

An Exploratory Case Study of Pre-Service Teachers' Learning to Teach Mathematics to Culturally Diverse Students through a Community-Based After-School Field Experience

Authors : Eugenia Vomvori-Ivanovic

Abstract : It is broadly assumed that participation in field experiences will help pre-service teachers (PSTs) bridge theory to practice. However, this is often not the case since PSTs who are placed in classrooms with large numbers of students from diverse linguistic, cultural, racial, and ethnic backgrounds (culturally diverse students (CDS)) usually observe ineffective mathematics teaching practices that are in contrast to those discussed in their teacher preparation program. Over the past decades, the educational research community has paid increasing attention to investigating out-of-school learning contexts and how participation in such contexts can contribute to the achievement of underrepresented groups in Science, Technology, Engineering, and mathematics (STEM) education and their expanded participation in STEM fields. In addition, several research studies have shown that students display different kinds of mathematical behaviors and discourse practices in out-of-school contexts than they do in the typical mathematics classroom since they draw from a variety of linguistic and cultural resources to negotiate meanings and participate in joint problem solving. However, almost no attention has been given to exploring these contexts as field experiences for pre-service mathematics teachers. The purpose of this study was to explore how participation in a community based after-school field experience promotes understanding of the content pedagogy concepts introduced in elementary mathematics methods courses, particularly as they apply to teaching mathematics to CDS. This study draws upon a situated, socio-cultural theory of teacher learning that centers on the concept of learning as situated social practice, which includes discourse, social interaction, and participation structures. Consistent with exploratory case study methodology, qualitative methods were employed to investigate how a cohort of twelve participating pre-service teacher's approach to pedagogy and their conversations around teaching and learning mathematics to CDS evolved through their participation in the after-school field experience, and how they connected the content discussed in their mathematics methods course with their interactions with the CDS in the after-school. Data were collected over a period of one academic year from the following sources: (a) audio recordings of the PSTs' interactions with the students during the after-school sessions, (b) PSTs' after-school field-notes, (c) audio-recordings of weekly methods course meetings, and (d) other document data (e.g., PST and student generated artifacts, PSTs' written course assignments). The findings of this study reveal that the PSTs benefitted greatly through their participation in the after-school field experience. Specifically, after-school participation promoted a deeper understanding of the content pedagogy concepts introduced in the mathematics methods course and gained a greater appreciation for how students learn mathematics with understanding. Further, even though many of PSTs' assumptions about the mathematical abilities of CDS were challenged and PSTs began to view CDS' cultural and linguistic backgrounds as resources (rather than obstacles) for learning, some PSTs still held negative stereotypes about CDS and teaching and learning mathematics to CDS in particular. Insights gained through this study contribute to a better understanding of how informal mathematics learning contexts may provide a valuable context for pre-service teacher's learning to teach mathematics to CDS.

Keywords : after-school mathematics program, pre-service mathematical education of teachers, qualitative methods, situated socio-cultural theory, teaching culturally diverse students

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