

## **Workshop on 3-Dimensional Learning with a focus on using the crosscutting concepts as problem-solving lenses when developing explanations of phenomena**

Joe Krajcik and Helen Quinn

We will begin the workshop with brief introductory presentations that focus on how three dimensions of scientific knowledge requires the interweaving of scientific and engineering practices, disciplinary core ideas and the crosscutting concepts for students to apply to further develop their science learning and refine models of the system under study and reach satisfactory model-based explanations of phenomena. Although all three dimensions are critical for learners to make sense of phenomena or design solutions to problems, this workshop focuses on crosscutting concepts. We describe crosscutting concepts as major ideas that transverse disciplines and are important to all the science disciplines, and that serve as problem solving lenses when developing explanations of phenomena. During the workshop, participants will work in groups to analyze how to support students in using crosscutting concepts alongside science and engineering practices and disciplinary core ideas as they seek to explain various phenomena. We will present a series of focus phenomena to be analyzed for the ways in which various crosscutting concepts lead to questions that help illuminate aspects of the phenomena to be explained and help students to develop, revise and refine their models and explanations of phenomena. Participants will share their ideas and receive feedback from the Professors Quinn and Krajcik and other workshop participants.