# Helping Your Students Learn "Engineering-ese": Using the Results of Conceptual Change Research to Inform Your Instruction

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*Abstract*— **The purpose of this proposed mini-workshop is to connect our research in conceptual change [Collaborative research: Getting Engineers to Talk Across Disciplines, EEC 1129447] to instructional practice. Our research suggests that one potential indicator of students' conceptual understanding across several engineering disciplines is their use (or misuse) of language. During this mini-workshop participants will be able to read excerpts from interviews we conducted, discuss how to draw inferences about student learning from these interviews, and then brainstorm how they can be more explicit about the use of language in their classrooms**.

Keywords—conceptual change, misconceptions, research-to-practice

## I. INTRODUCTION

Professors often think their students share their understanding of fundamental terms. But our research findings suggest that this might not be the case. A common theme in our findings across several engineering disciplines is that students misuse (and probably misunderstand) fundamental engineering terms [1, 2]. Students often confuse the specific engineering meaning of a term like "normal force" with the meaning of the term in common usage. We see this mini-workshop as an opportunity to have a discussion about how this tendency to misuse the language of engineering may play out in various disciplines and to brainstorm instructional strategies to mitigate this issue.

More specifically, the mini-workshop will be an opportunity to answer the questions: (1) So what? Why might this misuse of language matter? And (2) what can an instructor do to reverse these misunderstandings?

We will use a community of practice framework as a model for our session. We will form small ad hoc communities [small groups] around specific domains [related engineering disciplines] and focus on practice [in this case, instructional practice]. Participants will share their pedagogical content knowledge to build a shared understanding of what parts of their field might contain problematic language (terms that are often misunderstood) and what strategies might be used to allow students to better understand these terms.

## II. SESSION DESCRIPTION

### A. Intended Audience

This workshop should have value for any engineering faculty member with instructional duties. Our examples will come from undergraduate engineering classrooms and so the information will be most easily transferred to undergraduate contexts.

### B. Goals

The goal of this session is to use research on conceptual change to inform instructional practices.

### C. Expected Outcomes

By the end of this session it is expect that:

1. Participants will be able to identify problematic language in their respective field of instruction.

2. Participants will be able to identify instructional strategies to mitigate the problematic language uncovered in learning objective 1.

## III. SESSION AGENDA

Our session will be highly interactive and will allow participants to connect with the research as well as with colleagues in their discipline with whom they may form a

community of practice. The structure of the session is as follows:

- **Overview of the session and introduction of session presenters** (5 minutes)

- **Participants organize themselves into small groups of related disciplines and introduce themselves to each other** (5 minutes)

- **Distribute portions of anonymized transcripts taken from our research that highlight areas where problematic language is used**. These transcripts will contain sections that illustrate students' misunderstanding and misuse of fundamental terms. The examples will come from a variety of disciplines and will be matched as much as possible to the disciplines represented in the small groups. (5 minutes)

- **Small groups discuss the transcripts and predict instances of misuse/misunderstanding they see in their students' language**. (20 minutes) - Full group discussion. (15 minutes)

- **Presenters and participants discuss instructional strategies that may mitigate the issues raised in the previous discussion**. (25 minutes)

- **Individually, participants reflect on and document what they have learned in the session to (1) identify potentially problematic language in their courses and (2) identify instructional strategies to mitigate #1.** (10 minutes)

- **Participants complete session evaluation** (5 minutes)

### REFERENCES

[1]     [Herman, G.L., Streveler, R.A., Montfort, D. & Brown, S. (2012, October). Work in progress: Do students need to learn to speak "Engineering-ese?" Conceptual change as language acquisition in engineering. Proceedings of the Annual ASEE/IEEE Frontiers in Education Conference, Seattle, WA.

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