

## Department of Mathematics Colloquium

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# Differentiating instruction based on models of students' thinking



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In this talk I will relate parts of my journey toward my current research on differentiating mathematics instruction for middle school students. Then I will talk about one phase of this research. In this phase, I conducted three iterative, 18-episode design experiments after school with groups of 6-9 middle school students to understand how to differentiate mathematics instruction. Prior research on differentiating instruction (DI) and hypothetical learning trajectories guided the instruction. As the experiments proceeded, this definition of DI emerged: proactively tailoring instruction to students' mathematical thinking while developing a cohesive classroom community. Analysis of 10 episodes across experiments yielded five teaching practices that facilitated DI: using research-based knowledge of students' mathematical thinking, providing purposeful choices and different pathways, inquiring responsively during group work, attending to small group functioning, and conducting whole class discussions across different thinkers. The latter three practices, at times, impeded DI. This study is a case of using models of students' thinking to differentiate instruction, and it reveals that inquiring into research-based knowledge and inquiring responsively into students' mathematical thinking is at the heart of differentiating mathematics instruction. In subsequent phases I worked with teachers and in classrooms; the local theory held in these settings, but many questions remain.