SUSTAINABILITY IN ENGINEERING EDUCATION:  
NEW HORIZONS FOR CYBER-ENABLED  
TEACHING AND LEARNING

Prof. Brent K. Jesiek  
School of Engineering Education  
School of Electrical and Computer Engineering  
Purdue University

Prof. Krishna Madhavan  
School of Engineering Education  
Network for Computational Nanotechnology  
Purdue University
What value-add can cyberinfrastructures provide for courses, projects, or programs with sustainability or global dimensions?

How might these cyberinfrastructures be developed in ways that extend beyond, or allow integration with, other platforms and tools?
Transformative Global Engineering Education

Traditional Orientation
- Language
- History
- Cultural Etiquette

Global Engineering Orientation
- Engineering Cultures
- Participant Observation Strategies

Immersive Global Experiences
- Study
- Research
- Intern

= Transformative Global Engineering Education

Cyber Infrastructure
International Research and Education in Engineering (IREE)

Program Objectives
- Leverage international partnerships to enhance education and research innovations in U.S.
- Enhance international perspective for U.S. early-career faculty and students
- Set stage for future scale-up, including by systematically studying aspects of program

Participant Summary
- 360 applications, 278 complete
- 23 site-placement participants
- 36 self-placement participants
- 27 (46%) women, 28 (48%) ugrad
- 40+ U.S. schools represented
- Dozens of Chinese universities

IREE 2010 is administered by Purdue University and supported by NSF through award #0965733
Leveraging Cyberinfrastructure: IREE 2010 China

Jan-Feb: Promote Program
- Program Information
- Online Application Form

Mar: Select Participants
- Online Application Review System*

Mar-Apr: Share Pre-Departure Information
- Logistical Information
- Travel Tips
- China in Brief Guide
- Food, Health, Safety

Apr: Form Online Community
- Participant Profiles
- FAQ
- Discussion Forum
- Group Site and Wiki

May: Orientation Program
- Multimedia Content (EC China)
- Survey and Evaluation Exercises*
- Written Orientation Exercises

Jun-Aug: Research Experience
- Participant Blogs
- Discussion Forum
- Survey and Evaluation Exercises*

Sept: Re-Entry Program
- Program Information
- Trip Reports
- Survey and Evaluation Exercises*

* NOTE: Items marked with asterisks indicate new features planned for GlobalHUB.
Welcome to IREE 2010 Online Community

Congratulations on receiving the IREE 2010 award. Welcome to the main wiki page of the IREE 2010 Awardees group.

From now onwards, we will use this group to exchange ideas and resources, and ask questions about the program. This could be done by starting a discussion in the group discussion area, and posting a resource[1] that will be available under the group resources area. For every Wiki page below, you can also add your comments. IREE Team will moderate discussion and answer questions on a daily basis. You can also message your fellow IREE awardees on globalhub for communication purposes (more information here).

IREE News (Please check frequently for latest updates)

July 19 – Please note that you are welcome to make your travel arrangement for your re-entry program. The travel costs to the reentry meeting will be included in your second payment in September.

May 11 – Check out the IREE CHINA ORIENTATION TENTATIVE SCHEDULE.

May 9 – Check out the IREE PURDUE ORIENTATION TENTATIVE SCHEDULE.
<table>
<thead>
<tr>
<th>Topic</th>
<th>Replies</th>
<th>Author</th>
<th>Last Post</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>Re-entry program</td>
<td>2</td>
<td>Andrew Michael Head</td>
<td>2010-08-26 11:00:43</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Yating Chang</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2010-09-21 15:11:47</td>
<td></td>
</tr>
<tr>
<td>Summer Travel</td>
<td>7</td>
<td>Anna Simon</td>
<td>2010-06-17 07:14:13</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Bradley Jordan Collins</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2010-06-24 05:08:56</td>
<td></td>
</tr>
<tr>
<td>fresh fruit/markets</td>
<td>3</td>
<td>Allison N. Ribachonek</td>
<td>2010-06-09 04:17:39</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Michelle Stolzoff</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2010-06-16 11:41:04</td>
<td></td>
</tr>
<tr>
<td>Food &quot;To go&quot;</td>
<td>1</td>
<td>Sarah Mace Farmerie</td>
<td>2010-06-04 11:36:13</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Catlin Powers</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2010-06-15 08:19:03</td>
<td></td>
</tr>
<tr>
<td>Beijing/Qinghai (1 2 End)</td>
<td>29</td>
<td>Catlin Powers</td>
<td>2010-04-15 19:51:17</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Catlin Powers</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2010-06-15 07:57:54</td>
<td></td>
</tr>
<tr>
<td>Skype Names</td>
<td>8</td>
<td>Michael P Garver</td>
<td>2010-05-30 05:10:41</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Catlin Powers</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2010-06-15 07:50:59</td>
<td></td>
</tr>
</tbody>
</table>
Reflection #2

Communication is becoming an issue of the past. When I first arrived, discussions of research and experiments were limited by language barriers. The students here rarely speak English and I rarely spoke Chinese and there was quite a bit of difficulty translating more technical terms and jargon. ... Continue reading →
Global Competency

Possess the knowledge, ability, and predisposition to work effectively with people who define and solve problems differently than they do.

Be able to explain how national differences are important in engineering work.

Engineering Cultures China consists of multimedia modules that examine the historical development and contemporary state of engineering education and the engineering profession in mainland China. The content builds on the Engineering Cultures instructional model, originally developed by Profs. Gary Downey (Virginia Tech) and Juan Lucena (Colorado School of Mines). These modules can help you take the first step toward enhancing your ability to practice effectively as a global engineering professional, in China and beyond.

Select Course Content

- Engineering Cultures China - Introduction (narrated PPT, 30 min)
- Science and Technology in Ancient China (narrated PPT, 15 min)
- Early Modern Engineering and Engineering Education (narrated PPT, 15 min)
- History of Engineering Education, 1911-1976 (narrated PPT, 55 min)
- Engineering and Engineering Education in the Post-Mao Era (narrated PPT, 15 min)
- Interview Excerpts (video, 40 min)
- Imitation or Innovation (narrated PPT, 15 min)
- Engineering Problem Solving with People (narrated PPT, 15 min)
Engineering Education in China: 20th Century Developments

Grand Auditorium, Tsinghua University, Beijing, China

Source: http://upload.wikimedia.org/wikipedia/commons/8/87/Tsinghua_University__Grand_auditorium.JPG
<table>
<thead>
<tr>
<th>Now Available</th>
<th>Under Development</th>
</tr>
</thead>
<tbody>
<tr>
<td>Britain</td>
<td>China</td>
</tr>
<tr>
<td>France</td>
<td>Canada</td>
</tr>
<tr>
<td>Germany</td>
<td>Australia</td>
</tr>
<tr>
<td>Japan</td>
<td>India</td>
</tr>
<tr>
<td>Russia/USSR</td>
<td>Korea</td>
</tr>
<tr>
<td>United States</td>
<td>Mexico</td>
</tr>
<tr>
<td></td>
<td>Colombia</td>
</tr>
<tr>
<td></td>
<td>Brazil</td>
</tr>
</tbody>
</table>
Trust and acceptance in business:

- Depends on *kone*
- Requires *nemawashi*
- Japanese agreement seeking 'harmony'
- Involves *Nomination*
  - Feeling relaxed, sharing information
  - Can raise sensitive issues
- *Fraternity*
"Which of these communication tools did you use regularly while in China?" (n=56 IREE participants)
GTIA Global Irrigation Simulator

Timothy Bond, Erin Elizabeth Potrzebowski, Tyler Jay Williams, Jeremy Koehler, Timothy Reid Gray

http://globalhub.org/resources/833
<table>
<thead>
<tr>
<th>Title</th>
<th>Authors</th>
<th>Journal</th>
<th>Year</th>
<th>Volume</th>
<th>Issue</th>
<th>Pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identifying barriers to and outcomes of interdisciplinarity in the engineering classroom</td>
<td>David M. Richter, Marie C. Paretti</td>
<td>European Journal of Engineering Education</td>
<td>2009</td>
<td>vol.34</td>
<td>issue.1</td>
<td>29-45</td>
</tr>
<tr>
<td>Enhancing student learning through international university-industry cooperation: The GO GREEN course</td>
<td>Patricia L. Fox, Wanda L. Worley, Stephen P. Hundley, Kay Wilding</td>
<td>International Journal of Engineering Education</td>
<td>2008</td>
<td>vol.24</td>
<td>issue.1</td>
<td>175-184</td>
</tr>
<tr>
<td>Where is 'Community'?: Engineering education and sustainable community development</td>
<td>J. Schneider, Jon A. Leydens, Juan C. Lucena</td>
<td>European Journal of Engineering Education</td>
<td>2008</td>
<td>vol.33</td>
<td>issue.3</td>
<td>307-319</td>
</tr>
<tr>
<td>Engineers, development, and engineering education: From national to sustainable community development</td>
<td>Juan C. Lucena, J. Schneider</td>
<td>European Journal of Engineering Education</td>
<td>2008</td>
<td>vol.33</td>
<td>issue.3</td>
<td>247-257</td>
</tr>
<tr>
<td>Sustainable engineering design at James Madison University</td>
<td>Eric C. Pappas, Ronald G. Kander</td>
<td>Frontiers in Education Conference</td>
<td>2008</td>
<td>vol.N/A</td>
<td>issue.N/A</td>
<td>T4C-14-T4C-15</td>
</tr>
</tbody>
</table>
What value-add can cyberinfrastructures provide, especially for courses, projects, or programs with sustainability or global dimensions?

How might new cyberinfrastructure be developed in ways that extend beyond, or allow integration with, other platforms and tools?