

CA04 9:00 a.m. Students' Reasoning Regarding Fundamental Concepts in Thermodynamics: Implications for Instruction*

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To aid in developing curricular materials for the introductory physics course, we have investigated students' reasoning regarding concepts in thermal physics. I will describe how students' difficulties with fundamental concepts such as heat, work, and the first law of thermodynamics present obstacles to learning more advanced topics. We found that responses to written questions were very consistent with results of detailed individual interviews, and suggested that most students seemed to acquire a reasonable grasp of the state-function concept. However, there was a widespread and persistent tendency to improperly over-generalize this concept to both work and heat. Most students interviewed thought that net work done and net heat absorbed by a system undergoing a cyclic process must be zero, while fewer than 20% were able to make effective use of the first law of thermodynamics even after instruction was completed. I will outline possible instructional strategies to address these issues.

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