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

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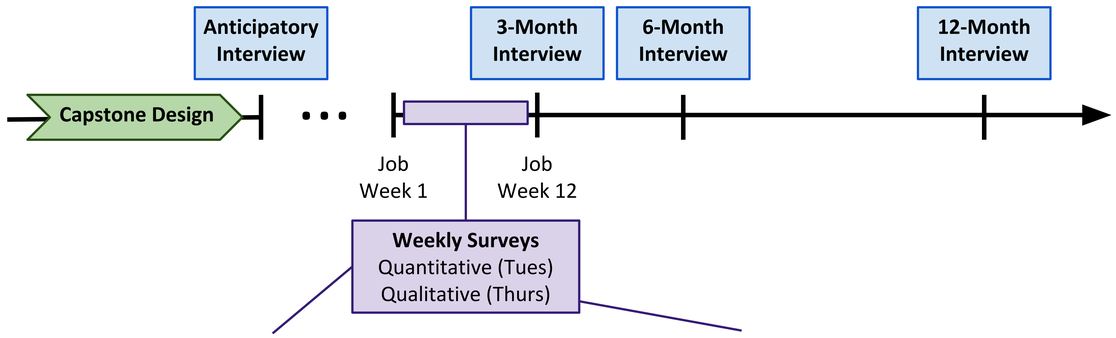
Motivation

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)**



Quantitative Weekly Survey Items

***Please check all of the activities you've been involved with over the past week*:**

□ Team meetings within your unit or project team
□ Project planning
□ Writing reports
□ Making formal presentations
□ Performing engineering calculations
□ Generating or refining design concepts
□ Prototyping and testing designs
□ Computer-aided modeling
□ Meeting with clients
□ Project budgeting (business financials)
□ Other (please provide a short description)

To what extent did you feel prepared for this activity?

(7-point scale provided for each activity checked: 7=completely prepared, 1=completely unprepared)

Qualitative Weekly Reflective Prompts

1. What was your biggest challenge this week?
2. What made it so challenging?
3. How did you approach this challenge?
4. To what extent did you feel prepared for this challenge based on your capstone design experience? Based on other experiences?
5. Is there anything you think your education might have done that would have better prepared you?
6. Are there any other workplace activities this week that you felt particularly well or poorly prepared for? If so, please explain.

Preliminary Results:
432 survey responses
(201 female, 231 male)

Preliminary Results: Quantitative Surveys

- Highest frequency:
  - **Team Meetings** (50)
  - Project Planning (44)
  - **Engineering Calculations** (39)
- Highest perceived preparedness:
  - Report writing (6.0)
  - **Engineering Calculations** (6.0)
  - **Team Meetings** (6.0)
- 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** ($p=0.0014$)

Frequency and Perceived Preparedness Results

Activity	N	AVG	MIN
Team Meetings	50	6.0	4.9
Project Planning	44	5.6	4.7
Report Writing	30	6.0	5.3
Formal Presentations	22	6.0	5.6
Engineering Calculations	39	6.0	5.2
Generating/Refining Concepts	37	5.6	4.8
Prototyping/Testing Designs	22	5.9	4.9
CAD Modeling	35	5.6	4.9
Client Meetings	30	5.6	5.0
Project Budgeting	21	5.0	4.2

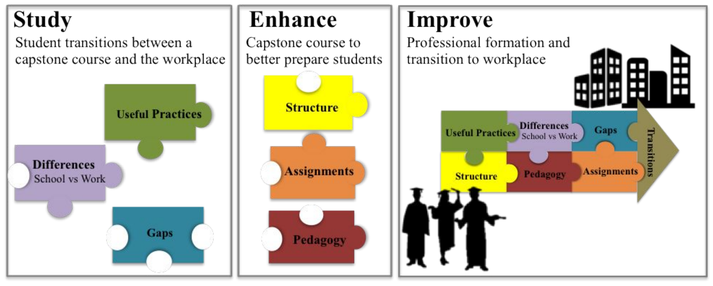
***N** = participants involved with activity at least one of the first 12 weeks on the job*
***AVG** = perceived preparedness ratings per participant across all weeks averaged across all respondents*
***MIN** = lowest rating per participant across all weeks averaged across all respondents*

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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