

You are cordially invited to attend

Wednesday, February 13, 2019

12:00 - 1:30 pm

252 Erickson Hall

Michigan State University

(Light refreshments provided)

David Fortus

**Systems, Transfer, and Fields:
Evaluating a new Approach to Energy Instruction**

Abstract: Energy is a central concept in science in every discipline and also an essential player in many of the issues facing people everywhere on the globe. However, studies have shown that by the end of K-12 schooling, most students do not reach the level of understanding required to be able to use energy to make sense of a wide range of phenomena. Many researchers have questioned whether the conceptual foundations of traditional approaches to energy instruction may be responsible for students' difficulties. In response to these concerns, we developed and tested a novel approach to middle school physical science energy instruction that was informed by the recommendations of the Framework and the NGSS. This new approach differs substantially from more traditional approaches to energy instruction in that it does not require energy forms and it emphasizes connections between energy, systems, and fields that mediate interaction-at-a-distance. We investigated student learning during this novel approach and contrasted it with student learning within a comparable unit based on a more traditional approach to energy instruction. Our findings indicate that students who learned in the new approach outperformed students who learned in a traditional approach in every quantitative and qualitative aspect considered in this study, irrespective of their prior knowledge of energy. They developed more parsimonious knowledge networks in relation to energy that focused primarily around the concept of energy transfer. This study warrants further investigation into the value of this new approach to energy instruction in both middle and high school.



David Fortus is an Associate Professor in the Department of Science Teaching at The Weizmann Institute of Science in Israel. He develops and studies instructional interventions that foster 3D learning and investigates the environmental and curricular factors that influence self-efficacy, engagement, and mastery orientation toward science, in and out of schools. His publications range from science education to theoretical physics to legal economics. Before joining the Weizmann Institute of Science, he was an assistant professor at the Michigan State University, a high school physics teacher, and a project director in the aerospace industry. Dr. Fortus received his Ph.D. in Science Education at the University of Michigan.

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