2021 ASEE ANNUAL CONFERENCE
Virtual Meeting | July 26–29, 2021 | Pacific Daylight Time
Paper ID #34363

Development and Employment of a Course Feedback Classification Tool

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COLLEGE OF ENGINEERING

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INTRODUCTION

Engineering culture among students and practicing engineers all too commonly conveys that pursuing a 4-year engineering degree is difficult and is commonly associated with weed-out courses early in the degree program. At times, this weed-out culture can work in opposition to the diversity and inclusion efforts that many engineering programs are implementing to diversify the field of engineering. While many in the engineering education community have supported this initiative and called for changes at research and institutional levels [1], what can be done at the individual course, classroom, and instructor level to improve students' feelings of inclusion and motivation to persist in this field?

With this framing, my research aims to elevate the holistic student learning experience through feedback. Instructor feedback is a critical aspect of student learning, as it is how instructors communicate misconceptions or gaps in knowledge to learners [2] and therefore, a worthwhile and deserving focus of engineering education reform.

BACKGROUND

Feedback

In multiple courses at various education levels, feedback has been shown to impact student learning through deeper content understanding, improved retention, and more meaningful interactions with instructors [3]. With targeted feedback, students are better able to adjust and correct misconceptions, recognize their strengths and weaknesses, and set personal learning goals. Best practices regarding feedback, such as feedback being timely and targeted, have been identified [4]. When research-based feedback practices are used, the feedback positively impacts student learning and achievement of intended learning outcomes [2], [3], [4]. Past research supports that feedback benefits student learning, but there is less definitive evidence in the literature that demonstrates *how* feedback benefits learning.

Motivation

Self-Determination Theory (SDT) [5] is the framework used to explore feedback and its impact on student engagement. More specifically, this research employs Causality Orientation Theory (COT) [6], a mini-theory of SDT. COT explores the behavioral regulation behind a person's actions at a "personality-level" [7, p. 125]. This mini-theory categorizes an individual's initiation and regulation of their own behaviors into three orientations: autonomy, control, and impersonal orientations [6].

RESEARCH QUESTION

In what ways do students' perceptions and descriptions of feedback describe its influence on their motivation and course engagement?

FEEDBACK CLASSIFICATION TOOL

Purpose

In order to study feedback being given in specific courses, a classification tool was developed to help determine what feedback was being utilized in the course and the characteristics of that feedback as defined by Rucker & Thomas [8]: source (who), mode (how), timeliness (when), and content (what). Instructors of the course that students were being sampled from were asked to complete the Feedback Classification Tool to provide insights into what feedback practices were being used in that course and the characteristics of those practices.

Development

A survey was developed through Qualtrics that instructors could use to submit information on the feedback used in their courses. The survey first had instructors enter their institution and course title. Then, instructors were asked to select any and all types of activities used in their course, selecting from Exams, Quizzes, In-lab Activities, Lab Assignments, Projects, In-class Activities, Class Assignments, or Other, allowing them to enter an additional activity used. Instructors could also select that they do not use activities, ending the survey. For each type of activity selected, instructors were asked to select which of the activities feedback is provided on, ending the survey if they do not provide feedback on any of them. For each activity feedback is provided for, instructors were asked to select details on the characteristics of feedback (Source, Mode, Content, and Timeliness). After instructors looped through these questions for each type of activity they provide feedback on, their submission was saved and the survey ended.

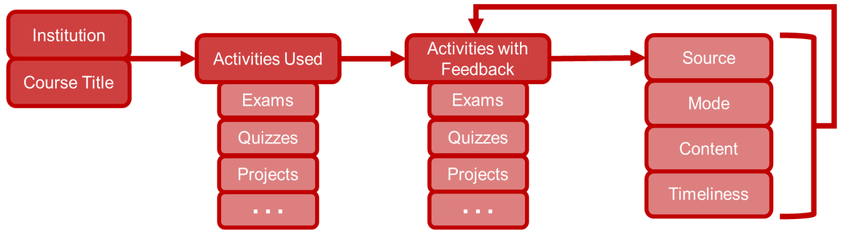


Figure 1: Workflow of Feedback Classification Tool

Applications

The results of this classification tool can be used to illustrate how instructors are using feedback in their courses and areas they could consider adding or adapting the feedback they provide. By compiling the results and creating tables showing what activities are employed, which of those activities feedback is given on, and the characteristics of that feedback (Source, Mode, Content, and Timeliness), instructors can identify what feedback practices are being used and how they do or don't align with evidence-based practices. The output of this classification tool can also help identify additional opportunities for feedback to be implemented.

Activity/Assessment	Feedback Source	Feedback Mode	Feedback Timeliness	Feedback Content
Homework	UTAs & GTAs	Online Rubric	~ 1 week	Task Level
Quizzes	GTAs	Written	~ 1 week	Task Level Process Level Self-Regulatory Level
Exams	Instructor	Written	~ 2-3 weeks	Task Level Process Level

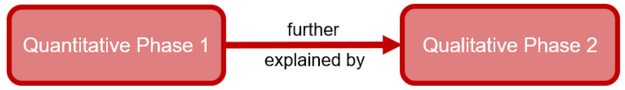
Figure 2: Example Output from the Feedback Classification Tool

The utility of this classification tool extends beyond single courses. Course sequences, programs, departments, and colleges can use this tool to quickly gather data on the feedback practices being employed in specific courses. This data can then be logged for reference, output for comparisons, or further evaluated to determine the alignment with evidence-based practices.

CONTINUING RESEARCH

Explanatory Mixed Methods Research

The goal of this dissertation research is to contribute to both the breadth and depth of knowledge about educational feedback given to students. For this reason, an explanatory mixed methods study design was chosen [9].



Phase 1: Quantitative Data Collection & Analysis

Phase 1 data was collected through a survey that collected demographic information, the General Causality Orientations Scale (GCOS) [6] score, and self-identified feedback preferences. Students were recruited for the quantitative data collection in Fall 2020. This quantitative data was used to explore relationships between students' motivation orientations and preferred forms of feedback. Intentional mixing [9] occurred between these two phases, as the survey results were used to purposefully sample students based on demographics and scores on the GCOS for Phase 2 interviews in Spring 2021.

Phase 2: Qualitative Data Collection & Analysis

Phase 2 Qualitative data collection was conducted virtually in one-hour semi-structured artifact-based interviews. The interview protocol aimed to uncover details about these beliefs around what is good and poor feedback as they relate to motivation and how that motivation driven by feedback impacts students engagement [10]. Qualitative analysis following transcript cleaning involved identifying themes related to the three orientation subscales of COT [6] as well as the four characteristics of feedback [8]. Although the qualitative analysis initially centered around these ideas, the interview data was also analyzed to allow for additional salient themes to emerge from the data that might not have been apparent based on the initial codes developed.

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