

Ph.D. in Engineering Education Systems and Design (EESD)

Arizona State University



We are risk takers, entrepreneurs, makers, and scholars: **join our ecosystem of innovation.**

engineering.asu.edu/eesd

Institute for STEM and Diversity Initiatives

- Advocating for and nurturing underrepresented student and faculty success inside and beyond the classroom
- Conducting and catalyzing STEM educational research

IDoTeach

- Incorporating engineering in a pre-service STEM teacher education program
- Developing a streamlined engineering degree pathway to facilitate undergraduate engineering majors teaching in the K-12 classroom

NSF Funded STEM Education Projects

- STEP, WIDER, REU, RET, S-STEM, I³

<http://stem.boisestate.edu>
donnallewellyn@boisestate.edu

<http://idoteach.boisestate.edu/>
noahsalzman@boisestate.edu

Clemson University Engineering & Science Education PhD and Certificate Programs



- The CU Engineering & Science Education Department offers a unique experience with engineering education research and science education research in one program.
- The ESED learning community provides strong mentoring, colleagues passionate about their research, and engagement with projects encompassing social capital, motivation, mathematical success, retention, self-efficacy, international experiences, and sustainability education.
- Contact ESEGradinquiries@Clemson.edu



Engineering Education Research at the University of Georgia

Contacts:

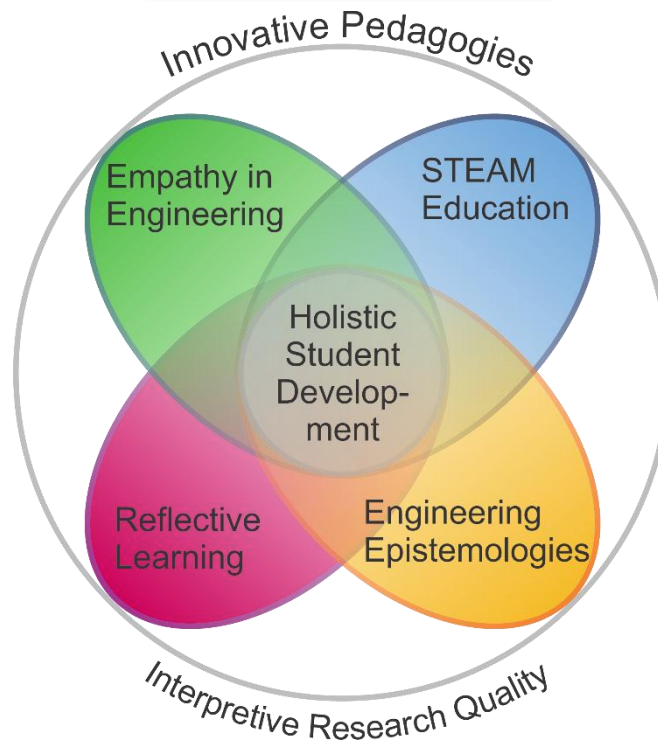


Dr. Jo Walther
jwalther@engr.uga.edu

We are a transdisciplinary, collaborative group that uses interpretive research methods to investigate diverse aspects of engineering education.



Research Areas:



Dr. Nicki Sochacka
sochacka@uga.edu

We include students as partners in research projects in a transdisciplinary, dynamic process of mutual learning and shared discovery.

Ask us about:





Discovery Research K-12
Award #0822241, 2009-2014



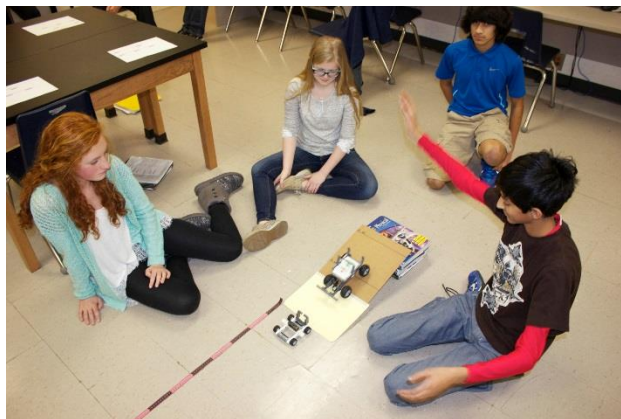
Georgia Tech's Center for Education Integrating Science, Mathematics & Computing (CEISMIC)

PI: Dr. Marion Usselman

**SLIDER integrates project-based inquiry
learning and robotics into two middle
school physical science unit:**

The Accident Challenge: Energy

The Braking Challenge: Force & Motion



Aligns with NGSS
Disciplinary Core Ideas &
Practices



Uses engineering challenges
to engage and support
student learning



Emphasizes evidence-based
decision-making and
argumentation



Features LEGO robotic kits to
drive design and engagement

www.slider.gatech.edu

Research & Curriculum
Available at Our Site



PH.D. ENGINEERING - ENGINEERING EDUCATION CONCENTRATION PH.D. COMPUTATIONAL ANALYSIS AND MODELING

Director:

Katie Evans – Mathematics and Statistics

Associate Directors:

Marisa Orr – Mechanical Engineering

Galen Turner – Mathematics and Statistics

Engineering Education Concentration Director:

Kelly Crittenden – Mechanical Engineering

ISERC Members:

Mitzi Desselles – Psychology and Behavioral Sciences

Jean Gourd – Computer Science, Cyber Engineering

David Hall – Mechanical Engineering

Kathleen Johnston – Physics

Patrick O'Neal – Biomedical Engineering

Michael Swanbom – Mechanical Engineering

Heath Tims – Mechanical Engineering



Katie Evans



Marisa Orr



Michael
Swanbom

← Look for us here at ASEE!

U271I Online, open-source homework in engineering

M715 Assessing the Effect of Online Homework on Student Learning in First Circuits Course

T638B Attracting, Developing, and Retaining Diverse Talent in Mechanical Engineering

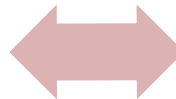
W429A Student Demographics and Outcomes in Industrial Engineering

UNIVERSITY OF
LOUISVILLE

J.B. Speed School of Engineering @ University of Louisville



**Center for Teaching
and Learning
Engineering**



**Engineering
Education Research
Group**

Centre for Engineering Education (CEE) Universiti Teknologi Malaysia (UTM)

Activities of CEE

- Rigorous research in engineering education – grants, collaborations, publications, & PhD program
- Training on innovative T&L, and conducting research in engineering education → mentoring champions
- Host conferences, workshops, and Innovative Practices in Higher Education Expo (IPHEX)

Transforming engineering education through innovative evidence-based practices

- Focus on training and research in Engineering Education
- PhD in Engineering Education program
 - Started in 2008
 - Up till now, 13 students completed PhD
 - Current enrolment: 40 students
- Also: Joint PhD in Engineering Education with Aalborg University, Denmark
- Post-doctoral and faculty position available



Contact:

khairiyah@cheme.utm.my

<http://tree.utm.my>



CREATE for STEM Institute

create4stem.msu.edu

Mark Urban-Lurain

Associate Director, Engineering Education

urban@msu.edu

- **C**ollaborative **R**esearch in **E**ducation, **A**ssessment and **T**eaching **E**nvironments for the fields of **S**cience, **T**echnology, **E**ngineering and **M**athematics
- Goal: improve STEM teaching and learning from grades K-16 through interdisciplinary research and development
- Research Areas:
 - Creating and Investigating Change in K-16 STEM Education
 - Educational Policy in STEM fields
 - Discipline-Based Undergraduate STEM Education
 - Developing Innovative and Digital Materials
 - International Engagement with the Global STEM Education Community



- Four tenured/tenure-track **EER faculty** to be integrated into traditional engineering departments



Shanna Daly

Assistant Professor
Mechanical Engineering



Cindy Finelli

Associate Professor
*Electrical Engineering &
Computer Science; Education*



Aileen Huang-Saad

Assistant Professor
Biomedical Engineering



Joi Mondisa

Assistant Professor
*Industrial & Operations
Engineering*

- EER certificate** available for engineering PhD students
- EER PhD program** being developed
- 37 **EER presentations** at ASEE by 51 UM authors



eerprogram@umich.edu

STEM



EDUCATION CENTER

 UNIVERSITY OF MINNESOTA

STEM Initiatives



Learning and Cognition



STEM Integration



P12 Instructor &
Curriculum Development



Evaluation and Assessment

The **STEM (Science, Technology, Engineering, & Mathematics) Education Center** is dedicated to conducting high quality research and disseminating findings in meaningful ways to influence STEM education on a global scale.

Highlighted Projects



I-Corps™ for Learning

www.asee.org/i-corps-l



 DEPARTMENT OF
Curriculum & Instruction

STEM Education Doctor of Philosophy (Ph.D.)

This integrated-style program is one of the first in the nation, and is designed to prepare scholars to conduct thoughtful disciplinary and interdisciplinary research in STEM education in order to assume roles as university faculty members, educational leaders, policy makers, and researchers.

Learn more at www.cehd.umn.edu/stem



Department of Engineering Education



Faculty News:

- Welcome Assistant Professors David Delaine & Rachel Kajfez!
- Ongoing recruitment of tenure track and clinical faculty

Graduate:

- Engineering Education PhD, MS Programs under development

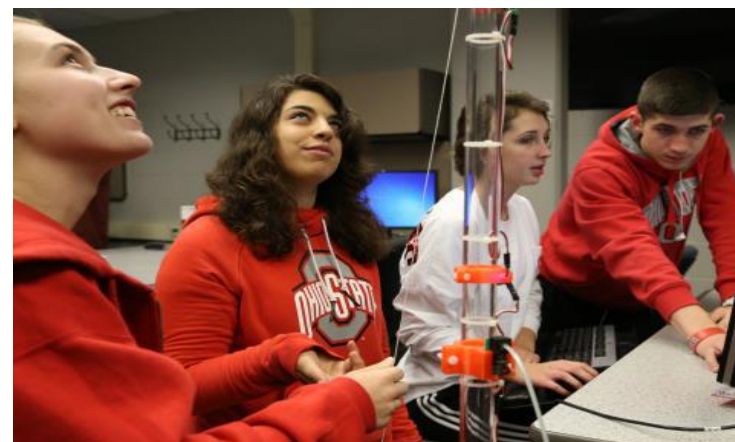
Contact: Dr. Ann Christy, Graduate Chair, Professor christy.14@osu.edu

Dr. Monica F. Cox, Department Chair, Professor cox.1192@osu.edu

Undergraduate:

- First-Year Engineering Program (2300 students)
- Multidisciplinary Capstone
- Engineering Technical Communication
- Integrated Business and Engineering 4-year program
- Engineering Sciences Minor

Contact: Dr. Lisa Abrams, Associate Chair abrams.34@osu.edu



Find us at <https://eed.osu.edu/>
Twitter & Instagram: @OhioStU_EED

The Leonhard Center for the Enhancement of Engineering Education

25 years of Excellence in Engineering Education

Mission

- Catalyze and support innovative teaching, learning, and assessment to ensure that Penn State delivers world-class engineering education
- Develop and disseminate innovative approaches to address challenges faced by engineering undergraduates, graduate students, staff, and faculty

Current strategic focus areas

1. Enhancing ethics education for graduate and undergraduate students
2. Evidence-based strategies to increase engagement
3. Assessment of learning environment
4. Elevating writing and presenting skills of graduate and undergraduate students



For more information:

Contact Tom Litzinger at tal2@psu.edu or visit www.engr.psu.edu/leonhardcenter



Tom Litzinger
Center Director



Michael Alley
Director, Engineering Communications



Sarah Zappe
Director, Assessment & Instructional Support



Stephanie Cutler
Assessment & Instructional Support Specialist



PennState
College of Engineering



ENGINEERING EDUCATION RESEARCH CENTER

A Center of the Swanson School of Engineering

PROFESSIONAL DEVELOPMENT
ENGINEERING ED COMMUNITY

[WHO WE ARE](#)[WHAT WE DO](#)[RESEARCH](#)[CONNECTIONS](#)[EVENTS/NEWS](#)

Advance Engineering Education through Research

The Engineering Education Research Center was established in 2011 to expand engineering education research and produce new approaches to learning that engage students.

Upcoming Events

[+ VIEW DETAILS](#)
[+ REGISTER NOW](#)

Workshop: How to Engineer Engineering Education (July 13, 2016)

07-13-2016 | 8:30 AM | TBD

A little overview of Mike Prince and the workshop... Mike is a professor of Chemical Engineering at ... [Learn more](#)

[+ VIEW DETAILS](#)
[+ REGISTER NOW](#)

Workshop: How to Engineer Engineering Education (July 14, 2016)

07-14-2016 | 8:30 AM | TBD

A little overview of Mike Prince and the workshop... Mike is a professor of Chemical Engineering at ... [Learn more](#)

PURDUE UNIVERSITY **PhD in ENGINEERING EDUCATION**

WE RESEARCH **HOW ENGINEERING IS
BEST**

**TAUGHT
LEARNED
PRACTICED**

First PhD Program

26 Faculty

32 Staff

60 PhD students

66 graduates

State-of-the-Art Research Lab

GRADUATE OPEN HOUSE
OCTOBER 28-29, 2015

- * Learn about our PhD program
- * Meet our faculty and students
- * Attend our weekly research seminar
- * Tour the campus and facilities

purdue.edu/ENE/InfoFor/GraduateStudents

PURDUE
UNIVERSITY

ENGINEERING EDUCATION

BIG
QUESTIONS
IN ENGINEERING
**EDUCATION
RESEARCH**

WHO
WHO BECOMES AN ENGINEER?

HOW
HOW CAN WE BEST SUPPORT ENGINEERING LEARNING?

WHEN
WHEN DO PERSONS BECOME ENGINEERS?

WHAT
WHAT IS ENGINEERING AND WHO DECIDES?

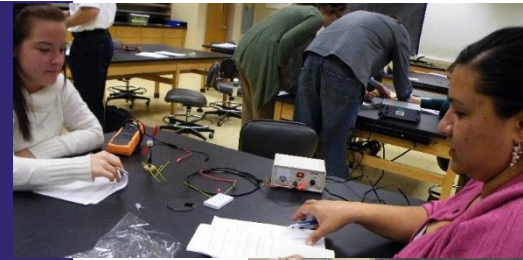
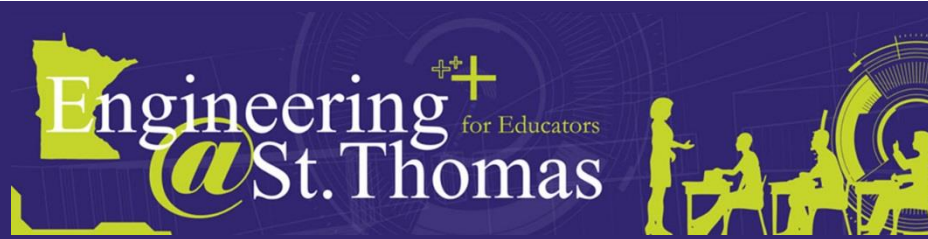


Center for the Practice and Scholarship of Education

Improving engineering education by:

- ✓ **supporting faculty working to improve student learning and enhance instructional effectiveness**
- ✓ **assisting faculty engaged in educational scholarship and assessment**
- ✓ **facilitating the sharing of ideas and practices within the Institute and the larger educational community,**
- ✓ **promoting faculty development nationwide through the Making Academic Change Happen workshop (MACH)**





The Center for Engineering Education (CEE) is a partnership between the **University of St. Thomas' Schools of Engineering and Education**

The **UST Center for Engineering Education** offers:

- a **graduate certificate** in Engineering Education
 - an **undergraduate minor** in Engineering Education
 - professional development **workshops**
-



The mission of CEE is to prepare future and current P-12 educators to teach **integrated STEM education with an engineering focus.**



<http://www.stthomas.edu/cee/>

Director: Dr. AnnMarie Thomas aphomas@stthomas.edu

STEM Education

Master's & PhD Programs (97 students total)

Past and Current Research

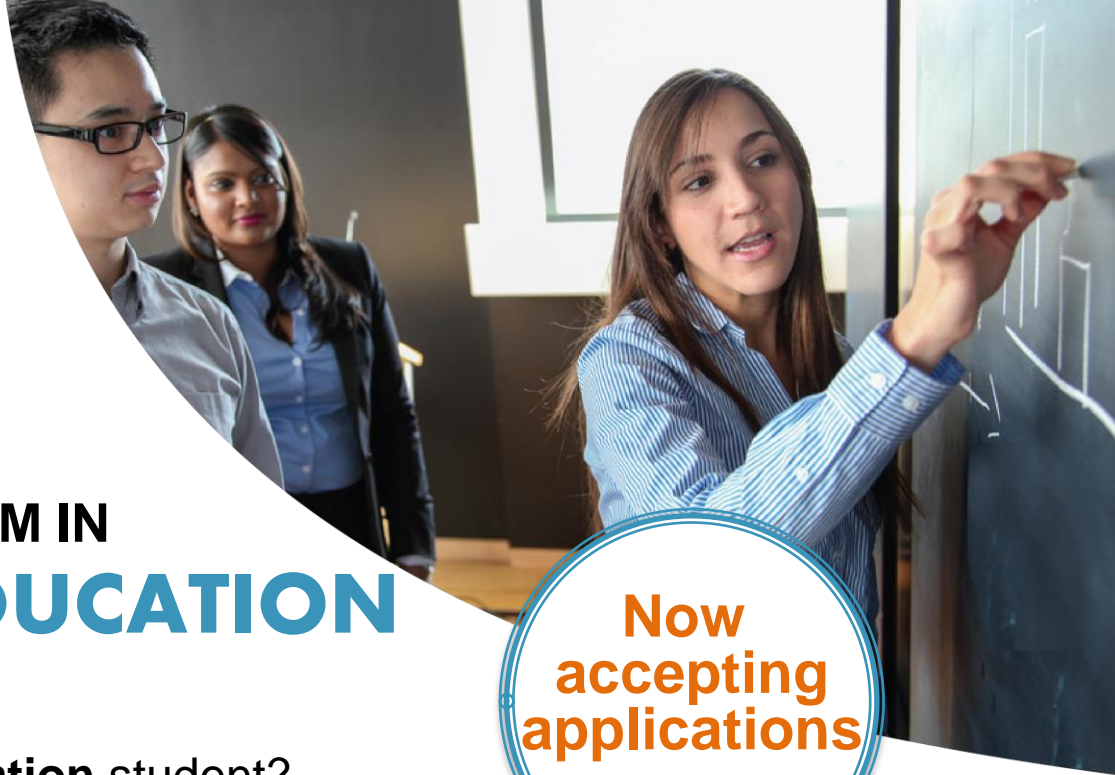
UTeach Engineering (NSF-MSP)
Beyond Blackboards (NSF-ITEST)
VaNTH (NSF-ERC)
Teacher Training for Engineering
IPRO - Programming Standing Up
Adaptive Expertise in Engineering
K-12 LEGO Robotics
Discourse in K-12 engineering teams
National HS Curriculum Project

Faculty

David Allen (Chem Eng)
Leema Berland (STEM-Ed)
Richard Crawford (Mech Eng)
Ken Diller (BioEng)
Jill Marshall (STEM-Ed)
Anthony Petrosino (STEM-Ed)
Catherine Riegler-Crumb (STEM-Ed)



UNIVERSITY OF TORONTO
FACULTY OF APPLIED SCIENCE & ENGINEERING



COLLABORATIVE PROGRAM IN **ENGINEERING EDUCATION**

Are you an **engineering** or **education** student?

Want to enrich your degree with research and training in **engineering education**?

Now
accepting
applications



Offered at the **Master's and Ph.D. levels** through the ***Faculty of Applied Science & Engineering*** and the ***Ontario Institute for Studies in Education***.

Contact:

Natalie Leung, natalieyl.leung@utoronto.ca | www.gradstudies.engineering.utoronto.ca



Mission: Improving Education through Engineering

- An interdisciplinary center that includes faculty in engineering, education, child development and computer science.
- Ongoing research in engineering teaching and learning, outreach, and educational technology development.
- Highlighted projects:
 - Novel Engineering: Integrating Engineering and Literacy*
 - Interactive Learning and Collaboration Environment (InterLACE)*
 - OKEE - Online K-12 Engineering Education program*
- *Ph.D. and M.S. in Engineering Education (in cooperation with Tufts Department of Education)*

Education
Research

Engineering
Research

Outreach

Engineering Education



Graduate Program

Graduate students in this vital and emerging field, have the opportunity to become involved in cutting-edge engineering education research, such as:

- Teaching and learning strategies
- Cognition and metacognition in engineering education
- Problem solving and framing
- K-12 engineering education

About the Program

- Ph.D. Program started in 2008
- 8 Engineering Education Faculty
- 15 Ph.D. Graduate Students



For more information: www.eed.usu.edu



Graduates of the program will have the knowledge to:

- Conduct and direct research in engineering education
- Develop, review and critique effective research designs
- Effectively teach engineering subjects
- Design and assess engineering courses
- Address critical issues facing engineering education

Fast Facts:

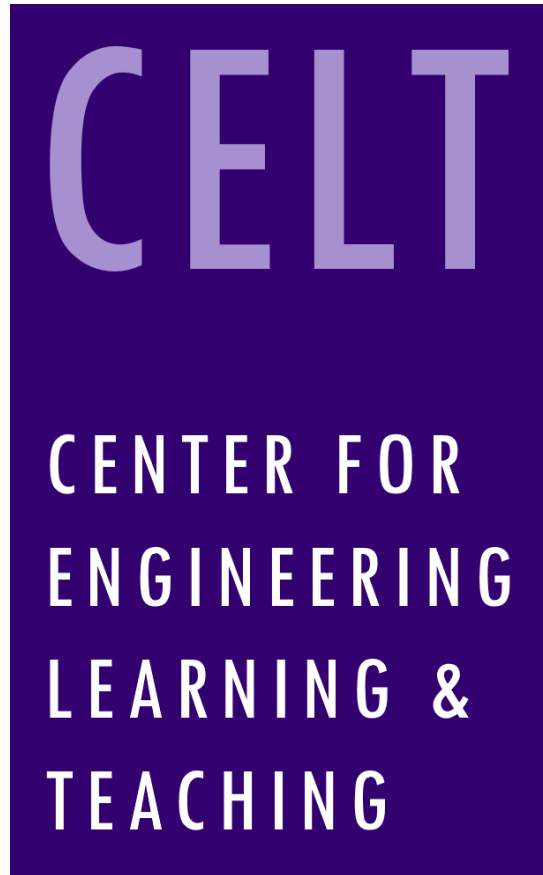
- Ph.D. began in 2008
- 21 Faculty
- 31 PhD Graduate Students
- 6 NSF Career Awardees
- 1 PECASE Award
- 2 NSF GRFP Awardees

Funding

Generous Funding is available to incoming students and current students with satisfactory degree progress

Application & more information

www.enge.vt.edu



Center for Engineering Learning & Teaching

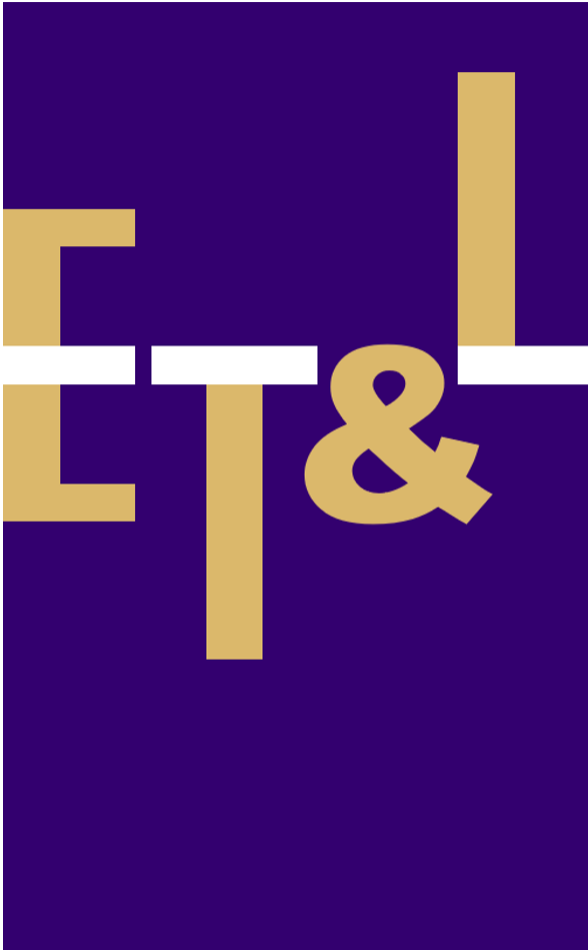
Main goals

- Conduct internationally recognized research in research in engineering learning
- Connect research-and-practice to effect change change in engineering education

Significant recent accomplishments

- The UW College of Engineering institutionalized the CELT faculty development model (see ET&L¹).
- A consortium of 12 schools across the country (CPREE) advanced the use of reflection reflection of engineering learning contexts.
- Over forty engineering education pioneers stories provide compelling narratives to energize energize future generations of scholars.





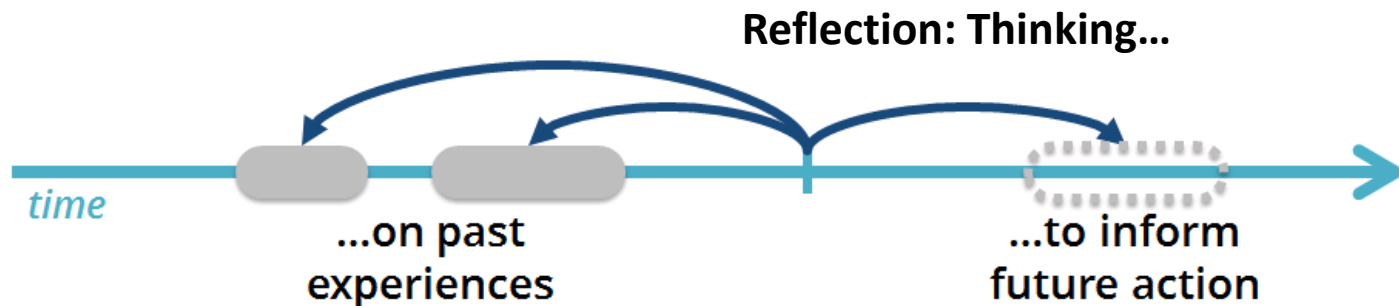
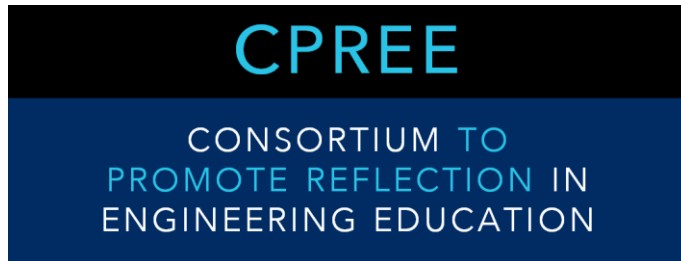
OFFICE FOR THE ADVANCEMENT OF ENGINEERING TEACHING & LEARNING

ET&L is a new organization with a long history, previously the instructional development wing of CELT, the Center for Engineering Learning & Teaching.

Our services include...

- One-to-one consultations
- Formative course assessments
- Faculty workshops
- In-class presentations
- Learning communities
- Education resources and expertise

Jim Borgford-Parnell, Director & Instructional Consultant
Ken Yasuhara, Instructional Consultant



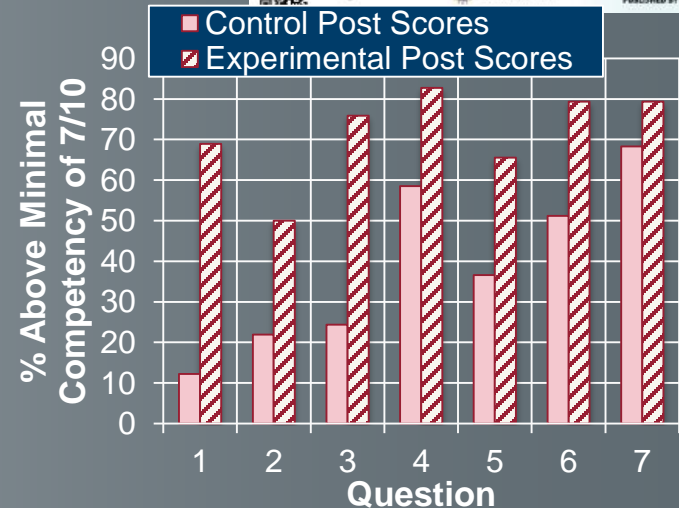
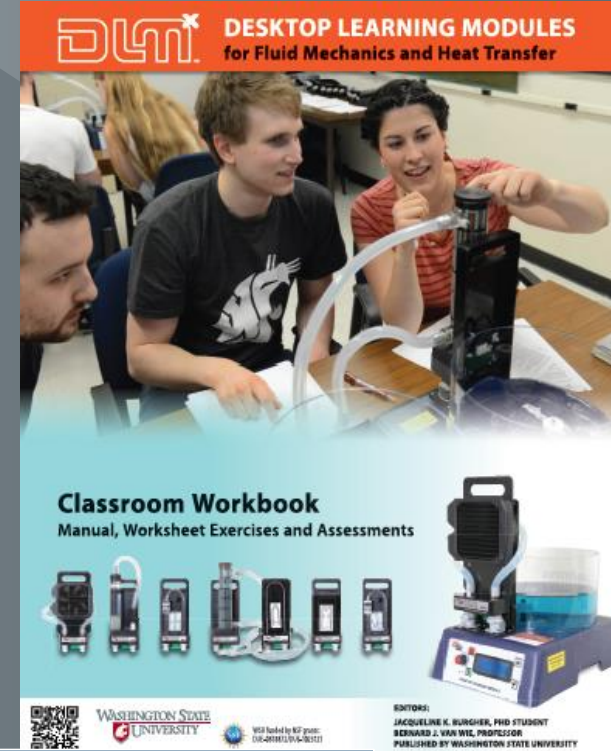
Goals:

1. Cataloguing 120 examples of reflection activities in engineering education across 12 campuses
2. Promoting more reflection in engineering education—to date, 57,000+ student reflection experiences and 1,000+ educator experiences



Engineering Education Research at Washington State University

- Hands-On Active Learning with Desktop Learning Modules (bvanwie@wsu.edu)
 - B. Van Wie, R. Richards, P. Dutta, D. Thiessen, O. Adesope
- Cataloging and Characterizing Engineering Education Assessments (denny.davis@wsu.edu)
 - D. Davis, H. Davis, M. Trevisan, B. French, J. LeBeau
<http://assess.tidee.org>
- Human-centered Environments for Learning and Programming (hundhaus@wsu.edu)
 - C. Hundhausen, R. Zollars
<http://helplab.org/>
- Exploring Social Programming Environments in Early Computing Courses (hundhaus@wsu.edu)
 - C. Hundhausen, O. Adesope





GLOBAL
ENGINEERING EDUCATION
RESEARCH & INNOVATION



Careers in Engineering Education

Mentors for junior faculty

Career Supporters
(P&T and more...)

Academic Administration

Beyond the Academy

- ❖ *Industry (various)*
- ❖ *Informal Education*
- ❖ *Professional Societies*
- ❖ *Policy Development*
- ❖ *Social Entrepreneurship*

Global Opportunities

David F. Radcliffe
Purdue University



GLOBAL
ENGINEERING EDUCATION
RESEARCH & INNOVATION



Engineering Education Community Resource

A web catalog for the international engineering education community, including...

- Degree programs and centers
- Societies, conferences, and journals
- Job listings

<http://bit.ly/engredu>

