In this issue:

Supply of Computer Graduates is Not Binary!

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Abstract: Over the last ten years the demand for computer and information technology graduates has gone from a steady increase to a huge increase in demand to virtually no demand. Currently we are seeing a return to a steady increase in demand. The question is with offshoring and industry pressure for increases in temporary visas for technology professionals how long the demand will last. The decision on what to select for a major in college is long-term. Students select their major during high school or during the first few years of college. The completion of the major takes several years with an expectation of a job at the end of the academic pipeline. From 2001 until almost 2004 the passage from the academic pipeline to entry-level career was turned off or at least on low-flow. A large number of students, who graduated during that time period, did not receive job offers in the computer field. In the author's opinion, this lack of job offers in the computer and information technology field has led to the shortage of incoming students desiring to major in the field. Improving our recruiting efforts to bring in new majors is a good start, but we also need industry to realize that completely turning off the entry-level job spigot will lead to even fewer majors in the future.

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EDSIG activities include the publication of ISEDJ and JISAR, the organization and execution of the annual ISECON and CONISAR conferences held each fall, the publication of the Journal of Information Systems Education (JISE), and the designation and honoring of an IS Educator of the Year. • The Foundation for Information Technology Education has been the key sponsor of ISECON over the years. • The Association for Information Technology Professionals (AITP) provides the corporate umbrella under which EDSIG operates.

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Abstract

Over the last ten years the demand for computer and information technology graduates has gone from a steady increase to a huge increase in demand to virtually no demand. Currently we are seeing a return to a steady increase in demand. The question is with off shoring and industry pressure for increases in temporary visas for technology professionals how long the demand will last. The decision on what to select for a major in college is long-term. Students select their major during high school or during the first few years of college. The completion of the major takes several years with an expectation of a job at the end of the academic pipeline. From 2001 until almost 2004 the passage from the academic pipeline to entry-level career was turned off or at least on low-flow. A large number of students, who graduated during that time period, did not receive job offers in the computer field. In the author's opinion, this lack of job offers in the computer and information technology field has led to the shortage of incoming students desiring to major in the field. Improving our recruiting efforts to bring in new majors is a good start, but we also need industry to realize that completely turning off the entry-level job spigot will lead to even fewer majors in the future.

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1. INTRODUCTION

Headlines like the following do not encourage high school seniors and incoming college freshman to major in computer and information technology related fields:

> *"Cognizant, AOL, Perot Beef Up India Presence As Offshore Growth Continues"* McDougall (2003).

In 2002, Forrester Research predicted that 3.3 million services jobs will be offshored by 2015, lead by jobs in information technology (Lohr, 2003).

> *"Growth of IT Outsourcing: No End in Sight" (Computer, 2006).*

> *"Outsourcing Is Climbing Skills Ladder" (Lohr, 2006)*

> *"It's an Outsource World" (Gongloff, 2003).*

> *"Tech companies blast 2008 H-1B visa cap" (2007).*

Information sciences and systems ranked second and management information systems ranked fourth in demand by employers as reported by the National Association of Colleges and Employers (NACE) in their J*ob Outlook 2001*(O'Malley, 2001). Shortly after this the rates of unemployment in IT exceeded the general workforce, which had not happened in over a decade, following the start of the recession compounded by the dot-com crash (Goodridge, 2002). The decline in demand continued in 2003 with the NACE survey reporting that information sciences and systems graduates who were lucky enough to receive a job offer receiving a salary offer that was 3.9% lower than the prior year and management information systems (MIS) graduates saw salary offer decreases of 5 percent (CollegeRecruiter.com, 2003).

Finally in late 2004 information sciences and systems majors again made the list of top ten degrees in demand in NACE's *Job Outlook 2005* survey (NACEWeb, 2004). The

latest NACE surveys show management information systems/business data processing (I thought that name went away 20 years ago) graduates are seeing increased salary offers of 4.9% over last year (NACEWeb, 2007). So it would appear that the rollercoaster has come out of the trough, and that we are climbing the next hill of increased demand of computer majors. It also appears that the height of the next hill in increased demand will be dampened by increases in offshoring.

"High-speed Internet connections in the last few years has meant that Indian programmers are a mouse-click away from American corporations that are eager to cut their software development costs." (Lohr, 2003). Economist, Alan Blinder from Princeton University has forecasted that "29 percent of all jobs in the U.S. work force will be potentially 'offshoreable' in the next two decades" (McBride & Sasso, 2007). Blinder's prediction does not just include low-end jobs but also includes "jobs such as financial analysts, computer systems analysts and accountants."

We are told by economic experts that offshoring benefits the overall American economy with overall cost savings. However, "A study by the Institute for International Economics, examining manufacturing jobs losses from 1979 to 1999, found that a fourth of factory workers who were reemployed took pay cuts of 25 percent or more." (Lohr, 2003). Twenty-five percent is a lot of purchasing power lost by the American worker.

2. IMPACT ON SELECTION OF A MAJOR

Students with the advice of their parents are not going to select a major in technology until they see a "real" decline in offshoring of these jobs and a continuous demand for entry level jobs in information technology. Students know of a friend or family member who was majoring in computer or information technology before the decline and then graduated without receiving a single job offer. Perelman (2007) reports that even IT professionals are hesitant to recommend the IT profession to their children. It is not difficult to understand why universities now report that majors in computer related degrees are "one third of what it was at the start of the decade," (Tucci, 2007) with parents and IT professionals hesitant to recommend a career in the IT profession. Tucci (2007) also reports that the Bureau of Labor shows that the percent of incoming freshmen planning on a computer science or related IS degree has dropped from 3.7% of incoming freshman in 2001 to 1.1% currently.

Students pick a major as a freshman for a career in four or five years. Students do not want to invest four to five years of their life in a career without a steady employment record. Students like most other adults are risk adverse. The drought in recruiting and hiring of computer majors by the IT industry has caused students to select majors that would appear to have a more steady demand for college graduates.

We can examine the students' behavior from an investment payout view. Students are investing four to five years of their life in preparation for a career. Will the student select a career with a large payout (starting salary) and a high risk of a job offer being available or a smaller payout (lower starting salary) and lower risk with a steady demand for entry level jobs.

Evaluating the decline in incoming computer majors using this approach we find that students are acting in a very rational manner. They are avoiding the higher risk job opportunities in computer related jobs and seeking those majors with a greater likelihood of having open entry level positions when they complete their degree.

Hiring and recruiting practices during 2001 to 2004 did not encourage incoming college freshmen to select a computer related degree as their major. Organizations that had hired computer related majors during the 1990s either failed to attend career and job fairs on campus or if they attended it was for informational purposes only and no job offers were made. How can industry expect a ready supply of entry level computer majors when they turn the job spigot on and off in this binary fashion? In the author's opinion, the on/off recruiting of computer majors by IT industry will continue the decline in computer majors.

Students either select a major when they enter college or during the first couple of years. They then spend the next few years

completing the requirements of the major. When they are ready to graduate they expect to receive a job related to their course of study. The creation of college graduates is a continuous flow type model. If the flow is stopped at the end of the program the upstream flow will go somewhere else just like potential computer majors did from 2001 to the present. Students are not going to continue in a demanding major in a computer related field to jump into a reservoir of available talent to wait for industry to decide that they need computer majors immediately.

If industry wants to have a supply of computer related majors it must change from a binary approach to hiring to a continuous flow model. If they want students in the United States to continue majoring in computer related fields they will have to offer at least a minimum level of hiring even during poor economic times or the supply will dry up as it has done.

3. OFFSHORING IMPACT ON AVAILABILITY OF ENTRY-LEVEL JOBS

Grant and Babin (2006) make the connection that offshoring of traditional entry-level jobs (application development, coding, maintenance, help desk) is reducing the job prospects for graduating computer related majors. If you cannot get a foot in the door it is extremely difficult to gain the experience. Grant and Babin (2006) conclude that the reduction in entry-level jobs makes it more important for students to have co-op and internship experiences as part of the curriculum requirements. With internships students are able to gain real-world experience and organizations pay significantly less while the student is gaining this experience.

4. TEMPORARY VISA PROGRAMS (H-1B)

H-1B requests by industry also provide a disincentive for becoming a CIS major. In 2005 the capacity was met before the end of the year (Grant & Babin, 2006) and this year the limit of 85,000 visas was reached in one day (Tech, 2007) (Broache, 2007) (Mark, 2007a) (Thibodeau, 2007). Microsoft and other members of the Compete America coa-

lition are seeking increases in the program claiming a shortage in the skills needed (Broache, 2007) (Thibodeau, 2007). Organizations can make the statement about shortages in the necessary skills and apply for the visas and do not have to prove a shortage until the H-1B visas exceed 15% of their workforces (Broache, 2007). One of the possible reasons for industry liking this source of IT workers is that hiring can be turned on and off as needed with little recourse. Opponents of the H-1B program and any increases claim that the program suppresses wages in the industry and discourages people from majoring in tech careers (Tech, 2007). U.S. Senator Bernie Sanders (I-Vt.) has made a statement on the U.S. Senate floor that "H1-B visas are being used to replace American workers with lower-cost foreign workers" (Mark, 2007b).

One of several bills in front of congress to modify the H-1B program by Sens. Durbin and Grassley would require companies to advertise job openings prior to submitting H-1B applications for those jobs, prevent the outsourcing of H-1B visa holders, and to pay prevailing wages (Thibodeau, 2007). Other bills seek to increase the quota from the current 85,000 per year to 180,000 (Mark, 2007a).

5. IT MARKET GROWTH

Demand for IT workers, according to government and industry sources, is expected to experience steady growth for the next decade (Grant & Babin 2006). Jefferson (2006) reports on a study by the National Association of Colleges and Employers (NACE) that finally showed 2004 information sciences and systems graduates receiving salary offers greater than 8.2 percent from the prior year. This was welcome news since this group has been depressed in terms of job offers and salaries since 2000 (Jefferson, 2006).

6. RECRUITING OPPORTUNITIES

A way to improve the supply of computer and information technology majors is to increase our efforts at recruiting majors. Tucci (2007) reports on the Teen Tech Week program in Memphis, Tennessee, co-sponsored by the Society for Information Management (SIM). The program provides "a weeklong summer IT camp for kids ages 12 to 15."

The Association for Computing Machinery (ACM) along with the Association or Information Systems and IEEE Computer Society created a web site on computing degrees and careers (ACM, 2007). The site is aimed at high school students and counselors. Students can find out about the different majors in computers and computer related careers outside of computer hardware and software. Colleges and universities are encouraged to refer potential majors to the site and to refer to the information from the site in their own recruiting efforts.

7. CONCLUSION

The job market for graduates of computer and information technology majors has experienced significant changes during the first few years of this century. Both the definition of jobs available in the U.S. and the number of jobs in computer related careers have changed. Colleges and universities have been working on curriculum changes (White & Tastle, 2006) to address offshoring and increasing recruiting efforts of high school seniors. But all the efforts at curriculum changes and recruiting of incoming majors could prove to be fruitless if industry once again fails to show up on college campuses to recruit our majors for entry-level jobs. McGillicuddy (2007) reports that CIOs may have gotten the message as one deputy CIO states that "as IT leaders, we can't ever take our eyes off the ball [around] recruitment or retention, even during the softer times."

The author has started a discussion on industry recruiting efforts with the recruiters, who are now coming to campus, and with our computer information systems advisory board. The members, who are CIOs and directors of information systems, recognize that past recruiting efforts had an impact on the current supply of computer related majors. However, during downturns in the economy the implementation of a hiring freeze is usually directed from above their level.

I believe that all computer educators need to be proactive on recruiting and hiring practices of industry. If we say nothing to industry then nothing will change. If we make the issue known we can at least start a dialog that might have a positive impact.

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