

Workshop: Transcending Engineering's Weed-Out Culture Through Feedback to Students

Cassie Wallwey, The Ohio State University

Cassie Wallwey is currently a Ph.D. candidate in Ohio State University's Department of Engineering Education. She is Graduate Teaching Associate for the Fundamentals of Engineering Honors program, and a Graduate Research Associate working in the RIME collaborative (<https://u.osu.edu/rimetime>) run by Dr. Rachel Kajfez. Her research interests include engineering student motivation and feedback in engineering classrooms. Before enrolling at Ohio State University, Cassie earned her B.S. (2017) and M.S. (2018) in Biomedical Engineering from Wright State University.

Dr. Rachel Louis Kajfez, The Ohio State University

Dr. Rachel Louis Kajfez is an Assistant Professor in the Department of Engineering Education at The Ohio State University. She earned her B.S. and M.S. degrees in Civil Engineering from Ohio State and earned her Ph.D. in Engineering Education from Virginia Tech. Her research interests focus on the intersection between motivation and identity of undergraduate and graduate students, first-year engineering programs, mixed methods research, and innovative approaches to teaching. She is the faculty lead for the Research on Identity and Motivation in Engineering (RIME) Collaborative.

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Workshop Summary

Introduction

Policies and practices informed by research have been put into place to improve engineering diversity and inclusion through expanded K12 education, recruitment efforts, and support programs. (e.g. [1]–[3]). With that framing, what can be done on an individual instructor level that does not align with engineering's weed-out culture but instead aims to be actively inclusive and retain more engineering students? Feedback is a critical aspect of student learning through which instructors communicate misconceptions or gaps in knowledge [4]. Feedback's importance makes it a worthwhile practice to explore when considering engineering education reform at an individual course/instructor level. How can the feedback of students on course-related material improve their learning of engineering content, but also their learning *experience* as an engineering student?

This workshop will be grounded in the results of a mixed methods research study that explored the impact of feedback on student motivation. Specifically, the overarching research question for the mixed methods study was “In what ways do students’ descriptions of feedback’s influence on their motivation and course engagement relate to students’ motivation orientations?” Using Causality Motivation Theory [5] as a lens, we explored feedback and how the feedback influenced students’ motivation and subsequent course engagement. This workshop will be informed by the results of that mixed methods engineering education research study.

Content

Feedback practices discussed in this workshop are based on current evidence-based feedback practices in the literature, as well as the analysis of our study. Our aim is to give engineering educators new insights into what feedback practices engineering students find most motivational. Literature on feedback widely agrees on the importance of feedback related to learning, as well as ‘best practices’ in feedback for improved learning gains [4], [6], [7]. Topics that are significantly less researched are *how* feedback impacts learning or the effects of feedback beyond learning - such as students’ emotional responses and the motivational implications. Our work is framed about these understood impacts.

This workshop will focus on supporting engineering educators (faculty, graduate students, undergraduate teaching assistants, etc.) in their development of motivationally based feedback practices. Feedback practices will be defined, presented, and discussed through the four characteristics of feedback categorized by Rucker & Thomson [8]: source, timeliness, mode, and content. Current evidence-based feedback practices with regard to improving student learning, and their related characteristics, will also be reviewed. Additionally, motivational feedback practices as informed by the results of our research will be incorporated.

Attendees will also be given opportunities to engage with the facilitator and one another by applying the recommended feedback practices to examples of student work. Participants will

also engage in a discussion around course context and the different needs related to feedback in various settings. Furthermore, discussion and brainstorming between the workshop facilitator and attendees with regards to how the feedback practices explored in this workshop can be translated related to various instructional styles will also take place to allow for the collaborative generation of ideas and practices informed by research.

Outcomes

By the completion of the workshop, attendees should be able to:

- 1) Give concrete examples of feedback practices that result in student learning gains
- 2) Explain aspects of feedback engineering students find motivational
- 3) Produce feedback that improves both student learning and student motivation
- 4) Develop adaptations to recommended motivational feedback practices to better fit various course and instructor contexts.

A secondary outcome will be to provide engineering educators with ideas and fundamental knowledge needed to continue to address the gap in literature related to feedback in STEM settings if they desired to do so.

Workshop Outline

This workshop will leverage both active learning techniques as well as collaborative learning approaches. Table 1 provides an outline of how the workshop will be structured.

Table 1: Scheduled outline for a 60-minute workshop

5 min	Introduction of Facilitators and Participants Through Ice Breaker Activity
5 min	Review of Evidence-Based Feedback Practices from the Literature
5 min	Present Motivational Feedback Results & Recommendations from Our Research
15 min	Feedback Practice: Individual, then Partner Comparison & Revisions
15 min	Share Out & Discussion on Feedback Similarities & Difference
10 min	Brainstorm & Discussion of Feedback Across Contexts, Roles, & Instructional Styles
5 min	Complete Feedback on Workshop

The first fifteen minutes of the workshop will be used to introduce the workshop facilitators to the workshop participants and vice versa using an ice breaker activity, summarize the research that informed the workshop, as well as the present the results and recommendations resulting from that research.

The next fifteen minutes will then be spent with workshop attendees implementing recommended feedback practices on a variety of student work samples based on their areas of expertise. Attendees will first provide feedback on the sample assignments individually, and will then be partnered with another individual who provided feedback on the same assignment to compare feedback practices.

Following that activity, there will be opportunities for attendees to share out their experience implementing the recommendations in a group discussion related to how feedback practices varied between people, and how those variations may be related to the context that those attendees typically teach in. This will transition into facilitators speaking about how context of a course, its content, instructional style, or the role of the person giving feedback may impact the recommendations based on our research.

Following this, workshop attendees will be asked to participate on a collaborative Jam Board (virtual collaboration space) for fifteen minutes. The first few minutes will be spent by attendees identify ways their own role, instructional style, or courses might not allow for the exact recommendations provided in this workshop. The rest of the time will then be used by facilitators and attendees to collaboratively brainstorm adaptations to the recommendation that make them more accessible based on the identified limitation.

In the last five minutes of the workshop session, attendees will be asked to complete a rubric ‘grading’ the workshop quality and provide feedback to the workshop facilitators using the recommendations provided or adaptations collaboratively generated.

References

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