

Transforming sociomathematical norms in a South African grade 11 classroom to enhance learners' mathematical proficiency

Lekwa Mokwana ^{1*} , Satsope Maoto ¹ , Kabelo Chuene ¹ 

¹ Department of Mathematics, Science and Technology Education, School of Education, University of Limpopo, Limpopo, SOUTH AFRICA

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Abstract

In this paper we use parts of qualitative data from the first author's doctoral study to explore how transforming existing sociomathematical norms enhance learners' mathematical proficiency. The study was conducted in a grade 11 mathematics classroom comprising of 23 learners, facilitated by the first author as learners engaged in a mathematical discourse on analytical geometry. Data were gathered through video recording, documents and researcher journal. We adopted Yackel and Cobb's (1996) interpretive framework and Kilpatrick et al.'s (2001) notion of mathematical proficiency as lenses, which guided the data analysis. We analyzed the data following Polkinghorne's (1995) narrative analysis method. We found that transforming existing sociomathematical norms to enhance learners' mathematical proficiency involved a three-stages process: negotiating entry into learners' existing sociomathematical norms, disrupting learners' existing sociomathematical norms and constituting 'new' sociomathematical norms. As learners developed new taken-as-shared meanings regarding acceptable mathematics explanations, justifications and mathematically different solutions they enhanced their conceptual understanding, procedural fluency, adaptive reasoning, and strategic competence.

Keywords: mathematics education, mathematical proficiency, sociomathematical norms

INTRODUCTION

Department of Basic Education (DBE) (DBE, 2018) in South Africa developed and published the '*Mathematics teaching and learning framework for South Africa: Teaching mathematics for understanding*' (TMU). The framework is aimed at providing guidance to mathematics teachers for all school grades (grade R-12) in teaching mathematics for understanding. TMU in a way provides standards for teaching school mathematics in South Africa, just like there are standards for teaching mathematics in other countries such as the United States, which are *problem solving, communication, reasoning and proof, representation and connections* (National Council of Teachers of Mathematics [NCTM], 2000). TMU framework is underpinned by five interwoven strands of mathematical proficiency: *conceptual understanding, procedural fluency, strategic competence, adaptive reasoning and productive disposition* (Kilpatrick et al., 2001). In this article, we argue that enhancing learners' mathematical

proficiency may require the transformation of existing norms in a classroom setting.

Sociomathematical norms are aspects of mathematics classroom culture, a set of distinct instructional practices, concerned with the shared understandings and behaviors related to mathematical activities that are encouraged and enacted within a classroom (Cobb & Yackel, 1996). However, classroom culture is implicitly learned through observation and participation, and not by deliberate study. As such, to achieve the goals of TMU, amongst other implications, teachers are expected to create learning opportunities to enhance learners' mathematical proficiency. Creating learning opportunities implies orchestrating classroom social interactions and negotiating classroom culture (Cobb & Yackel, 1996). Consequently, Cobb and Yackel (1996) define learning as "a constructive process that occurs while participating in, and contributing to, the practices of the local community" (p. 185).

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A Seat at the Table Hettie V. Williams, Melissa Ziobro, 2023-09-11 Contributions by Omar H Ali Simone R Barrett Tejai Beulah Sandra Bolzenius Carol Fowler Lacey P Hunter Tiera C Moore Tedi A Pascarella John Portlock Lauren T Rorie Tanya L Roth Marissa Jackson Sow Virginia L Summey Hettie V Williams and Melissa Ziobro While Black women's intellectual history continues to grow as an important subfield in historical studies there remains a gap in scholarship devoted to the topic To date major volumes on American intellectual history tend to exclude the words ideas and contributions of these influential individuals *A Seat at the Table Black Women Public Intellectuals in US History and Culture* seeks to fill this void presenting essays on African American women within the larger context of American intellectual history Divided into four parts the volume considers women in politics art government journalism media education and the military Essays feature prominent figures such as Shirley Chisholm Oprah Winfrey journalist Charlotta Bass and anti abortion activist Mildred Fay Jefferson as well as lesser known individuals The anthology begins with a discussion of the founders in Black women's public intellectualism providing a framework for understanding the elements structure and concerns central to their lives and work in the nineteenth century The second section focuses on leaders in the Black Christian intellectual tradition the civil rights era and modern politics Part three examines Black women in society and culture in the twentieth century with essays on such topics as artists in the New Negro era Joycelyn Elders a public servant and former surgeon general and America's foremost Black woman influencer Oprah Lastly part four concerns Black women and their ideas about public service particularly military service with essays on service members during World War II and the post WWII military Taken as a whole *A Seat at the Table* is an important anthology that helps to establish the validity and existence of heretofore neglected intellectual traditions in the public square

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