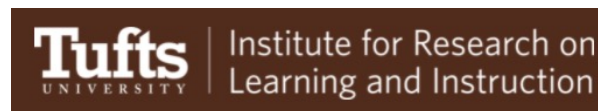


Characterizing undergraduate grader stances in reformed introductory physics courses

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Motivation

Students' productive engagement of problem sets has long been a goal of reformed physics courses that seek to promote their agency and enactment of scientific practices. Among the factors influencing such productive engagement is grader commenting that foregrounds and interacts with students' ideas, experiences and curiosities (*responsive* grading). This kind of feedback is difficult to construct for undergraduate students who are often employed to grade in large courses with little training. We wonder: *What exactly are the challenges that these graders face? How might we characterize their stances towards grading? What factors contribute to stabilities or shifts in these stances?* This is what we set out to learn about.

Context and Methods

Data sources: Eleven undergraduate graders for physics 1 and 2 proposed *comments* to sampled student reasoning in 20 problem sets. Ten of the graders participated in hour long *interviews*.

Grader comments: We first began by looking for significant features of and common patterns across grader comments. We thought of these characteristics as evidence or *markers* of a possible grader stance towards the activity of grading. Each comment was entered into an AirTable database where it was color-coded by grader and characterized by markers. We saw how often each marker was used and the frequency with which each grader used it. We also saw see if a grader's comments changed over time.

Location	Grader(s)	Attribute Abbreviat...
109 3.D5	April Zion	FR CR FQ
110 2.B7	Ben	C

Figure 1. Screenshot of AirTable database used to organize comments and markers.

Interviews: After analyzing the comments, we interviewed 10 of 11 graders to further understand their experiences as graders and as students, ideas about their roles, and rationale for how and why they constructed specific comments (e.g., language, syntax, punctuation).

Selected References

National Research Council (NRC). (2012). A framework for K-12 science education: Practices, crosscutting concepts, and core ideas. Washington, DC: National Academies Press.

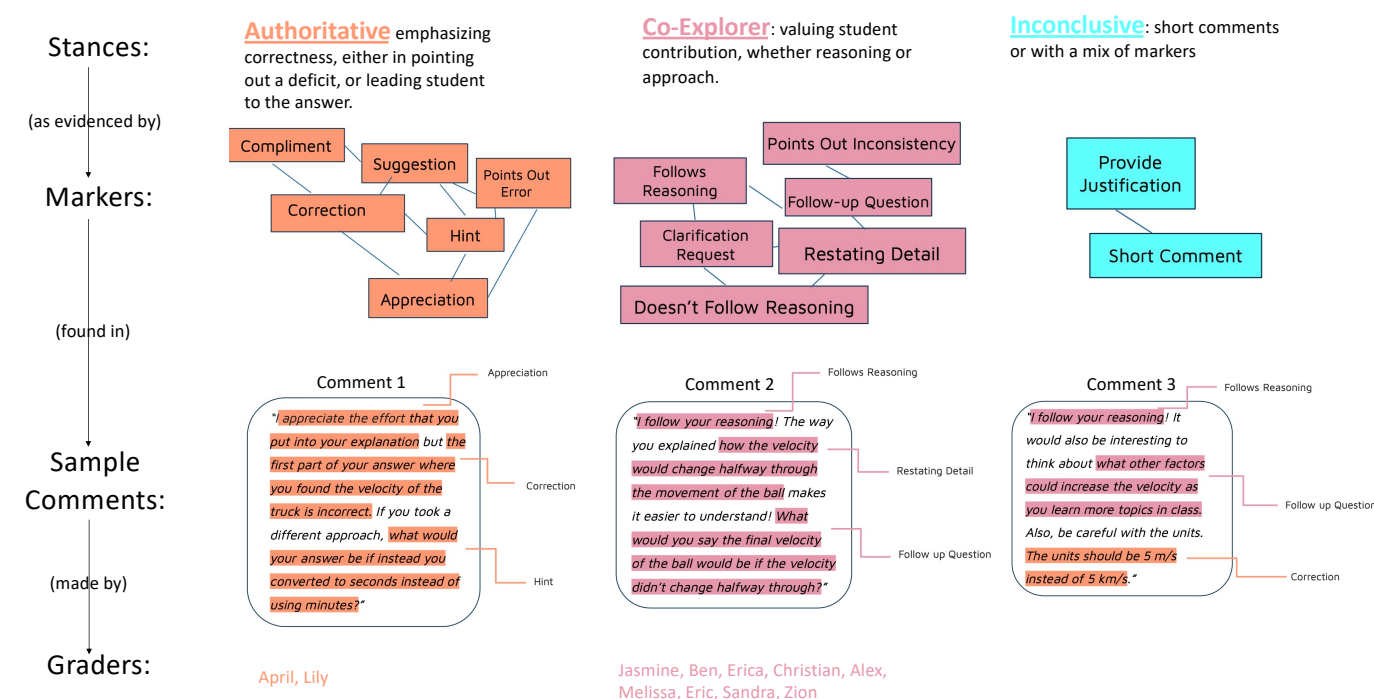
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Data Analysis

The comment analysis and interview data showed evidence of at least two grader stances, authoritative and co-explorer. We identified 12 distinct markers that we used as evidence for one or the other stance. Within each comment we identified these markers and then classified the comment accordingly. We ascribed a stable stance to a grader when the large majority of comments were characterized by a specific category of markers (an ongoing analysis is underway to see why some comments may not have fit the dominant commenting pattern). We saw two frequent characteristics that were not particularly indicative of either stance (i.e., inconclusive), and we also saw that some comments were characterized by a mix of markers. A few of these cases were put to the graders during interviews, which helped us better understand otherwise hard-to-interpret grader intentions



Preliminary Findings

1. Interviews showed that all graders expressed the desire to "help" or "support" the students that they were grading, though they enacted this goal differently.
2. *Written* guidance and feedback on comments from the instructor that highlighted elements of productive commenting (e.g., encouraging tone, evidence of listening, providing additional insight) did not shift some of the graders' approaches.
3. Interviews showed that all graders found productive commenting for students who got the correct answers was difficult.
4. Interviews showed that all graders used methods that they found helpful as a student when writing their comments (e.g., giving suggestions and real life examples, asking follow up questions beyond the scope of the original question.)