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Meta-analysis of teaching methods: a 50k+ student study ELEANOR SAYRE, BENJAMIN ARCHIBEQUE, Kansas State Univ, K. ALISON GOMEZ, University of Texas – Brownsville, TYREL HECKENDORF, Georgia State University, ADRIAN M. MADSEN, SARAH B. MCKAGAN, American Association of Physics Teachers, EDWARD W. SCHENK, Kansas State Univ, CHASE SHEPARD, Georgia State University, LANE SORELL, Kansas State Univ, JOSHUA VON KORFF, Georgia State University — The Force Concept Inventory (FCI) and the Force and Motion Conceptual Evaluation (FMCE) are the two most widely-used conceptual tests in introductory mechanics. Because they are so popular, they provide an excellent avenue to compare different teaching methods at different kinds of institutions with varying student populations. We conducted a secondary analysis of all peer-reviewed papers which publish data from US and Canadian colleges and universities. Our data include over fifty thousand students drawn from approximately 100 papers; papers were drawn from Scopus, ERIC, ComPADRE, and journal websites. We augment published data about teaching methods with institutional data such as Carnegie Classification and average SAT scores. We statistically determine the effectiveness of different teaching methods as measured by FCI and FMCE gains and mediated by institutional and course factors. As in the landmark 1998 Hake study, we find that classes using interactive engagement (IE) have significantly larger learning gains than classes using traditional instruction. However, we find a broader distribution of normalized gains occurs in each of traditional and IE classes, and the differences between IE and traditional instruction have changed over time and are more context dependent.

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