Global Perspectives on Engineering Education Research (EER) and Engineering Education Innovation (EEI)

Adapted from the ASEE EER&I Networking Sessions in partnership with the
Rigorous Research in Engineering Education Initiative
(DUE 0817461)
http://CLEERhub.org

Fourth International Workshop (EEI2013) – January 10, 2013 – Jeju Island, South Korea

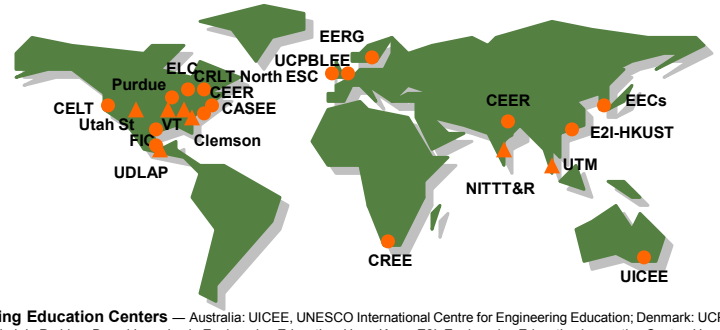
Facilitated By

Karl A. Smith
Purdue University and
University of Minnesota

Ruth A. Streveler
Purdue University

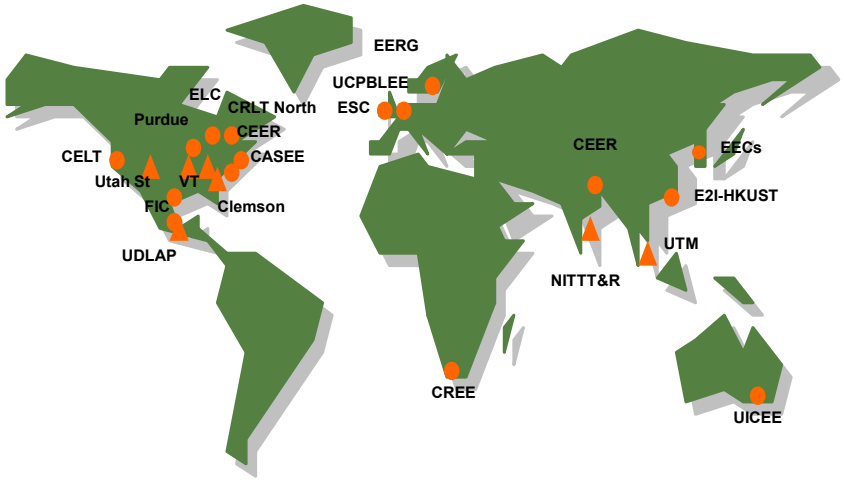
Slides posted - http://www.ce.umn.edu/~smith/links.html

Groups, centers, departments…

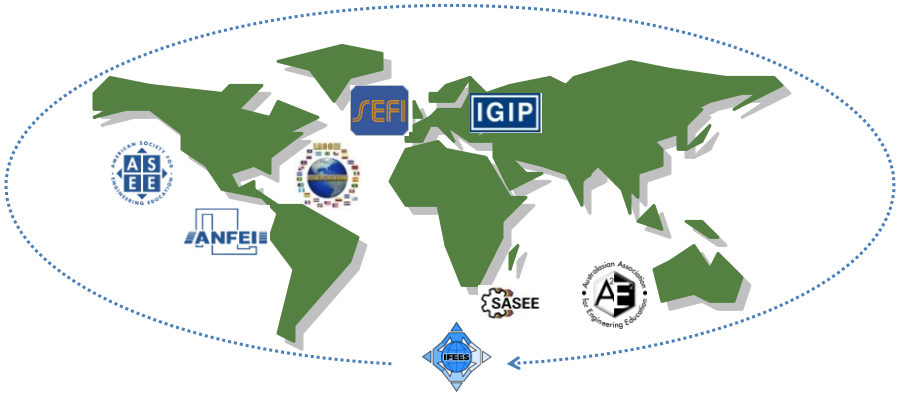


- **Engineering Education Centers** — Australia: UICEE, UNESCO International Centre for Engineering Education; Denmark: UCPBLEE, UNESCO Chair in Problem Based Learning in Engineering Education; Hong Kong: E2I, Engineering Education Innovation Center, Hong Kong University of Science and Technology; Pakistan: Center for Engineering Education Research, NUST, National University for Science and Technology; South Africa: CREE, Centre for Research in Engineering Education, U of Cape Town; Sweden: Engineering Education Research Group, Linköping U; UK: ESC, Engineering Subject Centre, Higher Education Academy; USA: CELT, Center for Engineering Learning and Teaching, U of Washington; CRLT North, Center for Research on Learning and Teaching, U of Michigan; Faculty Innovation Center, U of Texas-Austin; Engineering Learning Center, U of Wisconsin-Madison; CASEE, Center for the Advancement of Scholarship in Engineering Education, National Academy of Engineering; EEIC, Engineering Education Innovation Center, Ohio State University; CEER, Center for Engineering Education Research, Michigan State University.
- **Engineering Education Degree-granting Departments** — USA: School of Engineering Education, Purdue U; Department of Engineering Education, Virginia Tech; Department of Engineering and Science Education, Clemson U; Department of Engineering and Technology Education, Utah State U; Malaysia: Engineering Education PhD program, Universiti Teknologi Malaysia; India: National Institute for Technical Teacher Training and Research; Mexico: Universidad de las Americas, Puebla

Groups, centers, departments…



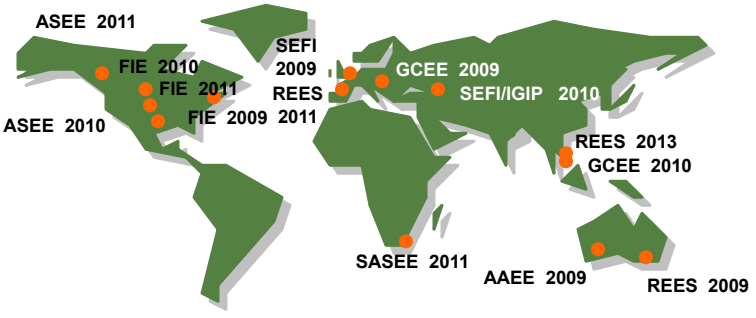
Engineering education societies…



Societies with Engineering Education Research Groups — ASEE, American Society for Engineering Education, Educational Research Methods Division; SEFI, Société Européenne pour la Formation des Ingénieurs (European Society for Engineering Education), Engineering Education Research Working Group; Australasian Association for Engineering Education, Engineering Education Research Working Group; Community of Engineering Education Research Scholars, Latin America and Caribbean Consortium for Engineering Institutions

Societies with Engineering Education Research Interests — Indian Society for Technical Education, Latin American and Caribbean Consortium of Engineering Institutions, Asociación Nacional de Facultades y Escuelas de Ingeniería (National Association of Engineering Colleges and Schools in Mexico), Internationale Gesellschaft für Ingenieurpädagogik (International Society for Engineering Education), International Federation of Engineering Education Societies, South African Engineering Education Association (SASEE)

Forums for dissemination…



Conferences with engineering education research presentations:

- **ASEE** — Annual Conference, American Society for Engineering Education, see www.asee.org
- **AAEE** — Annual Conference, Australasian Association for Engineering Education, see www.aaee.com.au
- **FIE** — Frontiers in Education, sponsored by ERM/ASEE, IEEE Education Society and Computer Society, /fie-conference.org/erm
- **GCEE** — Global Colloquium on Engineering Education, sponsored by ASEE and local partners where the meeting is held, see www.asee.org
- **SEFI** — Annual Conference, Société Européenne pour la Formation des Ingénieurs , see www.sefi.be
- **REES** — Research on Engineering Education Symposium, rees2009.pbwiki.com/
- **SASEE** – South African Society for Engineering Education,

VIEW EDIT

Engineering Education Departments and Programs (Graduate)

(redirected from Engineering-Education-Degree-and-Certificate-Programs)

last edited by Elliot Douglas 2 months, 3 weeks ago

Page history

1. Engineering/STEM Education Graduate Programs
2. Engineering Education-Related Certificate Programs
3. Innovative Engineering and Inter/Cross-Disciplinary Programs

<Home

Engineering/STEM Education Graduate Programs

Institution	Program	Degrees Awarded
Arizona State University	Mary Lou Fulton Teachers College	M.Ed. Educational Technology Ph.D. in Curriculum and Instruction with concentration in Engineering Education (more info) Ph.D. in Educational Technology Ph.D. in Educational Technology with concentration in Arts, Media, and Engineering
	Ira A. Fulton School of Engineering	Ph.D. Aerospace Engineering with concentration in Engineering Education Ph.D. Mechanical Engineering with concentration in Engineering Education
University of California - Berkeley	Studies in Engineering, Science, and Mathematics (SESAME) Education	M.A. Technology, Science, or Math Education, Ph.D. Technology, Science, or Math Education
Chalmers University of Technology (Sweden)	Department of Applied Information Technology	Licentiate Engineering Education Research Ph.D. Engineering Education Research
University of Cincinnati	School of Engineering Education (SEE)	
Clemson University	Department of Engineering and Science Education	Ph.D. Engineering or Science Education
University of Kentucky	College of Education - Department of Science, Technology, Engineering, and Mathematics	Ph.D. Science, Technology, Engineering and Mathematics Education
Linköping University (Sweden)	Engineering Education Research Group	Ph.D. Engineering Education Research
The College of New Jersey	School of Engineering - Department of Technological Studies	M.A.T. in Secondary Education - Technology Education
Niagara University	College of Education	M.S. Ed. Math, Science, and Technology Education
North Carolina State University	College of Education - Department of Science, Technology, Engineering, and Mathematics Education	M.S. and M.Ed. Program in Technology Education Ed.D. Program in Technology Education
Old Dominion University	Darden College of Education - Department of STEM Education & Professional Studies	M.S. Engineering - Modeling and Simulation

http://tinyurl.com/engredu

Engineering Education Research Networking Session

Connecting and Expanding the Engineering Education Research (EER) and Engineering Education Innovation (EEI) Communities

ASEE Headquarters Session T106D in partnership with the
Rigorous Research in Engineering Education Initiative
(DUE 0817461)
http://CLEERhub.org

ASEE Annual Conference – June 12, 2012 – T106D – 7:00 am – 8:30 am

Facilitated By

Karl A. Smith
Purdue University and
University of Minnesota

Ruth A. Streveler
Purdue University

Slides posted - http://www.ce.umn.edu/~smith/links.html

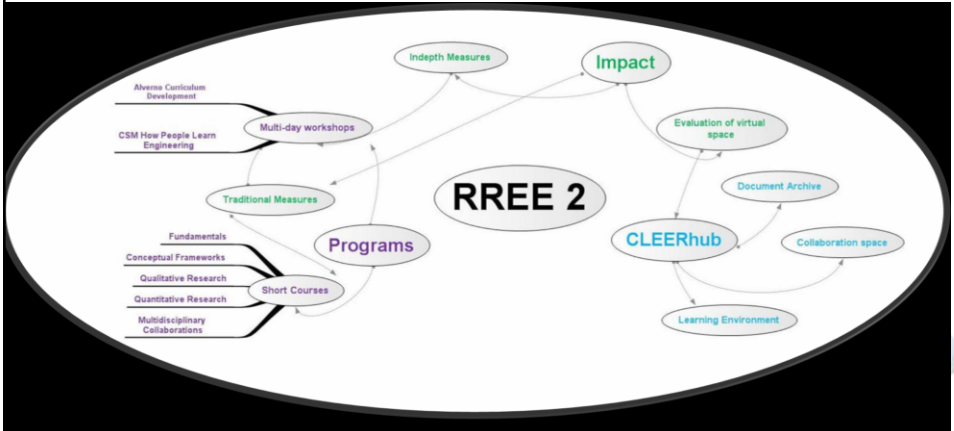
Activity	Time Allotted
Introduction of session and facilitators	5
Brief report on status of EER & EEI	
Update on RREE – CLEERHub.org (Collaboratory for Engineering Education Research)	10
Update on EER – NRC DBER report	5
Update on EEI – ASEE Innovation with Impact & NAE FOEE	10
Participant Networking	
Rapid introductions around guided questions – Four to five conversations in groups of 3 – as a way to meet many people	25
Identification of "intellectual neighborhoods" around research and innovation questions and opportunities – individual reflection and writing	5
Brainstorming on strategies to connect, expand, and sustain the emerging EER and EEI communities	10
Summary of ideas for (1) local, (2) national – conferences, etc. and (3) virtual community	5
Individuals share reflections with the large group, facilitators sum up the session and participants complete feedback forms	10

RIGOROUS RESEARCH in ENGINEERING EDUCATION

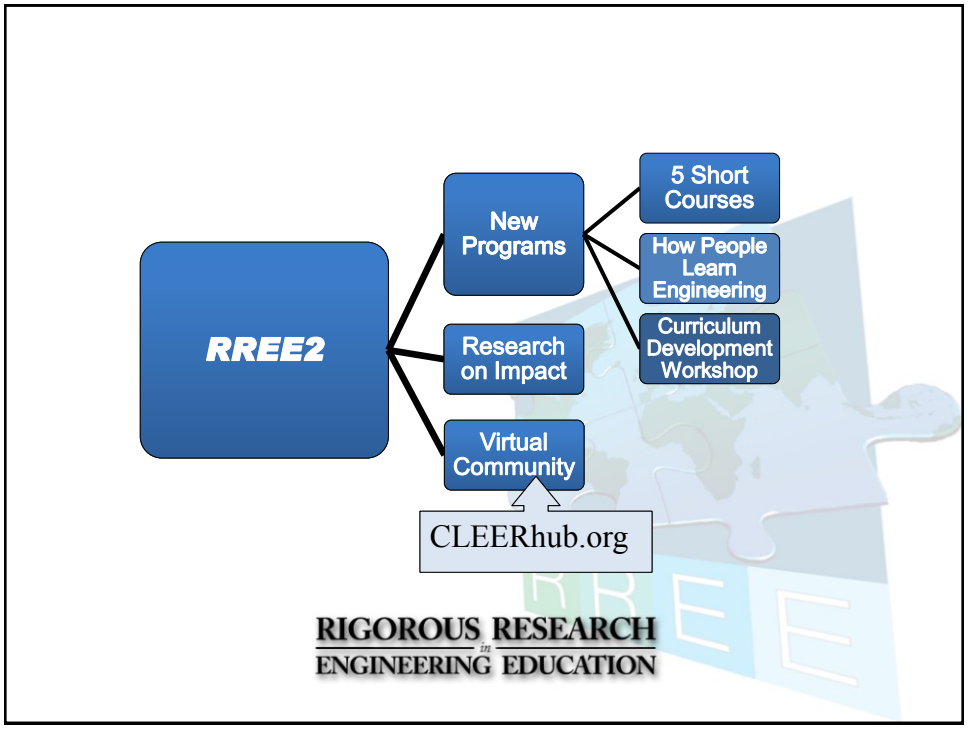
Funded by the National Science Foundation through awards DUE 0341127 and DUE 0817461

Expanding and sustaining research capacity in engineering and technology education: Building on successful programs for faculty and graduate students

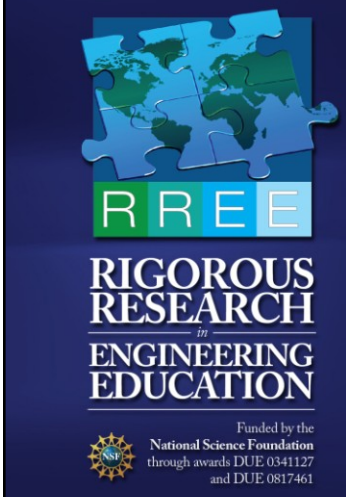
Collaborative partners: Purdue (lead), Alverno College, Colorado School of Mines, Howard University, Madison Area Technical College, National Academy of Engineering



RIGOROUS RESEARCH in ENGINEERING EDUCATION


RREE2
New Programs
Research on Impact
Virtual Community
5 Short Courses
How People Learn Engineering
Curriculum Development Workshop
CLEERhub.org
RIGOROUS RESEARCH IN ENGINEERING EDUCATION


CLEERHUB
Collaboratory for Engineering Education Research
Welcome to CLEERhub.org!
Getting Started in Educational Research
Guide Books
Rigorous Research in Engineering Education
Collaborate



CLEERhub
June 2012 Update

Objectives

- Explore available resources for your use.
- Share information about upcoming improvements.

RIGOROUS RESEARCH in ENGINEERING EDUCATION

CLEERhub's Vision & Mission

Vision:

- To be the leader in engineering education research content and collaborative opportunities.

Mission:

- Partnering with the community to develop engaging and useful content.
- Continually improving user experience with regards to information availability, platform ease of use, and tools that enable collaboration.

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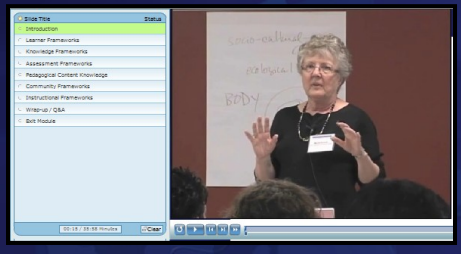
What's Available Now

Some of our most popular resources:

- Fundamentals of Engineering Education Research
- Qualitative and Quantitative Research Methods
- Exploring How People Learn Engineering



Example of a Learning Module.

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What's Coming Up

- Expanding accessibility by adopting the HTML 5 standard.
  - This enables users to access content via tablets and mobile devices.
- Self-scoring quizzes to help you gain insight into your understanding.

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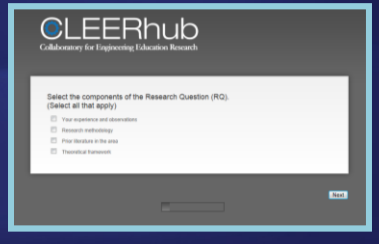
Self-Scoring Quizzes

- Many of our resources will have self-scoring quizzes to help you gain insight into your understanding.



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I Want More Information!

Request more info from your mobile phone.

Or...

Complete the request for more information from a computer. We've shortened the URL to make it easier to write down.

http://bit.ly/Lj3zb6

RIGOROUS RESEARCH IN ENGINEERING EDUCATION

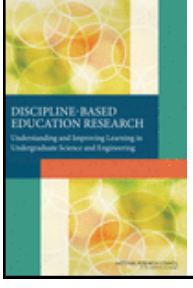
Recent Reports/Initiatives

- National Research Council Discipline-Based Education Research (DBER)
  - http://www.nap.edu/catalog.php?record_id=13362
- ASEE Innovation with Impact report
  - http://www.asee.org/about-us/the-organization/advisory-committees/Innovation-with-Impact
- NAE Engineering Education Research and Innovation Activities
- Froyd, J.E., Wankat, P.C. & Smith, K.A. (2012). Five major shifts in 100 years of engineering education. *Proceedings of the IEEE*
  - http://ieeexplore.ieee.org/stamp/stamp.jsp?arnumber=06185632

SCIENCE EDUCATION AT THE NATIONAL RESEARCH COUNCIL
www.nationalacademies.org/bose

Discipline-Based Education Research (DBER)

Understanding and Improving Learning in Undergraduate Science and Engineering



http://www.nap.edu/catalog.php?record_id=13362

Undergraduate Science and Engineering Education: Goals

- Provide all students with foundational knowledge and skills
- Motivate some students to complete degrees in science or engineering
- Support students who wish to pursue careers in science or engineering

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Undergraduate Science and Engineering Education: Challenges and Opportunities

- Retaining students in courses and majors
- Increasing diversity
- Improving the quality of instruction

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What is Discipline-Based Education Research?

- Emerging from various parent disciplines
- Investigates teaching and learning in a given discipline
- Informed by and complementary to general research on human learning and cognition

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Study Charge

- Synthesize empirical research on undergraduate teaching and learning in physics, chemistry, engineering, biology, the geosciences, and astronomy.
- Examine the extent to which this research currently influences undergraduate science instruction.
- Describe the intellectual and material resources that are required to further develop DBER.

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Committee on the Status, Contributions, and Future Directions of Discipline-Based Education Research

- **SUSAN SINGER** (Chair), Carleton College
- **ROBERT BEICHNER**, North Carolina State University
- **STACEY LOWERY BRETZ,** Miami University
- **MELANIE COOPER**, Clemson University
- **SEAN DECATUR**, Oberlin College
- **JAMES FAIRWEATHER**, Michigan State University
- **KENNETH HELLER**, University of Minnesota
- **KIM KASTENS**, Columbia University
- **MICHAEL MARTINEZ**, University of California, Irvine
- **DAVID MOGK**, Montana State University
- **LAURA R. NOVICK**, Vanderbilt University
- **MARCY OSGOOD**, University of New Mexico
- **TIMOTHY F. SLATER**, University of Wyoming
- **KARL A. SMITH**, University of Minnesota and Purdue University
- **WILLIAM B. WOOD**, University of Colorado

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Structure of the Report

- Section I. Status of Discipline-Based Education Research
- Section II. Contributions of Discipline-Based Education Research
- Section III. Future Directions for Discipline-Based Education Research

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Section I. Status of Discipline-Based Education Research

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Status of DBER: Goals

- Understand how people learn the concepts, practices, and ways of thinking of science and engineering.
- Understand the nature and development of expertise in a discipline.
- Help to identify and measure appropriate learning objectives and instructional approaches that advance students toward those objectives.
- Contribute to the knowledge base in a way that can guide the translation of DBER findings to classroom practice.
- Identify approaches to make science and engineering education broad and inclusive.

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Status of DBER: Types of Knowledge Required To Conduct DBER

- Deep disciplinary knowledge
- The nature of human thinking and learning as they relate to a discipline
- Students' motivation to understand and apply findings of a discipline
- Research methods for investigating human thinking, motivation, and learning

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Status of DBER: Conclusions

- DBER is a collection of related research fields rather than a single, unified field. (Conclusion 1)
- High-quality DBER combines expert knowledge of:
  - a science or engineering discipline,
  - learning and teaching in that discipline, and
  - the science of learning and teaching more generally.

  (Conclusion 4)

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Section II. Contributions of Discipline-Based Education Research

Contributions of DBER: Conceptual Understanding and Conceptual Change

- In all disciplines, undergraduate students have incorrect ideas and beliefs about fundamental concepts. (Conclusion 6)
- Students have particular difficulties with concepts that involve very large or very small temporal or spatial scales. (Conclusion 6)
- Several types of instructional strategies have been shown to promote conceptual change.

Contributions of DBER: Problem Solving and the Use of Representations

- As novices in a domain, students are challenged by important aspects of the domain that can seem easy or obvious to experts. (Conclusion 7)
- Students can be taught more expert-like problem-solving skills and strategies to improve their understanding of representations.

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Contributions of DBER: Research on Effective Instruction

- Effective instruction includes a range of well-implemented, research-based approaches. (Conclusion 8)
- Involving students actively in the learning process can enhance learning more effectively than lecturing.

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Section III. Future Directions for Discipline-Based Education Research

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Future Directions for DBER: Translating DBER into Practice

- Available evidence suggests that DBER and related research have not yet prompted widespread changes in teaching practice among science and engineering faculty. (Conclusion 12)
- Efforts to translate DBER and related research into practice are more likely to succeed if they:
  - are consistent with research on motivating adult learners,
  - include a deliberate focus on changing faculty conceptions about teaching and learning,
  - recognize the cultural and organizational norms of the department and institution, and
  - work to address those norms that pose barriers to change in teaching practice. (Conclusion 13)

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Future Directions for DBER: Recommendations for Translating DBER Into Practice

- **RECOMMENDATION:** With support from institutions, disciplinary departments, and professional societies, faculty should adopt evidence-based teaching practices.
- **RECOMMENDATION**: Institutions, disciplinary departments, and professional societies should work together to prepare current and future faculty to apply the findings of DBER and related research, and then include teaching effectiveness in evaluation processes and reward systems throughout faculty members' careers. (Paraphrased)

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Future Directions for DBER: Advancing DBER through Collaborations

- Collaborations among the fields of DBER, and among DBER scholars and scholars from related disciplines, although relatively limited, have enhanced the quality of DBER. (Conclusion 15)

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Future Directions for DBER: Research Infrastructure

- Advancing DBER requires a robust infrastructure for research. (Conclusion 16)
- **RECOMMENDATION**: Science and engineering departments, professional societies, journal editors, funding agencies, and institutional leaders should:
  - clarify expectations for DBER faculty positions,
  - emphasize high-quality DBER work,
  - provide mentoring for new DBER scholars, and
  - support venues for DBER scholars to share their research findings

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Future Directions for DBER: Some Key Elements of a Research Agenda

- Studies of similarities and differences among different groups of students
- Longitudinal studies
- Additional basic research in DBER
- Interdisciplinary studies of cross-cutting concepts and cognitive processes
- Additional research on the translational role of DBER

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Acknowledgements

- National Science Foundation, Division of Undergraduate Education (Grant No. 0934453)
- Various volunteers:
  - Committee
  - Fifteen reviewers
  - Report Review Monitor (Susan Hanson, Clark University) and Coordinator (Adam Gamoran, University of Wisconsin-Madison)
- Commissioned paper authors
- NRC staff (Natalie Nielsen, Heidi Schweingruber, Margaret Hilton)

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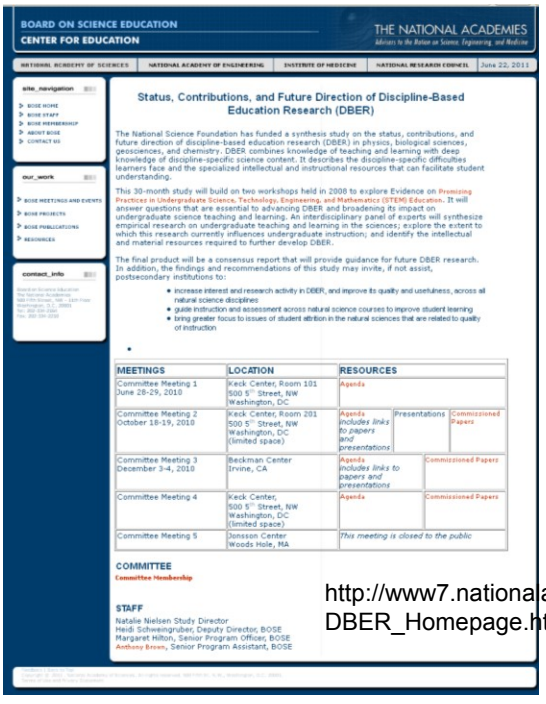

http://www7.nationalacademies.org/bose/DBER_Homepage.html

Emphasis on Innovation

- ASEE Innovation with Impact report
  - Excerpt from Presentation by Leah Jamieson, Dean, College of Engineering, Purdue
- NAE Engineering Education Research and Innovation Activities
  - Briefing by Beth Cady, Program Officer, Engineering Education, National Academy of Engineering

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ASEE Reports - A Path Forward

Seven Recommendations for Innovation with Impact

Who

1. Grow professional development in teaching and learning.
2. Expand collaborations.

What

3. Expand efforts to make engineering more engaging, relevant, and welcoming.

How

4. Increase, leverage, and diversify resources for engineering teaching, learning, and innovation.
5. Raise awareness of proven practices and of scholarship in engineering education.

Seven Recommendations for Innovation with Impact *(continued)*

Creating a Better Culture

To measure progress in implementing policies, practices, and infrastructure in support of scholarly and systematic innovation in engineering education:

6. Conduct periodic self-assessments in our individual institutions.
7. Conduct periodic community-wide self-assessments.

National Academy of Engineering

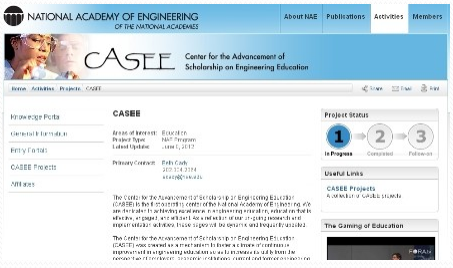
Engineering Education Research and Innovation Activities

Beth Cady
Program Officer, Engineering Education
ecady@nae.edu

Center for the Advancement of Scholarship on Engineering Education

- Created to foster continuous improvement
- Extensive set of resources at www.nae.edu/casee
  - Research-to-Practice documents
  - Meeting agendas and reports of CASEE projects
  - Equity-related resources
  - Videos
  - Summaries

- Please help us organize the site!
  - Search terms, categories



Real-World Engineering Education

- Sponsored by AMD
- Innovative programs infusing real-world experiences
- Final publication to be released over the summer
- Includes program description and discussion of barriers/solutions

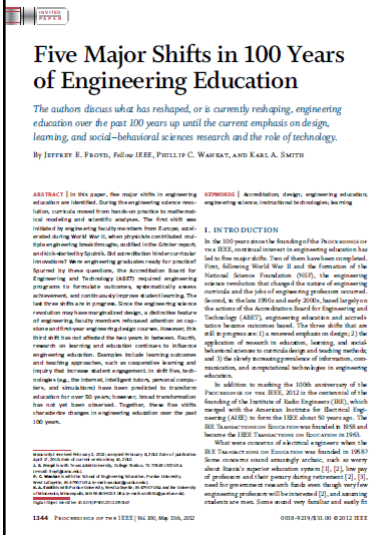
Frontiers of Engineering Education (FOEE)

- Catalyze a vibrant community of *emerging* engineering education leaders
- Recognize faculty accomplishment, facilitate learning, broaden collaboration, and promote dissemination of innovative practice in engineering education

FOEE (continued)

- Attendees share their work with peers
- Speakers on topics of interest to attendees
- Speakers/Coaches provide mentoring advice
- Opportunities to network with peers and coaches

- 150 alums
- Nominations for 2012 currently open
  - Nominations from dean or NAE member
  - Applications due in July
- Symposium will be October 14-17 in Irvine, CA



Five Major Shifts in 100 Years of Engineering Education

The authors discuss what has reshaped, or is currently reshaping, engineering education over the past 100 years up until the current emphasis on design, learning, and social–behavioral sciences research and the role of technology.

By Jeffrey E. Froyd, *Fellow IEEE*, Phillip C. Wankat, and Karl A. Smith

1. a shift from hands-on and practical emphasis to engineering science and analytical emphasis;
2. a shift to outcomes-based education and accreditation;
3. a shift to emphasizing engineering design;
4. a shift to applying education, learning, and socialbehavioral sciences research;
5. a shift to integrating information, computational, and communications technology in education.

EER & STEM Centers and Programs

- **Arizona State University**
- **University of California-Berkeley**
- **Clemson University**
- **University of Cincinnati**
- **University of Georgia**
- **Georgia Tech**
- **University of Kentucky**
- **Linkoping University (Sweden)**
- **Michigan State University**
- **University of Michigan**
- **University of Minnesota**
- **North Carolina State University**
- **The Ohio State University**
- **Pennsylvania State University**
- **University of Pittsburgh**
- **Purdue University**
- **Tufts University**
- **Universidad de las Americas Puebla (Mexico)**
- **Universiti Teknologi Malaysia**
- **University of Texas – Austin**
- **Uppsala University (Sweden)**
- **Utah State University**
- **Virginia Tech**
- **Washington State University**
- **University of Washington**
- **Wichita State University**

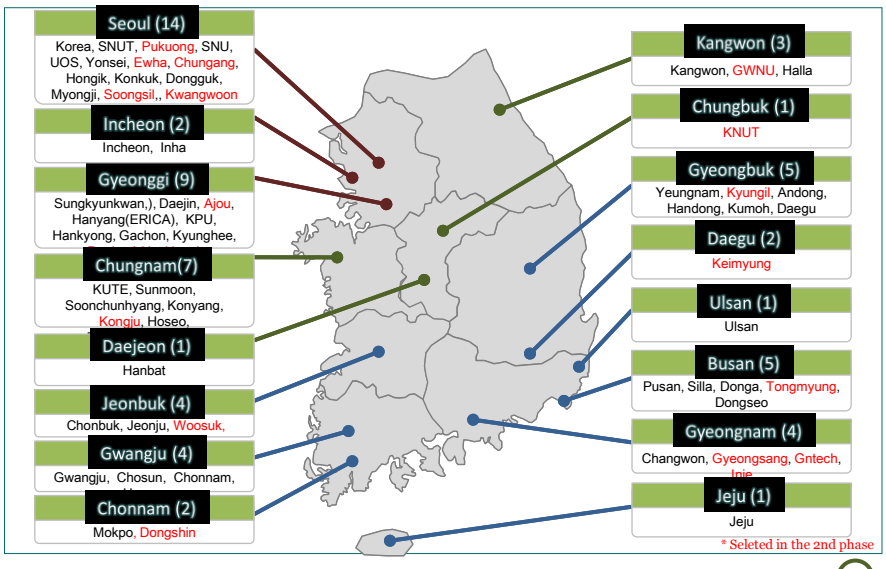
Hong Kong University of Science and Technology – Engineering Education Innovation Workshop – June 2012

- Engineering Education Centers in Korea
- Engineering Education Research at the Universiti Technologi Malaysia

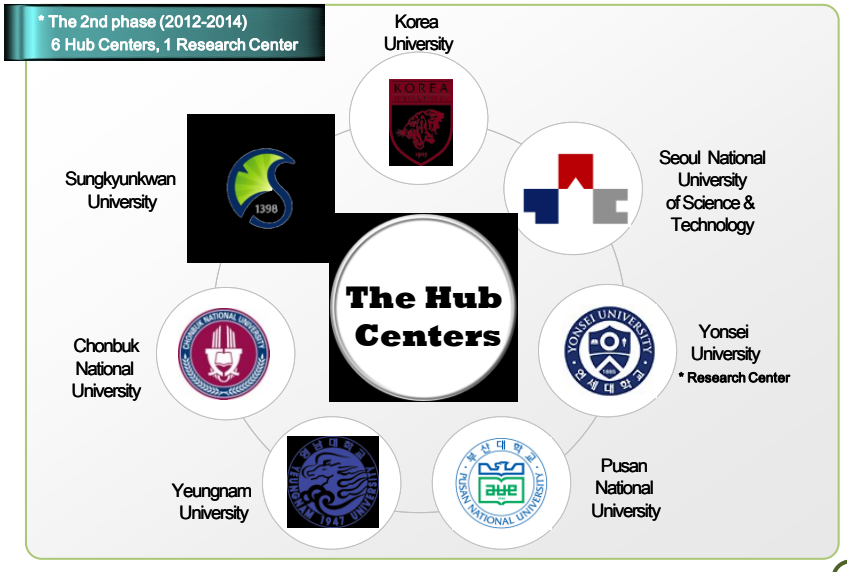
Engineering Education Centers in Korea

- Center for Innovative Engineering Education – 65 Centers
- Hub Center for Innovative Engineering Education – 6 Centers
- Center for Engineering Education Research – 1 Center
- Korea Association for Innovative Engineering Education

Universities operating the ICEE (65)



The Hub Centers for Engineering Education Innovation



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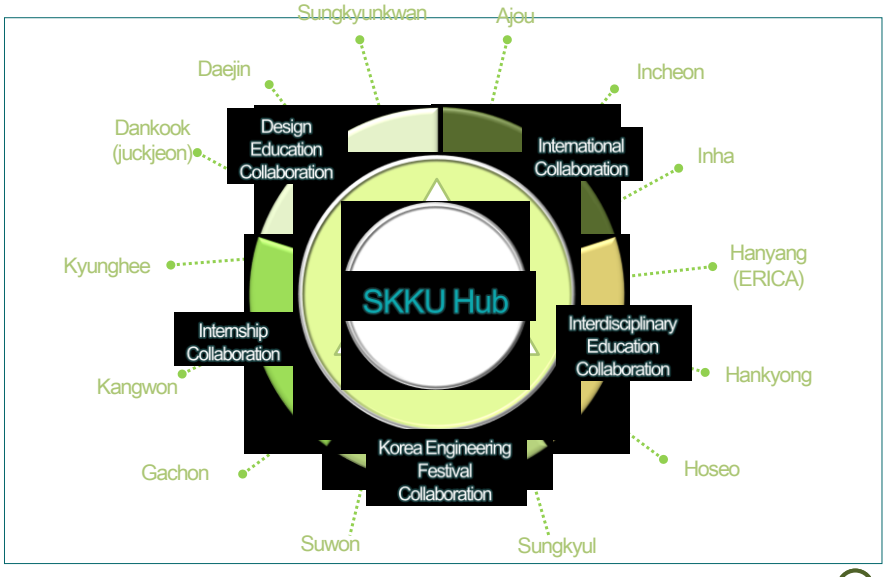
SKKU Hub Centers



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Engineering Education Research at SKKU Hub Center

Current Topics

- Assessment of Program Education Objectives: Competency-based Approach
- Assessment of Outcomes produced by Center for Innovative Engineering Education Program
- Implementation of Grand Challenge Tech+ Innovator (GCTI) Learning Community in SKKU

Future Topics

- Course-embedded Assessment of Program Outcomes

PhD in Engineering Education @

Regional Centre for Engineering Education (RCEE)

Universiti Teknologi Malaysia (UTM)

Transforming engineering education through innovative evidence-based practices

FACTS ON UTM

- 10 engineering schools
- 2000 tenured academics
- 2,800+ foreign students
- Largest number of engineering alumni in Malaysia
- More than 43% enrolment at graduate levels in engineering and technology in Malaysia

- Focus on training and research in Engineering Education
- PhD in Engineering Education program
  - Started in 2008
  - Up till now, 8 students completed PhD
  - Current enrolment: 30 students
- International collaboration and networking
- Post-doctoral and faculty position available

Contact:

khairiyah@cheme.utm

http://tree.utm.my

Thrust Research Areas in UTM

1. Flexible learning - mobile learning, social network, courseware development, e-learning, etc.
2. Training - academic staff, engineers or assistant engineers
3. Quality Management System – OBE, program level assessment, CQI, etc.
4. Curriculum & Teaching and Learning - learning of difficult concepts, understanding learners, innovative T&L, course design
5. Engineering Problem solving - different types of thinking, skills
6. Course Assessment – authentic assessment, assessment of learning, assessment of professional skills

On-going Research

- Training of academic staff in SCL techniques, especially CL & PBL
- Intellectual development/maturity of engineering students
- Developing engineering problem-solving skills
- Mobile learning for difficult engineering contents
- The use of simulations to learn engineering concepts
- Authentic assessment in engineering courses
- Sustainable development in engineering curricula
- Learning and assessing 3-D CAD
- Program quality management system

Completed PhD Research

- A model for assessing student's achievement in basic electronic laboratory
- Enhancement of engineering students' problem-solving skills through cooperative problem-based learning
- Conceptual knowledge in 3D CAD assessment of mechanical engineering undergraduates conceptual understanding and relative comparison as perceived by manufacturing industries
- Self-regulated learning strategies, concept understanding and performance in statics
- An inquiry based simulation supported module to assist students' learning of basic electric circuit
- The effectiveness of learning thermodynamics through multi-media courseware based on visualization and constructivism
- An instrument to measure ICT user-skills ability for engineering learning
- Assessment of Psychomotor skills in electronics laboratory

Events coming up in 2013

- Research in Engineering Education Symposium (late June)
- Research Symposium in Problem-based Learning (early July)
- Workshop in between the 2 symposiums?

ASU ARIZONA STATE UNIVERSITY

ASU Home | My ASU | Colleges & Schools | A-Z Index | Directory | Map | SIGN

Search ASU

program faculty | presentation schedule

ENGINEERING EDUCATION PhD

No profession unleashes the spirit of innovation like engineering. The Doctor of Philosophy in Curriculum and In struction with a concentration in Engineering Education prepares the next generation of thought leaders and experts to devise improved strategies for engineering teaching and learning across the education spectrum. A collaborative of the Mary Lou Fulton Teachers College and the Ira A. Fulton Schools of Engineering, ASU's PhD program in Engineering Education provides students a multidisciplinary academic experience that bridges fundamental research and best practices to improve learning.

Graduates of the program emerge with the knowledge and abilities needed to succeed in the global engineering community of the 21st century as they pursue careers in academia, industry, government and policy, foundations or within P-16+ systems, as engineering faculty members, outreach directors, corporate trainers, or assessment specialists.

Discover ENGINEERING; foster engineering habits of mind; ENHANCE k-12 STEM education; retain undergraduate engineering students; ENCOURAGE mathematical thinking; systems thinking, CREATIVITY, OPTIMISM, COLLABORATION, COMMUNICATION, ETHICAL considerations research, innovation; scholarship of teaching and learning engineering; address the GRAND CHALLENGES of our time

ADMISSION & PROGRAM INFORMATION

Admission requirements:

- Minimum grade point average of 3.0 (on a 4.0 scale) is required for graduates of accredited United States institutions
- Current score on the general Graduate Record Examination (GRE)
- Three letters of recommendation
- Statement of academic and career objectives
- Curriculum vita and writing sample

Please review the Engineering Education Program Guide and visit the ASU Graduate College website for more detailed information regarding admission requirements and how to apply.

APPLICATION DEADLINE

- Applications are accepted only for Fall admission.
- Admissions for Fall 2010 are now closed. Application deadline for Fall 2011 will be announced soon.

PROGRAM DOCUMENTS

- Engineering Education Program Guide
- Curriculum & Instruction PhD Handbook

CONTACT US

Tirupalavanam G. Ganesh, PhD
Program Coordinator & Assistant Professor

Arizona State University: Engineering Education Doctoral Program
http://engineeringed.asu.edu

CLEMSON
ENGINEERING AND SCIENCE EDUCATION

International leadership in engineering and science education through discipline-based education research, preparation of future faculty, and implementation of inclusive, evidence-based curricula

Research Focus Areas:

- Assessment and improvement of problem solving
- Relationships between STEM student motivation and learning
- Student-centered learning environments
- Equity and gender issues in STEM disciplines
- STEM identity development
- Students' academic and career development and success

http://www.clemson.edu/ese/

University of Georgia
http://education.engineering.uga.edu/

Georgia Tech

The **Georgia Tech American Society for Engineering Education Student Section** is working to build capacity. They recently held a workshop sponsored by the College of Engineering (COE)and ASEE entitled "Teaching, Scholarship, and Research: Building an Engineering Education Community at Georgia Tech" sponsored by COE and ASEE. Over 60 individuals participated in the day's events, and the ASEE Student Section is planning similar future events to continue their efforts to improve engineering education and more strongly connect Georgia Tech's engineering education research community.

Georgia Tech College of Engineering

Dr. Wendy Newstetter is a cognitive scientist with extensive research experience in engineering education. She is supported by the **College of Engineering** to work with faculty engineering education research efforts. In Biomedical engineering alone, she has collaborated with faculty on NSF funded efforts through grants REESE, EEC, SES, IRES, CCLI and DUE.

CETL Center for the Enhancement of Teaching and Learning

Drs. Donna Llewellyn and Tris Utschig , along with other **CETL** staff members, encourage, consult, and partner with faculty who become involved in the scholarship and assessment of teaching and learning through individual, program, or grant driven initiatives.

CETL offers a range of support for implementing engineering education research and innovation, from classroom consultations to seminars, project-based fellows programs, and retreats. CETL currently supports engineering education research efforts funded by NSF, the US Dept of Education, the Engineering Information Foundation, the Goizueta Foundation, and others.

PhD in Engineering Education @

Regional Centre for Engineering Education (RCEE)

Universiti Teknologi Malaysia (UTM)

Transforming engineering education through innovative evidence-based practices

FACTS ON UTM

- 10 engineering schools
- 2000 tenured academics
- 2,800+ foreign students
- Largest number of engineering alumni in Malaysia
- More than 43% enrolment at graduate levels in engineering and technology in Malaysia

- Focus on training and research in Engineering Education
- PhD in Engineering Education program
  - Started in 2008
  - Up till now, 8 students completed PhD
  - Current enrolment: 30 students
- International collaboration and networking
- Post-doctoral and faculty position available

Contact:

khairiyah@cheme.utm

http://tree.utm.my

UTM Universiti Teknologi Malaysia | School of Graduate Studies | www.sps.utm.my | innovative • entrepreneurial • global

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ceer Center for Engineering Education Research @ Michigan State University

MICHIGAN STATE UNIVERSITY

The CEER research team includes backgrounds in engineering, other STEM areas, and education.

CEER roles:

- **Funded engineering education research**
- **Collaborate to enhance research in STEM programs at MSU**
- **Promote, nurture, and encourage outcomes-based education**

http://ceer.egr.msu.edu

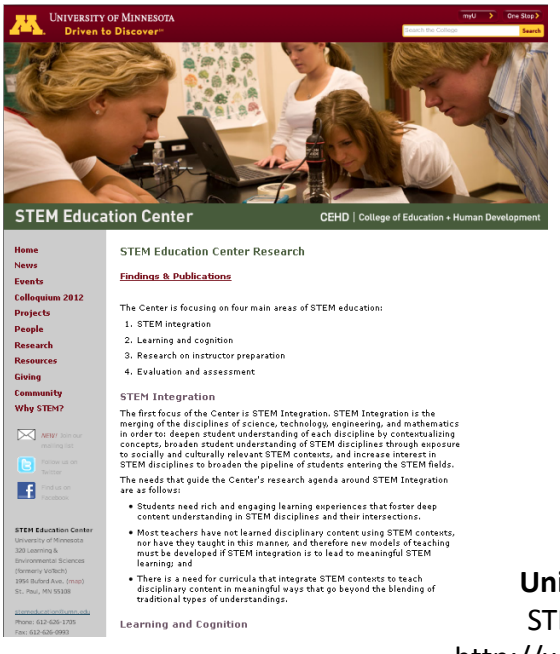
U. Michigan: Center for Research on Learning and Teaching in Engineering
www.engin.umich.edu/crltengin

Programs to enable research

- **SoTL grants** for faculty and graduate students
- **PhD Certificate** in Engineering Education Research
- **Networking lunches** to expand research initiatives
- **Faculty learning community** around large course teaching

Ongoing research initiatives

- **Faculty motivation** to adopt effective teaching practices
- **Impact of screencast technology** on student perceptions and performance
- Strategies for **innovative design practice** and their translation to education
- **Ethical development** of engineering undergraduates



University of Minnesota
STEM Education Center
http://www.cehd.umn.edu/STEM/

Ohio State University: College of Engineering and College of Education and Human Ecology
Contact: Robert J. Gustafson (Engineering) Gustafson.4@osu.edu or Paul E. Post (Education) post.1@osu.edu

Guide for New Ph.D. Students in ENGINEERING EDUCATION

The Doctoral Program in Engineering Education is designed to help develop the highest levels of professional competence in technology and engineering education and to develop the capacity to contribute knowledge into their field. At Ohio State, doctoral degree programs consist of a coherent pattern of courses and other educational experiences, a candidacy examination, a dissertation, and a final oral examination.

Program content is selected to fit the individual student's background, experience, and professional goals. Students admitted to the program will be assigned initial faculty advisers who will provide guidance as they begin the program. Students have the option of choosing new advisers as their program evolves. This document serves as a resource to be used by the student and adviser in developing the individualized program. The adviser and the Ph.D. Advisory Committee retain the right to substitute other courses as appropriate. The program is approved by the student's Ph.D. Advisory Committee and is subject to the rules of the Graduate School and school's Graduate Studies Committee.

ADVISORY COMMITTEE
After the second quarter of enrollment, the student and their advisor will choose an advisory committee consisting of four professors, a minimum of two of whom shall be members of the STEM Area of Study. The student will plan the doctoral program in consultation with this committee. This committee also will be responsible for developing and assessing the Candidacy Examination. Upon completion of the examination, the student may reorganize the committee to reflect the expertise needed for the dissertation.

PROGRAM OF STUDY
Students should develop a tentative program plan with their faculty advisers during the first year. This plan will be reviewed during the second year for revision or continuation. A copy of the final, approved program plan should be submitted to the Office of Academic Services prior to the Candidacy Exam. The program of study should include the following categories:

Learning, Teaching, and Social Context Component - 15 hours

Edu T&L 721	Logic and Psychology in School Science/Mathematics, or equivalent
Edu T&L 975	Theoretical Perspectives on Learning, Teaching and Social Contexts

The Ohio State University
Engineering Education Innovation Center

http://eeic.osu.edu/about

The Leonhard Center for the Enhancement of Engineering Education

Founded in 1990 with a gift from William E. Leonhard

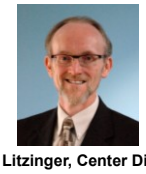
Mission includes:

- Leading and supporting enhancements in undergraduate engineering courses and programs
- Supporting assessment, including ABET
- Leading improvements in communication courses for engineering students
- Preparing graduate and undergraduate teaching assistants
- Conducting externally funded research

Current strategic focus areas:

- Cross-national teams in capstone courses
- Integration of creative process into engineering courses
- Ethics education for first year students
- Technology-enhanced learning

For more information, contact Tom Litzinger at TAL2@PSU.EDU or visit www.engr.psu.edu/leonhardcenter/



Tom Litzinger, Center Director

Sarah Zappe, Director
Assessment & Instructional Support

Michael Alley
Engineering Communications

University of Pittsburgh
http://www.engineering.pitt.edu/eerc/

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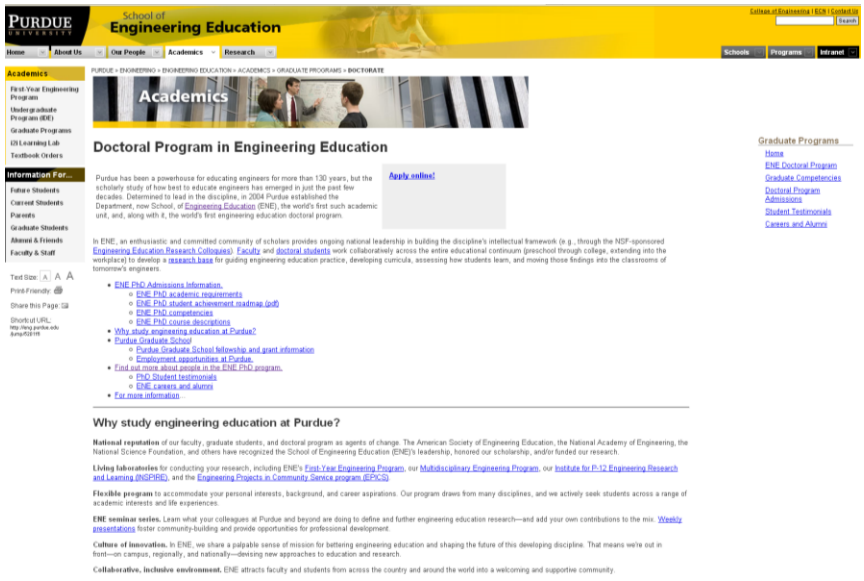


Purdue University

https://engineering.purdue.edu/ENE/Academics/Graduate/Doctorate/index.html

THE UNIVERSITY OF TEXAS AT AUSTIN

The College of EDUCATION

STEM Education

Master's & PhD Programs (97 students total)

<u>Past and Current Research</u>

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

<u>Faculty</u>

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

Tufts UNIVERSITY | Center for Engineering Education and Outreach

Engineering Education Research

Improving Education through Engineering

- Research in engineering teaching and learning, outreach, and educational technology development.
- Current projects:
  - Integrating Engineering and Literacy (IEL)
  - Design Compass: How people design
  - Interactive Learning and Collaboration Environment (InterLACE)
  - LEGO Robotics: Catalyzing Social Communication in Students with Autism
  - W-STOMP Women in Engineering

Tufts Department of Education

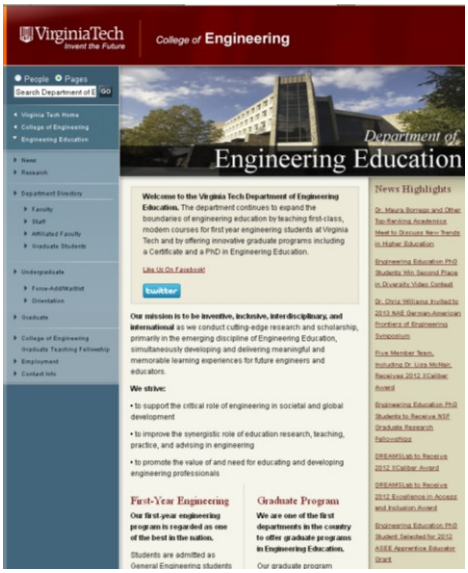
Engineering Education M.S. & Ph.D. Program

- Develop research on how students (K-College) learn/engage in engineering
- Interdisciplinary thesis committee (at least 1 education and 1 engineering professor)

http://ceeo.tufts.edu/

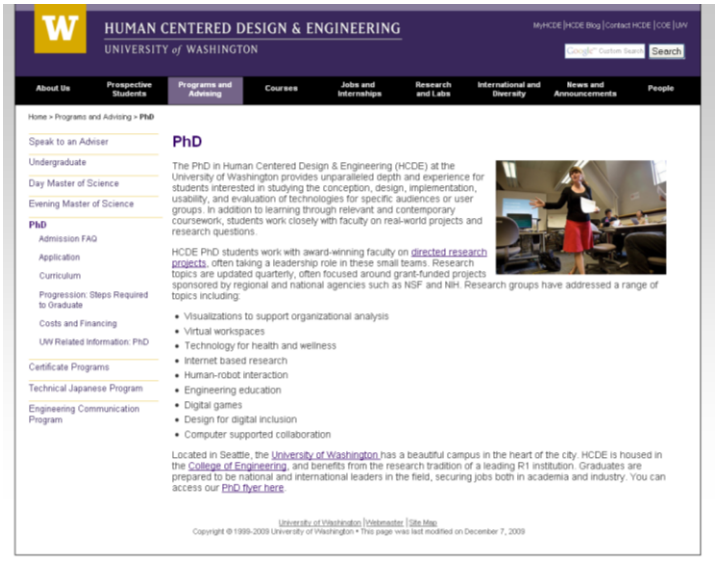
Utah State University

http://www.engineering.usu.edu/htm/information/phd-engineering-education



Virginia Tech

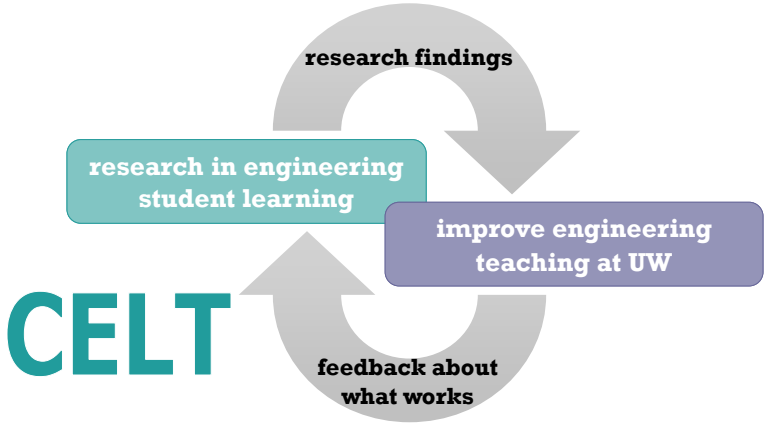
http://www.enge.vt.edu/



University of Washington

http://www.hcde.washington.edu/nav-prog-advise/phd

Center for Engineering Learning and Teaching



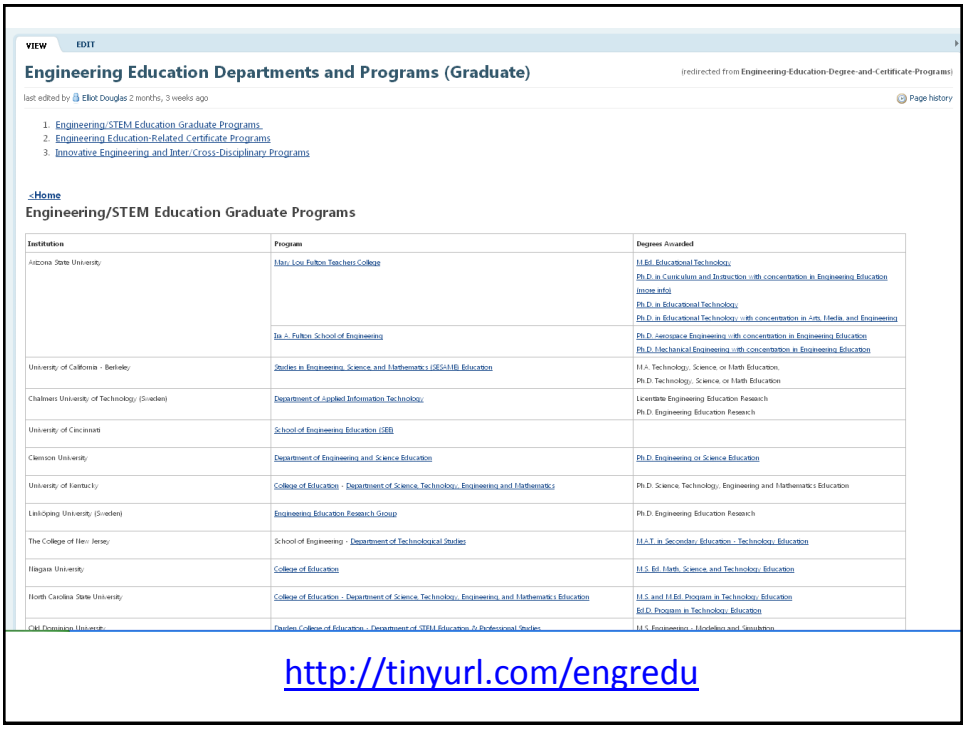
Founded in 1998, CELT is First Campus-Based Center in U.S. to Combine Research and Faculty Development Missions.

WASHINGTON STATE UNIVERSITY
World Class. Face to Face.

Engineering Educat Research Cente

- Six faculty in College of Engineering and Architecture who focus on engineering education
- About 20 active engineering education graduate students
- Students receive engineering degrees
- Research areas include conceptual change and epistemology, human computer interactions, adoption of innovations, assessment of design skills, problem-based learning, and collective intelligence in design

http://eerc.wsu.edu/



VIEW EDIT

Engineering Education Departments and Programs (Graduate)

(redirected from Engineering-Education-Degree-and-Certificate-Programs)

last edited by Elliot Douglas 2 months, 3 weeks ago

Page history

1. Engineering/STEM Education Graduate Programs
2. Engineering Education-Related Certificate Programs
3. Innovative Engineering and Inter/Cross-Disciplinary Programs

<Home

Engineering/STEM Education Graduate Programs

Institution	Program	Degrees Awarded
Arizona State University	Mary Lou Fulton Teachers College	M.Ed. Educational Technology Ph.D. in Curriculum and Instruction with concentration in Engineering Education (more info) Ph.D. in Educational Technology Ph.D. in Educational Technology with concentration in Arts, Media, and Engineering
	Ira A. Fulton School of Engineering	Ph.D. Aerospace Engineering with concentration in Engineering Education Ph.D. Mechanical Engineering with concentration in Engineering Education
University of California - Berkeley	Studies in Engineering, Science, and Mathematics (SESAME) Education	M.A. Technology, Science, or Math Education Ph.D. Technology, Science, or Math Education
Chalmers University of Technology (Sweden)	Department of Applied Information Technology	Licentiate Engineering Education Research Ph.D. Engineering Education Research
University of Cincinnati	School of Engineering Education (SEE)	
Clemson University	Department of Engineering and Science Education	Ph.D. Engineering or Science Education
University of Kentucky	College of Education - Department of Science, Technology, Engineering and Mathematics	Ph.D. Science, Technology, Engineering and Mathematics Education
Linköping University (Sweden)	Engineering Education Research Group	Ph.D. Engineering Education Research
The College of New Jersey	School of Engineering - Department of Technological Studies	M.A.T. in Secondary Education - Technology Education
Niagara University	College of Education	M.S. Ed. Math, Science, and Technology Education
North Carolina State University	College of Education - Department of Science, Technology, Engineering, and Mathematics Education	M.S. and M.Ed. Program in Technology Education Ed.D. Program in Technology Education
Old Dominion University	Darden College of Education - Department of STEM Education & Professional Studies	M.S. Engineering - Modeling and Simulation

http://tinyurl.com/engredu