ABSTRACT:

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This study used quantitative and qualitative data to explore what helps and hinders students enrolled in a required, first-year course at a large Midwestern research university. The objective of the course is to introduce students to programming (C++ and Matlab) and algorithmic thinking. The study was conducted as part of a joint effort between faculty in the College of Engineering and researchers in the School of Education aimed at increasing retention of women and underrepresented minorities.

Pre- and post-surveys were administered to all 185 students enrolled in one section of the course during fall semester of 2004, with a 65 percent response rate. Information captured on the surveys suggested motivational problems associated with the course and possible over-reliance by students on a newly deployed "autotester" that provides students with instant feedback on their computer code. Concern over the survey results inspired twenty semi-structured interviews with students in the course. The sample included 12 female and 8 male students. Six of the student in the sample identified themselves as African American, two as Latino, eight as Caucasian, and four as Asian-Americans. Thematic coding was used to capture categories and themes that arose in the interviews (Emerson, Fretz & Shaw, 1995). Themes that emerged included motivational problems, perceptions that the course is not relevant to students' careers, ineffective use of groups in the course, and possible over-reliance on the autotester. Particularly interesting was the predominant perception by students that learning to program is not important to their educational or career goals. Differences by race and gender are a significant part of the analysis.

The paper presents results from both the surveys and the interviews, using a conceptual framework derived from the literature on teaching first-year students (e.g., Erickson & Strommer, 1991), student motivation (e.g., Eccles, Barber, Updegraff & O'Brien, 1995), large-class formats (Cooper & Robinson, 2000), and experiences of students of color at predominately-white universities (e.g., Chesler, 1997). In addition, the paper includes suggestions for course improvement, including suggestions for more effectively incorporating the autotester into the course.

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