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The Student-Centered Active Learning Environment for Undergraduate Programs (SCALE-UP) Project

ROBERT J. BEICHNER, North Carolina State University

How do you keep a classroom of 100 undergraduates actively learning? Can students practice communication and teamwork skills in a large class? How do you boost the performance of underrepresented groups? The Student-Centered Active Learning Environment for Undergraduate Programs (SCALE-UP) Project has addressed these concerns. Because of their inclusion in a leading introductory physics textbook, project materials are used by more than 1/3 of all science, math, and engineering majors nationwide. The room design and pedagogy have been adopted at more than 100 leading institutions across the country. Physics, chemistry, math, astronomy, biology, engineering, earth sciences, and even literature classes are currently being taught this way. Educational research indicates that students should collaborate on interesting tasks and be deeply involved with the material they are studying. We promote active learning in a redesigned classroom for 100 students or more. (Of course, smaller classes can also benefit.) Class time is spent primarily on "tangibles" and "ponderables"–hands-on activities, simulations, and interesting questions. Nine students sit in three teams at round tables. Instructors circulate and engage in Socratic dialogues. The setting looks like a banquet hall, with lively interactions nearly all the time. Hundreds of hours of classroom video and audio recordings, transcripts of numerous interviews and focus groups, data from conceptual learning assessments (using widely-recognized instruments in a pretest/posttest protocol), and collected portfolios of student work are part of our rigorous assessment effort. Our findings (based on data from over 16,000 students collected over five years as well as replications at adopting sites) can be summarized as the following: 1) Female failure rate is 1/5 of previous levels, even though more is demanded of students. 2) Minority failure rate is 1/4 that seen in traditionally taught courses. 3) At-risk students are more successful in later engineering courses. 4) Top students gain the most, although students at all levels benefit. 5) Conceptual learning and problem solving are significantly improved, with same content coverage. In this talk I will discuss the need for reform, the SCALE-UP classroom environment, and examine the findings of studies of learning.