a business issue. The best team projects from each of 10 course sections competed against each other; external judges evaluated the projects. Faculty and students from across the university as well as staff advisors were invited to the competition. This exercise provided both visibility and information about the IS field.

The National Science Foundation also sponsors a summer Research Experience for Undergraduates (REU) to encourage future research in the sciences. Students work on a project with a faculty mentor. Within the computing field, these programs are almost exclusively in Computer Science. Some universities provide REUs during the school year. In both instances, presentations and sharing of the students’ research work provides visibility for the Computer Science field. Other computing disciplines may benefit by introducing similar programs.

Call for Coordinated Effort

Information Systems as a viable academic discipline faces a number of serious challenges. Perhaps the most immediately critical of these is reversing our recent decline in enrollments. Addressing these challenges effectively is difficult for individual departments; a coordinated collaborative effort is necessary.

In early 2007, Dennis Galletta announced via ISWorld the formation of a task force directed at marketing the information systems profession. This is an excellent and important first step. However, simply forming a task force is not enough. Individuals will need to answer Dr. Galletta's call and contribute their time, talents and efforts for the common good. We urge each of you to contribute what you can.

We also believe that regional collaborations may be useful. Important regional variations in students, jobs, and other environmental factors may necessitate modifying marketing materials and approaches. While schools within a region may be competitors, effective collaborative efforts may lead to a "rising tide" of students that will benefit all.

Our recent request through ISWorld generated numerous comments on declining enrollments. While we are most grateful to those who responded, we would like to see a more formal mechanism for tracking enrollment data that would distinguish program (computer science, information systems, information technology, software engineering, computer engineering), academic level (bachelor, master, Ph.D.), metric used (e.g. number of IS majors, total number of students in IS courses), geographic region, etc. Perhaps AIS would be willing to host such an initiative. Figures that are currently available tend to lag by a year or two and do not provide a good basis for addressing the immediate problem.

Final Comments

The IS field needs more visibility. Educating university admissions officers and academic advisors and counselors at both the secondary and university levels will help. However, educating faculty and students in all disciplines is critical. The core IS course in the curriculum is a key factor in attracting IS enrollments. Shifting the focus to the impact of IS in the organization, treating technology as a tool, and downplaying programming may attract more students who want to interact with people, not computers.

The picture, we believe, is not all doom and gloom. There is considerable evidence that the job market is recovering, perhaps very significantly. The efforts and modifications made by many universities, as reported here, seem to be bearing fruit, although it is early yet. It seems to us that in order to be successful, a number of coordinated approaches will be required, from increasing visibility, through re-designing curricula and course offerings, to marketing campaigns.

It has been suggested that the decline in our enrollments is simply cyclical. Information Systems enrollments experienced a decline in the early 1990s followed by a resurgence in the second half of that decade, fueled at least partially by Y2K and the rapid development of the Internet ("Degrees in computer and information sciences" n.d.). Perhaps the current enrollment declines are just part of a cycle. Enrollments may come back regardless of what we do.

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