Transitioning from Capstone Design to Industry: Preliminary Results of a Multi-Site Study

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Motivation
How and to what extent do capstone design courses prepare students to effectively enter communities of practice in engineering workplaces?

This 3-year study is investigating engineering students’ transitions from school to work by examining the role capstone design courses play in preparing graduates. Using qualitative and quantitative insights from participants in their first 12 months at work, we reveal interesting trends regarding frequency of activities and preparedness.

Methodology
- Multi-case study at four institutions: CU Boulder, New Mexico Tech, Smith, Virginia Tech
  - Cohort 1: 54 participants (25 female and 29 male)
  - Cohort 2: ~70 participants (in process)
- Sequential explanatory mixed-method design: Interviews (4) + Surveys (24)

Preliminary Results: Quantitative Surveys

<table>
<thead>
<tr>
<th>Activity</th>
<th>Frequency</th>
<th>Perceived Preparedness</th>
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</thead>
<tbody>
<tr>
<td>Team Meetings (50)</td>
<td>50</td>
<td>6.0</td>
</tr>
<tr>
<td>Project Planning (44)</td>
<td>44</td>
<td>5.6</td>
</tr>
<tr>
<td>Engineering Calculations (39)</td>
<td>39</td>
<td>5.6</td>
</tr>
<tr>
<td>Report Writing (6.0)</td>
<td>60</td>
<td>5.6</td>
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<tr>
<td>Engineering Calculations (6.0)</td>
<td>60</td>
<td>5.6</td>
</tr>
<tr>
<td>Team Meetings (6.0)</td>
<td>60</td>
<td>5.6</td>
</tr>
<tr>
<td>Generating/Refining Concepts (37)</td>
<td>37</td>
<td>5.6</td>
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<tr>
<td>Prototyping/Testing Designs (22)</td>
<td>22</td>
<td>5.9</td>
</tr>
<tr>
<td>CAD Modeling (35)</td>
<td>35</td>
<td>5.6</td>
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<tr>
<td>Client Meetings (30)</td>
<td>30</td>
<td>5.6</td>
</tr>
<tr>
<td>Project Budgeting (21)</td>
<td>21</td>
<td>5.0</td>
</tr>
</tbody>
</table>

Frequency and Perceived Preparedness Results

- Highest frequency:
  - Team Meetings
  - Project Planning
  - Engineering Calculations

- Highest perceived preparedness:
  - Report Writing
  - Engineering Calculations
  - Team Meetings

- ANOVA and Tukey-Kramer post hoc tests: average perceived preparedness for Project Budgeting is lower (p=0.007) than for other activities

- T-tests: higher average perceived preparedness reported by men (6.1) than women (5.0) for Generating/Refining Design Concepts (p=0.0014)

Preliminary Conclusions

- Capstone content is relevant, especially regarding professional skills and practices
- Most participants feel at least somewhat prepared for activities → capstone plays a key role in preparation
- Capstone could emphasize project budgeting further
- Gender may play a role in participants’ perceived preparedness (need larger data set for fuller understanding)

Next Steps
- Analyze weekly reflective prompts for Cohort 1 [ASEE18]
- Analyze 3, 6, and 12 month interviews for Cohort 1
- Collect and analyze complete data for Cohort 2
- Share with industry + capstone

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