Student Engagement while Establishing Classroom Mathematical Practices

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This study investigates student engagement while learning through use of an app that collected student engagement reported by participants during a classroom teaching experiment. This paper discusses preliminary results on students' engagement in the process of learning. Though not anticipated, we observed differences between male and female students' engagement while working in mixed-pairs worthy of investigation.

Keywords: Student engagement, Classroom mathematical practices, Preservice teachers

There is a significant connection between student engagement and performance achievement. Klem and Connell write, "student engagement has been found to be one of the most robust predictors of student achievement and behavior in school, a conclusion which holds regardless of whether students come from families that are relatively advantaged or disadvantaged economically or socially" (2004, p. 5). However, student engagement is complex, and currently relationships to outcomes such as mathematical understanding and learning are elusive (Fredricks, Blumenfeld, & Paris, 2004; Middleton, Jansen, & Goldin, 2017). This study investigates student engagement in the process of learning.

## **Theoretical Framing**

From the perspective of flow theory, student engagement is comprised of interest, enjoyment, and concentration (Shernoff, Csikszentmihalyi, Schneider, & Shernoff, 2003), where interest and enjoyment make up emotional and behavioral aspects and concentration accounts for cognitive engagement. The emergent perspective describes learning as social and individual, where classroom mathematical practices comprise collective learning and individuals' ways of participating in such practices reflects individual learning (Cobb & Yackel, 1996). We consider students' affective and cognitive experiences through these theories.

## Methods

We conducted a classroom teaching experiment (Cobb, 2000) with 6 preservice teachers (3 female and 3 male) to address the question, *what characterizes relationships between student engagement and learning*? Participants were sent a 5-item survey on engagement at two random times during each one-hour session through a mobile app on their smart phones. One-on-one recall interviews were conducted based on survey responses and mathematical contributions. All sessions and interviews were video recorded. Data were analyzed for participants' engagement and classroom mathematical practices (Stephan & Rasmussen, 2002).

## **Results and Conclusions**

We observed differences between male and female students' engagement while working in mixed-pairs surrounding important mathematical contributions from female partners. Female students described situations in which they perceived of male partners overlooking valuable contributions towards completing tasks, resulting in dips in engagement. With regards to data collection, the app and survey effectively gathered information on student engagement, which was triangulated by students' descriptions in recall interviews.

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