Designing and Implementing Open-Ended Modeling Problems (OEMPs) in Engineering Science Courses

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ENGINEERING HONORS PROGRAM
UNIVERSITY OF MICHIGAN

SHUTTLE Lab

What is an OEMP

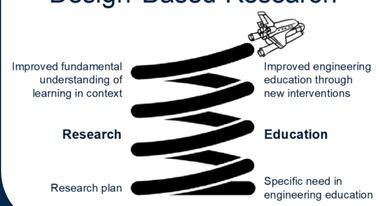
- OEMPs are designed to give students insights and skills into solving real-world engineering problems
- Students are required to make assumptions and simplifications to solve OEMPs
- OEMPs do not have one correct answer, but allow for multiple ways to optimize to the best answer

Why Implement OEMPs

- Current engineering science courses (such as statics and dynamics) are taught like mathematics courses
- Most engineering students are not exposed to open-ended problems until their senior-year capstone courses
- Providing students with OEMPs to solve helps develop their productive beginnings of engineering judgment (akin to intuition)

How We Research OEMPs

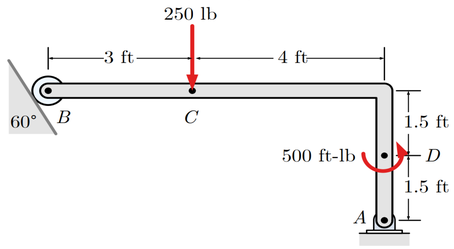
Design-Based Research



Productive Beginnings of Engineering Judgment Coding Framework

- PBJ1. Making Assumptions
- PBJ2. Assessing Reasonableness
- PBJ3. Using Technology Tools
- PBJ4. Deciding to Override an Answer

Model for a Typical Statics Problem



- Well Defined
- No Real-World Context
- All Information Given
- One Correct Answer

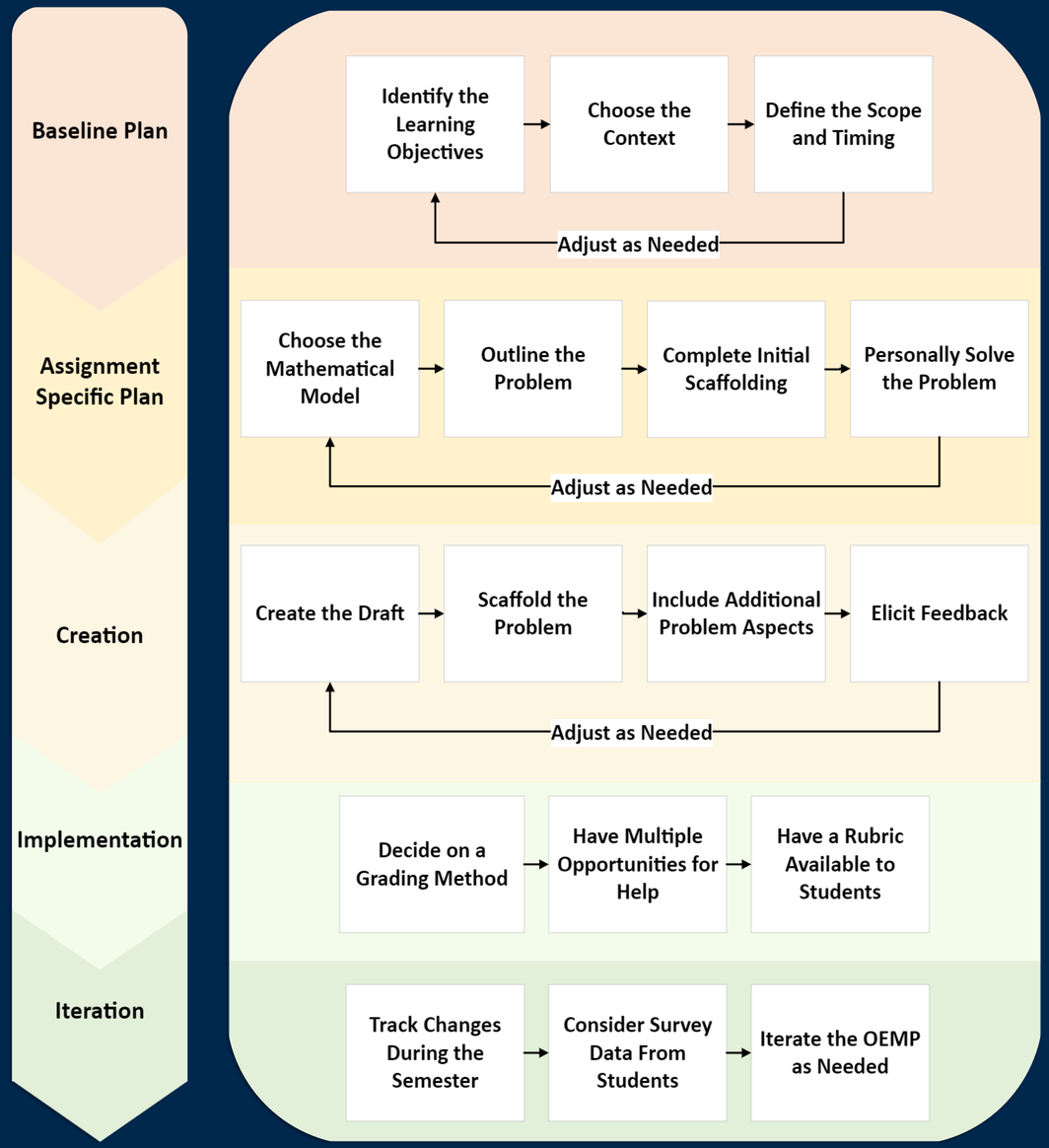
Model for a Statics OEMP

- Ill Defined
- Real-World Context
- Assumptions Required
- Multiple Correct Answers

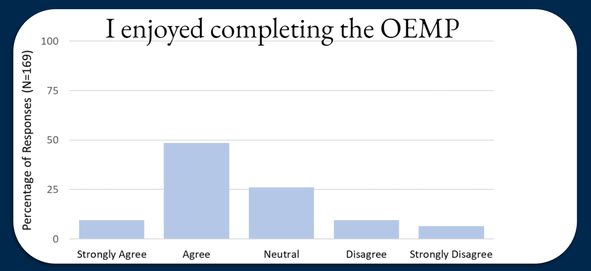
Current Implementations

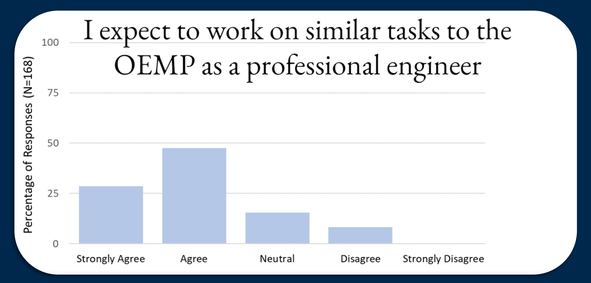
- Our research team has implemented OEMPs at 9 institutions over the past 5 years
- We hope to keep expanding, and provide an easy-to-use guide so any instructor can properly implement OEMPs

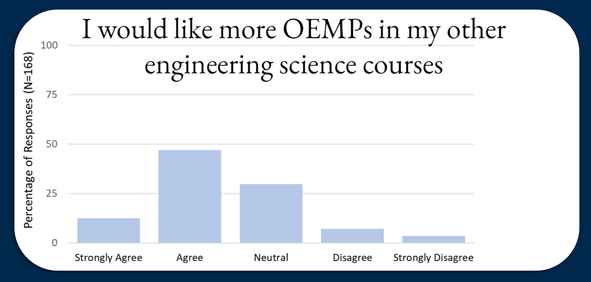
How to Make an OEMP

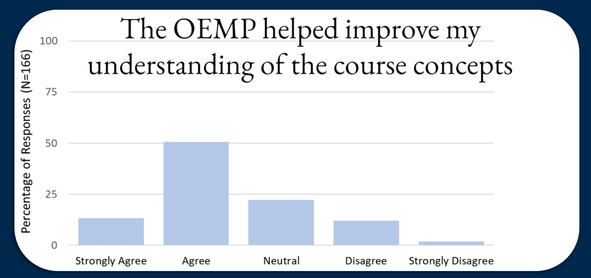


Student Views on OEMPs









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