

# Mapping Local Trajectories of Engineering Education Research to Catalyze Cross-National Collaboration: Australia, the United Kingdom, and India

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Supported by NSF #DUE-0810990

# EER's expanding global profile

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- SEFI's Engineering Education Research Working Group (EER-WG) formed in 2008
- Australasian Association for Engineering Education's (AAEE) Educational Research Methods (ERM) Group formed in 2008

"Engineering Education Research," (n.d.) <[http://www.sefi.be/index.php?page\\_id=1192](http://www.sefi.be/index.php?page_id=1192)> Accessed February 2, 2009.

"ERM (Educational Research and Methods)," *AAEE Newsletter*, 2008/1, March 2008.

<[http://www.aee.com.au/newsletters/Newsletter%20March%202008\\_files/index.html](http://www.aee.com.au/newsletters/Newsletter%20March%202008_files/index.html)> Accessed March 6, 2009.

# Internationalizing EER

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- *Journal of Engineering Education (JEE)* now distributed via professional societies in Australasia, the Caribbean, Europe, India, North America, Russia, and South America
- International Conference on Research in Engineering Education (ICREE) in Honolulu, HI in 2007; Research in Engineering Education Symposium (REES) in Switzerland in 2008 and Australia in 2009
- Advancing the Global Capacity for Engineering Education Research (AGCEER) in 2007-2008

# About AGCEER

**“AGCEER is a joint initiative by the *European Journal of Engineering Education*, published by the Société Européenne pour la Formation des Ingénieurs, and the *Journal of Engineering Education*, published by the American Society for Engineering Education.**

**The goal is to significantly advance the global capacity for engineering education research** through moderated interactive sessions offered in a series of international engineering education conferences between July 2007 and December 2008.

**The sessions address fundamental questions facing the development of a global community of scholars and practitioners in engineering education research.”**

Lohmann, J. R. (2008). Advancing the Global Capacity for Engineering Education Research (AGCEER): A Year of International Dialogue. Paper presented at the American Society for Engineering Education Annual Conference, Pittsburgh, PA.

# Project goals

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- 1) Describe the development and state of engineering education research in specific national contexts
- 2) Identify opportunities, strategies, and approaches for developing multi-national research collaborations
- 3) Promote further discussion and agenda-setting activities at all levels (institution, nation, region, globe)

# Subjects and methods

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## **Cases**

- Australia, the United Kingdom, and India

## **Data Sources**

- Database of 800+ empirical research papers published 2005-2008
- Brief interviews (in-person or e-mail) with actors/stakeholders from countries of interest
- Additional archival, database, and Internet research

**Table 2. Number of Qualifying Papers by Author Country of Origin**

<b>Author Country<sup>1</sup></b>	<b>No. of Papers</b>	<b>Author Country<sup>1</sup></b>	<b>No. of Papers</b>	<b>Author Country<sup>1</sup></b>	<b>No. of Papers</b>
United States	315	Israel	7	Korea	2
Total – EU	257	Hong Kong	5	Latvia	2
Australia	154	Japan	5	Palestine	2
United Kingdom	54	Malaysia	5	Poland	2
Spain	37	Brazil	4	Slovenia	2
Germany	28	Colombia	4	UAE	2
Netherlands	28	India	4	Czech Republic	1
Turkey	23	Greece	4	Iran	1
South Africa	22	Norway	4	Nigeria	1
Sweden	21	Romania	4	Oman	1
Denmark	20	Thailand	4	Pakistan	1
Finland	19	Chile	3	Puerto Rico	1
Canada	17	Italy	3	Qatar	1
Belgium	10	Kuwait	3	Saudi Arabia	1
New Zealand	10	Lebanon	3	Sierra Leone	1
France	9	Russia	3	Trinidad & Tobago	1
Mexico	8	Singapore	3	Ukraine	1
Portugal	8	Slovakia	3	Zimbabwe	1
Taiwan	8	Hungary	2	<b>Total – All Data</b>	<b>888<sup>2</sup></b>

<sup>1</sup> Shaded cells indicate European Union (EU) member countries.

<sup>2</sup> Total is larger than total papers (n= 815) due to double counting of multi-authored papers.

# Interview questions

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1. What led you into this type of work?
2. What are the most active areas or topics for engineering education researchers in your country?
3. What criteria is used to assess if the research is good?
4. What individuals, centers, and/or institutions in your country are active in engineering education research?
5. Where is engineering education research from your country being published and/or presented? (e.g. books, journals, conferences, etc.)
6. Do you have any other relevant insights about the historical development and/or current state of engineering education research in your country?

# Typical case themes

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- Relative global visibility of each country
- Historical development and context
- Support mechanisms
  - ▣ Professional societies and conferences
  - ▣ Centers, departments, degree programs
  - ▣ Journals and other publication outlets
  - ▣ Funding sources
- Cross-national collaborative patterns
- Current areas/topics of research interest
- Horizon opportunities (research areas, etc.)

# Areas of research interest in Australia

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## Online/Distance/E-Learning

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Long history of distance education to remote interior

2

Strategy to make higher education an export industry

3

Focus on equity, access, and continuing education

# Areas of research interest in Australia

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## Problem/Project-Based Learning (PBL)

1

Leadership of influential faculty

2

Shift to outcomes-based accreditation

# Areas of research interest in the UK

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Recruitment, retention, and gender

Continuing education, professional development, and industry cooperation

Design education

E-learning and educational technology  
(including through Open University)

# Areas of interest in India

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Systematically evaluating *quality* of technical education, including development and performance of students, faculty, and institutions

Aligning engineering education with industry needs and expectations

Autonomy of institutions, including as way to enable quality reforms and alignment

# Support mechanisms

## Professional societies and conferences

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Australasian Association for Engineering Education (AAEE) and Annual Conference (both est. 1989)



From LTSN (est. 1998) and BEES (2000) to HEA, CETL, and Subject Centres



Indian Society for Technical Education (ISTE, est. 1941/1968) and Annual Conventions (since 1972)

# Support mechanisms

## Journals

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*Australasian Journal of Engineering Education (AJEE, est. 1991), also JEE*



*British Journal of Engineering Education (2001), now Engineering Education: Journal of the Higher Education Academy Engineering Subject Center (2005)*



*Indian Journal of Technical Education (1978), also JEE*

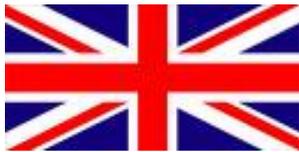
# Support mechanisms

## Funding

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Australian Teaching and Learning Council (ALTC, formerly Carrick Institute) – primarily for teaching/curriculum innovation; also some funding from internal university grants, professional societies, industry



Engineering Subject Center; Center for Materials Education; Royal Academy of Engineering; other UK technical societies and university-based centers; EU funding



Appears wholly lacking

# Challenges and opportunities

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## □ Shared

- Improve recognition and legitimacy of educational research in the context of engineering education
- Respond to globalization trends and pressures
- Connect research with outcomes-based accreditation

## □ Local

- UK: Use and grow networks, scale up research projects, secure larger grants, interface w/EU
- Australia: Leverage existing networks, interface with regional and global partners
- India: Connect research with reform movements, coordinate among many semi-autonomous schools

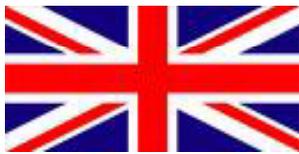
# Challenges and opportunities

## Moving to outcomes-based accreditation

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Institution of Engineers, Australia (now Engineers Australia) establishes outcomes-driven accreditation in 1996



Outcomes-based UK-SPEC standard implemented beginning in 2004



Provisional signatory of Washington Accord (2007), AICTE now moving toward outcomes-based criteria

# Current and future work

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- Additional case studies: Canada, Portugal, Hong Kong, Mexico, Spain (and others?)
- Cross-national workshops
  - ▣ PBL at Loughborough (UK), June 2009
  - ▣ Gender/Diversity at Delft, June-July 2009
  - ▣ e-Learning in Australia, December 2009

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