POWER

Photonics and Optics Workforce Education Research

www.rit.edu/power

NSF
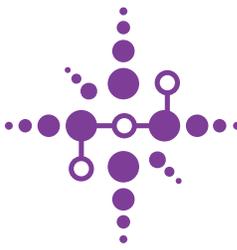
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What is SMERC?
The Science and Mathematics Education Research Collaborative (SMERC) is a multi-disciplinary group of faculty conducting research in physics, biology, chemistry, biochemistry, and mathematics education research.

SMERC Mission
SMERC conducts discipline-based education research, assessment, and curriculum development at the highest levels of rigor, embodied by national dissemination (publications and presentations) and external funding. It also serves as an agent for culture change in the College of Science toward evidence-based teaching practice.

What is DBER?
Discipline-Based Education Research (DBER) combines knowledge of teaching and learning with deep knowledge of discipline-specific science content. It describes the discipline-specific difficulties learners face and the specialized intellectual and instructional resources that can facilitate student understanding (National Research Council)

Uniting STEM Workforce Development and Education Research

POWER Mission
POWER works to unite workforce development with education research by conducting education studies situated in real STEM workplaces. Using rigorous evidence to support finding, POWER aims to inform policy decisions on a regional and national level. POWER translates workforce development issues back to academia and higher education. It also acts as a liaison to unite varied communities interested in education and workforce development (STEM and Social Science faculty, workforce advocates, education researchers, policy makers).

About POWER
POWER is an interdisciplinary team of researchers in Science Education, Physics, Communication and Adult Education. POWER conducts studies with rich qualitative and quantitative data from interviews, observations, and surveys to provide in-depth insights.
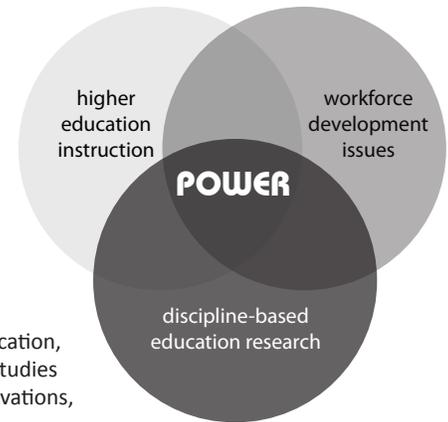
Rochester Photonics Workforce Development
NSF DGE-1432578

This project explores the photonics workforce and how entry-level employees transfer their knowledge of math, physics, and communication skills into their entry-level positions. POWER stands out among other education and workforce studies by expanding beyond short surveys of corporate executives to include an in-depth analysis of the experiences of employees and their supervisors.

We are looking specifically at (1) how employees use math, physics and communication skills in the workplace (2) how employers evaluate competency in these skills (3) differences in required training for PhD-level academic researchers versus engineers in industry and (4) the ways that higher education and on-the-job training combine for STEM workforce development.

Through these efforts, POWER will translate findings into concrete recommendations for higher education and the private sector that will collaboratively support Rochester's photonics workforce.

National 21st Century Skills in STEM Jobs
NSF DGE-1561493 | Collaborative with University of Wisconsin, Madison DGE-1561686

This project looks at perspectives on 21st century skills and investigates:

1. How do educators and employers define, value, and incorporate into instruction and workplace training the essential 21st century competencies of collaboration, problem solving, communication, and self-regulated learning?
2. To what degree do students engage in these competencies in the classroom?
3. How do students and employees define, value, and think they are learning about these skills?
4. What is the nature of cross-sector relations between education and industry in each region? and
5. Which individual, organizational, and sectoral factors influence whether (a) these skills are cultivated in school and/or work, and (b) active learning techniques are utilized?

The study sample includes:

4 – 21st Century Competencies: Collaboration, Communication, Problem Solving, and Self-regulated Learning
4 – STEM Sectors: Photonics, Information Technology, Energy, and Advanced Manufacturing in
4 – Geographic Regions: Denver, Houston, Seattle, and Raleigh through
4 – Perspectives: Employers, Employees, Faculty, Students

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RIT's Center for Advancing Science/Mathematics Teaching, Learning & Evaluation

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