

APPLYING A SOCIOPOLITICAL EQUITY FRAMEWORK TO A DEVELOPMENTAL ALGEBRA CURRICULUM

Sarah Oppland-Cordell, Professor, Northeastern Illinois University, s-cordell@neiu.edu

Natalie McGathey, Professor, Prairie State College, nmcgathey@prairiestate.edu

David Feikes, Professor, Purdue University Northwest, feikesd@pnw.edu

William S. Walker, III, Purdue University, wswalker@purdue.edu

Brandon Sorge, Associate Professor, IUPUI, bsorge@iupui.edu

Abstract

The Thinking With Algebra (TWA) curriculum, a National Science Foundation Project (DUE 2021414), applies a sociopolitical equity framework (Gutiérrez, 2012) to strengthen student participants' mathematics achievement outcomes and mathematics identity development. Instructor and student data indicate improvements in these two dimensions. This project also expands knowledge about creating equitable math learning environments that support underrepresented students' mathematical success.

Theoretical Framework

Gutiérrez's (2012) sociopolitical equity framework consists of four dimensions: access, achievement, identity, and power. The TWA curriculum applies the achievement and identity dimensions across two main categories of the project: (1) designing the curriculum and (2) investigating achievement and identity outcomes among students. *Achievement* refers to how the curriculum design supports students' strengthened achievement levels (i.e., grades earned, improved attendance, persistence in mathematics) and how students express satisfaction with their achievement outcomes. *Identity* refers to how the curriculum design supports students in constructing strengthened mathematical identities and how students perceive their identity constructions as mathematics learners.

Methods and Preliminary Findings

Key elements incorporated into TWA to support achievement and identity outcomes include: equity-oriented pedagogical approaches (e.g., small-group work, whole-class discussions), embracing multiple solution strategies that reflect students' experience and culture, and offering equity-oriented professional development workshops for TWA instructors. Data include interview responses from seven instructors who used TWA and student responses to a pre- and post-survey on efficacy. Feedback from instructors indicated that students are constructing strengthened mathematical identities (e.g., confidence) in relation to their engagement with the TWA curriculum. Statistical analysis on a subset of students showed emerging confidence ($n=39$, $p=.12$) in their ability to succeed in their next math class with a small ($d=.33$) effect size. Additional performance, participation, efficacy, and interview data will be collected to further understand and capture how students experience the achievement and identity dimensions. Importantly, the knowledge gained from a sociopolitical equity lens can be drawn on to create equitable math learning environments that support underrepresented students' mathematical success.

References

- Feikes, D., Kafle, B., McGathey, N., & Walker, W. S., III. (2021). Thinking with algebra: A project and perspective. In W. S. Walker, III, L. A. Bryan, S. S. Guzey, & E. Suazo-Flores (Eds.), *Proceedings of the sixth annual Indiana STEM Education Conference*. West Lafayette, IN. <https://doi.org/10.5703/1288284317291>
- Gutiérrez, R. (2012). Context matters: How should we conceptualize equity in mathematics education? In B. Herbel-Eisenmann, J. Choppin, D. Wagner, & D. Pimm (Eds.), *Equity in discourse for mathematics education: Theories, practices, and policies* (pp. 17-33). Springer. https://doi.org/10.1007/978-94-007-2813-4_2