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Invention and Impact: Building Excellence in Undergraduate STEM Education

Sponsored by the NSF Division of Undergraduate Education (DUE), in collaboration with the American Association for the Advancement of Science, Directorate for Education and Human Resources Programs (AAAS-EHR), this conference seeks to highlight recent innovations in undergraduate Science, Technology, Engineering, and Mathematics (STEM) education for the diverse student population. Our aim is to inform the national audience about learning environments, course content, curricula, and educational practices that improve learning and achievement of all undergraduate students.

Research-Based Curriculum Development in Thermodynamics

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We have been engaged in a long-term project to create active-learning curricular materials for thermodynamics. Our initial focus has been on introductory university courses in both physics and chemistry, and we are now extending that focus to courses at the advanced-undergraduate level. The first phase of this project has been to investigate student learning as it takes place with standard instruction, and to probe students' reasoning with thermodynamic concepts in both physics and chemistry contexts. Based on this research, we have developed preliminary versions of guided-inquiry worksheets that we employ in small-group-learning format. Assessment of the effectiveness of the materials, re-design, and further research and development are underway.



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