

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

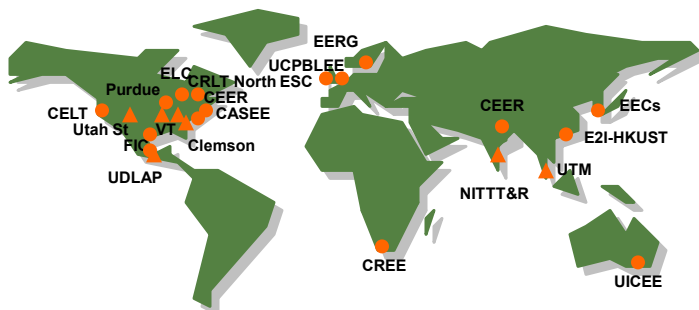
Facilitated By

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...



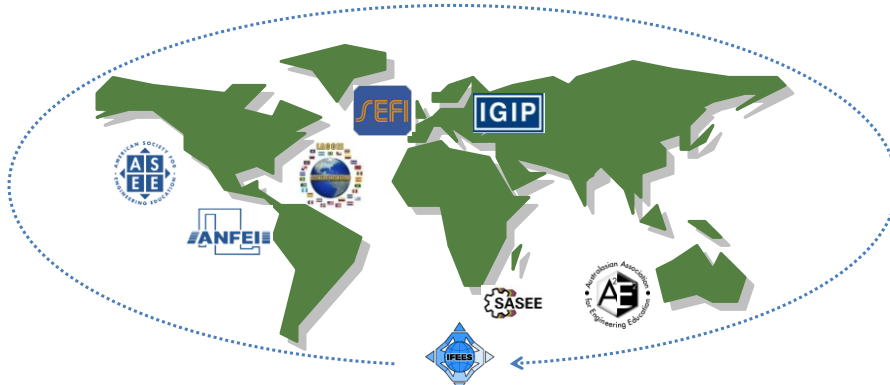
- **Engineering Education Centers** — Australia: UICEE, UNESCO International Centre for Engineering Education; Denmark: UCPBLEE, UNESCO Chair in Problem Based Learning in Engineering Education; Hong Kong: E2I, Engineering Education Innovation Center, Hong Kong University of Science and Technology; Pakistan: 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...



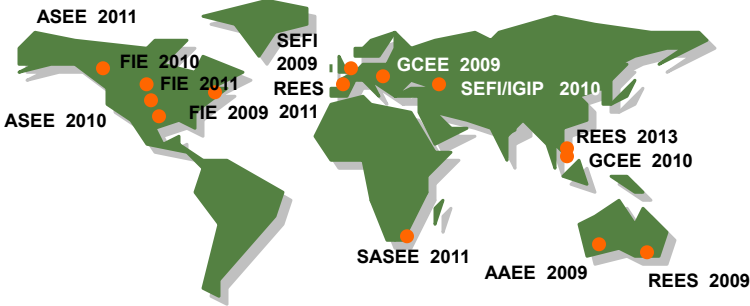
Engineering education societies...



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](http://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 Eliot Douglas 2 months, 3 weeks ago

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2. [Engineering Education-Related Certificate Programs](#)

3. [Innovative Engineering and Inter/Cross-Disciplinary Programs](#)

[Home](#)

Engineering/STEM Education Graduate Programs

Institution	Program	Degree Awarded
Arizona State University	Herb A. Fulton Teacher College	M.Ed. Educational Technology Ph.D. in Curriculum and Instruction with concentration in Engineering Education Jedee.edu Ph.D. in Educational Technology Ph.D. in Educational Technology with concentration in Arts, Media, and Engineering
University of California - Berkeley	Studies in Engineering, Science, and Mathematics (SESM) 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
Lundöping 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
Hagaia 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
OKI Domingo University	Domingo 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



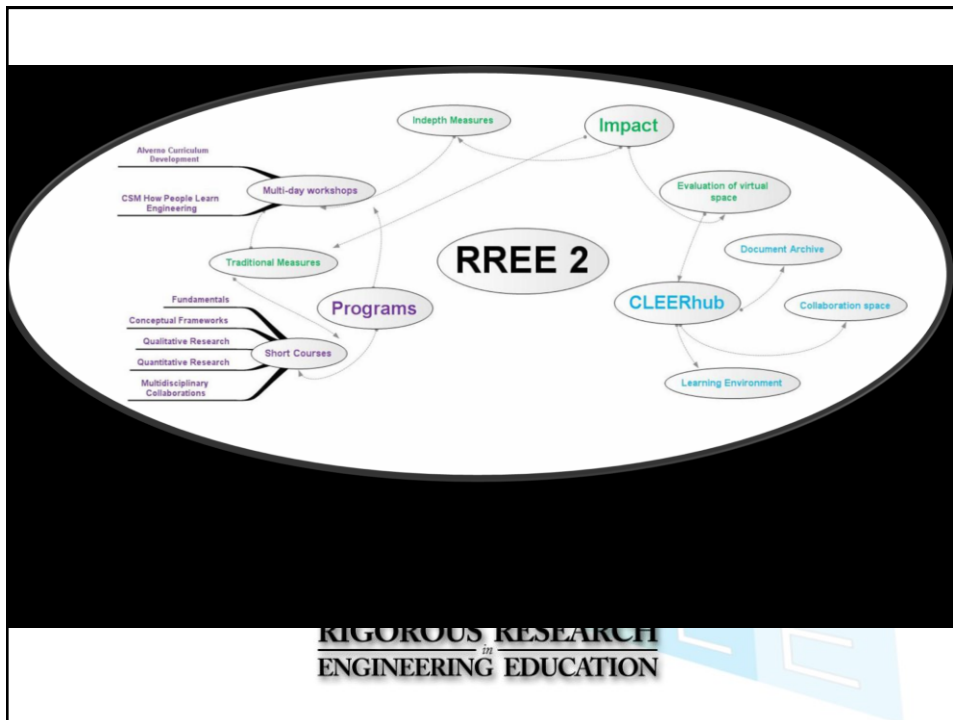
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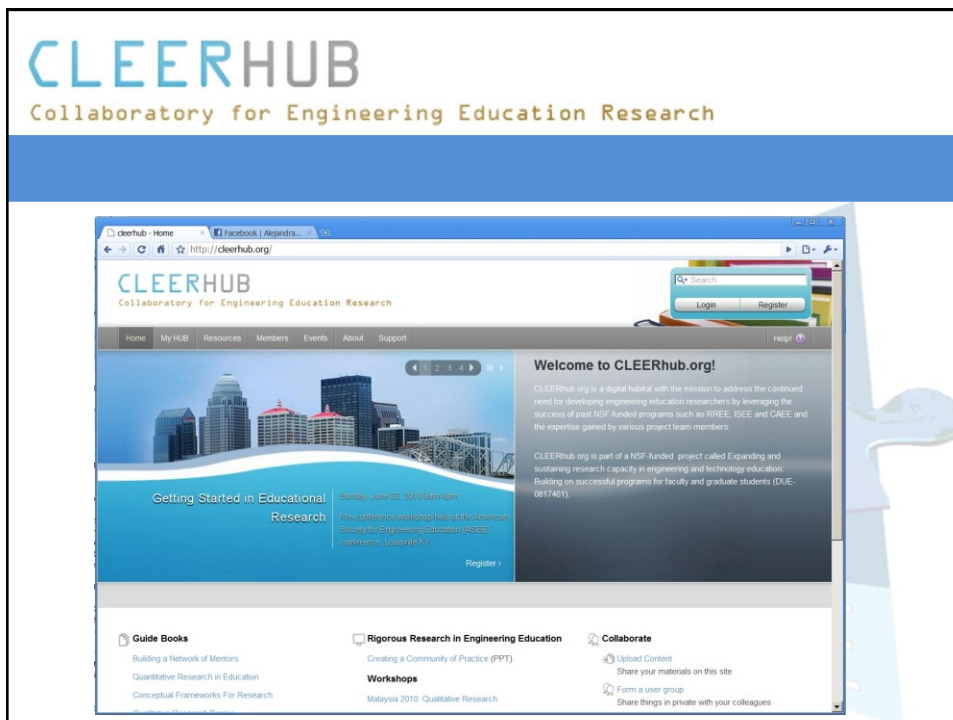
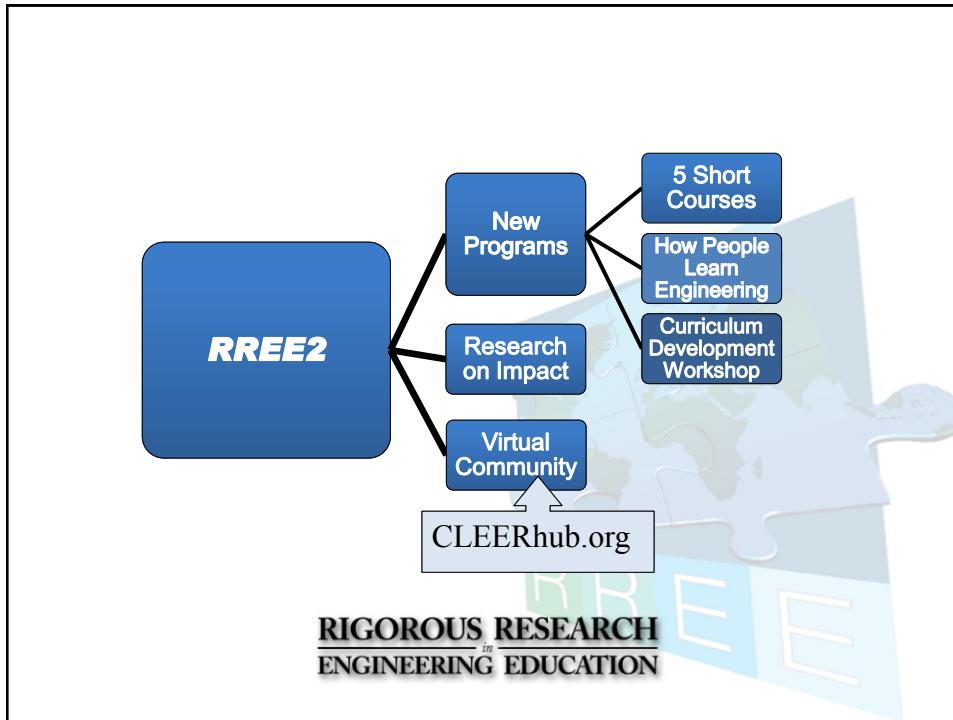


Funded by the
National Science Foundation
through awards DUE 0341127
and DUE 0817461

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*







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CLEERhub **June 2012 Update**

Objectives

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

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CLEERhub's Vision & Mission

Vision:

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

Mission:

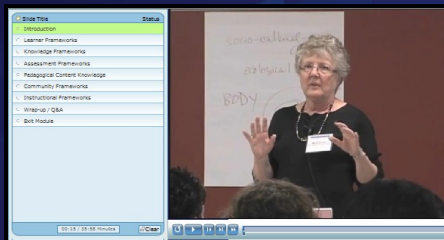
- Partnering with the community to develop engaging and useful content.
- Continually improving user experience with regards to information availability, platform ease of use, and tools that enable collaboration.

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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...

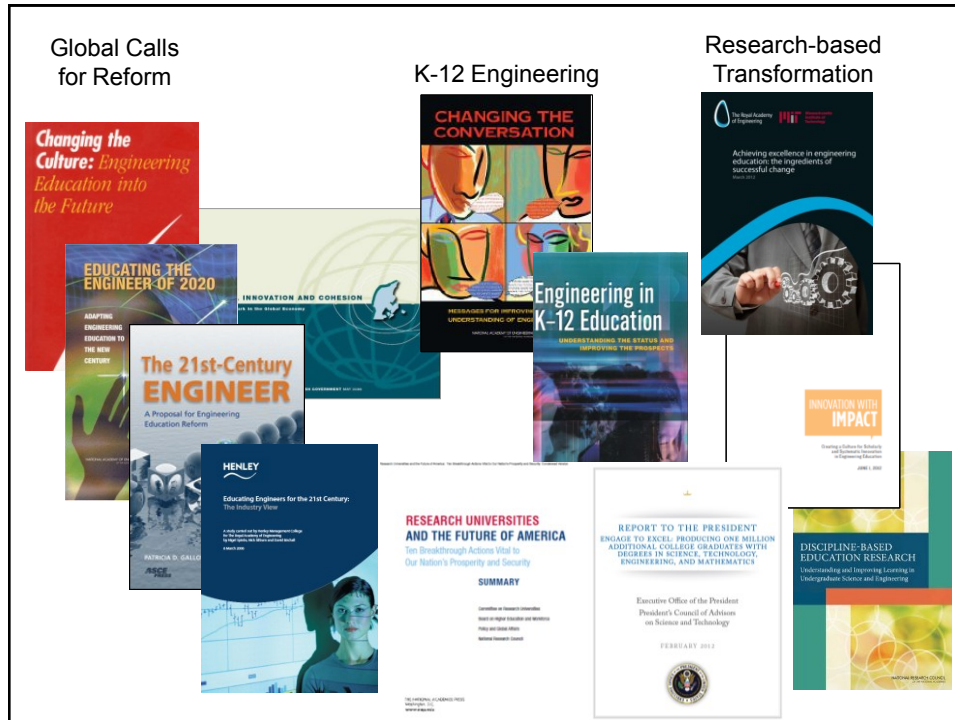
Complete the request for more
information from a computer. We've
shortened the URL to make it easier
to write down.

<http://bit.ly/Lj3zb6>

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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

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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.

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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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STATUS, CONTRIBUTIONS, AND FUTURE DIRECTION OF DISCIPLINE-BASED EDUCATION RESEARCH (DBER)

The National Science Foundation has funded a synthesis study on the status, contributions, and future direction of discipline-based education research (DBER) in physics, biological sciences, geosciences, and chemistry. 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.

This 30-month study will build on two workshops held in 2008 to explore *Evidence on Promising Practices in Undergraduate Science, Technology, Engineering, and Mathematics (STEM) Education*. It will answer questions that are essential to advancing DBER and broadening its impact on undergraduate science teaching and learning. An interdisciplinary panel of experts will synthesize empirical research on undergraduate teaching and learning in the sciences; explore the extent to which this research currently influences undergraduate instruction; and identify the intellectual and material resources required to further develop DBER.

The final product will be a consensus report that will provide guidance for future DBER research. In addition, the findings and recommendations of this study may invite, if not assist, postsecondary institutions to:

- increase interest and research activity in DBER, and improve its quality and usefulness, across all natural science disciplines;
- guide instruction and assessment across natural science courses to improve student learning;
- bring greater focus to issues of student ability in the natural sciences that are related to quality of instruction.

MEETINGS	LOCATION	RESOURCES
Committee Meeting 1 (June 28-29, 2010)	Kick Center, Room 301 500 5 th Street, NW Washington, DC	Agenda
Committee Meeting 2 (October 18-19, 2010)	Kick Center, Room 301 500 5 th Street, NW Washington, DC (limited space)	Agenda Includes links to papers and presentations
Committee Meeting 3 (December 3-4, 2010)	Beckman Center Irvine, CA	Agenda Includes links to papers and presentations
Committee Meeting 4	Kick Center, 500 5 th Street, NW Washington, DC (limited space)	Agenda Commissioned Papers
Committee Meeting 5	Jonsson Center Woods Hole, MA	This meeting is closed to the public

COMMITTEE
Committee Membership

STAFF
Natalie Nielsen, Study Director
Heidi Schweingruber, Deputy Director, BOSE
Margaret Hilton, Senior Program Officer, BOSE
Anthony Brown, Senior Program Assistant, BOSE

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

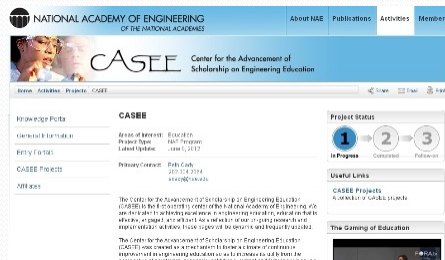
Engineering Education Research and Innovation Activities

Beth Cady
Program Officer, Engineering Education

ecady@nae.edu

Center for the Advancement of Scholarship on Engineering Education

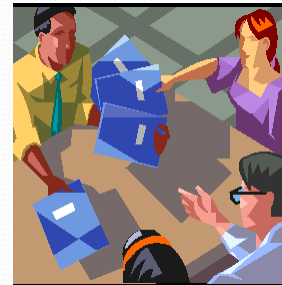
- Created to foster continuous improvement
- Extensive set of resources at www.nae.edu/casee
 - Research-to-Practice documents
 - Meeting agendas and reports of CASEE projects
 - Equity-related resources
 - Videos
 - Summaries
- Please help us organize the site!
 - Search terms, categories



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. FLOYD, Fellow IEEE, PHILLIP C. WARDAT, and KARI A. SMITH

ABSTRACT In this paper, five major shifts in engineering education are identified. During the engineering science revolution, curricula moved from hands-on practice to mathematical modeling and scientific analysis. The first shift was initiated by engineering faculty members from Europe, who arrived during World War II, when they contributed much to the engineering knowledge base. The second shift was initiated by the engineering graduates ready for a practical career. By these questions, the Accreditation Board for Engineering and Technology (ABET) initiated engineering programs to formulate outcomes, systematically assess achievement, and contribute to career advancement. The last three shifts are in progress. Since the engineering science revolution has been integrated design, a distinctive feature of engineering faculty members, research attention to outcomes and the engineering design process. However, this third shift has not affected the two years between study, research, and whether continues to influence engineering education. Therefore, include learning outcomes and teaching approaches, such as cooperative learning and inquiry that require student engagement to address challenges (e.g., the Internet, intelligent tutors, personal computers, and simulations) have been combined to transform education for over 50 years, however, based on transformation has not yet been observed. Together, these five shifts characterize changes in engineering education over the past 100 years.

INDEX TERMS Accreditation; design; engineering education; engineering science; instructional technologies; learning outcomes; research; social-behavioral sciences; technology.

1544 PAPER RECEIVED ON THE IEEE [Vol. 50, No. 10, 2012]

KEYWORDS Accreditation; design; engineering education; engineering science; instructional technologies; learning outcomes; research; social-behavioral sciences; technology.

1. INTRODUCTION

In the 100 years since the founding of the American Society of Mechanical Engineers (ASME) in 1902, engineering education has been in a state of flux. Over the last century, there have been three major shifts in engineering education. First, following World War II and the formation of the American Society of Mechanical Engineers (ASME), the engineering science revolution that changed the nature of engineering curricula and the role of engineering professors occurred. Second, in the late 1980s and early 2000s, based largely on the actions of the Accreditation Board for Engineering and Technology (ABET), engineering education and curricula have become outcome-based. The three shifts are: 1) a renewed emphasis on design; 2) the emphasis of research in education, learning, and social-behavioral sciences to curricula design and teaching methods; and 3) the development of a new paradigm of information, communication, and instructional technologies in engineering education.

In addition to marking the 100th anniversary of the formation of the ASME, 2012 is the centennial of the founding of the American Institute of Electrical Engineers (AIEE) in 1902, the IEEE about 50 years ago. The IEEE Transactions on Education was founded in 1958 and became the IEEE Transactions on Education in 1983. What were concerns of electrical engineers when the IEEE Transactions on Education was founded in 1958? Some concerns included university curricula, such as worry about faculty's experience education [1], [2], the gap of problems and their primary during retirement [3], [4], need for government research funds even though engineering professors will be concerned [5], and learning outcomes are new. Some were not very familiar and ready for

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 social behavioral sciences research;
5. a shift to integrating information, computational, and communications technology in education.

EER & STEM Centers and Programs

- | | |
|--|---|
| <ul style="list-style-type: none"> – Arizona State University – University of California-Berkeley – Clemson University – University of Cincinnati – University of Georgia – Georgia Tech – University of Kentucky – Linköping University (Sweden) – Michigan State University – University of Michigan – University of Minnesota – North Carolina State University – The Ohio State University – Pennsylvania State University | <ul style="list-style-type: none"> – 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 |
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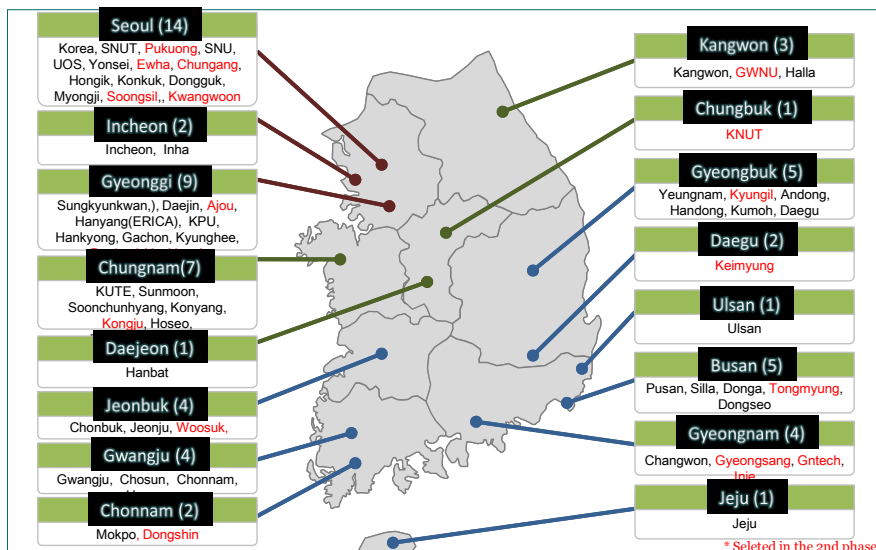
Hong Kong University of Science and Technology
 – Engineering Education Innovation Workshop –
 June 2012

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

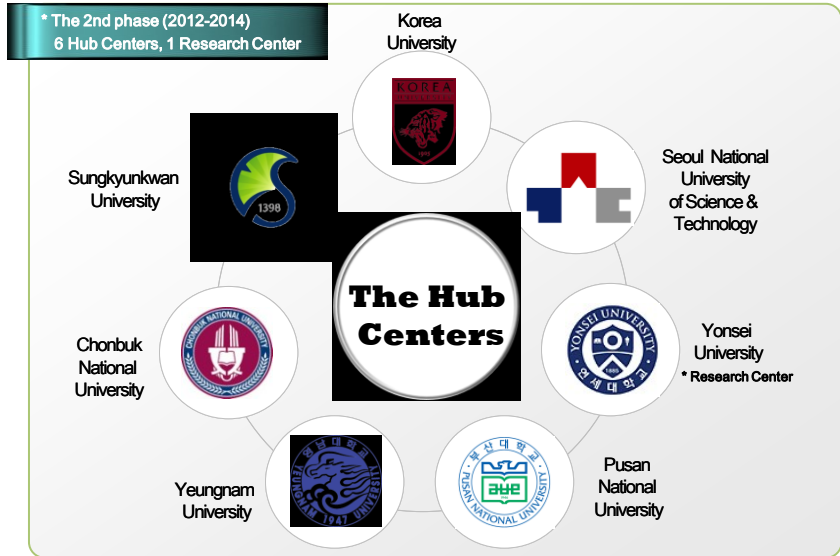
Engineering Education Centers in Korea

- | 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)

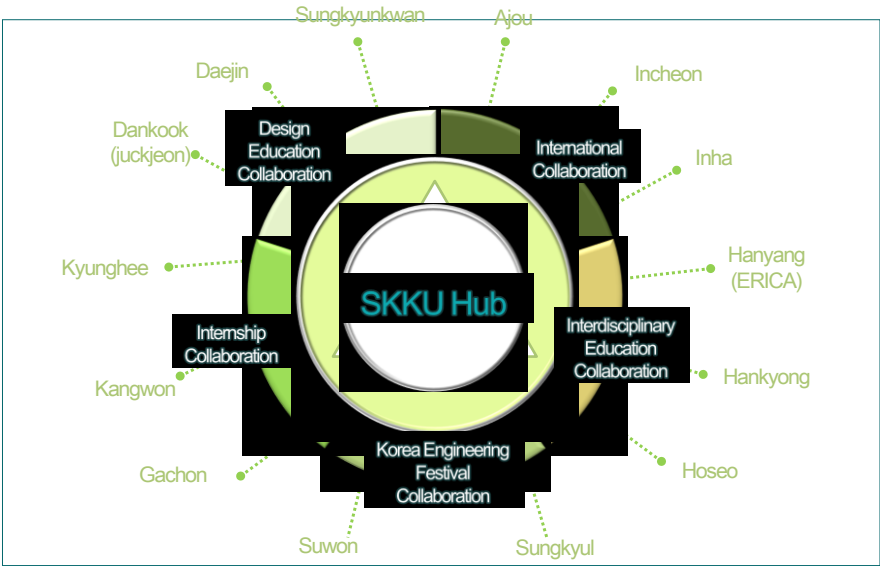


The Hub Centers for Engineering Education Innovation



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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

Contact:

khairiyah@cheme.utm.my

<http://tree.utm.my>

- 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

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 Home](#)
[R1: ASU](#)
[Colleges & Schools](#)
[A-Z Index](#)
[Directory](#)
[Map](#)
[RSS](#)

[program faculty](#)
[presentation schedule](#)

ENGINEERING EDUCATION PhD

No profession unleashes the spirit of innovation like engineering. The Doctor of Philosophy in Curriculum and Instruction 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

Tringali, Karen G. Gansah, PhD
Program Coordinator & Assistant Professor

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




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/>



CLUSTER
education.engineering.uga.edu

Welcome Research People CLUSTER Publications Network Teaching Prospective Students Contact Us

CLUSTER at work ...

Welcome

The engineering education research CLUSTER (Collaborative Lounge for Understanding Society and Technology) led by Dr. Nadia Kellam and Dr. Joachim Walther is a trans-disciplinary, collaborative group at the University of Georgia that focuses on engineering education research.

We use interpretive research methods to investigate diverse aspects of this exciting, young field and build on the results of this research to push the boundaries and transform engineering curricular and teaching practice in our engineering programs.

Our work in engineering education research, which includes students as partners in research projects, is based on an enjoyable, supportive and personally meaningful environment that emerges from our trans-disciplinary, dynamic process of mutual learning and shared discovery.

CLUSTER researcher wins NSF CAREER award

Dr. Joachim Walther will investigate research quality in interpretive engineering inquiries. This engineering education research initiation grant seeks to combine elements of the total quality management (TQM) movement from engineering with a framework for evaluating qualitative research that will be...

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




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.



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.



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

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<http://tree.utm.my>



UTM School of Graduate Studies
UNIVERSITI TEKNOLOGI MALAYSIA

www.sps.utm.my

innovative • entrepreneurial • global



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.eqr.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



STEM Education Center

CEHD | College of Education + Human Development

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News
Events
Colloquium 2012
Projects
People
Research
Resources
Giving
Community
Why STEM?

NEW! Join our mailing list
Follow us on Twitter
Follow us on Facebook

STEM Education Center
University of Minnesota
320 Learning & Environment Sciences
(formerly VOTEC)
2100 Sibley Ave. (mso)
St. Paul, MN 55108
www.engin.umich.edu
Phone: 612-626-1295
Fax: 612-626-0993

STEM Education Center Research

Findings & Publications

The Center is focusing on four main areas of STEM education:

1. STEM integration
2. Learning and cognition
3. Research on instructor preparation
4. Evaluation and assessment

STEM Integration

The first focus of the Center is STEM Integration. STEM Integration is the merging of the disciplines of science, technology, engineering, and mathematics in order to: deepen student understanding of each discipline by contextualizing concepts, broaden student understanding of STEM disciplines through exposure to socially and culturally relevant STEM contexts, and increase interest in STEM disciplines to broaden the pipeline of students entering the STEM fields.

The needs that guide the Center's research agenda around STEM Integration are as follows:

- Students need rich and engaging learning experiences that foster deep content understanding in STEM disciplines and their intersections.
- Most teachers have not learned disciplinary content using STEM contexts, nor have they taught in this manner, and therefore new models of teaching must be developed if STEM integration is to lead to meaningful STEM learning, and
- There is a need for curricula that integrate STEM contexts to teach disciplinary content in meaningful ways that go beyond the blending of traditional types of understandings.

Learning and Cognition

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
Theoretical Perspectives on Learning,
Teaching and Social Contexts

Edu T&L 975

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



Tom Litzinger, Center Director



Sarah Zappe, Director
Assessment & Instructional Support



Michael Alley
Engineering Communications



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



my.pitt Swanson School of Engineering Contact Us

ENGINEERING EDUCATION RESEARCH CENTER

A Center of the Swanson School of Engineering

FACULTY
GRAD STUDENTS / POST DOCS
ENGINEERING ED COMMUNITY

WHO WE ARE

SERVICES

EFFECTIVE TEACHING

RESEARCH

CONNECTIONS

EVENTS/NEWS



Upcoming Events

Using Model Eliciting Activities (MEAs) in the Engineering Classrooms

07-19-12 | 08:30 am | 102 Benedum Hall, University of Pittsburgh

This workshop will provide engineering faculty with the ability to adapt or develop, implement, and assess Model Eliciting Activities (MEAs) in the upper division engineer classrooms. Participants will learn the theoretical basis for the MEAs, how to best implement MEAs within a course, as well as assessing the effectiveness of the MEAs.


... [Learn more](#)


Teaching Workshop

08-21-12 | 08:20 am |

Universidad de las Américas Puebla
Mexico

Doctoral Program in
Science,
Engineering, and
Technology Education





- **Fall 2003**
 - Center for Science, Engineering, and Technology Education

- **Fall 2006**
 - PhD program

- **Spring 2008**
 - program accredited by the National Council of Science and Technology (CONACYT) of Mexico

- **Fall 2009**
 - first graduate

- **Fall 2010**
 - ≈ 40 PhD students


UDLAP

CONACYT

GOALS

- Conduct world-class research on teaching and learning of science, engineering and technology
 - *Scholarship of discovery*
- Use the results of that research to continually improve instruction at UDLAP, Mexico and other Ibero-American countries to better support the learning process of our students
 - *Scholarship of application, integration, and teaching*

- Support the educational needs of science, engineering and technology teachers and learners at the P-12, University, and continuing professional development levels
 - *Scholarship of application, integration, and teaching*



UNIVERSIDAD DE LAS AMÉRICAS PUEBLA

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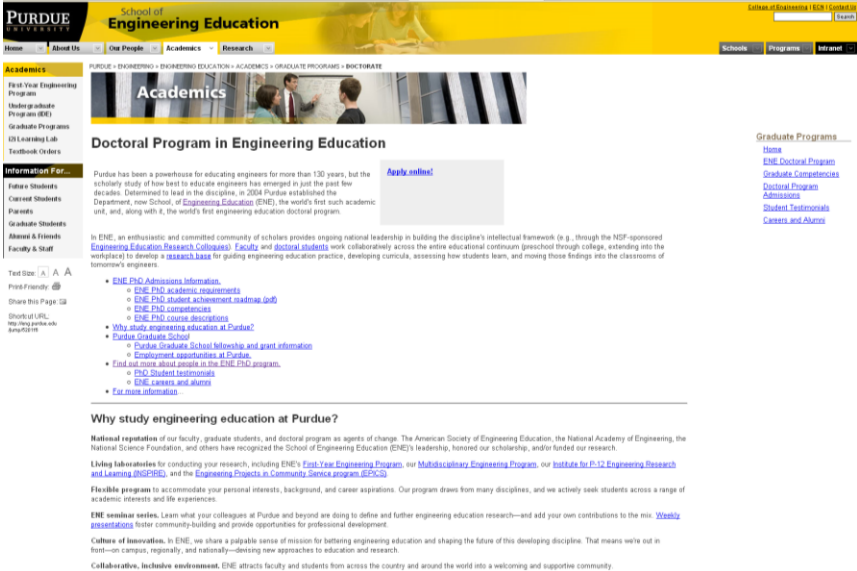
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Purdue University School of Engineering Education

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Academics

Doctoral Program in Engineering Education

Purdue has been a powerhouse for educating engineers for more than 130 years, but the scholarly study of how best to educate engineers has emerged in just the past few decades. Determined to lead in the discipline, in 2004 Purdue established the Department, now School, of Engineering Education (ENE), the world's first such academic unit, and, along with it, the world's first engineering education doctoral program.

[Apply online!](#)

In ENE, an enthusiastic and committed community of scholars provides ongoing national leadership in building the discipline's intellectual framework (e.g., through the NSF-sponsored [Engineering Education Research Collaborative](#)). [Faculty](#) and [doctoral students](#) work collaboratively across the entire educational continuum (preschool through college, extending into the workplace) to develop a [research base](#) for guiding engineering education practice, developing curricula, assessing how students learn, and moving those findings into the classroom of tomorrow's engineers.

- [ENE PhD Admissions Information](#)
 - [ENE PhD academic requirements](#)
 - [ENE PhD student achievement standards \(pdf\)](#)
 - [ENE PhD competencies](#)
 - [ENE PhD course descriptions](#)
- [Why study engineering education at Purdue?](#)
 - [Purdue Graduate School fellowship and grant information](#)
 - [Employment opportunities at Purdue](#)
- [Find out more about research in the ENE PhD program](#)
 - [PhD Student testimonials](#)
 - [ENE careers and alumni](#)
- [For more information](#)

Why study engineering education at Purdue?

National reputation of our faculty, graduate students, and doctoral program as agents of change. The American Society of Engineering Education, the National Academy of Engineering, the National Science Foundation, and others have recognized the School of Engineering Education (ENE)'s leadership, honored our scholarship, and/or funded our research.

Living laboratories for conducting your research, including ENE's [Early Life Engineering Program](#), our [Multidisciplinary Engineering Program](#), our [Institute for P-12 Engineering Research and Learning \(INPER\)](#), and the [Engineering Projects in Community Service program \(EPSCS\)](#).

Flexible program to accommodate your personal interests, background, and career aspirations. Our program draws from many disciplines, and we actively seek students across a range of academic interests and life experiences.


ENE seminar series. Learn what your colleagues at Purdue and beyond are doing to define and further engineering education research—and add your own contributions to the mix. [Weekly announcements](#) foster community-building and provide opportunities for professional development.

Culture of innovation. In ENE, we share a palpable sense of mission for bettering engineering education and shaping the future of this developing discipline. That means we're out in front—on campus, regionally, and nationally—designing new approaches to education and research.

Collaborative, inclusive environment. ENE attracts faculty and students from across the country and around the world into a welcoming and supportive community.

Purdue University

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



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 Riegle-Crumb (STEM-Ed)



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

COLLEGE OF ENGINEERING

Doctorate of Philosophy in Engineering Education

The Doctorate of Philosophy in Engineering Education is offered through the Engineering and Technology Education Department. Emphasis is on the learning and teaching of engineering design. Engineering Design is a decision-making process, which utilizes results from basic sciences, mathematics, and the engineering sciences. This program produces doctoral students with proficiency in developing engineering design skills in others, and expertise in research into how these skills are best learned and taught.

Program graduates are expected to:

- Be familiar with the theory and practice of engineering education and an aspect of these aspects within their specific area of engineering specialization.
- Have the ability to conduct research in engineering education in areas such as engineering epistemologies, engineering learning mechanisms, engineering learning systems, engineering diversity and inclusiveness, technology-enhanced learning, distance delivery, and engineering assessment.
- Have the ability to develop, implement, and assess engineering curricula at high school and community levels.

Engineering Education Core

This curriculum component recognizes that engineering education is an emerging discipline. As such, students must have an accredited degree in an engineering discipline.

Area of Specialization

This component allows students to develop an in-depth knowledge in one area of engineering education. Students will identify a research area approved through the department and take courses within that area. The research area and courses will be identified and chosen with the advice and approval of the student's doctoral advisory committee. Three credits of these courses must be taken outside the ETE Department.

Research Component

This component ensures that program graduates have the skills

Utah State University

<http://www.engineering.usu.edu/html/information/phd-engineering-education>

Virginia Tech
College of Engineering

Department of Engineering Education

Welcome to the Virginia Tech Department of Engineering Education. The department continues to expand the boundaries of engineering education by teaching first-class, modern courses for first-year engineering students at Virginia Tech and by offering innovative graduate programs including a Certificate and a PhD in Engineering Education.

News Highlights

Dr. Mark Brown and Other Top Faculty Academic Award to Receive New Award in Higher Education

Engineering Education PhD Student Wins Award from Graduate School Council

Dr. Chris Williams Awarded 2012 NSF Graduate Research Fellowship

First-Year Engineering Program

Graduate Program

Virginia Tech

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

W HUMAN CENTERED DESIGN & ENGINEERING
UNIVERSITY of WASHINGTON

MyHCDE | HCDE Blog | Contact HCDE | COE | JMW

PHD

The PhD in Human Centered Design & Engineering (HCDE) at the University of Washington provides unparalleled depth and experience for students interested in studying the conception, design, implementation, usability, and evaluation of technologies for specific audiences or user groups. In addition to learning through relevant and contemporary coursework, students work closely with faculty on real-world projects and research questions.

HCDE PhD students work with award-winning faculty on directed research projects, often taking a leadership role in these small teams. Research topics are updated quarterly, often focused around grant-funded projects sponsored by regional and national agencies such as NSF and NIH. Research groups have addressed a range of topics including:

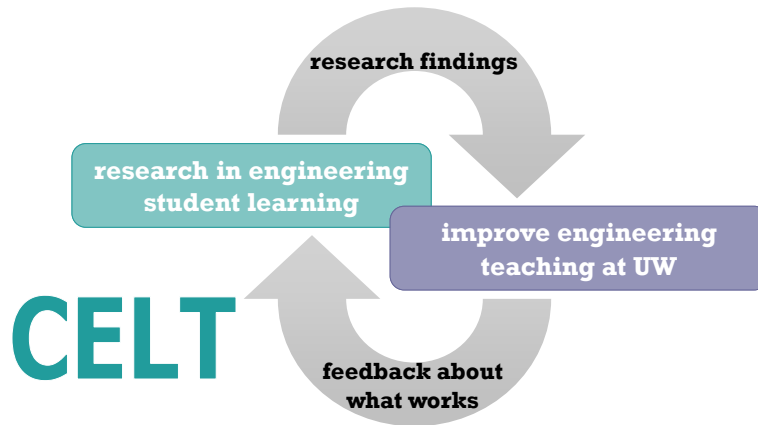
- Visualizations to support organizational analysis
- Virtual workspaces
- Technology for health and wellness
- Internet based research
- Human-robot interaction
- Engineering education
- Digital games
- Design for digital inclusion
- Computer supported collaboration

Located in Seattle, the University of Washington has a beautiful campus in the heart of the city. HCDE is housed in the College of Engineering, and benefits from the research tradition of a leading R1 institution. Graduates are prepared to be national and international leaders in the field, securing jobs both in academia and industry. You can access our [PHD flyer here](#).

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 Education Research Center

- 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 Eliot Douglas 2 months, 3 weeks ago

Page history

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2. [Engineering Education-Related Certificate Programs](#)

3. [Innovative Engineering and Inter/Cross-Disciplinary Programs](#)

[Home](#)

Engineering/STEM Education Graduate Programs

Institution	Program	Degree Awarded
Arizona State University	Liberal Arts Fellows Teacher College	M.Ed. Educational Technology Ph.D. in Curriculum and Instruction with concentration in Engineering Education Innovation Ph.D. in Educational Technology Ph.D. in Educational Technology with concentration in Arts, Media, and Engineering
	Ba 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	Center for Engineering, Science, and Mathematics (CESM) 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
Liaoning 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
Hagaza 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
CMU Pomona University	Division College of Education - Department of STEM Education & Pedagogical Studies	M.S. Engineering - Modeling and Simulation

<http://tinyurl.com/engredu>