

# DISCIPLINE-BASED EDUCATION RESEARCH

## National Research Council Report

### DBER

- Presents the breadth and depth of evidence documenting how research-based pedagogies strengthen student motivation, persistence, and achievement.
- Recognizes that in all disciplines, undergraduate students bring with them incorrect ideas and beliefs about fundamental concepts.
- Identifies several types of instructional strategies that have been shown to promote conceptual change, including:
  - Interactive lecture demonstrations
  - Socially-mediated learning environments
  - Open-ended problems
  - Interventions to promote metacognition
  - Advances in understanding and improving learning in undergraduate STEM education.

### ABOUT DBER

DBER is research that investigates teaching and learning in a discipline using a range of methods grounded in disciplinary priorities, world-view, knowledge, and practice. This research is informed by and complementary to:

- Cognitive science
- Educational psychology
- K-12 education research.

The DBER report is a collection of related research from individual disciplinary communities rather than from a single unified field. High-quality DBER combines expert knowledge of a STEM discipline, learning and teaching in that discipline, and the science of learning and teaching more generally.

This national report focuses on problem-solving, a key learning outcome driving most campus-based change initiatives. It examines problem-solving from three perspectives, as; i) a pedagogical approach; ii) an expectation of what learners should learn to do; and iii) as a skill that society expects of 21<sup>st</sup> century college graduates.

### WHY DBER?

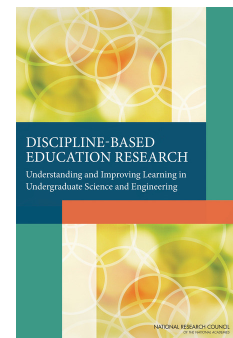
Society's most important problems are usually ill-defined in some way. These are the kinds of problems students will have to solve after they graduate. Students who have scant experience with ill-defined problems during their undergraduate education may be poorly prepared to grapple with the most significant problems in their field [upon graduation].

— DBER Report, p. 76.

*“DBER findings challenge us to implement instructional strategies that advance student learning. The proverbial “sage on the stage” is being replaced by the “guide on the side,” challenging our centuries old image of a lecture hall.*

*A beautiful, collaborative learning space that supports team learning can enhance effective pedagogies and inspire the best in students and faculty, alike. Without effective practices that include problem-driven/problem-based approaches, however, it is simply an aesthetic space. DBER resources provide a valuable resource for planners working to align form and function in new learning spaces.”*

— Susan Singer, Chair–NRC Committee on the status, contributions, and future directions of discipline-based education research; VP for Academic Affairs and Provost–Rollins College



#### RESEARCH & RESOURCES

- <https://serc.carleton.edu/NAGTWorkshops/DBER.html>

