Recruiting Students to Major in CIS and Other Computing Related Disciplines: One School's Approach

Lisa Kovalchick
kovalchick@calu.edu

Gina Boff
boff@calu.edu

Mathematics, Computer Science & Information Systems Department,
California University of Pennsylvania
California, PA 15419, USA

Abstract

Attracting students to major in Computer Information Systems and other computing fields has become a big problem in the United States in recent years. Today's student just does not seem interested in pursuing a degree in computing. At the same time, the United States is facing a shortage of technology savvy employees. Several studies have been conducted in order to determine methods for attracting students back to computing majors. Some of these methods include increased advertisement of the field to students, parents/guardians, high school teachers and guidance counselors and dispelling myths concerning the lack of employment opportunities and difficulty of the curriculum. This paper will discuss one approach taken by Computer Information Systems faculty at California University of Pennsylvania in an attempt to attract more students to major in computing fields.

Keywords: CIS Recruitment, CIS Enrollment, Computing Careers, Computing Interest

1. INTRODUCTION

Within the last decade, we have seen a drastic decline in the number of students majoring in Computer Information Systems (CIS) and other computing majors. Several authors report enrollment declines of 70% or more; according to Bureau of Labor Statistics (BLS), the number of total incoming freshmen planning to seek an Information Systems (IS) or Computer Science (CS) degree is down 2.6% since 2001 (Granger, 2007). At the same time that we are facing a decline in the number of students majoring in computing fields, we are facing an increase in the number of computing employment opportunities available; thus, leading to a shortage of qualified computing employees. In fact, "BLS projections suggest almost half (five of the top twelve) of the fastest growing occupations will be in high-paying Information Technology (IT) related occupations" (Walstrom, 2008).

In recent years, several studies have been conducted in order to determine reasons that students are not majoring in computing fields, especially CIS (also referred to by some authors as IS). Many of these studies have drawn similar conclusions to the problem of declining CIS enrollment. CIS faculty at California University of Pennsylvania (Cal U), a state-system, liberal arts institution located in south western Pennsylvania have used the results of these studies to aid them in developing a strategy for recruiting students to major in computing fields. This pa-

per will begin by reviewing some of the studies conducted on computing enrollment; it will then explain the recruitment strategy developed by Cal U's CIS faculty. Finally, it will discuss and analyze the results of their recruitment strategy.

2. LITERATURE REVIEW

CIS employment opportunities continue to grow; however, many schools are still having problems attracting students to major in CIS. As a result of the recent decrease in CIS enrollment, several authors have conducted studies and published material on this subject.

Lenox, Woratschek and Davis, 2005 reported results of a survey administered to individuals employed within departments offering CS/IS/IT degrees at various institutions. As a result of their survey, the authors identified the following top causes of enrollment decline: outsourcing, the economy, the dot.com failure, the belief that such enrollments are cyclical in nature and the lack of institutional recruitment (Lenox, 2005). Increasing high school recruitment, modifying course content, increasing the number of articulation agreements with community colleges and IT schools, creating new multidisciplinary majors, creating new tracks within the major and increasing recruitment at community colleges and IT schools were among the top strategies given by survey respondents, when they were asked to address efforts to increase enrollment (Lenox, 2005).

Lomerson and Pollacia surveyed freshmen in introductory computer courses in order to determine the amount of knowledge the students had concerning various computing majors. This study specifically focused on the CIS degree and it looked at factors that discouraged or persuaded students to major in CIS. Over half of the students surveyed responded that they self-selected their college major without the influence of guidance counselors, peers, parents, publications, etc.; in addition, the respondents listed several interesting factors that discouraged them from pursuing a computer-related major including: an inadequate amount of information on computing-related fields and the perception that there were not many employment opportunities in computing-related fields (Lomerson, 2005). In response to their findings, the authors suggested initiating an advertisement campaign to educate high school teachers and guidance counselors about computing-related fields; they also suggested including information on computing fields as part of the curriculum of introductory computer courses (Lomerson, 2005).

Walstrom, Schambach, Jones and Crampton conducted a study to determine why students are not majoring in IS. For their study, they surveyed students in an entry level business class in order to collect data concerning the majors being selected by students and factors affecting a student's choice of a major. Walstrom, 2008 detailed the results of this study, where several interesting conclusions are drawn; the authors found that, IS was rated very low in student awareness and that "there is a strong association between student awareness level of career opportunities and their selection of a major" (p. 48). Therefore, they determined that "since the majority of the students surveyed were first semester freshmen with limited exposure to IT coursework, it is likely that they made their assessments based on incomplete information" (p. 50). In addition, they note that "it appears likely that students are not exposed early enough to the true nature of IT to make an informed decision" (p. 49). As a result of these conclusions, the authors suggest that "given the high percentage of students making their initial major selection in high school, it appears clear that there is a need to connect with and inform incoming students before they reach college" (p. 49). Walstrom, 2008 suggested that the best method to reach these students is via College/Department Websites, brochures and the Internet.

Zhang, 2007 reported results of a survey given to students enrolled in an introductory IS course, which was required for all business students and also taken by many students who had not, yet, declared a major. Zhang, 2007 concluded that "the results of this study identified genuine interests in the IS field (whether students thought that they would enjoy studying IS), job availability, the difficulty of the IS curriculum, and opinions from family and professors as important factors affecting students' intentions to choose an IS major" (p. 447). As a result of

these conclusions, the author suggests the following strategies in order to encourage more student interest in IS:

- "start with cultivating more positive attitudes toward choosing an IS major by enhancing students' interest in IS; spreading the recent good news about the improving IS job market; and offsetting the students' perception that IS courses are too difficult" (p. 456)
- "pitch the IS major as a viable option to the students' families because students' intention to choose an IS major was influenced by their opinions" (p. 456)
- "IS professors can encourage students to choose an IS major: by teaching IS courses in a way that offsets students' preconception that the IS curriculum is difficult and by being more supportive of students choosing an IS major" (p. 456)
-

Lee and Lee conducted a study to determine the factors affecting the selection of an IS major by business students. For their study, they surveyed business undergraduate students at 12 public universities across the United States. Their study identified the following factors, which negatively affected students' perception of IS: job availability, lack of advertising, difficulty of curriculum and undesirability of parents and peers. Lee, 2006 reported on the results of the study; the following ideas for attracting more students to the IS major were presented:

- "Change the misperception of job availability" possibly by distributing literature and offering more internships and industry-sponsored projects (p. 216)
- Do more advertising of the IS major such as provide IS information sessions, provide more scholarship/fellowship opportunities and connect students to IS alumni
- "Change students' perception of the difficulty in majoring in IS"; this could be done by developing lower-level courses to attract students' interest and/or placing our best instructors in introductory IS courses (p. 217)
- Change the "lower-level preference of parents and peers in majoring in IS" possibly by advertising IS to parents and sponsoring lectures by prominent IT professionals (p. 2107)
-

The studies cited here were conducted on different populations (including both educators and students) in different regions of the United States; however, they all draw some very similar conclusions. In order to attract more students to the CIS major, these authors seem to agree that we need more marketing/advertisement of the CIS field. This marketing/advertisement could include facts on the availability of employment opportunities and interesting CIS courses. In addition to marketing CIS to students, we should also consider developing CIS marketing/advertisement materials targeted to parents/guardians. The remainder of this paper will detail a recruitment strategy employed by CIS faculty at Cal U and it will discuss initial results of their efforts.

3. RECRUITMENT STRATEGY

The CIS program at Cal U debuted in the Fall of 2005. Since its debut, the program has seen a steady increase in enrollment with approximately 58 students enrolled in the CIS major at the end of the 2008-2009 academic year. However, upper-level CIS only elective courses are still susceptible to being cancelled by administration due to lack of student enrollment. Not only is this cancelling of courses a disappointment for students enrolled in the course, it is also a possible concern for the CIS program's upcoming ABET accreditation visit. In addition to these concerns, the CIS faculty members have been approached by several local businesses wanting to hire CIS graduates; however, there are simply not enough graduates to fill the requested positions. As a result of these occurrences, CIS faculty at Cal U searched for a strategy to recruit more students into their program.

Faculty in Cal U's CIS program wanted to increase the number of students enrolling in CIS and other computing disciplines. These faculty recognized the need to inform both students and parents about the CIS field and the differences between CIS other computing majors such as IT, CS, Computer Engineering and Software Engineering. As a result, several strategies were employed. One such strategy included redesigning the pro-

gram's Web site to include information distinguishing the various computing disciplines and giving prospective students some insight concerning which discipline may be best for them, based on their computing interests. Another strategy involved creating a program brochure that provided a list of the CIS courses that a student takes and highlighting aspects of the CIS discipline such as career opportunities and salaries. The CIS faculty observed that in several instances entry-level students chose to change their major from CIS to some other discipline based on a bad experience in an entry-level CIS course. As a result of this observation, the CIS faculty placed some of the program's 'best' teachers in entry-level CIS courses in hopes of improving a student's experience in entry-level courses.

High School Visits

In addition to the strategies outlined above, a grant was obtained by a CIS faculty member at Cal U in order to fund visits to local high schools to talk to students about computing and to hold recruitment events on the campus of Cal U in order to introduce both students and parents to the various computing fields. Details concerning the attainment of this grant are published in Kovalchick, 2008.

As a result of the grant, the CIS faculty members were able to visit local high schools in order to educate both students and teachers about the various computing fields. In addition to promoting CIS and computing, the CIS faculty members also promoted the importance of a post-secondary degree, regardless of major. During a high school visit CIS faculty members from Cal U began with a presentation outlining the advantages of a post-secondary degree with the emphasis of a degree in computing. During the presentation, students were given folders containing information on various computing degrees and a postcard allowing them to inquire about the various computing and non-computing degrees available at Cal U. At the conclusion of the presentation, students were asked to complete and return the postcard to the visiting faculty members, if they were at all interested in attending Cal U, regardless of major. The faculty members explained that students who returned the postcard and indicated an interest in computing would be invited to a recruitment event held at Cal U (this recruitment event was intended for both the student and his/her parents/guardians).

Recruitment Event

Recognizing several of the conclusions drawn from the studies presented in the literature review, the CIS faculty set out to use the recruitment event to further market/advertise CIS to both students and their parents/guardians. In addition to the general marketing/advertisement of Cal U's CIS program, the faculty also strived to dispel myths concerning the availability of CIS employment opportunities and the difficulty of the CIS curriculum. As a result, the recruitment event began with lunch, where several computing alumni and industry representatives were available for informal conversation. Following lunch and a tour of the Cal U campus, the CIS faculty presented information on various computing degrees and several grants and scholarships available to students majoring in computing at Cal U; they also provided both students and parents/guardians with folders containing additional information on these computing fields. After the computing presentation, representatives from the following university areas presented the audience with information: Admissions, Student Mentoring and Career Services. The presentation by Admissions was intended to help students and their parents/guardians to understand the admissions requirements and processes at Cal U. The Student Mentoring presentation was intended to help students realize that, if they chose to attend Cal U, they could opt to have a mentor to help them adjust to the University lifestyle. Finally, a presentation by Career Services was intended to help students and their parents/guardians to realize the abundance of employment opportunities available in the computing field, especially CIS.

At the conclusion of the recruitment event, surveys were given to students in order to assess the effectiveness of the event. In addition, follow up surveys were mailed to the students during the summer following the recruitment event; this data was collected and used to assess the effectiveness of the recruitment efforts of Cal U's CIS faculty.

4. RESULTS AND ANALYSIS

In order to be invited into local high school classrooms, the CIS faculty at Cal U contacted teachers who taught mathematics, business and/or computing from 13 high schools in close proximity to the Cal U campus. The CIS faculty explained their project and asked to be invited into the teacher's classroom in order to speak with their students concerning computing. The response from high school teachers was overwhelming; approximately 31% of the teachers who were contacted requested visits to their classrooms. Many teachers asked the CIS faculty to visit several of their classes. In total, Cal U's CIS faculty visited 64 classrooms at 10 local high schools, where they spoke to approximately 1,641 students.

As a result of their efforts approximately 23% of the students (370 students) returned postcards indicating that they were interested in pursuing post-secondary education at Cal U, regardless of major. Figure 1 depicts the class rank distribution of students who returned postcards.

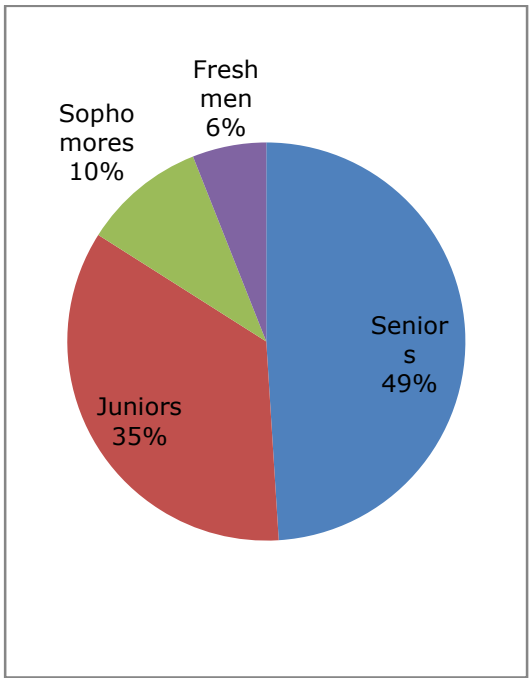

Figure 1: Distribution of students indicating an interest in attending Cal U, regardless of major

When visiting high schools, Cal U's CIS faculty spoke with students in grades 9 through 12. The CIS faculty realize that the college decisions made by Juniors and Seniors would give them more immediate results; however, they believe that it is Freshman and Sophomore students that are less likely to have chosen an intended college major, since, for them, college is still several years away. This notion was further validated after speaking with high school teachers. Therefore, the CIS faculty members believe that their presentation had a larger impact on Freshman and Sophomore students; even though, they were less likely to return postcards indicating their interest in attending Cal U.

Four percent of the students (58 students) who returned postcards indicated an interest in pursuing a computing degree at Cal U. Figure 2 depicts the class rank distribution of students who expressed such an interest.

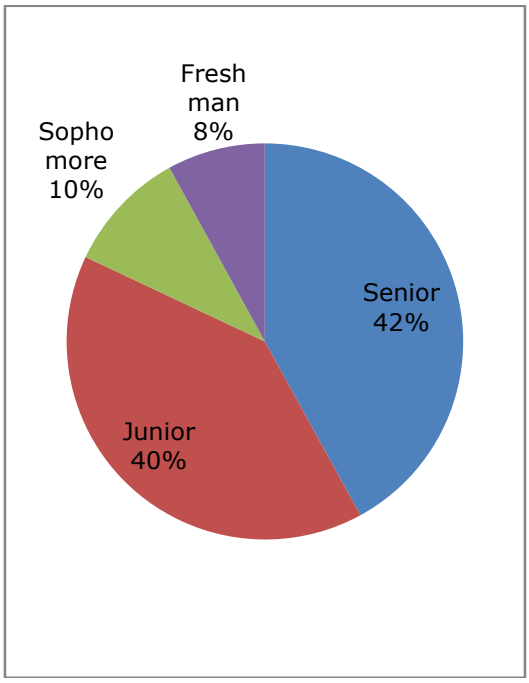

Figure 2: Distribution of students indicating an interest in pursuing a computing degree at Cal U

It should be noted that Cal U is located next to two of the poorest counties in Pennsylvania and it was high schools in these counties that were visited. Many households in these economically disadvantaged communities lack computers; therefore, the CIS faculty members believe that the students visited

were less likely to be interested in computing than students from more economically viable communities. It is the belief of the CIS faculty that continuing to visit these high schools and talking with students about computing will help them to become interested in the computing field.

Students who returned postcards expressing interest in pursuing a computing degree at Cal U were subsequently mailed an invitation to a recruitment event at Cal U. Fourteen percent of the students (8 students) who were mailed invitations attended a recruitment event. Figure 3 depicts the class rank distribution of students who attended a recruitment event.

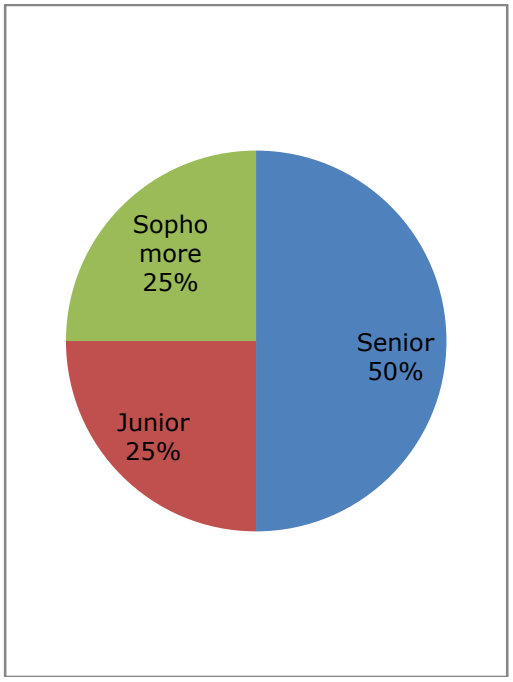

Figure 3: Distribution of students who attended a computing recruitment event held at Cal U

Students who attended a recruitment event were sent a survey over the summer which they were asked to complete and return. This survey included questions concerning whether the efforts of the CIS faculty helped the student to decide whether to pursue a degree in computing. One hundred percent of the students who completed surveys indicated that this project helped them to arrive at their decision to pursue a computing degree. In addition, 75% of the seniors who attended a recruitment event are currently enrolled in a computing field at Cal U and 50% of the students who were unable to attend a recruitment event and asked to be mailed additional information concerning pursuing a computing degree at Cal U are currently enrolled in a computing field at Cal U.

It should be noted that some students attended the same computing presentation several times during the day that the CIS faculty visited their high school, since some students have the same teacher for multiple courses and CIS faculty were often invited to several of a single teacher's classes. Therefore, the number of students attending a presentation and the number of students returning a postcard may be slightly skewed, since a single student would normally only return, at most, one postcard, regardless of the number of times he/she viewed the presentation.

5. CONCLUSION

In recent years, institutions of higher education throughout the United States have seen a large decline in the number of computing-related majors; however, the number of computing-related career opportunities continues to grow. Educators must take steps now in order to ensure that there is a sufficient number of computing graduates to meet the needs of industry.

The CIS faculty at Cal U employed several of the strategies identified by previous CIS major studies in order to recruit students into their program. Specifically, the faculty redesigned their Web page, created a program brochure, placed some of their 'best' teachers in entry-level CIS courses and advertised various computing fields to high school students and teachers by visiting their classrooms and distributing information on these fields. In addition, the CIS faculty targeted the parents/guardians of students interested in computing in order to inform these individuals of the various computing fields and their curriculum, career opportunities available and several university resources available to help students succeed in their pursuit of post-secondary education. As a result of their efforts, in a single year, the CIS faculty members were able to recruit three new CIS majors to Cal U.

The CIS faculty members at Cal U believe that their high school visitations and the recruitment event held at Cal U had a large impact on the success of recruiting students into their program; therefore, they have requested and received grant funding to continue their recruitment efforts for another year. They are currently in the process of collecting data on students' lack of interest in computing fields including whether family education-level and/or income level influences a student's decision to major in a computing field.

6. ACKNOWLEDGEMENTS

Data made available in this publication is a result of the support of the project by a diversity and equity grant from the Pennsylvania State System of Higher Education, Office of the Chancellor.

7. REFERENCES

Granger, Mary J., Geoffrey Dick, Carolyn McKinnell Jacobson and Craig Van Slyke (2007) "Information Systems Enrollments: Challenges and Strategies." *Journal of Information Systems Education* , 303-311.

Kovalchick, L., G. Boff, P. Sible and G. DeLorenzo (2008) "Finding the Right Grant to Address Your University's Decreased Enrollment in the Computing Discplines." Proceedings of EISTA'08, June 29-July 2, pp. 129-135.

Lee, Y. A. (2006) "The Competitiveness of the Information Systems Major: An Analytic Hierarchy Process." *Journal of Information Systems Education* , 211-221.

Lenox, Terri L., Charles R. Woratschek and Gary A. Davis (2005) "Exploring Declining CS/IS/IT Enrollments." Proceedings of ISECON'05, October 6-9.

Lomerson, William and Lissa Pollacia (2005) "Declining CIS Enrollment: An Examination of Pre-College Factors." Proceedings of ISECON'05 October 6-9.

Walstrom, K. A. (2008) "Why Are Students Not Majoring in Information Systems?" *Journal of Information Systems Education* , 43-52.

Zhang, W. (2007) "Why IS: Understanding Undergraduate Students' Intentions to Choose an Information Systems Major." *Journal of Information Systems Education* , 447-458.