The Effects of Prompts to Draw Diagrams in a Flipped Engineering Classroom
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Why Prompt Students to Draw?
- Drawing diagrams is a disciplinary practice in engineering.
- Drawing diagrams can help students learn (Rittle-Johnson, Siegler, & Alibali, 2001).
- Yet, drawing is not used by novice engineering students in entry-level courses (de Vere, Melles, & Kapoor, 2011).
- Hence, students may benefit from prompts to draw as an instructional intervention (Wu & Rau, 2017, Smithrud & Pinhas, 2015).

Study Questions
1) Does prompting students to draw diagrams increase their use and perception of drawing?
2) Does drawing prompts enhance learning outcomes (i.e., test and course performance)?
3) How do students use their drawings to solve problems?

Conclusion
- Drawing prompts increased students' use and value of drawings.
- The use of drawings was related to enhanced performance on a exam and on the course.
- Students may need additional support to use diagrams effectively.

Intervention Materials
- Drawing Prompts asks students to draw and share diagrams with peers (added to Class 2, 4, 6 in Spring 2018).

Video Lectures modeled the use of drawing (Spring 2018 only):
- Graphical representation
- View inside
- Product realization
- Complete plane

Assessments
- Exams assess course content (includes 3 midterms and 1 final).
- Surveys assess students’ use and value of various learning strategies (conducted at end of semester of Fall 2017 and at the beginning, middle, and end of semester of Spring 2018).
- Drawings collected from students (from Class 2, 4, and Exam 1 in Spring 2018).
- Checkboxes assess students’ problem-solving strategy (added to specific problems in Class 4, 5, 6, 18 in Spring 2018).

References

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