

Abstract Submitted
for the APR16 Meeting of
The American Physical Society

The impact of conservative forces on student reasoning about graphical work¹ JOHN THOMPSON, JESSICA CLARK, University of Maine — Many students compare thermodynamic work done during processes based on P-V diagrams using the endpoints of the processes being compared rather than the process paths. Researchers speculate one cause of this reasoning to be overgeneralization of work done by conservative forces. In a study to investigate this possibility, students in introductory calculus-based physics were presented with a force-position graph (F-x) that showed two different mechanical processes with identical initial values and identical final values for force and position. The task, to compare the work done in each process, was administered before and after relevant instruction along the two-semester sequence to probe differences in student responses and reasoning. Findings were also compared to results from analogous thermodynamics questions in physics and engineering courses. Response prevalence varied little with instruction. However, student reasoning did show trends, with more intuitive explanations on the pretest and more technical explanations after instruction for both correct and incorrect responses, including more prevalent invocation of path independence or conservative forces for the major incorrect interpretation.

¹Supported in part by NSF Grants DUE-0817282 and DUE-1323426.

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Date submitted: 08 Jan 2016

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