

Department of Computer Sciences

Assessment Update 2009

Informal polling of juniors and graduating seniors in Spring 2008 (majors, double-majors and CS Certificates) revealed generally high satisfaction with their summer internship opportunities as well as their preparation and opportunities for graduate work or employment following graduation. Similarly, employers have expressed high praise for the preparation our students obtain in our project-oriented 500-level courses as well as during summer internships. Some students have expressed great interest in upper division courses that we don't currently offer but that we are interested in offering as soon as we are able to recruit new faculty to cover them. Students also expressed great interest in having an opportunity to exchange information about extracurricular software development projects, with each other and with the faculty. After further dialog, two of this year's seniors are developing a proposal for a new Computer Sciences software competition, with possible inaugural kickoff in Fall 2009 and final selection of the winning project by a panel of people from local industry in Spring 2010.

Given the relatively high satisfaction of Computer Sciences majors with the preparation they are receiving, we have focused our assessment activities this 2008-2009 academic year on our introductory courses, with the goal of improving the number of students who are choosing to major in CS (to achieve parity with peer departments at other large universities such as U. Illinois and U. Washington) and also to improve the courses for students majoring in other disciplines. To that end we have carried out the following assessments and improvements to student learning:

- We met with the Cross College Advising Service (CCAS) during August 2008 (after the completion of SOAR) to learn of their experience during the past couple of years with students who have enrolled in CS 302 (Intro to Programming). In response to their concerns that many students were finding 302 too difficult, in Fall 2008 we made a number of improvements. We selected a new textbook that emphasizes basic problem solving and programming skills and de-emphasizes intricacies of the Java programming language. We revised the second midterm to give the students more opportunities to write programs, provided extra credit grading incentives for extra effort into the 302 lab exercises and on programming assignments, and created a small TA-taught freshmen-only lecture section. The freshmen-only section was highly successful in terms of student achievement. For example, on the second midterm, the low score in that section was the same as the average on the same exam in the two large 302 lectures. The TA who taught the freshmen-only lecture is a skilled teacher who relates well to the students. He reported that the first-semester freshmen were very engaged with each other before and after class. Thus, the 30-student lecture also provided a venue for the students to get to know other freshmen with similar interests. We plan to offer several similar freshmen-only sections of 302 in Fall 2009. We have many TAs who are skilled teachers, so we don't anticipate any problems staffing the freshmen-only sections.
- We conducted an informal poll of the students in the large CS 302 lectures after the second midterm, and found that 95% of the students felt that the lectures, labs, and lab TAs were useful to very useful, but that almost 75% of the students rated their programming ability as average (47%) to weak (28%). In response to that result, we have removed some of the more advanced features of the Java programming language from the final three weeks of the course, in order to give the

students more time to master the more broadly useful programming constructs. The more advanced features were not previously included in the 302 assignments or exams, and can be introduced in our more advanced courses. We will re-survey the students again this semester to determine whether they have more confidence in their programming skills.

- We evaluated introductory computing courses at other institutions that appeal to a broad cross-section of undergraduates, i.e., courses that are sometimes called computer literacy courses. This led to a new course proposal, CS 202 Principles of Computing, approved by the Physical Sciences Divisional Committee at their February 2009 meeting. The course will be offered to a small number of freshmen in Fall 2009, and on a larger scale to all undergraduates starting in Spring 2010.
- The Department of Computer Sciences seeks to increase the participation of women and minority students. To help achieve this goal, in Fall 2004 we started an innovative program called Wisconsin Emerging Scholars-Computer Science (WES-CS). The program combines what we think are the best features of the Emerging Scholars Program (used in Math departments across the country including here in Madison) with features of Peer-Led Team Learning (developed for use in Chemistry). WES-CS involves actively recruiting women and minority students to enroll in our introductory CS course, CS302. Because in our experience those students are hesitant to participate in programs that single them out, we also recruit white male students from small, rural high schools. In addition to attending the regular CS302 lectures and labs, WES-CS students meet in groups of 4 to 8 students once a week for two hours of group problem solving. WES-CS groups are run by outstanding undergraduate Peer Leaders who in turn are trained and supervised by Professor Susan Horwitz, who runs the WES-CS program. WES-CS exercises are designed to help all students to understand the material taught in the main course in more depth, and to learn to work cooperatively in groups. WES-CS was started as NSF-funded project at eight universities. The evaluation of the programs showed that the approach has the following benefits:
Increasing retention rates: In academic years 2005-2007, 93.2% of WES-CS students, compared with 88.0% of non-WES-CS students, completed the main course.
Improving grades: in 2005-2007, 80% WES-CS and 68% non-WES-CS earned a grade of B or better. Students perceptions of WES-CS are very favorable: 95% of the students reported that they would recommend WES-CS to a friend planning to take the 302 course.
We continue to assess and improve the WES-CS student and peer leader experience each year.
- During Fall 2008 and Spring 2009, we are working with the National Center for Women and Information Technology (NCWIT) to assess our undergraduate program, with an emphasis on improving its impact on women. NCWIT has provided Consultant Tom McKlin to work with us. McKlin has a broad range of expertise in program evaluation, organizational change, computing education, and other relevant fields. The activities being carried out include: (1) a 2-day site visit by McKlin during Fall 2008 for interviews of faculty, TAs, undergraduate majors, and undergraduate students enrolled in our introductory courses, to determine how our curriculum and climate are perceived; (2) further data collection from the student data warehouse in the form of aggregate information about our undergraduate majors; (3) an initial recommendations report including prioritized recommendations (due in Spring or early summer 2009), and (4) help with implementation and assessment of improvements as a result of the report.