AN EVALUATION OF THE IMPACT OF A SERVICE LEARNING PROJECT IN A REQUIRED FIRST-YEAR ENGINEERING COURSE

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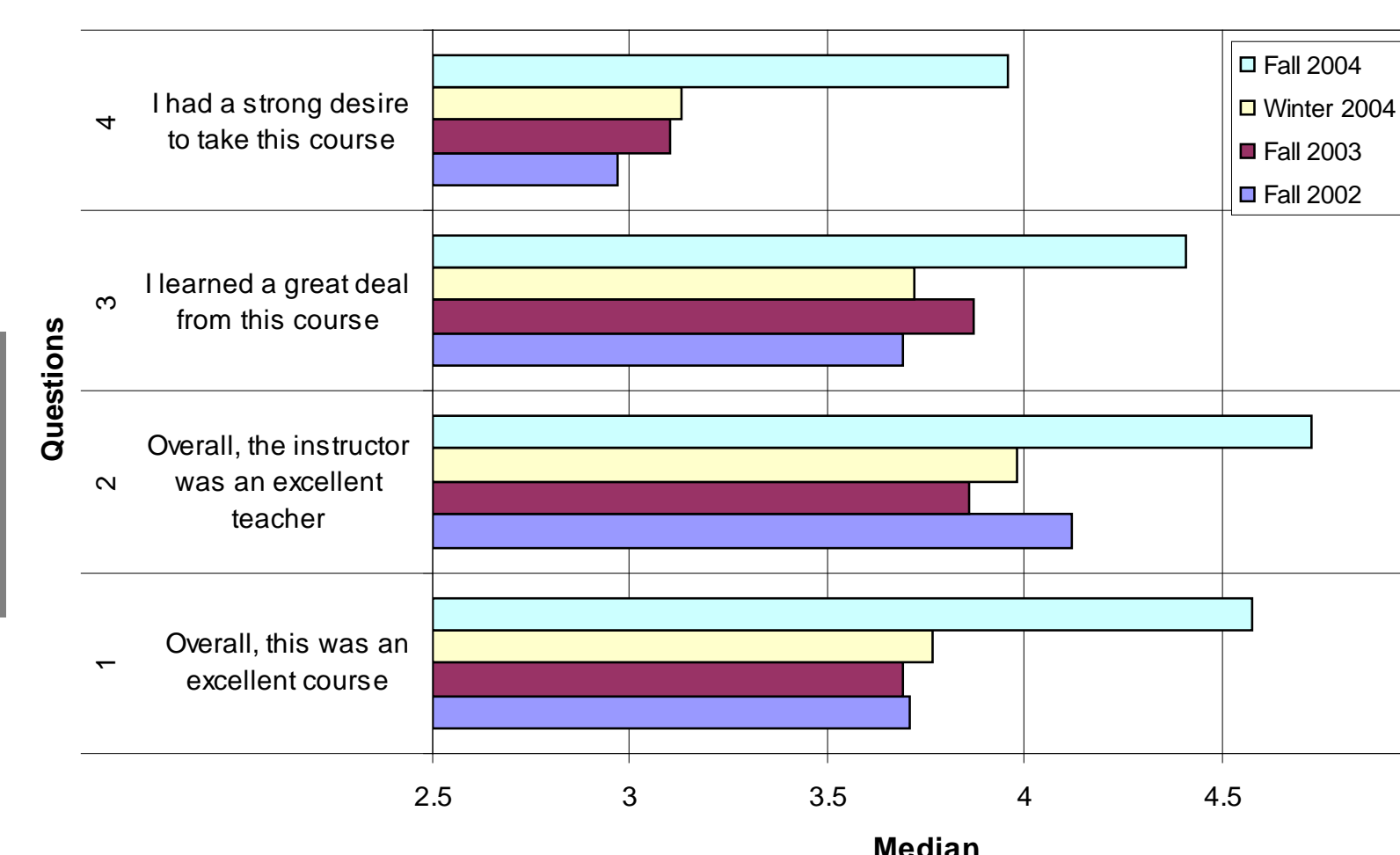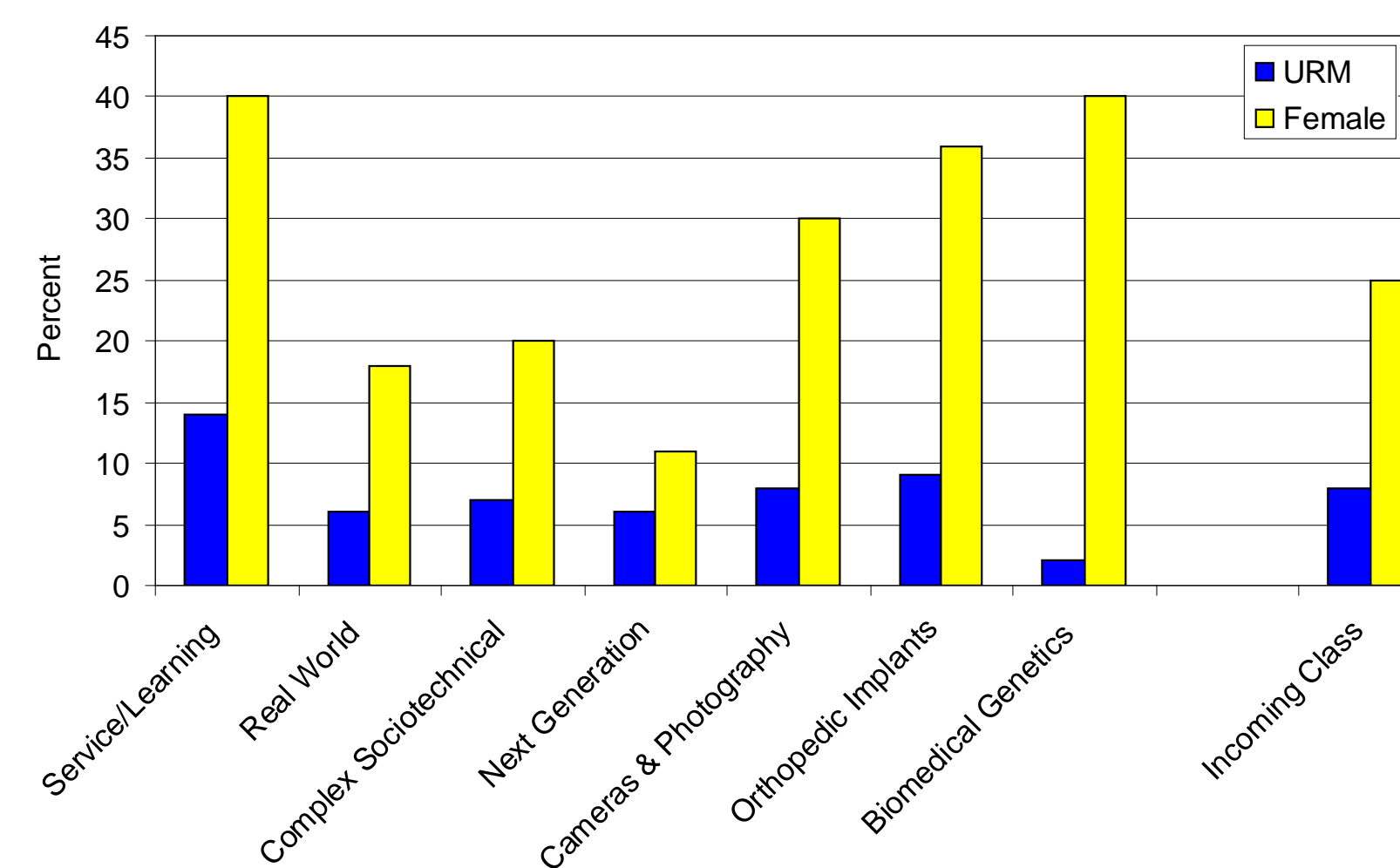AMERICAN SOCIETY FOR ENGINEERING EDUCATION ASEE

Abstract

- In Fall 2004, a service-learning curriculum was introduced in one section of Engineering 100: Introduction to Engineering, at the University of Michigan. The incentive for this change was to develop a first year option for students that directly addressed the role of the engineer in society and appealed to students with altruistic goals who often leave engineering for other majors. The goals of this project was to explore the impact that service-learning might have on students' learning, including their level of engagement and motivation, in a required first year course.
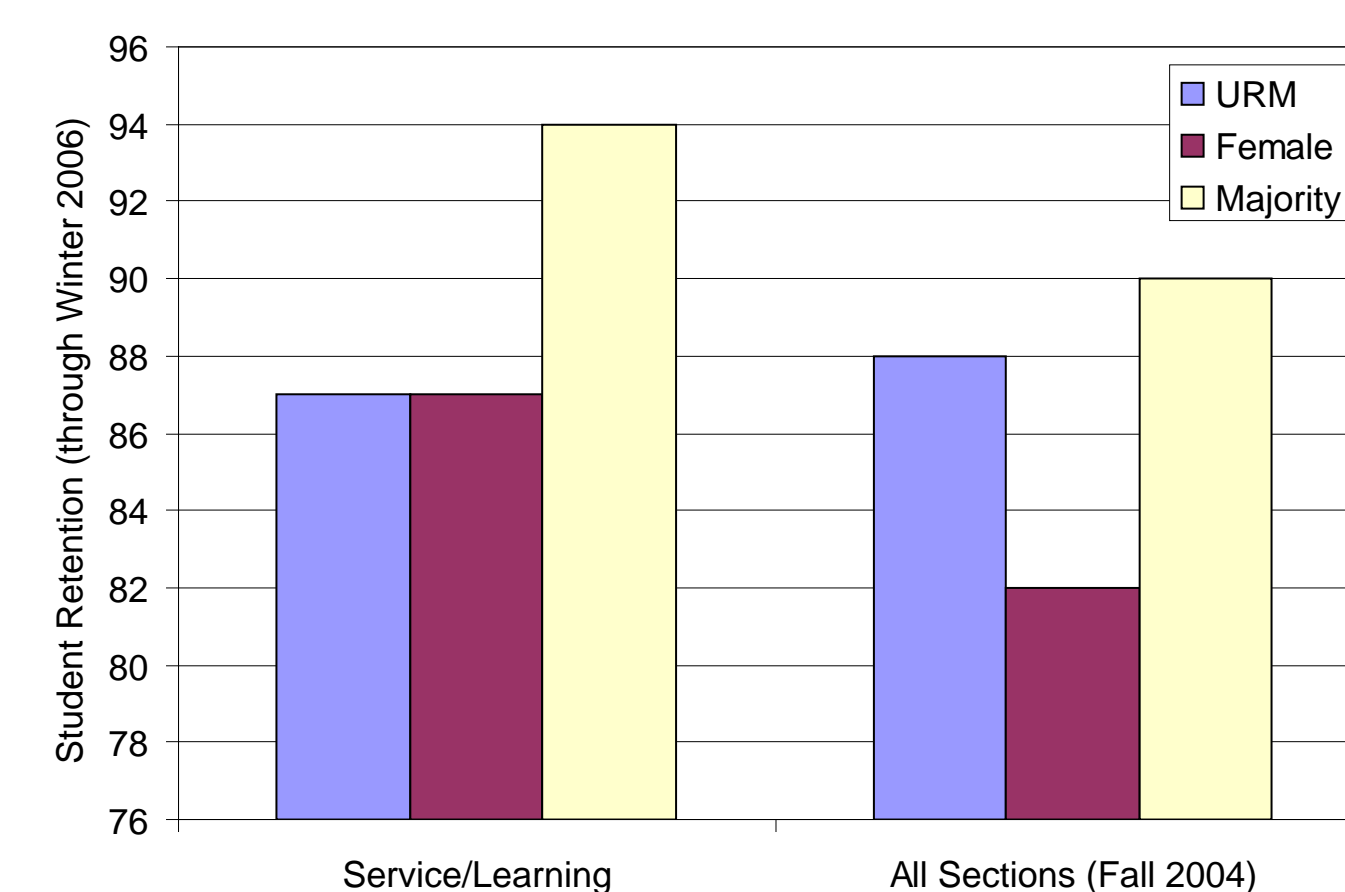
Methods

- One method for assessing student learning is the anonymous semester-end instructor evaluation questionnaire required for all courses at the University of Michigan. Students' responses to these questions provide insight into their perceptions of the quality of the course and instructor, the extent to which they "learned" in the course, and their desire to enroll in the course, as well as specific teaching outcomes for the course.

- To determine if the integration of a service-learning curriculum into Engineering 100 affected the student's learning in the course, a detailed statistical analysis of the teaching evaluation responses was performed. These analyses included a Stepwise Regression analysis, Multiple Regression analysis, Correlation analysis, and a Multifactor ANOVA test performed on the evaluations for four successive semesters of ENG 100 taught by the same instructor; the first three without and the last with a service-learning curriculum.

Results

- Compared to the incoming class as well as other sections of E100, the service-learning section hosts a higher percentage of under-represented minority students. Both the service-learning and bio-medically themed sections appeal to female engineering students.

- In a comparison of instructor evaluation median values before and after the introduction of a service-learning curriculum, it is apparent that students who experienced the service-learning section held a more positive perception of the quality of the course and instructor, and the amount of learning. The students also displayed a much stronger desire to enroll in the service-learning course.

- A Forward Selection Stepwise Regression analysis for Q1 and Q3 revealed that students perceptions of the quality of the course were better predicted by a model which included a sense of pride and accomplishment, and recognition of an impact on society. Whereas, in previous semesters, the predictive model included questions related to technical communication skills and technical knowledge.

Semester	Q1: Excellent Course	Q3: Learned a Great Deal
Consistent	Q2, Q3, Q4	Q1, Q4
Fall 02		Q712
Fall 03	Q721, Q730	Q718, Q712
Winter 04	Q712, Q726, Q725, Q730	Q722

- 712 This course helped me understand the rewards and challenges of being an engineer
- 718 I enhanced my technical knowledge in at least one area of engineering
- 722-726 Technical Communications
- 730 I found the guest lecturers valuable

Fall 04	Q719, Q721, Q712	Q721

- 712 This course helped me understand the rewards and challenges of being an engineer
- 719 I have a sense of pride and accomplishment as a result of completing my projects
- 721 I will think more carefully about engineering's impact on society because of this course

- A quick look at student retention data shows that, to date, female and majority students enrolled in the service-learning section have slightly higher retention rates, however, under-represented minority students show little retention differential. Although further study is needed, we suspect that other external factors play a significant role in retention of URM students.

Discussion

- The overall response of students during the service-learning semester indicated a higher sense of satisfaction with the course and instructor. Students deliberately elected this section of the course. The course served a population with more altruistic goals, thus hosting a larger population of women and under-represented minorities than the first year program population

- During the service-learning semester, student perceptions of the quality of the class could be best predicted by a model which included responses to questions related to the service-learning curricular goals.

Conclusions

- Overall, the implementation of a service-learning curriculum in this course offered a unique opportunity for students to partake in a project relevant to their professional and educational goals. Providing these opportunities is an excellent method for increasing the relevance of engineering curriculum to under-represented students, thus improving the diversity of the field. In addition, students enrolled in the course had an increased perception of their understanding of social and economic considerations in engineering, a sense of pride and accomplishment as a result of completing the project, and a recognized commitment to thinking more carefully about engineering's impact on society.

Acknowledgements