

Research, Innovation and Reform in Physics Education

David E. Meltzer, Iowa State Univ., Dept. of Physics and Astronomy, Ames, IA, 50011; 515-294-9358; dem@iastate.edu

Undergraduate physics courses have always produced a certain portion of students who seem to learn the material well. For the past 15 years or more, researchers in physics education have made a concentrated effort to pinpoint students' learning difficulties, aiming at improved learning by substantially larger proportions of enrolled students. Much has been learned regarding students' alternative conceptions of physical reality, contrasts between novice and expert problem solvers, and particular troublesome conceptual stumbling blocks. Growing out of this research, physics educators have developed new curricular materials and explored novel instructional methods to address obstacles to learning. Ongoing assessments of the effectiveness of these new methods are extremely promising, and widespread changes in undergraduate physics instruction are underway. There is much hope for future improvements, yet many difficulties remain to be resolved.