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In this issue:

Coping with Offshore Outsourcing and Enhancing Student Retention

Rathika Rajaravivarma
Central Connecticut State University
New Britain, CT 06050 USA

Ken Surendran
Southeast Missouri State University
Cape Girardeau, MO 63701-4799 USA

Abstract: The present enrollment reduction in CS, CIS and MIS programs may not be due to just a dip in the business cycle. Apart from the lack of recovery from the internet investment bubble-burst, the continued migration of entry-level system development jobs due to offshore outsourcing, could be a contributor to this reduction in enrollment. In addition to reduced enrollment, student retention in these programs seems to be another issue that needs to be examined. However, at the same time, there appears to be a steady demand for higher-level IT professionals and IT literate professionals in other disciplines. Since the CS, CIS, and MIS graduates are developed, from employment point of view, to assume entry-level jobs in the IT field, there seems to be a mismatch between the skills industries require and the skills with which these programs prepare the students. In this paper, the authors have compiled a few strategies academia could consider for addressing these issues. Some of these strategies are based on deliberations that took place during a special session at a professional conference. Also, the paper has suggestions for preparing graduates with skills closer to the market demands.

Keywords: offshore outsourcing, outsourcing, enrollment, retention, CS curricula, IS curricula

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Coping with Offshore Outsourcing and Enhancing Student Retention

Rathika Rajaravivarma
RajaravivarmaR@mail.ccsu.edu
Dept. of Computer Science
Central Connecticut State University
New Britain, Connecticut 06050 USA

Ken Surendran
ksurendran@semo.edu
Computer Science Department
Southeast Missouri State University
Cape Girardeau, Missouri 63701-4799 USA

ABSTRACT

The present enrollment reduction in CS, CIS and MIS programs may not be due to just a dip in the business cycle. Apart from the lack of recovery from the internet investment bubble-burst, the continued migration of entry-level system development jobs due to offshore outsourcing, could be a contributor to this reduction in enrollment. In addition to reduced enrollment, student retention in these programs seems to be another issue that needs to be examined. However, at the same time, there appears to be a steady demand for higher-level IT professionals and IT literate professionals in other disciplines. Since the CS, CIS, and MIS graduates are developed, from employment point of view, to assume entry-level jobs in the IT field, there seems to be a mismatch between the skills industries require and the skills with which these programs prepare the students. In this paper, the authors have compiled a few strategies academia could consider for addressing these issues. Some of these strategies are based on deliberations that took place during a special session at a professional conference. Also, the paper has suggestions for preparing graduates with skills closer to the market demands.

Keywords: offshore outsourcing, enrollment, retention, CS and IS curricula.

1. INTRODUCTION

In the past, enrollment in CS/IS programs have followed the business cycle. However, the current dip in enrollment may be longer lasting in view of the continued migration of *entry-technology* jobs (McDougall, 2005) due to offshore software development outsourcing. About two-thirds of the respondents in a recent survey of 12,158 IT professionals did not consider IT a promising career (Chabrow, 2005). This uncertainty is reflected in freshmen enrollment. The percentage of incoming undergraduates opting for the CS major declined by over 60 percent between 2000 and 2004 and is now 70 percent lower than its peak in the early 1980s (Vegso, 2005). If the situations in the authors' institutions are any indications, the trend in MIS may be worse. A recent study (Hira & Hira, 2005) observes a similar trend: *Enrollments in CS are down by 20% nationwide, while enrollments in MIS departments within business schools are down even more*.

Offshore outsourcing has been discussed, of late, in quite a few academic forums (Lopez, 2004; Ferguson et al, 2004, 2005) and in literature (Niederman, 2004). Lopez emphasizes the difference between general outsourcing and offshore outsourcing and

the value of using *career fields* as a component in the curriculum. He also identifies types of jobs that would remain onshore. Niederman (2004) presents short term global IT employment scenarios, points out the possible human resource shortages when the economic cycle turns around resulting in strong growth in the IT sector, indicates the need to commit disproportionate investments in science and technology (even though it could be risky) for remaining competitive in the world IT market, and reemphasizes the fact that IT jobs, too, are not immune from marketplace risks. The panels at the SIGCSE Symposia (Ferguson et al, 2004, 2005) examine the broader issues of offshore outsourcing and its impact on CS/IS curricula. They point out several misconceptions surrounding offshore outsourcing and provide quite a few pointers for preparing the undergraduates for the current job market. Some of their suggestions are included in section 3. Two other viewpoints in *ACM Communications* (Mann, 2004; Matloff, 2004) discuss the onshore IT job market in light of offshore outsourcing. Matloff is emphatic about the permanent loss of onshore programming jobs and suggests that *a CS student's mindset should shift from programming to understanding computer systems*. Mann, on the other hand, sees an increased IT employment diffused in some non-tech sectors.

In order to find out the academic issues resulting from offshore outsourcing and to derive some strategies for addressing those issues, one of the authors co-led a birds-of-a-feather session at the 2005 SIGCSE. About 30 conference participants took part in this session. This paper, in part, is based on their input.

In addition to reduced enrollment, retention also seems to be a problem in the lower level CS/IS courses. Research on retention and recruitment seems to focus on women, an underrepresented group of students, even though it is a general problem. According to the American Association of University Women, *the number of women graduating in computer sciences and information technology is decreasing…. and we must find ways to recruit and retain all types of students in math, science, and technology* (Brown, 2000). Brooks et al (Brooks et al, 2004) discuss a diverse perspective of four different scenarios for improving retention and student success through curriculum reform, technology integration, and improved instructional pedagogy. This factor is also emphasized by Roberts (2000) in the perspective of engineering disciplines, a field that faces problems similar to the computer and information sciences. A few strategies for retaining students in the CS/IS programs are discussed in this paper.

In the next section, the authors list some of the academic issues surrounding offshore outsourcing. They discuss a few strategies for addressing these issues in section 3. In section 4, the authors offer a few suggestions for improving student retention in the lower-level computing courses.

2. OFFSHORE OUTSOURCING-RELATED ACADEMIC ISSUES

Academia is faced with two issues arising out of offshore outsourcing: (i) reduced enrollment due to loss of entry-level system development and support jobs (which are usually taken up by CS/MIS graduates) and (ii) preparing graduates for jobs that are in demand with appropriate skills (which the current programs are not designed to fully address). McCracken sums this up (Ferguson, et al, 2004) in the following way: *The need for the kind of graduates we have been producing is evaporating. Those jobs are not coming back. We must find some way to educate people to do the parts of the job that cannot be exported*. Some of the retained jobs require higher level skills.

A possible consequential issue resulting from reduced student enrollment in majors is the reduction in faculty numbers. Reduced faculty numbers, in turn, can constrain the offering of optional and new courses and increase the number of course preparations for the remaining faculty. In the following section, suggestions and strategies for addressing the identified issues are provided.

Yet another related issue is the possible reduction in the number of internationals in onshore graduate programs. This results from the offshore undergraduates being able to secure jobs in view of market expansion in their countries. With fewer onshore undergraduates seeking graduate education, research could suffer in the long term.

A special session at the 2005 SIGCSE was arranged for interested academics to discuss

such issues informally. Its stated purpose read as:

- *To identify academic issues resulting from offshore outsourcing.*
- *To identify curriculum-related strategies for*
  - *coping with reduced enrollments in CS programs,*
  - *preparing the graduates adequately for higher-level jobs without the usual on-the-job training in entry-level positions (since they are not there), and*
  - *addressing other identified issues*

3. STRATEGIES FOR FACING THE REALITIES OF OFFSHORE OUTSOURCING

At the SIGCSE special session, several strategies were suggested for coping with the current situation. Quite a few of the strategies addressed overlap with those reported in the literature and academic forums.

3.1 Coping with reduced enrollment

Most universities have student recruitment committees that promote CS/IS education in schools through career seminars and programming contests. In addition, CS/IS appreciation programs could be offered to high school teachers. When the teachers recognize the background required for the various computer related majors, they could motivate more high-school students to consider CS/IS majors.

CS and MIS departments could offer service courses for increasing the effective fulltime student numbers and thus, to avoid faculty number reductions. Since the value of IT lies in its application, custom-made computer related courses could be offered for majors. Many degree programs require university studies type (liberal arts) courses for graduation. CS and IS departments could design and offer courses like *Information Society* that meet the general university study objectives.

Since the actual percentage (not the overall number) of jobs being lost due to offshore outsourcing is small, the possibility of revival in demand cannot be ignored. Reducing the faculty size due to such cyclical enrollment dips may be detrimental in the long run. Alternatively, when enrollments are low, faculty members could be encouraged to consider industrial sabbaticals. Such a proactive approach could help strengthen ties with industries and help build internship / career opportunities for the students.

Reduced class size could also be an issue in some courses. Cross-listing courses, where possible, from different programs (for instance, systems analysis and design offered in MIS and CS programs) could not only yield a meaningful class size, but also help in simulating real-life situations by letting students work in teams with mixed majors (Surendran, et al, 2005).

3.2 Adjusting programs to market situations

When a skill becomes globally ubiquitous, cost becomes a significant issue in determining from where that skill should be sourced (BCS, 2004). The 70s saw the offshore migration of manufacturing jobs due to significant cost differentials; system development jobs are now experiencing the same phenomenon. In the software development life cycle, analysis, design (in particular, user interface design), and acceptance testing activities require a recurrent working relationship with the customer; however, coding and maintenance may not be subject to such proximity constraints. Thus, for the most part, coding and support related jobs have been largely outsourced offshore.

In the IT sector, demand for customization, infrastructure maintenance, and project management is growing. Some of these jobs require excellent oral and written communication skills, interpersonal skills, broad knowledge in business operations, and knowledge of system-wide concepts.

Mann (2004) observes that, in comparison to many other sectors, health and education sectors as well as many small and medium size enterprises (SMEs) are not using IT intensively. As a result, demand for people with skills in developing applications for SMEs and in using domain-specific applications in such lagging sectors can be anticipated in the near future, especially as software costs decrease due to lower labor costs. In addition, it is difficult to offshore outsource the development of security-sensitive and strategic systems.

A few strategies are discussed that may help graduates avail themselves of these anticipated opportunities. These strategies include designing flexible curricula within the accreditation framework, broadening skill sets, and involvement in open source development.

3.2.1 Flexible CIS program:

The following quote regarding the need to broaden CS/IS programs was included in a report published by the British Computing Society on offshore outsourcing: *A narrow focus on technical skills and their application will not enhance career prospects for tomorrow's professionals* (BCS, 2004). The report provides an example wherein a SQL developer with pharmaceutical expertise, after losing his job due to offshore outsourcing, takes on a new role with a company supplying hospital technology because of his domain knowledge.

In one of the authors' department, the requirements for the CIS (undergraduate) program were revised recently. In this, the students majoring in CIS are required to take a minor outside the department as part of the degree requirements. In this program, students take 53 credit hours of core CS and IS courses, 8 credit hours of mathematics, 45 hours of general education requirements, and select either a minor (18 hours) or another major (optional, requiring additional credit hours over and above the 124 needed for CIS) (Duben, et al, 2004). In such programs, students are able to choose an area of interest for applying their IT skills which may enhance their scope for future employment.

3.2.2 Minor in CS/IS

In addition to such flexible CS/IS curricula, the departments could promote minors in CS/IS to adequately prepare students for taking up jobs in their own disciplines that require some IT skills. Such initiatives could help regain faculty workload lost due to reduced enrollment.

3.2.3 Broadening skill-sets

Most studies dealing with skill sets stress the need for students acquiring soft skills and knowledge in business areas. In this regard, MIS students have an edge over others since their programs include a few business courses. However, acquiring soft skills remains somewhat elusive. Making the students work in teams on system development or database projects helps the students, to some extent, hone their soft skills. The students are able to assume different roles and responsibilities in such assignments. In these roles, students are able to recognize deficiencies in their soft skills and learn from their mistakes. Further, in these group projects, the instructor usually lets the team leader manage the project and provides the necessary guidance and coaching for resolving conflicts and handling delegation. Thus, such assignments help students develop oral and written communication skills as well as provide opportunities for students to gain skills in leadership, project management and conflict resolution.

3.2.4 Internships and Apprenticeships

Simulated real-world experiences such as those described in the above cannot match the benefits available to students through internships and apprenticeships (Surendran, et al, 2002). During internships and apprenticeships, students are guided by mentors, interact with people in different disciplines, and obtain a broader exposure to business. The different roles they play during an apprenticeship program helps them hone both their technical and soft skills. An instructor-coordinated internship program allows for selective training in deficient areas. These days, some of the offshore companies (which are leading beneficiaries of offshore outsourcing) offer internships to students. For instance, Infosys has an InStep program (Infosys, 2004) in which some 70 university students from all over the world are presently interning. At present, apprenticeship programs in CS/IS are rare. Software Engineering programs may have a built-in year-long industrial apprenticeship requirement. In such programs, the students have industrial mentors to monitor progress and guide them in their professional development.

3.2.5 Involvement in open source software development

In order to perform well in higher-level jobs, the graduates need some experience in entry-level jobs. Even if the students acquire the skill sets needed in higher level jobs through revised programs, they would still lack the entry-level experience (since these jobs are no longer available). To make up for this deficiency, the students could be

encouraged to work on open source software projects where they are able to learn by interacting with other professional programmers. Going through programs written by professionals is a valuable learning activity.

4. STRATEGIES FOR ENHANCING RETENTION

CS/IS programs are at risk due to lower student enrollment and student migration to other programs. Many students of the video-game-generation enroll in CS with a lot of enthusiasm but soon drop out of the program. Even though attrition can happen at any stage of the program, it often occurs in the early stages of the program rather than the latter stages (Flores, 2000). In addition, many of studies have considered retaining women since women have been significantly underrepresented in the science related programs. A few strategies for retention are summarized below.

4.1 Changes in the curriculum

Any computer based curriculum is subject to changes and expansion as the underlying technologies change. The CS/IS program is obligated to retain the core content while accommodating the technology needs of the present and the future. Options in programs are introduced when applications in new areas emerge. In order to enhance marketability, the provision of either adaptive programs or totally flexible programs (as suggested in 3.2.1) is crucial to retain students.

Studies (Delvin, 2001; Gilmer, 2002) have indicated that stronger math and problem solving abilities provide the tenacity to sustain the challenges in the introductory courses. When students lack such skills, bridging courses and additional support help improve retention (Gilmer, 2002).

4.2. Changes in the learning environment

In order to keep CS/IS attractive to students, new learning environments suitable for active learning must be adopted. The traditional lecture approach is no longer enchanting and students, especially from the introductory courses, tend to drop out much faster. For instance, game based programming courses using color and video could keep the students focused and help them learn the essential programming and problem solving concepts.

Another factor that influences students' involvement in a field is through appropriate pedagogical approaches employed in the classroom. Different approaches that keep a student engaged while preparing them for real-world experiences are discussed in Surendran, et al (2005). In this paper, the authors also indicate that the project-based learning approach of working in teams proves to provide an effective learning environment.

4.3. Enhanced Educational Experience

Guest lectures and workshops organized by CS/MIS clubs and professional societies are commonly used strategies to extend the educational experience.

4.3.1. Guest lectures and field trips

The course contents make more sense when the context in which the concepts are applied is explained. Exposure to current research and technology through seminars and workshops can be used for this purpose. Lectures by alumni and potential employers can help reinforce the importance of the course contents in the program. Also, acquaintance with researchers and experts in the field stimulates a positive educational experience. In many instances, the students are motivated to explore research and work towards graduate degrees (Cohoon, 2002).

4.3.2. Undergraduate research and project opportunities

Undergraduate research helps define personal and professional goals and increases the probability of success (Flores, 2000). Projects (research or system development) from clubs and professional societies provide opportunities to work with like-minded students and gain greater confidence. The students explore, experiment, and enhance their knowledge by applying their skills to the projects they undertake.

4.3.3. Collaboration with industries and local communities

Involvement with industries and local communities to develop in-house products and applications is a great way to apply skills learned in the classroom to the real business environment. Many universities offer co-op program as a means of bridging the gap be-

tween the university and industry. These experiences expose students to a practical working environment and let them deal with day-to-day problems faced in the work place. These job-related experiences generate confidence in the students and provide context and meaning for the subject matter discussed in the classroom.

Also, by involving themselves in community projects and projects within the university, students help themselves by helping others. In one of the authors' university, the computer club serves as a conduit for channeling application development projects from the community to the students.

4.4. Student learning communities

A study performed at Trinity College, Dublin, concluded that *many students give up and turn away from science due to the failure of introductory courses to motivate students* (Stamouli, 2004). Creating a peer support group for tutoring students who need extra help can improve retention. Flores (2000) and Stamouli (2004) show that providing *non-judgmental service* support to students, especially in programming courses, helps overcome attrition. The support network is also a means, suggested by Cohoon (2002) that has proven effective for the retention of under-represented groups in science related disciplines.

4.5. Support from faculty

Advising is the starting point for one-on-one student-faculty interaction. The advisors can guide and provide direction to students in their curriculum and career planning. Timely guidance and mentoring by instructors help in retention. This act from the faculty is a source of strength to the students and improves their confidence. Flores (2000) indicates that student-faculty interactions, both in a formal and informal manner, have been shown to directly impact student retention.

5. CONCLUSION

The impact of offshore outsourcing is yet to be fully investigated (Hira & Hira, 2005). Based on past trends in hardware related offshore outsourcing, Mann (2003) predicts that investment in IT will revive due to reduction in software cost (realized through offshore outsourcing) making the technology even more affordable to many. In any event, the lost programming jobs are not going to comeback. Hence the focus for the CS/IS majors needs to shift to activities requiring customer proximity (such as specialization, user interface design, customization, project management, and system integration). Flexible CS/IS curricula (including minors), course content that reflects current technologies, and greater levels of industry interaction could help minimize the impact of offshore outsourcing.

At the university of one of the authors, the importance of helping the students plan their future careers (Lopez, 2004) has been built into the curriculum. According to this university-wide initiative, the students will be carrying out various career planning activities in four stages (one per year) leading up to resume preparation and interview preparation. Such initiatives are aimed at increasing retention.

Coping with reduced enrollments and improving retention are on-going issues. However, the offshore outsourcing may not stop at entry-level jobs as companies start farming out R&D to cut costs and get new products to market faster (Engardio, et al, 2005). Such trends could impact graduate school enrollments as well and force universities to come up with very innovative and, perhaps, unconventional solutions.

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REFERENCES

British Computer Society. (2004). Offshoring: Challenge or opportunity for British IT professionals? (Publication by The British Computer Society Working Party on Offshoring, Chapter 5).

Brooks, S., Brown, S. W., Mack, P., Moya, J., & Oakes, W. (2004, October). Panel – HP funded engineering retention initiative: Methodologies and finding of four diverse universities / colleges. Proceedings of the 34th ASEE/IEEE Frontiers in Education Conference, Savannah, GA.

Brown, Bettina L. (2001). Women and minorities in high tech careers," ERIC Digest No. 226.

Chabrow, E. (2005). Satisfied but uncertain. InformationWeek, Retrieved September 6, 2005, from http://www.informationweek .com/story/showArticle.jhtml?articleID= 161501030&tid=16008

Cohoon, J. M. (2002). Recruiting and retaining women in undergraduate computing majors. *SIGCSE Bulletin*, *34*(2).

Devlin K. (2001). Viewpoint: the real reason why software engineers need math. *Communications of the ACM*. *44* (10)*,* .21-22.

Duben, A. J., Naugler, D. R., & Surendran, K. (2004). "Agile computing curricula. *EDSIG, Proceedings of ISECON 2004.* Paper No. 2134.

Engardio, P., Einhorn, B., & Kripalini, M. (2005, March 21). Outsourcing innovation. *BusinessWeek*, *3925*, 84-94.

Ferguson, E., Kussmaul, C., McCracken, D., Robbert, M. A.., (2004). Offshore outsourcing: Current conditions & diagnosis. Proceedings of the Thirty-Fifth SIGCSE Technical Symposium on Computer Science Education, March 3-7.

Ferguson, E., Henderson, P. B., Huen, W., Kussmaul, C. (2005). IT offshore outsourcing: Impact on CS/IS curriculum. Proceedings of the Thirty-Sixth SIGCSE Technical Symposium on Computer Science Education, February 23-27.

Flores, B. & Piana C. K. D. (2000, October). Undergraduate student retention strategies for urban engineering colleges. *Proceedings of the 30th ASEE/IEEE Frontiers in Education Conference*, Kansas City, MO.

Gilmer, T. C. (2002). Do the math: Improved retention, longevity and grades of STEM majors via BGSU AIMS", *2001-02 STEM retention report: The retention and graduation rates of 1994-2000 freshman cohorts entering science, technology, engineering and mathematics* Retrieved September 6, 2005, from http://www .bgsu.edu/aims/dothemath923.doc

Hira, R, & Hira A. (2005). *Outsourcing America,* Amacom, New York

Infosys (2005). Retrieved June 12, 2005, from http://www.infosys.com/InStepWeb /default.htm

Lopez, A. M. (2004). Outsourcing? Offshore? Students need to know. *Proceedings of ISECON 2004.* Paper No. 3453.

Mann C. L. (2004). What global sourcing means for U.S. IT workers and for the U. S. economy. *Communications of ACM*, *47*(7), 33-35.

Matloff N. (2004). Globalization and the American IT worker. *Communications of ACM*, *47*(11), 27-29.

McDougall, P. (2005). 30% of tech jobs at risk from offshoring, Gartner says, InformationWeek, Retrieved September 6, 2005, from http://www.informationweek .com/story/showArticle.jhtml?articleID= 160401701

Niederman, F. (2004). IT employment prospects in 2004: A mixed bag. *IEEE Computer*, *37*(1), 69-77.

Roberts, E. S., Kassianidou, M., & Irani, L. (2002). Encouraging women in computer science. *SIGCSE Bulletin*, *34*(2).

Stamouli, I., Doyle, E., & Huggard, M. (2004, October). Establishing structured support for programming students. *Proceedings of the 34th ASEE/IEEE Frontiers in Education Conference*, Savannah, GA.

Surendran, K., Hays, H. M. & Macfarlane, A. (2002). Simulating software engineering apprenticeship*," IEEE Software*, *19*(5) 49-56.

Surendran, K., Ehie, I. C., & Somarajan, C. (2005). Enhancing student learning across disciplines: A case example using a systems analysis and design course for combined MIS and ACS majors," Journal of Information Technology Education, *4*.

Vegso, J. (2005). Interest in CS as a major drops among incoming freshmen. *Computing Research News, 17*(3), Retrieved September 6, 2005, from http://www .cra.org/CRN/articles/may05/vegso