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**PHYSICS**

**IDENTIFYING AND OVERCOMING MISCONCEPTIONS IN THE  
INTRODUCTORY PHYSICS COURSES AT KENT STATE UNIVERSITY**

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Physics education researchers have found that following the completion of an introductory physics course, students typically hold a number of misconceptions. Several instruments have been devised for identifying these misconceptions, including the Force Concept Inventory (FCI), constructed by Hestenes, Wells, and Swackhamer, and the Conceptual Survey of Electricity and Magnetism (CSEM), constructed by Hieggelke, Maloney, O’Kuma, and Van Heuvelen. If these tests are administered before and after instruction, they can be used to gauge the extent to which a student has overcome misconceptions. A Hake gain,  $\langle g \rangle$ , is defined as  $(\text{post test percentage} - \text{pretest percentage}) \div (100\% - \text{pretest percentage})$ . Following conventional instruction, student FCI Hake gains average 23%. Following “interactive-engagement” instruction, *i. e.* inquiry or constructivist teaching strategies, student FCI gains average 48%. I conducted several studies on the FCI, all of which tended to confirm its validity. Next, I introduced interactive-engagement methods to the laboratory portions of the introductory physics courses at Kent State University. Following the introduction of interactive-engagement methods to the first-semester introductory physics course, FCI gains increased from 14% (spring 2000) to 36% (summer 2001). Following the introduction of interactive-engagement laboratories in the second-semester course, CSEM gains increased from 7% (spring 2001) to 27% (summer 2002).

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