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Nontraditional approach to algebra-based general physics

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In order to improve the degree of conceptual learning in our algebra-based general physics course, the second semester (of a two-semester sequence) has been taught in a nontraditional format during the past year. The key characteristics of this course were: 1) Intense and continuous use of interactive-engagement methods and cooperative learning; 2) coverage of less than half of the conventional number of topics, 3) heavy emphasis on qualitative questions as opposed to quantitative problems, 4) adjustment of the pacing of the course based on continuous (twice per week) formative assessment. The students enrolled in the course were relatively poorly prepared, with weak mathematical skills. Open-book quizzes stressing qualitative concepts in electricity and magnetism were given twice per week; most were given in "group quiz" format, allowing collaboration. Exams (also open-book) were all done individually. Most of the class time was taken up by quizzes, and by interactive discussion and group work related to quiz questions. New topics were not introduced until a majority of the class demonstrated competence in the topic under discussion. Despite lengthy and intensive focus on qualitative, conceptual questions and simple quantitative problems, only a small minority of the class ultimately demonstrated mastery of the targeted concepts. Frequent testing and re-testing of the students on basic concepts disclosed tenacious persistence of misconceptions. ©*1997 American Institute of Physics.*

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