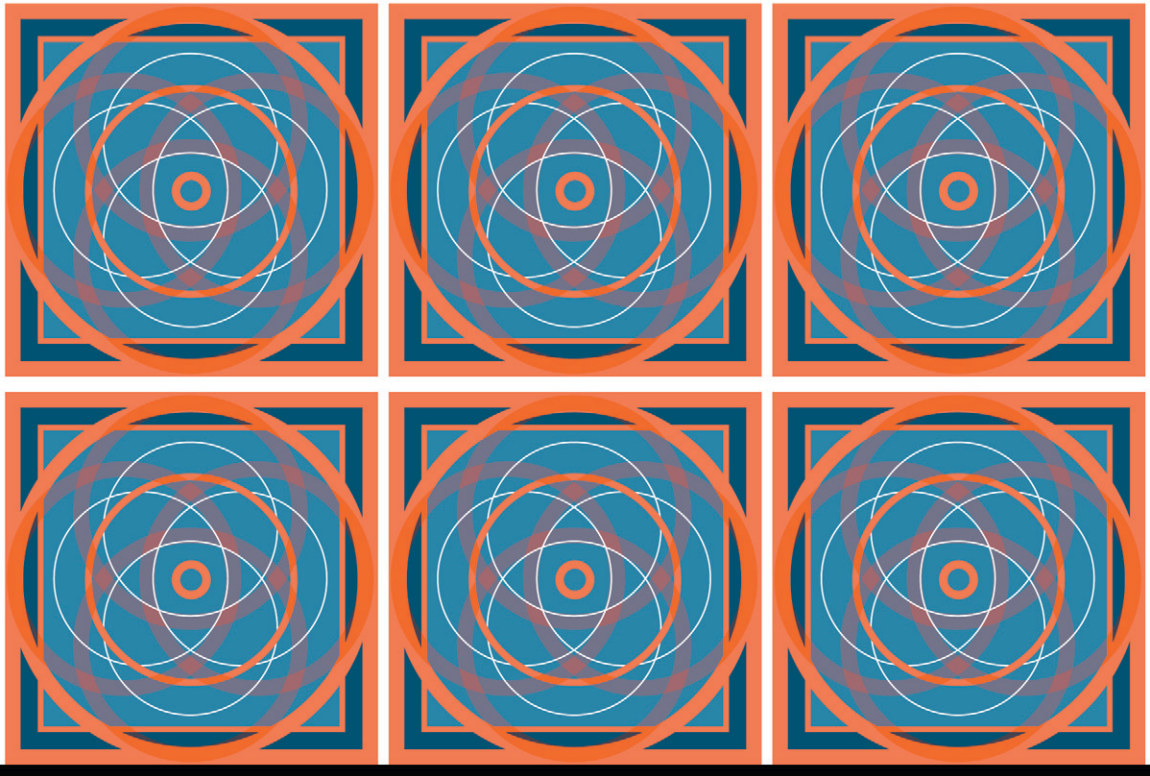
STUDIES IN EDUCATIONAL ETHNOGRAPHY

Racial Inequality in Mathematics Education

Exploring Academic Identity as a Sense of Belonging



Thierry Elin-Saintine

RACIAL INEQUALITY IN MATHEMATICS EDUCATION

STUDIES IN EDUCATIONAL ETHNOGRAPHY

Series Editor: Professor Rodney Hopson, University of Illinois-Urbana Champaign, USA

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RACIAL INEQUALITY IN MATHEMATICS EDUCATION

Exploring Academic Identity as a Sense of Belonging

BY

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Malaysia – China

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INVESTOR IN PEOPLE

This project is dedicated to my wife Rachel and my son Gabriel. This journey would never have made it past a dream, and bar stools banter without their unconditional love, support, patience, and Rachel's unyielding commitment to a more equitable tomorrow. I would be remiss if I did not take this opportunity to also thank Rachel for the countless feedback and always constructive criticism. Thank You. I love you.

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Praise for *Racial Inequality in Mathematics Education*

"This book skillfully unpacks the complexities of race, academic identity, and learning in a Philadelphia high school classroom. Saintine asks: what does it mean to be a "math person" and why is this problematic myth so durable? As a mathematics professor with an impressive background in performing arts, creative writing, and urban education, Saintine rejects the dualistic and overly simplistic idea that the world can be parsed into math persons and nonmath people. This is a wonderful ethnography that elevates Black and Latinx students' voices and reflections on themselves and their school. The book calls for a new social imaginary that begins with a reconceptualization of math education in urban schools."

Will J. Jordan, Temple University, USA

"This text is a must-read for preservice and in-service teachers of mathematics to examine the ways in which mathematics education continues to limit opportunities for Black students. Myths about who is and who is not a math person are pervasive and continue to dissuade historically excluded students from persisting in mathematics as a discipline. Elin-Saintine presents the results of an ethnographic study that examines academic identity and sense of belonging among a group of Black high schools students in an honor's precalculus class. The counterstories that emerge from this study challenge age-old assumptions and help teachers to understand the complex nature of mathematics learning in a race-based society. Most importantly, the text offers teaching strategies to foster the development of academic identity in Black students who, as a racial/ethnic group, have the brilliance to succeed in advanced mathematics courses."

Jacqueline Leonard, PhD, University of Wyoming, USA

"This book is a very welcome addition to recent scholarship on race, identity, and mathematics education. Pushing back on stereotypes and commonsense ideas about who can do mathematics, this book makes explicit how concepts like ability and competence are not innate traits of a select few but are contested and negotiated opportunities that are

readily made available to some students and denied to others. This book – through the voices and experiences of young people – ask readers to think about who gets to be considered a legitimate doer of mathematics, under what circumstances, and with what material consequences. This intellectually honest case study will challenge teachers to rethink their roles in these negotiations. More broadly, this book will appeal to mathematics education researchers, graduate students, in-service and preservice teachers, school administrators, policy makers, and others who are interested in the realities of race in schools but who are also willing to engage in antiracist practice. For all who pick up this book, I urge three things: listen, hear, and act."

Danny Bernard Martin, University of Illinois at Chicago

"Professor Elin-Saintine's work demonstrates clearly how identity is central to the learning process. Further, he shows that ideas about race are not just attitudes that individuals have about other individuals, but that racism is built into the structure of our educational institutions and the culture of math education. And those attitudes flourish because they are disguised behind ideas of what it means to be good at math. As such, this work stands to advance our understanding of how to support students of mathematics from diverse backgrounds. Further, it will be a support for practitioners in the field seeking to better understand how to mentor their students."

Wesley Shumar, Professor, Department of Communication, Affiliated Faculty, School of Education, Drexel University

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SERIES EDITOR PREFACE

Thierry Saintine's book, *Racial inequality in mathematics education: Exploring academic identity as a sense of belonging*, is a second book to be published in the *Studies in Educational Ethnography* book series most recently focused on African American boys and their academic achievement in the science, technology, engineering, and mathematics (STEM) context of schooling and education in the United States. Saintine tackles age-old race-based narratives and myths about ability and ideologies about success in mathematics among Black students, while interrogating beliefs and notions about a racial pyramid of academic ability in general. His ethnographic study provides counterstories and narratives of academic identity and sense of belonging among a group of Black students that society most easily casts off and forgotten, despite their brilliance.

Saintine's work extends the new directions in educational ethnography in the 21st century and the purpose of this reconstituted book series and international and student advisory board development over the last 5 years to study classrooms and educational communities with a concomitant reading of broader structural forces, giving meaning to these complex neighborhood, community, and global contexts. His book contributes to larger conversations about the forces and systems that contribute to mathematics, STEM broadly, and inequities in American education.

The birth of the series in the mid-2000s by Prof. Geoffrey Walford (Oxford University) spearheaded ethnographic research, perspectives and methodologies featured that would extend our understandings of sociocultural educational phenomena and their global and local meanings. One important community of scholars of ethnography was through Ethnography and Education conferences initially held at St. Hilda's College. *Racial inequality in mathematics education: Exploring academic identity as a sense of belonging* is the third book in the new volume home within the College of Education, University of Illinois-Urbana Champaign. Located in the Quantitative and Qualitative Methodology, Measurement, and Evaluation (QUERIES), Department of Educational Psychology, the College of Education has been the academic home to multiple traditions of research and evaluation scholarship in humanities and social sciences for

decades and the International Congress of Qualitative Inquiry (ICQI) which hosts hundreds of scholars and practitioners who travel from around the world to the cornfields of Illinois.

Just as Walford utilized UK and European networks to expand the reach of the series, the volume home takes advantage of the special interest groups, divisions, and associations such as the Ethnography of Education Forum at the University of Pennsylvania, Council on Anthropology and Education/American Anthropological Association and the American Educational Research Association (AERA) and other associations in the US and North America.

Further details about the book series are available through the Emerald website or from the Series Editor.

Rodney Hopson
Series Editor

ABOUT THE AUTHOR

Thierry Elin-Saintine is an Assistant Professor of Mathematics at Stockton University, USA. He holds a PhD in Urban Education, concentration in mathematics education, from Temple University. Elin-Saintine's research interests revolve around the idea of academic learning as a social practice; he focuses on academic identity defined as a sense of belonging.

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FOREWORD

This book is based on data collected for my dissertation during the 2015–16 academic year. At the time, a book seemed like a fantasy, a very distant and nearly unimaginable possibility. Receiving the 2017–18 Concha Delgado Gaitán's Presidential Fellowship, and joining the Council on Anthropology and Education (CAE) community provided me the confidence, support – special thanks to Dr. Rodney Hopson – space, and clarity necessary to begin this project. The CAE community helped me realize that the stories of 11 Black and Brown teenagers from northeast Philadelphia seeking to make sense of their classrooms' experiences in relationship to the mythical "math person" are part of the fight for more "anti-oppressive" educational experiences.

My path to the field of mathematics education is a bit unusual and unorthodox. I hold a PhD in Urban Education from Temple University, and a Master's of Arts in mathematics education and a Master's of Fine Arts in creative writing and literature from the City College of New York. Prior to my many years in graduate school, I was actively pursuing a career in theatre arts and film. My disparate professional experiences and mismatched credentials are not here to suggest or imply something "special" or "unique" about me. They're here to explain *belonging*. Being an immigrant, Black, with an incongruous set of academic and work experiences developed in predominantly white institutions (PWIs), belonging has always been central and foundational to my self-concept and emerging identity as a researcher.

Belonging is now one of the guiding principles of how I think about and study inequity in education. Framing and exploring academic identity as belonging in this book was not much of a leap. It was out of necessity, a need to understand and toil with some of the muted truths about the American education experiment.

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ACKNOWLEDGMENTS

I need to acknowledge another very special person in my life, my mother, Marie B. Bonhomette. Words can only betray the depth of my gratitude for the sacrifices, the love, and boundless caring. Still, I thank you for the human you have allowed and challenged me to become.

I also want to acknowledge others who have knowingly or unwittingly helped me on this journey. I extend my deepest gratitude to the faculty members of the Brooklyn College's Africana Studies and Political Studies Departments – a special thank you to Dr. George Cunnhingham – who introduced me to the world of academia. To the City College of New York's Graduate English and Mathematics departments, thank you for fueling the fire under my love for words, the performing arts, teaching, and mathematics.

Finally, I want to thank the Temple University's Urban Education and Teaching and Learning Departments. Special thanks to Dr. Will J. Jordan who has been integral to my academic development and emerging identity as a researcher. I am grateful for Drs. Maia Cucchiara, Carol Brandt, and Kristie Newton for the research assistantship opportunities that have undoubtedly provided me the skills and confidence needed to complete this project.

This would not be possible without the students and teaching staff who agreed to be part of this study. Thank you for your time and for making me a part of your community.

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INTRODUCTION

It is commonplace to hear stories of success or struggle in mathematics linked to genes. For many, a penchant for the arts is justification for negative experiences in mathematics. Others, often proudly, correlate careers in science, technology, engineering, and mathematics (STEM) fields with presumed creative deficiencies. One of the reasons is the widely accepted notion that people are born with either "math genes" or a natural aptitude for the arts – the right–left brain lore is one of the most widespread *neuromyths* in education (Goswami, 2004; Mason, 2009, p. 548). In mathematics education, the most common and most believed neuromyth is the idea of a *math person*. Many students, by middle school, firmly believe in the existence of math people. Those students interpret classroom experiences and grades as confirming evidence for a biological (and fixed) predisposition to struggle or do well in math. Decisions about postsecondary life and careers are made based on beliefs in the existence of math people.

Dominant narratives surrounding what is a math person shape most people's experiences and perception of mathematics. They control individuals' ability to develop relationship to math classrooms independent of or outside of the archetypical image of a *doer of mathematics*.

The idea of mathematics genes or success is rarely associated with groups of African or African American descent (e.g. Martin, 2009; Walker, 2012). Many scholars in the field of educational research have lamented the disproportionate number of studies focused on the failures of Black students. Martin (2009) argued that the abundance of data and the narrow focus on bridgingthe so-called race-based "achievement gap" have shored up existing and pervasive beliefs of a *racial hierarchy of mathematics ability* (p. 297). The idea that Asians and whites are on top of the math ability ladder and that African Americans are at the bottom is at the heart of most assumptions surrounding "what" and "who" is a math person.

Beliefs in the existence of a racial pyramid of academic ability are certainly not unique to mathematics. It is part of American history – it's in the DNA of the country's public education system. Government-funded public education has always been considered a controversial and divisive proposition

(Reese, 2000, pp. 20–21). Its inception, in the middle of the nineteenth century, was considered by many to be a necessary experiment. Dissenters viewed providing free education to white male teenagers living in poverty or from families who recently migrated to the United States as preposterous (p. 21). Ultimately, free public schools prevailed. They were promoted as the surest way to uphold and realize the, then, very young republic's democratic ideals and moral values. Values that never considered or extended to the liberation or education of enslaved school-aged children (p. 24). Values that, today, continue to label and treat Black children as antiintellectual, and that are the bedrock for the perception of a race-based hierarchy of math ability. Walker (2012) observed that images of "Blacks [and Brown teenagers] as physically gifted" juxtaposed to "Whites and Asians as intellectually so" are not only widely accepted, and often reproduced in mainstream American media, they also "diminish the importance of attending to [the] academic and intellectual selves" of urban youth of color (pp. 7–9). The assumptions about who can succeed in mathematics are rooted in a long and enduring American tradition: racism.

This ethnographic study made use of academic identity as a sense of *belonging* to show how a group of Black students developed their conception of mathematics and ensuing relationship to the discipline. Participants' stories of belonging made it possible to explore the limits and stunting effects of long-standing, yet understudied, assumptions surrounding mathematics and academic identity.

RACIAL INEQUALITY IN MATHEMATICS EDUCATION

This book joins in the conversation about mathematics as a high-status discipline, inequity in American education, and the impact that these two phenomena have had on racially and socially marginalized students. Beane (1989) characterized mathematics classrooms as "critical filters" that kept students of color and girls out of economic opportunities (see also Sells, 1973). More recently, a number of studies found that mathematics played "a pivotal role in the social structuring" of the lives of minority students living in underserved communities (Freitas, 2008, p. 43; see; Catsambis & Beveridge, 2001; Moses & Cobb, 2001). Mathematics has contributed to the exclusion of generations of Black Americans (and other racial minority groups) from certain economic opportunities and career paths. It will likely continue to preclude many more from ever imagining a future in STEM fields.

A motivator for this study is the well-documented relationship between students' performance in mathematics classroom and their economic prospects.

This relationship has received considerable attention in the last few decades, particularly since the rapid expansion of globalization, technology, and the subsequent ascension of mathematics to a high-status discipline necessary to compete in the job market.

However, it is important to note that debates about the state and future of mathematics education have been mostly about maintaining the country's world dominance (Gutstein, 2009, pp. 138–139). The problem with mathematics in the United States is usually framed as an imminent economic crisis. The fear of not producing enough "high-skilled" workers who can contribute to an increasingly more technological (thus mathematical) global labor market has been the biggest impetus for most reform initiatives in the field.

> *However, history shows that when U.S. productivity increases, the wealthiest benefit, not the majority. [Efforts] to channel public funding and students' talents into salvaging U.S. economic supremacy – in capital's interests – diametrically contrasts with educating youth to critique unjust relations of power and for democratic participation to change the world.*
>
> *(p. 138)*

The evolution of the field of mathematics education, in spite of calls for racial equity (e.g. NCTM, 1989, 2000), has been motivated by economic, geopolitical forces, and neoliberal (market-based) ideologies. Meanwhile, race-based inequality has persisted and is now a fixture, an accepted reality of the $K - 12$ and higher mathematics education landscape.

PURPOSE

This book provides a counternarrative to the "dominant framings and storylines about Black children and mathematics [that] have grown out of a race-comparative approach" (Martin, 2012, p. 48). It underscores the importance of the notion of "belonging" in educational research. Black and Brown students' voices and experiences are conspicuously absent in the field of mathematics education. Despite the abundance of empirical evidence of the factors adversely affecting academic performance, very little is known about those students' perception of mathematics, identification with the discipline, and interpretation of their classroom experiences (McGee, 2013, p. 255; see also; Ellington, 2006; Martin, 2006a, 2006b; Moody, 2003; Stinson, 2009).

Focusing on a group of honors students' perspectives of mathematics and interpretations of classroom experiences helped to unearth some of the visible and subliminal barriers that complicate the competence–confidence relationship for some students. Plato's "functionalist" or hierarchical model of education (Noddings, 1998) – a few students can and should be educated to rule while others are trained to serve – guides many scholarly and policy initiatives in education. This "ability model" has served to establish a "truth" around who is and what is mathematical; it has created an unexamined reality about STEM fields.

My hope is that this book highlights the dangers in propagating this notion that only a "few" are born and expected to succeed in mathematics. Ideas about the existence of a "math person" born with "near-supernatural" capacity for abstract thinking and sophisticated computations have helped to normalize racial differences in students' mathematics performance and attainment. Myths about a biological predisposition to succeed in mathematics continue America's racist history.

This study adds another dimension to the concept of a *growth mindset* – "the understanding that abilities and intelligence can be developed" (Dweck, 2006). Growth mindset has become ubiquitous among practitioners; it is widely accepted by educational researchers and psychologists (e.g. Boaler, 2016; Hochanadel & Finamore, 2015; Sheffield, 2017). It is now a fait accompli that a student's ability can be developed, regardless of the discipline. What about academic identity?

Like ability, I argue that positive academic identity can and should be fostered. Individuals' identification with a domain is not fixed. However, it requires ongoing justification and reaffirmation. Steele (1997) observed that individuals from social or racial groups characterized as "failures" in a particular discipline and who "remained identified with [the] domain" will experience sustained threats and obstacles to their continued "identification" (pp. 615–617). For some students, mathematics classrooms and activities present an ongoing threat and pressure; they are spaces and experiences imbued with the power to confirm or refute negative stereotypes about them.

> *High-achieving students are the most affected by stereotype threat and fare the worst when the condition of being stereotyped is presented. That is, students who are high achievement oriented, in terms of skill, motivation, and confidence, are the most impaired by stereotype threat. This threat is related to their efforts and frequent attempts to disconfirm these negative stereotypes and the academically harmful stress they cause.*
>
> *(McGee, 2013, p. 257)*

In the case of the students who participated in this study, being enrolled in honors precalculus and the prospects of having to take advanced college-level math courses represented a threat to their academic identity and a risk to their motivation to lead productive postsecondary lives.

This book provides in-service and prospective teachers the opportunity to examine the oppressive nature of mathematics as neutral and universal. *Exploring Identity as a Sense of Belonging* from northeast Philadelphia hopes to compel undergraduates, graduates, practitioners, and researchers to join or initiate movements aimed at countering narratives premised on the academic inferiority of certain groups. My hope is that this book foregrounds the need to redefine mathematics classrooms as antiracist projects and as sites where students can develop positive personal and academic identities.

OVERVIEW

The main arguments in this book are organized in seven chapters. They revolve around the "relationship between individual subjects and [their social realities] implicit" in the learning process and in their academic identity development (Hardy, 2007, p. 23).

I open with Oxford High School, its history, and story. Chapter 1 shows how Oxford and its honors students are part of the *urban education tale* – a tale wherein Black and Brown families and their public schools are constructed and only understood as part of a "culture of poverty." This section of the book serves as context with which to understand what it meant for this study's participants to continually engage in making sense of being "good" promising students in a "failing" school.

Then, the focus narrows to the classroom and Ms. Turner, the lead teacher of the honors precalculus class. I explain how her extensive experience in teaching in underresourced, racially, and socioeconomically segregated public schools helps to examine the interplay between perceptions of urban public schools, their students, and existing race-based beliefs that pervade mathematics education. Chapter 2 cautions against fixed and rigid ideas about the "ideal" learner and how they can distort and limit even well-intentioned and competent teachers' expectations of students.

The subsequent sections, Chapters 3 and 4, take a close and careful look at students' beliefs about "what" and "who" is a math person and the role those beliefs played in their math identity construction. Like most students around the world, the 11 teenage boys and girls interviewed for this study learned to

accept the myth of a math person as someone born with near-supernatural abilities. But, they were also taught to expect math people to be Asian or white males. I show how assumptions about math genes and widespread beliefs of a racial hierarchy of math ability combine to complicate, and in some instances, stunt participants' ability to make sense of their $K-12$ mathematics education.

The voices, stories, and experiences used in this book make clear some of the limitations of theories and frameworks based on the presupposed link between classroom success and academic identity. Chapter 5 expands on the idea of identity as belonging. It provides the framework and rationale with which to fully understand how students developed their conception of mathematics education and ensuing relationship to the discipline.

Chapter 6 provides an overview of the history of mathematics education in the United States. It shows how standards aimed at addressing the underrepresentation of Black and Brown people in STEM oversimplified and potentially undermined "the complexities of race, minority/marginalized status, underachievement" (Martin, 2003, p. 10). I explain how mathematics education's claim to neutrality and roots in neoliberal ideals prevented a century-old battle over content and pedagogy to effect meaningful changes in addressing existing racial disparities in the field.

This book not only brings much needed awareness to mathematics classrooms' potential to perpetuate or reverse the persistence of inequity in America's public school system but also calls for a reckoning.

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