Special Session - Model-Eliciting Activities: Motivating Students to Apply and Integrate Upper-Level Content in Engineering

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Abstract - This interactive session is for engineering faculty interested in curriculum reform, real-world engineering problem-solving aimed at upper-level content, and addressing ABET Criteria. Participants will take part in a Model-Eliciting Activity (MEA) group problem-solving session and learn the fundamental principles for developing an MEA. Participants will gain an understanding of the process involved in making advanced engineering content accessible to undergraduate students through a well-formulated MEA. They will also learn about new and innovative ways to integrate ethics into the classroom and use problem-solving as a means to elicit misconceptions.

Index Terms – engineering problem solving, modeling, ethics, misconceptions

INTRODUCTION

The MEDIA (Model Eliciting, Developing, and Integrating Activities) project, is a large-scale collaborative NSF-funded research project between six major universities: University of Pittsburgh, University of Minnesota, US Air Force Academy, Colorado School of Mines, Purdue University, and California Polytechnic State University. The purpose of the research is for the implementation of models and modeling as a foundation for undergraduate STEM curriculum and assessment within engineering domains. To do this, we are building upon and extending Model-Eliciting Activities (MEAs), a proven methodology originally developed by mathematics education researchers [1,2], and which has been recently introduced to engineering education [3-5]. MEA theory and practice was developed to observe the development of student problem-solving competencies and the growth of mathematical and conceptual cognition. However, it has been increasingly documented as a methodology to help students become better problem solvers, as a tool to help both instructors and researchers better design situations to engage learners in productive conceptual thinking, and as a vehicle for interest and engagement for underrepresented student populations [6].

For this research, we are extending the MEA construct to misconceptions by creating concept MEAs (C-MEAs), to ethical situations by creating ethics MEAs (E-MEAs), and to laboratory settings by creating laboratory MEAs (L-MEAs) in order to better understand the various strategies student teams use in approaching these respective concerns.

GOALS OF THE SESSION

This session will provide a collaborative learning environment where participants will:

• Learn the fundamental principles for developing Model-Eliciting Activities (MEAs)
• Take part in a MEA group problem-solving session aimed at upper-level engineering content
• Gain an understanding of the process involved in making advanced engineering content accessible to undergraduate students through a well formulated MEA
• Learn about the new MEA extensions (E-MEA, C-MEA, and L-MEA)

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REFERENCES


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