

Student Engagement in a Post-Secondary Developmental Mathematics Class

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I report on the first stage of my dissertation project which sought to understand engagement in a Precalculus course at a four-year public university. Breaching instructional activities, student interviews, and classroom recordings were used to study the development of several sociological and psychological constructs to help characterize students' engagement. Despite the instructor's attempts to negotiate productive norms, data analysis shows that some students' detrimental practices and beliefs remained unchanged or were even supported by the course. I examine the roots and consequences of this phenomenon.

Keywords: Social Norms, Sociomathematical Norms, Communal Mathematical Practices

Students of many post-secondary developmental mathematics courses experience long-term mathematics struggles and high attrition rates (Bailey, Jeong, & Cho, 2010; Bahr, 2013). This project explores how one such course, a Precalculus course at a public four-year university, attends to developing students' mathematical capabilities and practices by studying the social norms, sociomathematical norms, and communal mathematical practices emerging in the course. Development of these constructs coincides with development of students' beliefs and practices (Yackel & Cobb 1996), which may improve students' mathematical engagement and support long-term mathematical learning. One way to develop more constructive beliefs and individual practices is to negotiate productive norms and communal practices. The instructor of the studied Precalculus course attempted to negotiate such norms by introducing instructional activities that breach students' mathematical expectations, which allowed for explicit negotiation of productive norms and practices. In addition to 360° video recordings of these activities, data collection included repeated interviews with students which provided information about their beliefs, values, and individual practices, and how these changed or persisted over the semester. The data was then analyzed in conjunction with the interpretive framework of Cobb & Yackel (1996).

I focus on the case of Audrey, who, despite being a diligent and successful student in the Precalculus class, retained her detrimental practices and beliefs. For example, she would enumerate steps to memorize and would focus on repeating algorithms that she did not always understand. Audrey represents a student who is eager to learn, but whose efforts do not allow for extensive advancement of her mathematical capabilities. One critical observation from the study data is that the pedagogical instructional practices and course structure did not require her to change her practices to be successful in the course, and that some of these instructional practices actually supported and perpetuated her own. At the same time, the data shows that the instructor's attempts at negotiating productive norms and practices were often hindered by the need to coordinate his teaching approach and assessments with other instructors of that course.

The results concur with the literature by showing that repeated content exposure will not necessitate changes in students' practices and beliefs (Goudas & Boylan, 2013; Carlson et al., 2010). Although there were some attempts to make changes to the way the course is usually taught, more systemic change is needed. Because of institutional support for reform in Precalculus, the course can be redesigned with a focus on negotiating norms and practices to redirect students' efforts toward more productive mathematical engagement.

References

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