Planning Professional Development to Support Mathematical Play

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Our team has been conducting research on mathematical play and learning for some time. Recently, we began examining how Calculus I undergraduate students enrolled in a large lecture class can be supported in experiencing mathematical play during their sections. The first author implemented playful calculus tasks focusing on covariation in five different sections, and we have been analyzing that data to identify what teacher moves supported or discouraged playful mathematical engagement. In our discussions, we have identified a key tension between *establishing a playful environment* and *supporting mathematical content goals.* Particularly, the low-stakes nature of mathematical play (Williams-Pierce & Thevenow-Harrison, 2021) may sometimes be in conflict with the explicit mathematics learning goals, and vice versa. In this poster, we share some preliminary findings from this pilot study, with a particular focus on teacher moves. Our future plans involve conducting professional development (PD) with teaching assistants (TAs) so they can implement mathematical play opportunities in their sections. We consider a key part of that PD to be teacher moves that carefully thread that tension between establishing playful environments and facilitating productive mathematical learning.

For example, a key part of mathematical play is establishing an environment students are comfortably *playing* in. Play often involves exploration, agency, and learning from low-stakes failure ((Ellis et al., 2024a; Ellis et al., 2024; Williams-Pierce, 2019), which can be quite the contrast with the more traditional format of large lecture classes. Even the much smaller class sizes of the sections in this study served as more intimate extensions of the lecture, with desks arranged to face the TA at the chalkboard. In fact, in multiple of our sections, students walked into the classroom, saw that the desks had been rearranged into collaborative groups, and walked out again to double check the room number. In each section, we saw evidence that the first author engaged in ***nonjudgmental teacher moves*** that supported students in experiencing a more playful environment by the end of class. For example, a common teacher move was nonjudgmental contrasting of different student responses, such as following up a student sharing their graphed line by choosing the next student to be one who graphed a curve. By the end of class, students were more likely to be working loudly together, laughing, and taking ***public mathematical risks*** by volunteering to share their work even when they were unsure of the work or themselves. Fostering a newly playful environment is a sensitive process that works in tension with more explicit mathematical guidance – nonjudgmental teacher moves supported playfulness, but may not have efficiently improved covariational reasoning. We are continuing to explore this highly productive tension between play and content learning, and will discuss this in more detail in our poster.

References

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