

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

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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).

South African Grade 11 March 2014 Question Paper

**Edward Webster, Karin Pampallis, John
Mawbey, Jeremy Cronin**



South African Grade 11 March 2014 Question Paper:

The Unresolved National Question in South Africa Edward Webster, Karin Pampallis, John Mawbey, Jeremy Cronin, 2017-03-01 This volume examines the way in which various strands of left thought have addressed the National Question The re emergence of debates on the decolonisation of knowledge has revived interest in the National Question which began over a century ago and remains unresolved Tensions that were suppressed and hidden in the past are now being openly debated Despite this the goal of one united nation living prosperously under a constitutional democracy remains elusive This edited volume examines the way in which various strands of left thought have addressed the National Question especially during the apartheid years and goes on to discuss its relevance for South Africa today and in the future Instead of imposing a particular understanding of the National Question the editors identified a number of political traditions and allowed contributors the freedom to define the question as they believed appropriate in other words to explain what they thought was the Unresolved National Question This has resulted in a rich tapestry of interweaving perceptions The volume is structured in two parts The first examines four foundational traditions Marxism Leninism the Colonialism of a Special Type thesis the Congress tradition the Trotskyist tradition and Africanism The second part explores the various shifts in the debate from the 1960s onwards and includes chapters on Afrikaner nationalism ethnic issues black consciousness feminism workerism and constitutionalism The editors hope that by revisiting the debates not popularly known among the scholarly mainstream this volume will become a catalyst for an enriched debate on our identity and our future

Engineering and Mining Journal ,1895 The Mining Journal, Railway and Commercial Gazette ,1907 *Cannabis/Hemp for Sustainable Agriculture and Materials* Dinesh Chandra Agrawal, Rajiv Kumar, Muralikrishnan Dhanasekaran, 2022-04-08 The book contains review articles on the latest evidence based scientific knowledge and future insights on industrial hemp applications ranging from sustainable agriculture sustainable development and commercial uses of hemp derived innovative products The research articles evaluate and review the latest research and development on hemp s agronomy ecophysiology the opportunities and challenges of hemp cultivation in the different regions of the world including Africa The book reviews complete patent literature on hemp from the publication of the first patent in 1856 till the end of 2020 providing an excellent insight into hemp s business growth and future potential for industrial applications along with region and sector wise patenting activity concerning industrial hemp In addition articles describe the applications of hemp derived green materials for building construction wastewater treatment and water purification The book will be useful as a reference book for students researchers farmers business houses and individuals interested in industrial hemp for commercial aspects sustainable development farming and other hemp derived innovative products

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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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Table of Contents South African Grade 11 March 2014 Question Paper

1. Understanding the eBook South African Grade 11 March 2014 Question Paper
 - The Rise of Digital Reading South African Grade 11 March 2014 Question Paper
 - Advantages of eBooks Over Traditional Books
2. Identifying South African Grade 11 March 2014 Question Paper
 - Exploring Different Genres
 - Considering Fiction vs. Non-Fiction
 - Determining Your Reading Goals
3. Choosing the Right eBook Platform
 - Popular eBook Platforms
 - Features to Look for in an South African Grade 11 March 2014 Question Paper
 - User-Friendly Interface
4. Exploring eBook Recommendations from South African Grade 11 March 2014 Question Paper
 - Personalized Recommendations
 - South African Grade 11 March 2014 Question Paper User Reviews and Ratings

- South African Grade 11 March 2014 Question Paper and Bestseller Lists
- 5. Accessing South African Grade 11 March 2014 Question Paper Free and Paid eBooks
 - South African Grade 11 March 2014 Question Paper Public Domain eBooks
 - South African Grade 11 March 2014 Question Paper eBook Subscription Services
 - South African Grade 11 March 2014 Question Paper Budget-Friendly Options
- 6. Navigating South African Grade 11 March 2014 Question Paper eBook Formats
 - ePub, PDF, MOBI, and More
 - South African Grade 11 March 2014 Question Paper Compatibility with Devices
 - South African Grade 11 March 2014 Question Paper Enhanced eBook Features
- 7. Enhancing Your Reading Experience
 - Adjustable Fonts and Text Sizes of South African Grade 11 March 2014 Question Paper
 - Highlighting and Note-Taking South African Grade 11 March 2014 Question Paper
 - Interactive Elements South African Grade 11 March 2014 Question Paper
- 8. Staying Engaged with South African Grade 11 March 2014 Question Paper
 - Joining Online Reading Communities
 - Participating in Virtual Book Clubs
 - Following Authors and Publishers South African Grade 11 March 2014 Question Paper
- 9. Balancing eBooks and Physical Books South African Grade 11 March 2014 Question Paper
 - Benefits of a Digital Library
 - Creating a Diverse Reading Collection South African Grade 11 March 2014 Question Paper
- 10. Overcoming Reading Challenges
 - Dealing with Digital Eye Strain
 - Minimizing Distractions
 - Managing Screen Time
- 11. Cultivating a Reading Routine South African Grade 11 March 2014 Question Paper
 - Setting Reading Goals South African Grade 11 March 2014 Question Paper
 - Carving Out Dedicated Reading Time
- 12. Sourcing Reliable Information of South African Grade 11 March 2014 Question Paper
 - Fact-Checking eBook Content of South African Grade 11 March 2014 Question Paper
 - Distinguishing Credible Sources

13. Promoting Lifelong Learning
 - Utilizing eBooks for Skill Development
 - Exploring Educational eBooks
14. Embracing eBook Trends
 - Integration of Multimedia Elements
 - Interactive and Gamified eBooks

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