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ABSTRACT

It is almost unbelievable that in this age of technology we are experiencing decreasing worldwide enrollments in Information Systems (IS) programs. Suddenly, within a year or two, enrollments decreased as much as 70-80 percent throughout the world. Industry is begging for more graduates with a business and technical background and is expecting an even greater shortage in the next few years. Despite reports of the outsourcing of technical positions, there is a growing demand for IS graduates. This paper presents an overview of the discussion, resulting from a panel at the Americas Conference on Information Systems (AMCIS) 2007, of declining enrollments and some suggestions to reverse the trend. Two major themes, marketing and curriculum, emerged.

Keywords: IS curriculum, IS enrollments

I. INTRODUCTION

Few will disagree that enrollments in Information Systems courses have declined since reaching an all time high in the late 1990s. It is almost unbelievable that in this age of technology we are experiencing decreasing world-wide enrollments in Information Systems (IS) programs. Suddenly, since 2001, enrollments decreased as much as 70-80 percent throughout the world. There have been attempts to understand this trend and to try to reverse it. Currently, it appears that enrollments are increasing – slightly. Will we ever see the demand for IS curriculum that boomed in the late 1990s? There were so many students interested in the field at that time that, in some universities, limits were placed on the number of students admitted to the IS program. Some believe those figures are unrealistic for comparison to current enrollments: the target should be enrollment levels that were present in 1995, and only when enrollments fall below that

level should we be concerned. Becker et al. [2006] have been tracking enrollments at the University of North Texas since 1982, and they report three distinctive enrollment cycles. However, the decline in enrollments over a five-year (2001-2006) time-frame was so severe that they classify it as a "recession" [p. 2289]. What caused the decline, and what can be done to entice students back to the field? A panel organized at the Americas Conference on Information Systems (AMCIS) 2007 generated discussion concerning both issues. In conjunction with the panel, there were several papers [Dick, et al. 2007; Koch and Kayworth 2007; Bullen 2007] presented at the conference that generated a great deal of discussion regarding enrollments and the types of skills that CIOs are looking for in IS graduates. In order to help other IS faculty understand and address this issue, this paper summarizes the panel dialogue. This paper is organized as follows: First there is a discussion of why IS enrollments are important; then there is a summary of comments by the panelists. Two major themes for increasing enrollments, marketing and curriculum, emerged from the interaction of the audience and the panel and there is a synopsis of this dialogue. Finally, there is a summation of the exchange of ideas.

II. IS ENROLLMENTS: AN IMPORTANT ISSUE

Why is the decline in IS enrollments an important issue? Industry is begging for more graduates with a business and technical background and is expecting an even greater shortage of individuals with these backgrounds in the next few years. In spite of often misleading reports from the popular press that all technical positions are being outsourced overseas, there is still a growing demand for people to fill those positions [Zwieg 2006; Bullen 2007]. However, due to the decline in enrollments, universities are not educating enough students to meet industry's need. IS departments throughout the world have been shrinking, and the demand for doctoral students has diminished. There are more graduating doctoral students than there are faculty positions. There are even anecdotal reports that faculty are being dismissed due to the lack of students needed to support IS class presentations. In Australia, at least, academic staff have suffered forced redundancies. When enrollments were extremely high, the programs and the faculty were valued, even if the concept of IS was not clearly understood. The decline in enrollments has caused other departments in the university and/or the business school to devalue the IS program, and thereby, the IS faculty.

III. PANEL ORGANIZATION AND COMMENTS

Based on response to a paper accepted at AMCIS 2007, Professors Granger, Dick and Van Slyke proposed a panel to generate discussion and sharing of solutions concerning declining enrollments. Professor Mary J. Granger, George Washington University, moderated the panel. The panelists were:

- Professor Geoff Dick - University of New South Wales, Sydney, Australia
- Professor Jerry Luftman – Stevens Institute of Technology, New Jersey
- Professor John Plotnicki - Colorado State University, Colorado
- Professor Craig Van Slyke University of Central Florida, Florida and (now) Saint Louis University, Missouri
- Professor Richard (Rick) Watson - University of Georgia. Georgia

Each panelist shared their ideas and experiences concerning declining enrollments and their initiatives to reverse the downward trend at their universities. Their introductory comments are summarized as follows.

Professor Geoff Dick believes that in Australia the employment prospects are not as gloomy as they were a year ago. The best students are receiving multiple employment offers again, with competitive salaries, and all the graduates are employed. The Australian government is involved in the effort to attract more IS students, creating brochures and websites with an overview of the image of IS careers as exciting, creative and fun. There is a poor image of IS careers by students, parents, and advisors, a theme that was reiterated throughout the panel discussion. In

order to dispel that unfavorable image, various bodies in Australia have employed members of the IS industry to speak with high school and college students. Some universities have focused on using their core undergraduate IS course to entice students into the field. Nevertheless, there appears no immediate end in sight to the falling enrollments, and there well may be a further problem – a shortage of graduates in the very near future if not already in the present.

Professor Jerry Luftman began by citing a *Fortune* article, "Turning our backs on tech," from July 16, 2007, published just three weeks before *AMCIS* 2007. The article confirms the poor image of IS careers: "Most people don't understand the reality of today's infotech work." [Colvin 2007, p. 68] It also confirms the shortage of qualified people needed to fill today's infotech positions. Professor Luftman referenced the Bullen [2007] panel on "Workforce Trends: Implications of Curriculum and Hiring," which addressed the changing nature of today's technology careers, involving more business process management, project management, communication and integration. He sees three opportunities to increase enrollments:

1. Change the image of IS careers – and use industry to help. SIM, IBM and Microsoft have programs targeted at creating a more positive image of IS positions and opportunities.

2. Change the IS curriculum – not minor changes, but totally revamp the offerings and eliminate the "old stuff."

3. Create a strong relationship with practitioners and actively engage an advisory board that will be active in changing the poor image and updating the curriculum.

Professor John Plotnicki reported on a student survey which asked why students did not select IS as a major. The main findings are:

1. There are no jobs.
2. Parents discourage majoring in IS.
3. The IS major is too difficult.

There is no computer requirement at the high school level in Colorado; therefore students do not have any exposure to the field before entering college: Many select their field of study before beginning study at a university, or select a university based on its reputation for a particular field. Since all IS students from Colorado State University obtain positions after graduation, Professor Plotnicki does not believe that curriculum modifications will increase enrollments; rather, the image of IS careers must be revised and improved.

Professor Rick Watson reported that with extensive marketing effort, the University of Georgia's IS enrollments in the first two core classes increased from a low of 27 in fall 2006 to a respectable 80 in fall 2007, a substantial increase. The MIS department targeted those students undecided about their major and concentrated on keeping the current students satisfied. There are enough students on campus without a strong attachment to a particular major to meet IS enrolment expansion goals. They just need to be made aware of IS as a career.

Professor Watson reported that current majors are a key conduit for reaching other students. They are told of the problem of high demand and low supply and asked to market the IS major to their friends. Thus, we need to ensure current students have an outstanding experience. Some of the efforts at the University of Georgia include:

1. Advertisements on campus buses with smiling IS students– paid for by PricewaterhouseCoopers

2. Articles in the student newspaper

3. T-shirts – 5 reasons to be an IS major

4. Orientation for IS majors – really make them feel smart and welcome. It helps to retain the uncertain.

5. Social events for IS majors, faculty, and recruiters to mix
6. Current IS majors recruiting other students into the field.
7. An international trip to China – studying IS in another culture – 12 students from the University of Georgia and 13 students from China were in a joint Globalization and IS class.

The marketing efforts appeal to both the rational and emotional personality. The rational side emphasizes starting salaries and job prospects. The emotional dimension is based on three words—launch, fly, and soar—to excite students about career prospects. The department spent about $5,000 on promotions, and it subsidized its budget with support from IS industry.

Professor Craig Van Slyke approached declining enrollments with strategies to increase the number of students in a class or "number of seats occupied." In many cases, administrators may be more concerned with the number of credit hours generated, rather than the number of majors in a field. In both cases, attracting more students into IS courses may be a winning strategy. Cooperating with other academic units, both inside and outside the business school, to create interdisciplinary clusters may result in "win-win" situations. IS programs may be able to enroll more students in existing courses. Students may be at a competitive advantage because of their increased knowledge of IT. Particularly in business schools, almost any student can benefit from additional IT knowledge. Regardless of their career choice, students will encounter IT; increasing their knowledge will have payoffs both in their initial job search and in their careers. Making this point is often an easy sell. Today's students are surrounded with IT, so it is easy to point out that IT will be a central element of their work lives. Many will see the value of additional education in IT.

Efforts aimed at increasing enrollment in IS classes through attracting non-IS students can be done either via advisors or through more formal cooperative programs. There are many academic areas that readily acknowledge that their students could benefit from additional IT-related knowledge. Some examples include:

1. Healthcare – The use of IT in healthcare administration is increasing rapidly. Tomorrow's healthcare professionals need a solid grounding in IS-related areas such as database and systems analysis.
2. Business domain-specific fields – Accounting information systems is a prime example, but other opportunities exist, such as human resource information systems.
3. Geographic information systems – Students studying GIS need a thorough understanding of database concepts.
4. Computer science – Even though computer science has suffered similar enrollment problems, there may be opportunities to cooperate with CS departments.

Professor Van Slyke urged creative thinking, posing the question: Where can IS enhance other courses throughout the university? An IS major and almost any other major is a good combination.

IV. DISCUSSION

There were more than 50 conference attendees at the panel session, and many excellent ideas were shared. Additionally, many issues were raised. The following sections attempt to organize the discussion into two major themes: marketing and curriculum.

MARKETING

Many reported that the IS field is considered "not cool," involves "too much math" and "is concentrated on programming." This thinking is borne out by the following quote from Colvin [2007], Senior editor-at-large with *Fortune*:

> *… the pop culture image of infotech workers flipped from dot-com billionaires in Gulfstreams to Dilbertesque drones writing code in cubicles and Third World masses working for pennies an hour.*

Changing this unfavorable image is a huge task. Additionally, there is a shortage of minorities and women enrolled in IS courses. George [2005] believes female/male ratios may be improved by having a female teach the core course. How can we change the image and attract unrepresented populations? The gradual exodus of women [Cone 2007] from the field since 2000 is a contributor to the big decline in enrollments.

Most marketing strategies target high school and incoming students and those still undecided about their major. Although increasing enrollments is the main target, we should not neglect current IS students. It is more difficult to attract new customers than retain old customers. If we are good to current students, they will become good publicity for the program.

Different universities have been successful with various approaches. One major premise was involvement of current undergraduate students. Current students could use their networking skills to reach out to potential IS majors. Koch and Kayworth [2007] conducted an IS Summit. The activities focused on IS students, faculty and industry. Microsoft, IBM, and SIM have marketing programs that can be brought onto campus or into high schools. They provided incentives, such as MS Office, for attendees. Of course, there was the ever-popular t-shirt give-away that advertises reasons to major in IS. SIM has local chapters and sponsors a national SIMposium, and students are encouraged to attend. ACM publishes a brochure addressing all computer-related fields, distinguishing between Computer Science and Information Systems. Other organizations, seeing the shortage of IS qualified graduates, are willing to help increase enrollments. They are able to provide internships and speaker series. Calling on local IS executives to explain the role of Information Systems is a popular route, but more recent graduates may be able to relate better to current students. Some IS departments sponsor summer computer camps for high school students, offering hands-on experience with some of the newest software. The University of Georgia created an ongoing media blitz. At another university, the football coach spoke about IS, and there was standing-room only attendance at the event. A third university held a competition at the end of the semester, first within sections and then inter-sectional, for best IT-related solutions to business processes. Efforts were targeted at getting current students involved in recruiting new students and providing more positive publicity. Becker [2006] proposed some "good old fashioned" marketing strategies" [p.2296]:

- Market to college non-majors
- Enhance sophomore/junior introductory level IS/IT classes
- Create poster boards
- Create college/department TV monitors
- Provide information about hot IT job opportunities

Creation of an on-campus student Information Systems organization and publication of its activities may also highlight the field. SIM and ACM have formulas for such activities, and they provide guidelines. Faculty and students may both join local chapters. As mentioned, in Australia the government is concerned about a possible upcoming shortage in the IS workforce. Local chambers of commerce in the United States are trying to keep and attract employers and employees in their areas. They may be able to help in the marketing effort. Universities have a vested interest in increasing enrollments, and the local chambers of commerce often have funds for marketing that could be targeted to promoting IS as a field and career.

Students are not the only population that needs to be sold on the IS field. It is essential that parents become convinced that their children will have jobs upon graduation and future careers. Today's parents are very involved in study and career selections, and they might be invited to IS seminars and information sessions. Certainly, in the late 1990s, parents were encouraging careers in IS, but currently, media coverage of a lack of jobs due to outsourcing are discouraging them. Academic advisors and guidance counselors at both high schools and universities should be brought into the promotional mix. They are consulted about majors and careers and are often not knowledgeable about IS. Some business schools have their own advising centers: take the advisors to lunch and let them know about the exciting possibilities in IS. We need to convince all the relevant decision-making and advising populations that IS has tremendous career possibilities. Additionally, faculty might assume some of the advising duties, as they know more about IS opportunities in the workplace than many counselors.

Marketing efforts at the University of Georgia and Baylor University [Koch and Kayworth 2007] attempted to create an IS environment on campus. At the University of Georgia, the number of majors has substantially risen, while at Baylor the effort was too recent to determine results. In both instances, they focused on more visibility for IS and changing the nerdy, un-cool image of the majors, field, and careers.

One of the difficulties with marketing efforts is that many of IS faculty have no experience or expertise in this area. In the past, we have never had to recruit: students flocked to the field. Seeking assistance from professionals is a reasonable avenue.

CURRICULUM

Curriculum change was strongly recommended by several of the panelists and many of the audience members. Recommended changes ranged from repackaging courses, updating course content, renaming courses, introducing more courses, becoming less technical and becoming more technical. The main goal of curriculum modification is to provide graduates with skills needed and demanded by the marketplace. Some believe that current curriculum efforts are not meeting the needs of industry. However, the curriculum should also be attractive to both majors and potential majors. Additionally, the curriculum must be distinctive and its goals and learning objectives clearly articulated.

Instances were cited where the materials and content of the course changed but the course description remained the same. Some potential quick curriculum modifications include:

- Encourage students to minor in IS – increasing the number of students per class – and they may even switch to an IS major or double major.
- Create joint programs with other areas in the university–health, engineering, graphics, international affairs, public policy.
- Offer certificate programs – designate a set of courses to create a value added on the resume. This option might not involve any new course development.
- Invite speakers from industry into the classroom. Students like more practical experience along with theory.
- Enable faculty to obtain hands-on experience – similar to student internships, create faculty internships, and allow them the time needed to partake in one.

An overhaul of the introductory, entry-level, core Information Systems course may increase interest in the field. Many believe that this course is an opportunity to attract students to the IS field [George 2005]. Not only should the content become more relevant, it should focus on why technology is important to a business organization. George [2005, p. 16] presents a summary table of IS concepts and learning objectives. Making it an exciting course, presenting IS opportunities within the business environment, may capture students' interest. Too often,

students memorize technical terms and do not acquire a true understanding of the IS field. They have lived with technology throughout their lives and use it as a tool, and they are not interested in how it works. The text-books adopted for the course foster this rote-learning. The panel audience was challenged to write a more relevant, attention-getting book for the course. At several universities, in the semester-long projects, student teams solve a real-life business "problem" using technology. Additionally, Looney and Akbulut [2007] propose that scheduling the most effective teachers for the introductory course may also help increase enrollments. The effective teachers increase the interest in the field with their knowledge and enthusiasm.

Bullen [2007], in an AMCIS 2007 panel, presented the results of a survey sponsored by the SIM International Advocacy Program. These skills are consistent with Professor Luftman's annual survey of IS executives taken in the summer of 2007 (Appendix). Industry values interpersonal, communications, integration, management and project management skills, and industrial expertise. However, technical skills are necessary for entry-level employees. This discussion pointed out the difference between graduate programs and undergraduate programs. What is appropriate for one set of students may not be suitable for another. Recommendations of a less technical curriculum, with concentration on business process management, project management, and enterprise resource management, may meet the needs of graduate students, but these suggested changes do not prepare undergraduate students for their first positions. Colvin [2007] stated in *Fortune* that today's infotech work is not coding and programming. In fact, programming is not in the top 15 skills industry is seeking in IS graduates.

Many members of the audience and panel advocated immediate change, while others favored gradual change. There was total agreement among all participants that industry should be involved in curriculum change. Local employers have a strong interest in the abilities of IS graduates, and they are often willing to assist the university today in order to get better candidates tomorrow. Some IS departments have a board of advisors that assist, in conjunction with faculty, in updating the IS curriculum. The board of advisors might consist of IS executives, recent graduates, and current students. As accreditation of IS programs becomes more ubiquitous, an organization similar to a board of advisors or a board of advisors will be required for the IS department.

Changing the curriculum is not an easy task. Often there are faculty members who do not want to change. Often there is no incentive from the university for faculty to change. Also, faculty may not have the qualifications or expertise to teach in a new curriculum. Currently there is another review of the undergraduate IS model curriculum underway. The graduate model curriculum was recently finished [2006]. While these models provide guidance in developing and modifying curriculum, they do not guarantee success in attracting students to IS.

V. SUMMARY

The panel discussed two major themes for increasing enrollments: marketing and curriculum. However, one issue the panel did not discuss is what is meant by enrollments. Different interpretations include:

- Graduate versus undergraduate enrollments
- Number of students declaring IS as a major.
- Number of bodies in seats – whether they are majors or not.
- Number of credit hours taken in IS courses

An interpretation of enrollments may influence strategies for increasing them, as mentioned in the non-technical versus technical emphasis for graduate versus undergraduate students. Some universities count the number of majors, while others count the number of students per section or students per seats.

There appear to be potential short term solutions and long term solutions. Some of the marketing suggestions may increase enrollments in the near future, but will continued marketing efforts be

required to sustain those numbers? Some curriculum modifications may have immediate impact, while others clearly will involve more time to implement and are potential long-term solutions. However demand for particular skills may change, and the curriculum will likely need to continue to change over time.

Changing the unfavorable image of Information Systems may be the most beneficial, but most difficult, goal to accomplish. No matter how much more visible IS becomes, or how the curriculum is modified, if students, parents, academic advisors and guidance counselors believe that there are no IS jobs, and that only nerdy “non-cool” geeks are involved, enrollments will not increase.

At some universities, there has been very little effort to raise enrollments. However, there is a slight increase in enrollments. This is not the exponential increase seen in the 1990s, but it does provide a glimmer of hope. What is causing this interest? How can we capitalize on it?

As mentioned, there appears to be a slight increase in enrollments. This paper presents some ideas and suggestions shared at an AMCIS 2007 panel. "We could sit back and let the IS/IT market rebound on its own, as we might legitimately expect or instead take a more active role in assisting the turnaround" [Becker et al, 2006, p. 2297].

The president of AIS, Dennis Galletta is taking an active role and, has formed a task force to deal with IS enrollments, and this task force has a three-pronged approach: students, industry, and other associated organizations. The task force has been asked to report to International Conference on Information Systems (ICIS) 2007. This initiative is a global task force addressing declining enrollments and President Galletta is seeking both ideas and participation.

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EDITOR’S NOTE: The following reference list contains the address of World Wide Web pages. Readers, who have the ability to access the Web directly from their computer or are reading the paper on the Web, can gain direct access to these references. Readers are warned, however, that:

1. These links existed as of the date of publication but are not guaranteed to be working thereafter.

2. The contents of Web pages may change over time. Where version information is provided in the References, different versions may not contain the information or the conclusions referenced.

3. The authors of the Web pages, not CAIS, are responsible for the accuracy of their content.

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APPENDIX: SIM (SOCIETY FOR INFORMATION MANAGEMENT) SURVEY OF IS EXECUTIVES

CONDUCTED BY JERRY LUFTMAN, SUMMER 2007

2007 TOP "3" IT MANAGEMENT CONCERNS

1. Attracting, Developing, and Retaining IT Professionals
2. IT and Business Alignment
3. Build Business Skills in IT

SKILLS FOR ENTRY LEVEL EMPLOYMENT EMPLOYEES 2007

1. Problem Solving
2. Ethics and Tolerance
3. Communication (Oral & Written)
4. Collaboration; Teams
5. Business Analysis
6. Functional Area Knowledge

TOP 14 SKILLS FOR MID-LEVEL HIRES 2007

1. Ethics & Tolerance
2. Problem Solving
3. Communication(Oral & Written)
4. Collaboration; Teams

5. Project Leadership
6. Decision Making
7. Managing Expectations
8. Business Growth
9. Business Analysis
10. Project Plan/Budget/Schedule
11. User Relationship Management
12. Project Integration/Program Management
13. Systems Analysis
14. Functional Area knowledge

ABOUT THE AUTHORS

Mary J. Granger is a professor in Information Systems and Technology Management at George Washington University, Washington DC. She serves on the board of directors of the International Academy for Information Management (IAIM) and is currently editor of the *Journal of Informatics Education Research (JIER*). Some of her articles appeared in *Computers and Education*, *Journal of Information Systems Education*, *Science and Engineering Ethics* and the *Journal of Computers in Mathematics and Science Teaching*. She was a Fulbright Scholar at the Warsaw School of Economics, and a Fulbright Senior Specialist at the Institute of Finance and Economics, Ulaanbaatar, Mongolia. Some of her research interests include: Information Systems curriculum development and design, system analysis and design, human-computer interaction, and ethical issues in the computing environment.

Geoffrey N. Dick is a senior lecturer in Information Systems and director of the undergraduate programs for the Australian School of Business at the University of New South Wales. He is currently on the AIS President's working party looking at enrollment numbers. He is a reviewer on the global textbooks project, a director of the International Telework Academy and a member of the board of editors for the *Journal of Information and Management*. His research (around 50 publications) is mainly in the areas of telecommuting (his PhD) and online education – he is the recipient of an ICIS prize for a best paper in education.. He is a visiting professor at Georgia Southern and recently has been a visiting fellow at the University of Malaya, the Tec de Monterrey in Mexico and Agder University College, Norway.

Jerry Luftman is the associate dean of Graduate Information Systems Programs, and Distinguished Professor at Stevens Institute of Technology, Hoboken New Jersey. His career includes strategic positions in management (Information Technology, including being a CIO, and consultant), management consulting, Information Systems, and executive education. After a notable 22-year career with IBM, and more than 15 years at Stevens, Dr. Luftman's experience combines the strengths of practitioner, consultant, and academic. His framework for assessing IT-business alignment maturity is considered key in helping companies around the world understand, define, and scope an appropriate strategic planning direction that leverages Information Technology. Dr. Luftman is the founder and leader of Stevens graduate IS Programs; one of the largest in the world. His active membership in SIM includes being the VP of Academic Affairs for the SIM Executive Board.

Richard Watson is the J. Rex Fuqua Distinguished Chair for Internet Strategy and Director of the Center for Information Systems Leadership in the Terry College of Business at the University of Georgia. He has published more than 100 journal articles, written books on electronic commerce and data management, and given invited presentations in more than 20 countries. His most recent research focuses on the business of open source and the role of IS in creating ecologically sustainable practices. He is a consulting editor for John Wiley & Sons, a former President of the

Association for Information Systems, a visiting professor at the University of Agder in Norway, and co-leads the Global Text Project.

Craig Van Slyke is an associate professor and chair of the Decision Science/Information Technology Management department at Saint Louis University. He holds a Ph.D. in Information Systems from the University of South Florida. His current research interests focus on the adoption of information technologies. Dr. Van Slyke has published in a number of journals including *Communications of the ACM, Journal of the AIS, Communications of the AIS, Decision Sciences, and Database for Advances in Information Systems,* among other journals. He serves on the editorial board of *Information Resource Management Journal*, and the *Journal of Information Systems Education.*

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