GLOBAL ENGINEERING COMPETENCY: SITUATIONAL TRAINING AND ASSESSMENT

CILMAR Research Proposal – June 2017

Current challenges: Why global competency?

Intensified globalization trends, changing organizational structures and work practices, and widespread use of new information technologies have led to intensified calls for a more globally competent workforce. Growing demand for such capabilities is evident in many professional fields, including science and engineering. Nonetheless, there remain major gaps between what employees have and what organizations need for global competitiveness. In fact, one recent study found that most global companies are failing to cultivate global leaders, despite evidence of a strong association between global leadership development programs and business performance. Firms working to address these gaps through training and other initiatives face further challenges, including: 1) a lack of clarity around what attributes and capabilities are most critically important for global technical professionals, and 2) a shortage of high quality assessment tools that can be used to identify specific strengths and weaknesses when considering employees for global work roles or assignments.

How are we addressing these challenges?

Aligned with Purdue University’s global mission and with previous support from the U.S. National Science Foundation (NSF), our team is at the forefront of efforts to define and assess global competency. We couple deep understanding of what counts as “global engineering competency” with leading-edge, behavior-based assessment techniques that are both reliable and valid. A major outcome of this work is a new situational judgment test (SJT) covering three competency dimensions (Technical Coordination; Engineering Cultures; Ethics, Standards, and Regulations) and six cultural contexts (China, Japan, India, France, Germany, Mexico).

What is the current status of this project?

Using related literature and data collected from practicing engineers, our research team has developed 74 paragraph-length scenarios describing various situations often encountered by global technical professionals, and covering the competency dimensions and cultural contexts listed above. Our team additionally developed complete sets of behavioral response options for 68 of the 74 scenarios, and has performed large-scale data collection (from n=400 practicing engineers) to validate 6 of the China scenarios, with results currently being prepared for publication. The team is also developing scoring keys for select Germany scenarios based on input from experts. A progress summary (Table 1) and sample China scenario (Figure 1) are provided below.

What steps can be taken to maximize the outputs and impacts of this project?

Additional resources (e.g., 50% GRA support for one year) would be directed to the following specific activities:

1. Develop new instructional materials and guides so that instructors can more easily incorporate select scenarios into existing courses. Appendix A gives sample instructional materials for one pilot scenario.
2. Finish production of a second video vignette and associated instructional guide based on another SJT China scenario. Final video edits/production and an instructional guide still need to be completed.
3. Collect and analyze data from experts so that scoring keys can be developed for a subset of scenarios associated with the four remaining cultural contexts (Japan, India, France, and Mexico).
4. Perform another round of large-scale instrument validation for a second set of 5-6 SJT scenarios using a mix of survey responses from experts (i.e., global professionals) and novices (i.e., students).
5. Disseminate instructional materials and assessment questions for more widespread adoption.

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Table 1. Summary of GEC SJT Item Development

<table>
<thead>
<tr>
<th>National Context</th>
<th>Technical Coordination</th>
<th>Engineering Cultures</th>
<th>Ethics, Standards, and Regulations</th>
<th>Scenarios Fully Developed</th>
<th>Expert Scoring Completed</th>
<th>No. of Scenarios Validated</th>
</tr>
</thead>
<tbody>
<tr>
<td>China</td>
<td>9 items</td>
<td>3 items</td>
<td>6 items</td>
<td>16 (of 18)</td>
<td>Yes</td>
<td>6</td>
</tr>
<tr>
<td>Japan</td>
<td>3 items</td>
<td>3 items</td>
<td>4 items</td>
<td>9 (or 10)</td>
<td>No</td>
<td>TBD</td>
</tr>
<tr>
<td>India</td>
<td>3 items</td>
<td>3 items</td>
<td>5 items</td>
<td>12 (of 12)</td>
<td>No</td>
<td>TBD</td>
</tr>
<tr>
<td>Germany</td>
<td>4 items</td>
<td>6 items</td>
<td>4 items</td>
<td>11 (of 14)</td>
<td>Yes</td>
<td>TBD</td>
</tr>
<tr>
<td>Mexico</td>
<td>3 items</td>
<td>3 items</td>
<td>4 items</td>
<td>9 (of 10)</td>
<td>No</td>
<td>TBD</td>
</tr>
<tr>
<td>France</td>
<td>4 items</td>
<td>3 items</td>
<td>4 items</td>
<td>11 (of 11)</td>
<td>No</td>
<td>TBD</td>
</tr>
</tbody>
</table>

*NOTE: Items highlighted in yellow will be the target of project activities 3-4 listed above.*

Figure 1. Sample GEC SJT Assessment Question
(National/Cultural Context: China, GEC Dimension: Technical Coordination)

**Scenario 1 of 6**

You are a newly appointed program manager in a global agricultural equipment company. To prepare for an upcoming training initiative, you have been asked to identify the top engineering talent at each international site. For your firm’s operation in China, you engage your close colleague Wei Wang, who as plant manager supervises eight manufacturing engineers. When you explained the task to Wei during a recent teleconference, he said he understood it. You then asked him to e-mail you his numerical ratings for each of his engineer’s technical abilities, timeliness in project work, and effectiveness on global teams. Yet when you receive his e-mail, you find that he has rated everyone essentially the same. What would you do?

(Please rate the effectiveness of each item below on a scale from 1 = Not at all effective to 10 = Very effective)

<table>
<thead>
<tr>
<th>Not at all effective</th>
<th>Very effective</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 2 3 4 5 6 7 8 9 10</td>
<td></td>
</tr>
</tbody>
</table>

- Ask Wei whether he knows what he is doing, and have him explain the reasoning behind his actions.
- Create a new evaluation form that requires Wei to rank-order the engineers.
- Ask Wei to also send you written, descriptive evaluations of each engineer.
- Have a one-on-one conversation with Wei so you can go through the ratings together and hear what he has to say about each engineer.
- Randomly select one of the engineers for the training.