

## **Teaching Mathematics; Teaching Students; Teaching Mathematics to Students: Teachers' Trajectories toward Mathematical Knowledge for Teaching**

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**Question(s) for Discussion:** Many mathematics teachers find it difficult to think about students' mathematical thinking as they design instruction and materials. Why? What means of support will help them overcome their difficulties?

**Session Description:** The session will give two perspectives on teachers' transformations of their instruction from being teacher-centered to being student-centered. The first is a case study of Augusta. Augusta, a third-year teacher of 9th-grade Algebra, collaborated with a project researcher for one school year with the aim that she transform her teaching and curriculum from being teacher-centered to being conceptually oriented and student-centered. She and her collaborator met after each day's lesson and met Saturday mornings to plan upcoming instruction. All planning sessions were audiotaped, and all lessons and post-lesson meetings were videotaped. August also participated in weekly, videotaped, Professional Learning Community (PLC) meetings. A mix of grounded theory and conceptual analysis were used to document and understand Augusta's transformation from teacher-centered to student-centered instruction. She began the year teaching how to solve types of problems and afraid to expect her students to think. She ended the year teaching ways of thinking and expecting students to engage with them intensely. Augusta's transformation was arduous and complex, and is best summarized as her reconceptualization of a teacher's work and the role of curriculum in it. The second perspective is an analysis of 40 teachers' participations in PLCs over two years of weekly one-hour meetings. PLC conversations were coded according to a coding scheme that unpacks factors behind teachers' disinclinations to try something new. Statistical analyses of codes over time show changes in teachers' resistance being strongly associated with the nature of their participation in a course that challenged their knowledge of their school curricula. Analyses of teachers' participation in the courses themselves suggest that teachers who worked to make the courses' conceptual challenges coherent with the curricula they teach were more likely to try new approaches and to listen to students' thinking as engendered by them. Teachers whose mathematical knowledge centered on procedures had great difficulty reflecting on the course's challenges in relation to their personal mathematical knowledge and the mathematics they would teach.

The session will be in four parts. Each part will be designed for audience interaction.

Part I: Introduction of the issue of teacher change and the importance of understanding it for teacher preparation and professional development programs.

Part II: In-depth portrayal of one teachers' transformation. Judicious use of videotapes will support audience participation and discussion.

Part III: Overview of teachers' PLC conversations over time. A mix of statistical analysis and video excerpts from PLC meetings will support audience participation and discussion.

Part IV: General discussion of what it means for teachers to change from teacher-centered to effective student-centered instruction and means of supporting that change.