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Elementary Physics Course Based on Guided Inquiry

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Abstract

Undergraduate science courses taken by preservice teachers typically have textbook-centered lecture formats. There is a need for new course designs that implement ideas found beneficial in recent educational research. This project is a continuation and extension of such a course that has been under development for about two years. This elementary physics course, appropriate for preservice teachers, embodies a number of the recent innovations in educational theory and practice. It has been found that the breadth of topical coverage has to be substantially reduced from standard levels, in order to ensure that what is covered is actually learned and retained by the students. The theme of "energy" is used as a conceptual pivot to tie together the various topics. Students' pre/misconceptions regarding physical phenomena--as determined by pretesting--guide the presentation, activities, and discussion. The pretests form the basis for a thorough class discussion of the predictions made by students regarding the outcome of various experiments. Investigations to test their predictions are carried out by the students, working in small groups, through guided "mini-research-projects." Class discussions, centered around the results of the student investigations (and comparison with the predictions), lead to a systematic summing-up by the instructor to provide perspective, and tie into the next topical area with the thread of the

theme "energy transformation and conservation." During course delivery, ongoing testing and other assessment guide the pacing and depth of the topical coverage. The target audience is prospective elementary and middle-school teachers, and other non-technical students. The project has the potential to significantly improve the knowledge of and attitude towards physics on the part of those whose typical experience with college physical science tends to be distasteful and nonproductive.

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