

PREFACE

How might we empower students to use mathematics to explore, understand, and respond to social injustices?

Mathematics, like many other forms of knowledge, is situated in social and cultural contexts. Too often, students experience school mathematics as something that is unfamiliar and detached from any meaningful context. This leaves many students with the sense that mathematics is inaccessible and not connected to their ways of knowing and the resources that they bring to the mathematics classroom.

This book will introduce many teachers to teaching mathematics for social justice and serve as a resource for those who have already begun this journey. Teaching mathematics for social justice means using the wealth of cultural and social knowledge students bring with them to the mathematics classroom to help them access and deepen their understanding of mathematics. This then becomes a tool—or a lens—through which students can understand and critique their worlds and thus promote a democratic society that advocates for social change (Frankenstein, 1997). Teaching mathematics for social justice uses mathematics as a jumping-off point to explore, understand, and respond to issues of social injustice and to support arguments and actions aimed at promoting change.

We know that you make many decisions about the learning opportunities that will shape your students' mathematical experiences, two of which are the instructional practices and tasks you choose to use daily. The first decision requires that you learn or deepen your understanding about how such topics as social justice pedagogy, critical consciousness, culturally responsive pedagogy, and teaching mathematics for social justice inform your current instructional practices. The second decision calls on you to investigate how to infuse tasks set in social injustice contexts into your mathematics classroom. The challenge for both decisions is to study the social justice–related topics the same way you would a mathematical concept, such as teaching quadratic functions. The social justice issue must fit the mathematics you want to teach, rather than forcing the mathematics to fit a social justice issue. Mathematics is the tool, and social justice issues can use the tool to understand and critique the world.

To all of the teachers, continue to read and build your understanding of the topics related to teaching mathematics for social justice. It is not only important to have the tools to teach mathematics for social justice, but also equally important that nurturing spaces are afforded for all students such that the environment reflects inclusive, just, and equitable spaces.

To teacher leaders and coaches, embrace this opportunity to walk beside the teachers you lead and support as they begin or continue their journey of using

mathematics as a tool to examine social justice issues in their classroom. Model for them some of the teaching strategies and suggestions that are included in this book. Encourage them to learn about their students and how they can incorporate their students' lived experiences and issues of interest into the classroom.

To administrators, most of the social justice issues included in this book come from outside of the traditional mathematics textbook and might require you and mathematics teachers to take risks. In Chapter 2, we provide guidance for teachers to consider before teaching a social justice lesson and encourage them to collaborate with other colleagues so that they can make connections to topics and issues that might arise in other subject areas. For example, your environmental science teacher might discuss climate change, which would have a nice cross-curricular connection to Lesson 6.2, *Climate Change in Alaska*. Your support in providing time for teachers to meet allows for cross-curricular connections and will go a long way in helping mathematics teachers expand their instructional toolkit.

To district mathematics leaders, support the work of teachers but also make sure the integrity of the mathematics teaching and learning, as well as the social justice topics, is maintained. Mathematics content should not be sacrificed, and social justice issues should be given due diligence. Help teachers identify opportune times when they can infuse a social justice topic into their classroom. Use this book as a resource to embed experiences into your professional development offerings for teachers to deepen their understanding of teaching mathematics for social justice and other related topics.

To mathematics teacher educators and professional development providers, we invite you to infuse social justice issues into teacher preparation and professional development opportunities. Model ways that teachers can find and fit mathematics with social justice issues, and provide opportunities to critically examine lessons and topics.

We applaud you for taking time to delve into *High School Mathematics Lessons to Explore, Understand, and Respond to Social Injustice* and look forward to hearing about your journey.

Robert Q. Berry III
NCTM President 2018–2020

John W. Staley
NCSM Past President 2015–2017

ACKNOWLEDGMENTS

First, we—Robert, Basil, Brian, and John—would like to thank all of the contributing authors for your willingness to write and share lessons so that this book could become a reality. We knew from the start the importance of having a diverse set of voices from the field—educators who could share lessons and experiences, and who were willing to trust us with their work.

We also appreciate that the contributing authors often submitted much more robust lessons than we had space to include. We have made every attempt to maintain the intent of the lesson and some of the original activities. Note that all of the lessons in the book were modified and edited to create a consistent format for presentation and ease of use for the reader. In most cases the initial context, mathematical and social justice goals, and sequence of activities have remained the same. We trust that we have done due diligence (with many hours of editing) to share your work with others. For those whose work might not be included, we thank you for your willingness to share, but due to space limitations or overlap of content, we were not able to include your lessons in this version of the book.

Second, thank you to all of the educators who field-tested a social justice mathematics lesson (SJML). Your feedback and suggestions helped us further develop some of the key features for the lessons. Your willingness to share your experiences with these SJMLs and other social justice lessons also helped enhance our thinking as we developed the chapters in this book.

Next, we would like to thank all of the reviewers. Your thoughtful and thorough feedback on the chapters and lessons provided us with a road map to make the much-needed revisions. When you read the final version of this book, our hope is that you vaguely remember the rough draft as a skeleton of ideas and see that we have attempted to address all concerns and include each suggestion.

Thank you to NCTM and Corwin for your willingness to publish this book.

Last but not least, we would like to thank Erin Null, Jessica Vidal, and the Corwin team. From the inception of this book, Erin provided us with the encouragement and guidance needed to focus our work (and writing) so that we could complete the book. Your feedback on the manuscript and throughout the revision process was priceless. This book is in print today because you truly showed what it means to problem-solve and persevere. Jessica, thank you for your support in all of the little details that we sometimes overlooked or remembered at the last minute. And to the copyeditors, artists, and other members of the Corwin team, thank you for your willingness to publish a book that seeks to equip mathematics teachers so that they can empower their students with the mathematical tools to

explore, understand, and respond to social injustices as they become powerful learners and doers of mathematics.

Robert's Special Acknowledgments

"Truly wonderful and getting better." I want to thank colleagues, teachers, and students who are "truly wonderful" and who always push themselves and me to "get better."

Basil's Special Acknowledgments

To all of the women who are labeled mom in my life. Your compassion for others has helped me find my own.

Brian's Special Acknowledgments

My contributions to this book reflect all I have learned in my career from mathematics students and educators. Thank you so much, you have been amazing teachers.

John's Special Acknowledgments

I want to thank my wife, Karen, for walking beside me during this journey. You continue to push me to follow God's plans. To our grown folks, Jonathan, Alexis, and Mariah, continue to chase your dreams and change the world.

To the many mathematics leaders, mathematics teachers, educators, colleagues, and friends, thank you for the opportunity to serve and join in the journey to make mathematics more meaningful, relevant, and accessible for each and every student.

PUBLISHER'S ACKNOWLEDGMENTS

Corwin gratefully acknowledges the contributions of the following individuals:

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Robert Q. Berry III is currently the Samuel Braley Gray Professor of Mathematics Education at the University of Virginia, and he served as president of the National Council of Teachers of Mathematics (NCTM) for the 2018–2020 term. He received his BS (middle grades education) from Old Dominion University, his MAT (mathematics education) from Christopher Newport University, and his PhD (mathematics education) from the University of North Carolina at Chapel Hill. He has taught in public schools and served as a mathematics specialist since 1991.

Robert has collaborated with teachers, leaders, parents, and community members across the United States and has been a teacher at nearly all levels. These experiences have afforded him a perspective on the issues facing mathematics teaching and learning across diverse contexts. He sees himself as a teacher who is always learning and improving his professional practice. He has a strong sense of equity and fairness that is rooted in his understanding of the mathematical experiences of students of Color and the belief that all students deserve access to learning environments and resources that support their engagement with mathematics. He also has an ability to establish rapport and trust with people from diverse backgrounds by working to understand their perspectives, histories, and lived experiences. He understands the importance of building partnerships and how to draw on each partner's strengths to achieve a common goal. In sum, he draws on experiences and abilities that make him an effective advocate for teachers and students.



Basil M. Conway IV is currently an assistant professor of mathematics education in the College of Education and Health Professions at Columbus State University and serves as the mathematics education graduate program director. He serves on numerous doctoral committees as both a chair and methodologist. He earned his BS, MS, and PhD from Auburn University in mathematics education in 2005, 2012, and 2015, respectively. He also completed his MS in statistical science from Colorado State University in 2010.

Basil previously spent 10 years teaching in public middle and high schools before he became a teacher educator. During this time, he also worked as an instructor at a local junior college. Over the past 15 years of service in teaching mathematics and future teachers of mathematics, he has served in various local mathematics

education leadership positions and organizations, including Transforming East Alabama Mathematics (TEAM-Math), Auburn University's Teacher Leader Academy, East Alabama Council for Teachers of Mathematics, Woodrow Wilson Fellow, National Mathematics and Science Initiative, and A+ College Ready. His recent works on teaching mathematics for social justice have been published in NCTM's *Access and Equity: Promoting High-Quality Mathematics in Grades 9–12* (2018) and *Handbook of Research on Critical Thinking Strategies in Pre-Service Learning Environments* (2019).

Basil's lens for teaching and student learning draws heavily from Vygotsky's theory of social constructivism in which language and culture play essential roles in human development. Thus, he believes the co-construction of knowledge is paramount in the development of students' social and mathematical identities. He believes teachers, parents, peers, cultural norms, and other cultural communicative devices play a critical role in shaping students' knowledge of society and mathematics. His research has specifically focused on the development of statistical reasoning and social awareness in socio-constructivist learning environments.



Brian R. Lawler is currently associate professor for mathematics education in the Bagwell College of Education at Kennesaw State University and serves as coordinator for the secondary mathematics teacher certification programs. He earned his doctorate in mathematics education at the University of Georgia. He received his BS in mathematics from Colorado State University, his MA in curriculum and instruction from California State University Dominguez Hills, and his MA in mathematics from the University of Georgia.

Previously, Brian taught high school mathematics for nine years in a variety of settings, including suburban, urban, and urban/rural settings. Throughout his quarter-century career in mathematics education, he has advised school districts and provided professional development to high school math teachers as they aim to transform their programs in order to meet the needs of all learners—in discourse-rich, heterogeneous classrooms. He is a contributing author to the second edition of the Interactive Mathematics Program, a four-year, college preparatory, problem-based high school mathematics curriculum designed particularly for untracked classrooms.

Brian draws upon a Piagetian epistemological framework, a critical pedagogy, a Deweyan progressivism, and a poststructural worldview to theorize an equitable and socially just framework for mathematics education. This emerges as a Critical Mathematics Education, in which the child's mathematics and the mathematics of society are both held, not in tension, but as interacting, in order to understand learning and teaching of mathematics in its sociopolitical context. His research

focuses on the personal epistemology of adolescent mathematical learners, and power and privilege in the science, practice, and politics of mathematics and mathematics education.



John W. Staley is currently the coordinator of special projects in Baltimore County Public Schools, where his primary work involves supporting schools in the continuous improvement process. He earned his bachelor of science in mathematics from the University of Maryland, College Park; his master's in secondary education from Temple University; and his doctorate from George Mason University in mathematics education leadership.

John worked as a mathematics teacher and district leader for the past 30 years in private and public school settings in Pennsylvania, Virginia, and Maryland. He also served as an adjunct professor at George Mason University, Loyola University, University of Maryland-Baltimore County, and Morgan State University. During his career, he presented at state, national, and international conferences; served on many committees and task forces; facilitated workshops and professional development sessions on a variety of topics; received the Presidential Award for Excellence in Teaching Mathematics and Science; and served as president for NCSM (2015–2017), the mathematics education leadership organization. He is currently serving as the chair for the United States National Commission on Mathematics Instruction.

John's current interests include changing high school mathematics, addressing equity issues in schools and especially mathematics education, and leadership in mathematics education.