Observing active learning in mathematics classes: Do we have the right tool?

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Observation protocols allow researchers to document moments of teaching and learning, as well as reveal inequities and opportunities for improvement. In two undergraduate mathematics courses, I used the OPAL protocol to understand if and how active learning strategies created equitable learning environments. In this poster, I share findings from observations and discuss possibilities for adapting observation protocols to align with equitable teaching practices.

Keywords: observation protocol, methodology, active learning, equity

Background and Motivation

Recently, there has been a general effort in STEM departments across the nation to implement active learning (AL) strategies at the university level (CBMS, 2016). While some researchers claim that AL is the best way to help students learn mathematics (Freeman et al., 2014; Prince, 2004), others question whether issues of inequity arise in classrooms where students actively participate and collaborate (Gehrtz, Sampera, & Ellis, 2017). Considering the increased focus on issues of equity in mathematics education research (Adiredja & Andrews-Larson, 2017; Aguirre et al., 2017), I ask how researchers can continue to examine classrooms where instructors and students engage in AL strategies. To this end, this poster illustrates how I used and adapted a well-known observation protocol in order to document qualities of equitable learning environments in mathematics.

This poster will represent research that addresses the following questions:

1. What are examples of appropriate observation tools that explore the qualities of equitable learning environments in active learning mathematics classrooms?

2. How can we use observational data to examine issues of equity in these classrooms?

Methodology and Findings

These preliminary findings report observation data from two undergraduate mathematics instructors who teach entry-level courses at the same large, public university. Although both instructors took a student-centered approach to their teaching, they modified two traditionally lecture-driven courses using various collaborative and technology-based teaching practices.

Over one semester, I observed both instructors multiple times using the Observation Protocol for Active Learning (OPAL) (Frey et al., 2016). OPAL has been validated for undergraduate STEM classes that use an AL approach, and thus was an appropriate observational tool for my study. Codes for this protocol were created by the authors or adapted from the Teaching Dimensions Observation Protocol (TDOP) (Hora, Oleson, & Ferrare, 2013) and the Classroom Observation Protocol for Undergraduate STEM (COPUS) (Smith, Jones, Gilbert, & Wieman, 2013). In addition to the original codes, I developed some of my own after frequent occurrences during observations. For example, I noticed that both instructors frequently called students by name in an attempt to create a comfortable learning community, so I created a code to record these instances. I plan to discuss these new codes with fellow scholars and open the conversation for further adaptations to observation protocols that address equitable teaching.

The poster will provide quantitative and qualitative data obtained from the OPAL tool, as well as comparisons of other observation protocols used in undergraduate STEM courses.

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