WHAT YOUR COLLEAGUES ARE SAYING . . .

Burwell and Chapman provide so many resources that help people see that everyone is a math person. Through vignettes, math examples, talking about mistakes, teaching tips, portfolios, and more, this book has it all!

—Howie Hua
Math Instructor, Fresno State
Fresno, CA

I highly recommend *Power Up Your Math Community* for teachers, instructional coaches, principals, and district leaders! I love the seamless focus on both the classroom and school level, grounded in the implementation of effective instructional practices in a supportive community and developing this as a school-wide commitment. One of my favorite aspects is how the authors balance the true heart of teaching while simultaneously advocating for systemic change. You will love all the helpful features!

—Sarah B. Bush
Professor of K–12 STEM Education, University of Central Florida
Orlando, FL

Innovative, empowering, practical, and inspirational, *Power Up Your Math Community* is a groundbreaking must-read for any educator looking to transform their math education program. Readers will learn how to take a holistic, collaborative, and humanistic approach to professional learning—one that creates an inclusive, enthusiastic learning environment that empowers teachers to create classrooms where learning mathematics becomes a joyous, deeply engaging journey for students and teachers alike.

—Chase Orton
Math Change Agent
Author of *The Imperfect and Unfinished Math Teacher*
Independence, OR

All that is missing is the bow! This book offers a package of professional learning sessions that can be used by all educators who seek to grow their understandings and expand their teaching toolkits for mathematics. When teachers engage in learning and reflect on their practice, students' learning ultimately benefits!

—Susie Katt
K-2 Mathematics Coordinator
Lincoln Public Schools
Lincoln, NE

Power Up will Improve your Math PLC exponentially. Math instructional coaches can stop searching for tools to prompt math growth. It's all here. Instruction, games, student tasks, and reflection prompts.

—Carrie Cutler
Math Coach, University of Houston
The Woodlands, TX

Power Up Your Math Community is an essential resource for schools seeking a year-long, practice-based journey to enhance math teaching and learning. This guide fosters a robust math community through thoughtfully structured monthly themes and essential questions, promoting a culture where students and teachers embrace challenges, learn from mistakes, and grow as mathematicians. It's an invaluable tool for achieving sustained classroom improvement and nurturing a love for math.

—Lisa Ham
Executive Director, Learning Forward Texas
Roanoke, TX

Power Up Your Math Community is a resource for mathematics leaders seeking to enhance math education within their districts and campuses. With its practical guidance, research-based strategies, and emphasis on fostering a culture of continuous improvement, this book provides math educators with the tools they need to elevate math education and empower students to excel in mathematics.

—Nora E. Lugo
Elementary Mathematics Coordinator
San Antonio, TX

This book inspires readers to reexamine their math professional learning plan and provides the much needed road map for quality activities that will build strong professional learning communities (PLCs). Through practical activities that can be used during both PLCs and in the classroom, the authors guide leaders through an easy to follow process that can be implemented immediately. Every school leader should read this and utilize it to create a strong plan for building confident and competent math teachers and students.

—Tobey Realley
Supervisor of Curriculum and Instruction,
Woodbury City Public Schools
Woodbury, NJ

Burwell and Chapman have created a "must have" resource for any leader in mathematics wanting to ensure that both the educators and the students in our classrooms are empowered to work and grow as mathematicians!

—Janet D. Nuzzie
District Intervention Specialist, Pasadena Independent School District
Pasadena, TX

Burwell and Chapman have managed to provide mathematics professional learning at your fingertips in this beautifully written book. It's organized and approachable and feels like I have access to my own math coach. If you are looking to refine math practices in your district, school, or classroom - this book is sure to deliver.

—Rachel Cutler
Elementary Curriculum Coordinator, Great Falls Public Schools
Great Falls, MT

I highly recommend *Power Up Your Math Community* because it provides math educators a step-by-step guide on how to build productive and effective learning environments for all students to see themselves as doers of mathematics and engages them in powerful math habits.

—Jennifer Lempp
Author and Consultant
Alexandria, VA

POWER UP YOUR MATH COMMUNITY

Holly Burwell • Sue Chapman

Foreword by John SanGiovanni

Dedication

To Patty Clark and Mary Mitchell . . .
We are grateful for your servant leadership and advocacy for math education done right.
Your wisdom and compassion for math learners of all ages inspire us every day.

POWER UP YOUR MATH COMMUNITY

A 10-Month Practice-Based Professional Learning Guide, Grades K–5

Holly Burwell • Sue Chapman

Foreword by John SanGiovanni

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Please visit the companion website for
online resources and downloadable materials.
https://qrs.ly/vqfn1s2

Foreword

By John SanGiovanni

There is no argument that a vibrant classroom community is an essential ingredient of successful teaching and learning. Community is the engine for interaction, collaboration, and discussion. It creates opportunity for individuals to experience and consider diverse perspectives that will deepen their own understanding. Community can support and validate new efforts and ideas, which stirs confidence. Community can create belonging through a common pursuit of inquiry, discovery, and acquisition of new skills. Community can be an inclusive place nurtured, and occasionally shepherded, by a knowledgeable, skilled teacher.

Yet, there *are* arguments that community is a missing ingredient in mathematics teaching and learning. Look no further than common utterances like "I'm not a math person" as evidence that many students (and adults) suffer from damaged, if not destroyed, mathematics identities. Where do such notions start? What experiences reinforce negative perceptions? Surely, all of the responsibility for these unproductive dispositions cannot be laid solely at the feet of the math classroom community. But it does cause one to ask, how much of it *is* the outcome of a single classroom community or multiple communities over years of schooling?

From damaged identities and potentially damaging communities springs poor achievement. It is no secret that mathematics achievement in the United States is in a somewhat dire state. Some of this is certainly attributable to a worldwide pandemic in which students were isolated, disconnected, even excluded from learning. (When you think about it, pandemic challenges sound a lot like community challenges, don't they?) But make no mistake, other forces are at work. After all, poor mathematics achievement is not a recent event caused by the pandemic alone.

The mathematics community has responded to poor mathematics achievement results focusing on the content being taught, how it is taught, the number of doses of intervention to provide, and so on. But maybe we should instead be looking more closely at the environment in which mathematics is taught. If great learning comes through engagement, discourse and debate, feedback, support, and perseverance within a rich learning community, then surely there is something to be said about the math community for learning and achievement. Yet for many, that math community has often been fragile, purely transactional, even sterile, denying opportunity and access to the type of community that yields understanding and success.

There are significant challenges to establish and maintain productive mathematics classrooms. Antiquated perceptions of what it means to do math and how math "should" be taught conjure notions contrary to vibrant communities. Beliefs that math is procedural, delivered to students, for them to practice and mimic do not go well with ideas of rich, collaborative communities where ideas are co-developed, analyzed, and refined. Other challenges lie with instructional materials and curriculum standards that do not provide for building and maintaining mathematics community throughout the year. Instead, community is often something "done" or "checked off" the first few days of the year and then put aside for the "real" math. Training for community development is problematic in both pre-service and in-service mathematics teacher training.

The greatest challenge of all may possibly be limiting the notion of mathematics community to the four walls of the classroom or the hour or so a day of instruction. The math community is more than the teachers who teach it. It is everyone! That includes teachers, interventionists, paraeducators, co-teachers, students, and parents. Math community is the school community from classrooms to hallways, the teacher workroom to the conference room, the cafeteria to the principal's office. Beliefs, dispositions, and ultimately actions about mathematics instruction, within those walls and within that hour, are influenced by all of these and much more, including the district offices, homes, supermarkets, and ball fields of the school community. Every one of these mingle to create a mathematics community. But what sort of community is created?

Citing the importance of math community along with some of the challenges is not the same as doing something about the challenges. Ideas for building (or repairing) math community are splattered across journal articles, presentations, and social media. This book, however, does something more. Holly Burwell and Sue Chapman go beyond rhetoric and loosely connected good ideas. They provide a cohesive game plan with clear, doable activities to engage all stakeholders in learning and taking action, so that powerful math communities are something that every student can not only experience but also thrive within.

I encourage you to collaboratively engage with colleagues in your community to study, implement, and reflect on the moves to power up your math community. *Take your time to do it well.* Focus on one idea a month as the authors suggest. Learn from the authors and from the others in your math community, so that the work is not "one-and-done" but continued and strengthened year after year. Your work is the power! That power can change dispositions, change achievement, and even change lives.

Preface

The National Assessment of Educational Progress (NAEP), also known as *The Nation's Report Card*, is a congressionally mandated assessment program designed to measure public and private school student achievement in reading, mathematics, and science in Grades 4, 8, and 12. The NAEP is not intended to identify individual students' achievement but instead is used to evaluate the effectiveness of our nation's schools and education system and to monitor improvement efforts.

What Does It Mean to Be a Powerful Math Community?

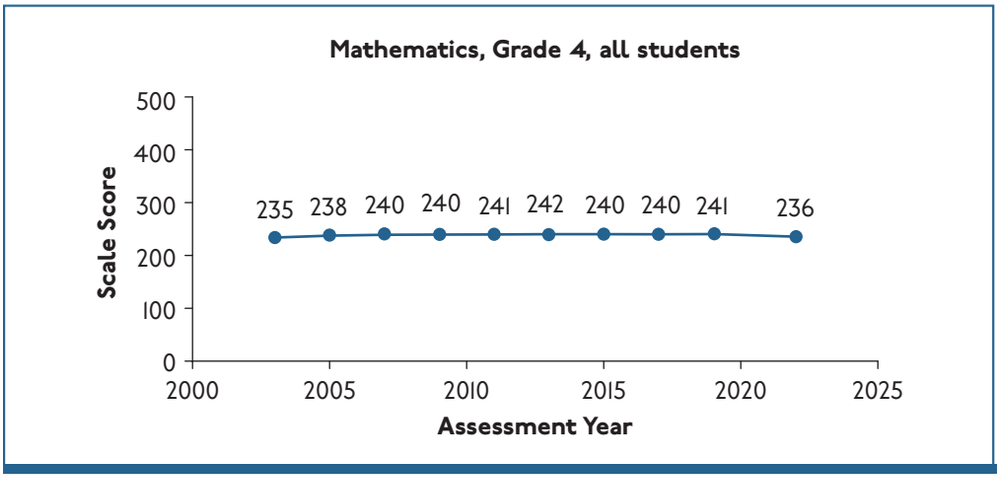
A **powerful math community** is a vibrant group of educators, students, and families, alive with positive energy, efficacy, and a passion for mathematics. Students, teachers, and leaders see themselves and each other as math people and mathematical colleagues. As they engage in rigorous and interesting mathematics tasks, they strengthen their mathematical identities and agency while growing their math understandings and skills. Math is experienced by both children and adults as relevant, empowering, and joyful.

Consider these headlines from The Nation's Report Card website page related to the 2022 Mathematics Assessment results:

- Fourth-grade mathematics scores declined across all regions of the country and in 43 states/jurisdictions.
- Fourth-grade mathematics scores declined in 23 of 26 participating urban districts.
- One quarter of fourth-graders performed below NAEP Basic in mathematics—a larger percentage compared to 2019.
- Fourth-grade mathematics scores declined across most racial/ethnic groups; scores declined for male and female students.

Granted, the pandemic contributed significantly to these discouraging assessment results. However, the bigger picture reveals that NAEP mathematics scores have shown little improvement in the last 20 years (see Figure P.1). And the score gaps between Black and Latine students and

Figure P.1 • NAEP Fourth-Grade Mathematics Average Scale Scores 2002–2022



"Insanity is doing the same thing over and over and expecting different results."

—Albert Einstein

their white peers and between female and male students are widening rather than narrowing (The Nation's Report Card, n.d.).

Although the education community has dedicated significant amounts of time, energy, and financial resources to the challenge of improving mathematics achievement, we have very little to show for our efforts.

Why haven't we made more progress? We believe there are three primary reasons:

1. **Expectations for what we teach and how we teach have changed.** The mathematics curriculum and our understanding of best instructional practice have changed in significant ways. Today's curriculum standards charge us with teaching more than just basic arithmetic skills, the only math that many of us learned in elementary school. In addition, we know much more than we used to about how students learn mathematics. We know, for instance, that math learning is supported through social interaction and the use of models and tools (National Council of Teachers of Mathematics [NCTM], 2020). Many of us, however, did not learn math in this way ourselves, and it's really hard to teach in ways that we haven't personally experienced and don't fully understand.
2. **We're fixated on numerical data as a measure of learning.** We have become so habituated to equating test scores with learning that we sometimes lose sight of the true goal of mathematics education: to help students develop mathematical proficiencies that position them to interact skillfully and confidently with the world. Because we forget that numerical data are an imperfect measure of student learning, we haven't fully developed our eyes and ears for observing and interpreting qualitative classroom data (e.g., students' explanations of their mathematical thinking) which often represent student learning more precisely and completely.
3. **We're not yet mindful of mindsets.** We have clear and convincing evidence that students' mathematical identities and agency are the key to their academic success (Aguirre et al., 2013). We know that students' beliefs about their capacity to understand math and the relevance of math to their lives, as well as their habits of mathematical thinking (e.g., perseverance), are critical to learning (NCTM, 2014; SanGiovanni et al., 2020). But we haven't yet committed to intentionally developing these dispositions and "soft skills" as part of our instructional work.

"Outdated curricula and pedagogies prevent many students from experiencing math as a fascinating area of exploration, culturally relevant and important in all spheres of life."

—-Su (2020, p. 7)

If we wish to finally succeed in improving student achievement in mathematics, we need to think deeply about what mathematics is and how it is best learned. We need to take a careful look at our own relationships with

mathematics, our own habits of mathematical thinking, and our personal beliefs about who we are as mathematical beings. *Power Up Your Math Community* will help you to do all of this.

Improving mathematics teaching and learning in the classroom requires that teachers and leaders rebuild their own relationships with mathematics through ongoing practice-based professional learning and collaboration. This important work is most effectively driven at the school level. *Power Up Your Math Community* supports schools in designing, implementing, and evaluating a comprehensive yearlong mathematics instructional improvement plan that allows students, teachers, and leaders to experience mathematics as a joyful activity, to see themselves as mathematically capable, and to effectively grow mathematical proficiency in all math learners.

"Most folks don't like math. Much of the anecdotal data we read on social media and hear in real life tells a story of dwindling interest in mathematics combined with an almost contagious distaste for it. It's a subject that often stirs emotions of disdain or resentment – or worse, memories of trauma from their experience in math class."

—Orton (2022, p. 14)

POWER UP YOUR MATH COMMUNITY WITH PRACTICE-BASED PROFESSIONAL LEARNING

This book is designed to help you and your school engage in **practice-based professional learning** to maximize your students' math learning and strengthen your mathematics teaching and learning community.

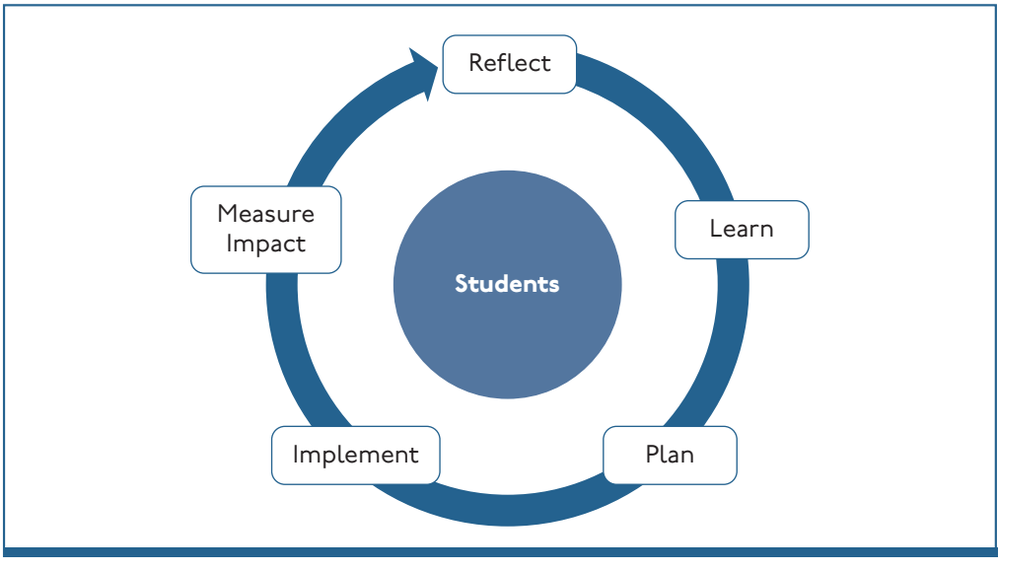
Practice-based professional learning is educator learning with the twin goals of strengthening teacher instructional practice and maximizing student learning. It helps teachers sharpen their ability to look at the link between specific teaching actions and their students' learning.

Practice-based professional learning occurs inside or close to the classroom. It is most often collaborative because social interaction supports thinking and energizes the learning community. Therefore, the impact of practice-based professional learning stretches beyond a single classroom. It naturally supports instructional improvement across a team or an entire school.

Practice-based professional learning is teacher driven and inquiry based, designed to address challenges educators uncover in their efforts to support student learning. The process of practice-based professional learning occurs in learning cycles that iterate into new learning cycles (see Figure P.2). Practice-based professional learning is a continuous improvement process that melds with the definition of what it means to be an educator.

Each chapter in this book will guide you and your school through a mini professional learning cycle focused on a specific math habit. The book as a whole is a guide to a larger professional learning cycle designed to power up your mathematics instructional program and your math learning community.

Figure P.2 • Monthly Professional Learning Cycle



WHO IS THIS BOOK FOR?

By design, *Power Up Your Math Community* has both a classroom-level and a building-level focus. These two focus areas are addressed in tandem because we believe:

1. Teachers are more successful implementing new instructional practices when they have the support of a learning community (MacDonald, 2023; Short & Hirsh, 2023).
2. Student learning is strengthened when a school's mathematics program is cohesive, when there is a school-wide commitment to the use of high-yield instructional practices and the growth of teachers' math content and pedagogical knowledge across grade levels (Karp et al., 2021).

Power Up Your Math Community will help elementary school educators:

- Strengthen their school's mathematics program to provide all students with opportunities to successfully engage in rigorous mathematics learning every day.
- Provide high-quality practice-based professional learning focused on improving math teaching and learning across a school year.
- Build a mathematical community of students, teachers, school leaders, and parents who see mathematics as a lens for understanding and appreciating the world and a way of thinking that allows them to tackle interesting and important real-world problems.

- Plan and implement engaging mathematics learning activities in the math classroom that support students' growing mathematical proficiency while building their mathematical identities and agency.
- Monitor and celebrate growth related to these important aspects of mathematics teaching and learning.

ALL EDUCATORS PLAY AN ESSENTIAL ROLE IN GROWING A POWERFUL MATH COMMUNITY

Power Up Your Math Community is a guidebook for all educators who play a role in improving a school's mathematics instructional program to strengthen students' math learning.

If you are a teacher, this resource will help you . . .

- Grow your students' competence and confidence as mathematicians
- Build your math content and pedagogical knowledge and skills
- Collaborate with team members to strengthen your grade-level mathematics program

You might use this resource in team meetings, with a teaching colleague, or on your own.

If you are an instructional coach, this resource will help you . . .

- Plan coaching cycles in support of individual teachers and teacher teams
- Provide robust practice-based professional learning across a school year
- Deepen your own understanding of math teaching and learning and adult professional learning related to mathematics

You might use this resource with grade-level teams, professional learning communities (PLCs), math vertical teams, and with individual teachers.

If you are a principal, this resource will help you . . .

- Support goal setting and strategic planning to strengthen your school's math program
- Monitor progress toward achieving the improvement goals you identify
- Build your own understanding of research-based instructional practice and curriculum expectations for mathematics

You might use this resource with your leadership team or your entire faculty.

If you are a district leader, this resource will help you . . .

- Support principals, assistant principals, and instructional coaches
- Plan and implement a yearlong professional learning series
- Gain fresh ideas and perspectives about ways to promote instructional improvement in math

You might use this resource in professional learning contexts, district-level meetings, and for campus support.

A COMMITMENT TO EQUITY

Professional learning thought leader Aguilar (2020) stated that every conversation we have in and about schools is a conversation about equity. We agree. We believe that equity conversations and equity work must be a part of every professional learning and school improvement initiative.

Aguilar defined equity in the following way:

> Educational equity means there is no predictability of success or failure that correlates with any social or cultural factor - a child's educational experiences or outcomes are not predictable because of their race, ethnicity, linguistic background, economic class, religion, gender, sexual orientation, physical and cognitive ability, or any other socio-political identity marker. (2020, p. 6)

Everything we do as math educators is an effort to help all students grow into resourceful mathematicians who confidently and strategically leverage habits of mathematical thinking to support their own and others' math learning. Therefore, the goal of equity must drive our every thought and action. It is the heart of our daily work. In *Power Up Your Math Community,* we strive to help teachers and leaders grow their understandings and expand their toolkits of strategies for promoting equity in math classrooms and schools. This commitment to equity runs throughout the book. We also highlight specific equity strategies in call-out boxes titled "Spotlight on Equity" because we believe educators are more effective when they are mindful of the strategies they use to support student learning. We believe that equity work is best supported through collaborative, practice-based professional learning. And so, we encourage you to use the resources in this book to make equity-focused conversations a part of your community norms.

In this book, we strive to use inclusive language. We use the currently accepted terms white, Latine, and Black to honor people's preferences for what they are called. We use the gender-neutral pronoun "they" rather than "he" and "she" whenever possible.

WHY WE WROTE THIS BOOK

We believe school systems should be places where classrooms, leaders, teachers, and students experience joy in mathematics. We want to stand beside you as you create this reality. For too long, we have ignored the research evidence that all human beings can learn rigorous mathematics with understanding. We've allowed the results of imperfect and limited assessments to shape our expectations for students' learning and dictate what students are or aren't exposed to in math class. We save the fun and beautiful part of mathematics for students we label "high" and condemn our "low" students to year after year of mindless drill-and-kill exercises. We've created a culture warped by its preoccupation with identifying students' deficits, blinded to each of our student's innate and ever-growing brilliance. It's time to look at and celebrate our own "mathness," our inborn mathematical nature, and help our students and our colleagues to do the same. It's time for us all to experience math as joyful and relevant to every aspect of our lives. As an educator, your beliefs and actions impact your students' identities and options. We want you to feel empowered to make these important changes. It's time we see all of our students as math capable.

ONE DISTRICT'S INCREDIBLE SUCCESS

In 2023–2024, I (Holly) took a position as a district math coach with Great Falls Public Schools, a school district of 10,000+ students and 700+ teachers. At first, I felt overwhelmed, wondering how I could impact student learning across this entire system. But I believed that if I could help our leaders, teachers, and students begin to feel joy in learning and doing math, we would make a difference. I didn't realize, however, the impact this mindset could have in just one year.

Before I share the students, teachers, and leaders' successes, I think it's important to examine why the work we did is important. We've all heard stories of math phobia, math trauma, and negative attitudes toward mathematics. You can read about this pervasive problem in Vanessa Vakharia's book *Math Therapy(TM): 5 Steps to Help Your Students Overcome Math Trauma and Build a Better Relationship With Math (2025)* and in Lidia Gonzalez's *Bad at Math? Dismantling Harmful Beliefs That Hinder Equitable Mathematics Education* (2023). How can we expect our students to learn, grow, and thrive in mathematics if their math experiences and their teachers' math experiences reflect trauma and negativity? In choosing to focus on math joy, we are focusing on the people and humanness of doing math. When our school communities feel joy and success in learning mathematics, they are motivated to build on that success.

Between 2020 and 2023, Great Falls' growth and achievement assessment data showed a steady decline in students' math achievement at all

15 elementary schools. It was time to ask and answer the question, *"How do we help our students make growth in mathematics?"* Often, in a frenzy to get students "caught up," districts turn to new curriculum resources or computer applications that claim to do it all. Fortunately, based on the advice of our teachers, the district refrained from these actions and chose to put its energy into growing the habits of mathematical thinking in all students. I advocated for also including teachers and leaders in this learning work, knowing that a mindset shift in our educators would benefit our students as well. The beliefs and culture of the school community drives what and how students learn.

The dedicated educators in Great Falls Public Schools rose to the occasion, adopting a vision of joyful mathematics teaching and learning and working together to build positive and powerful math communities within each school. By January 2024, students at all 15 elementary schools were on track for students to achieve one to two years of growth in mathematics. By the end of the school year, ***every single elementary school in our district in grades K-6 met and/or exceeded its instructional improvement goals in mathematics***. Eight out of 15 schools boasted averages in all grades K-6 above proficient, something this district had not seen before. When a community of educators makes a commitment to building positive and powerful math habits and mindsets, students grow and thrive.

It is our wish to you, reader, that this book supports you in building your positive and powerful math community. When you focus on your own relationship with math, the beauty and joy that math brings, and the habits of being a math learner, you and your students will grow and flourish!

Acknowledgments

HOLLY'S ACKNOWLEDGMENTS

When I started consulting years ago, I couldn't think of a better name than "Inspired Mathematics." It was an homage to the many people who inspired me in so many different ways. To my first mentors, Laurie Matteson and Kathy McLean, who if it weren't for them, I would not have been introduced to the brilliant mind of Marilyn Burns. To my coaching mentors who taught me to listen, give grace, and lead with courage: Shelly Kelly, Marni Napierala, Rachel Cutler, Ruth Uecker, and Lindsey Johnson. To my teaching partner who laughs, cries, debates, and aims to seek truth in teaching mathematics: Courtney Francetich. To my Math Solutions mentors who have become some of my best friends and colleagues: Patty Clark, Sandra Coulson, Diane Reynolds, Lucinda Surber, Hannah Pacifici, and so many more. To my friends who listen to me speak about math so passionately and who enjoy so lovingly calling me a "math nerd": Jennifer Duda and Blair Johnson. To my family who fiercely encourages me and patiently supports me as I continue to reach for the stars: my husband Kyle and my mom Kim.

So many incredible math leaders have influenced my career in education. They are dedicated to inclusivity and joy in learning mathematics. Marilyn Burns's work will forever be the reason why I fell in love with teaching math, and it was an honor to be a part of her influence at Math Solutions. I've spent hours on Robert Kaplinsky's website solving problems and sharing lessons with my colleagues. Being a part of the Twitter community has allowed me to learn and grow as a professional, and I highly recommend Howie Hua, Dan Meyer, Fawn Nguyen, Pam Harris, and Jenna Laib. Jo Boaler, Graham Fletcher, and John SanGiovanni's works have contributed significantly to my work as an educator, leader, and learner. Jennifer Lempp offered to be a thought partner and spoke kind words of encouragement and support when I shared I would be writing a book.

Sue has been my rock and leader as I learned how to write a book. Her knowledge, ideas, organization, and patience led us both to write this incredible work. I am honored to have partnered with her.

SUE'S ACKNOWLEDGMENTS

Teaching is a learning profession, and I am deeply grateful to the multitude of people who helped me grow as a teacher and teacher educator. I have learned and continue to learn important lessons from my colleagues,

leaders, and students every day. Like stars in the universe, my mentors are far too numerous to name here. We are fortunate to be part of a profession in which fellow learners consistently give so generously of themselves.

I am grateful, too, for the amazing education thought leaders from whom I have had a chance to learn. As an early career teacher, I learned to teach math for understanding and how to listen to students' math thinking from Marilyn Burns. From Jo Boaler, I learned about the importance of paying attention to learners' mathematical identities and relationships with math. Deborah Ball opened my eyes to how teaching mathematics can and must promote social justice. I am proud that these leaders' important work, as well as the work of many other math education leaders, is reflected in our book.

Holly has been an incredible writing and thinking partner. I am so thankful for her expertise and her heart for teachers and students. Her dedication and hard work made this book possible.

****

We thank John SanGiovanni for agreeing to write our foreword. We stand in awe of his work and are honored to have him introduce our book. We thank the Corwin team for helping us transform our vision of a resource to help schools strengthen their mathematics programs into reality. Nyle De Leon, Scott Van Atta, Amy Schroller, and Margaret O'Connor provided expert guidance at every step. Debbie Hardin, our editor, has been our cheerleader since day one. She led this project with passion, curiosity, and kindness and celebrated with us every step of the way. We are grateful to have her be a part of this book.

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Source: Lindsey Johnson Photography

Holly Burwell is a teacher, math specialist, learning facilitator, and instructional coach with students and educators in grades Pre-K through 12. She consults through her business Inspired Mathematics supporting math educators across the country and regularly presents professional learning sessions at conferences, including NCTM, NCSM, and the Model Schools Conferences. Holly worked as a math specialist in Great Falls Public Schools to lead and grow math achievement for 10,000+ students. She blogs about math experiences in the classroom on her website at inspiredmathematicsmt.com. Holly is committed to bringing joy to teaching and learning mathematics in schools. You can connect with Holly at hollyburwell@inspiredmathematicsmt.com and @holly_burwell.

Sue Chapman has served students and other math learners for more than 40 years in the roles of teacher, mathematics coach, campus administrator, district curriculum coordinator, and teacher educator. She currently teaches mathematics methods courses to preservice teachers at the University of Houston Clear Lake and provides virtual professional learning and coaching support to teachers and leaders across the country. Sue is the co-author of the book *MathVentures: 33 Teacher-Coach Investigations to Grow Students as Mathematicians* (Math Solutions, 2021) and has written numerous blog posts and articles about coaching, teacher leadership, instructional improvement, and math education. Sue is passionate about building capacity and collective efficacy in educators, teams, schools, and districts. You can connect with Sue at SueChapmanLearning@gmail.com and @SueChapmanLearn.

CHAPTER ONE

Getting Ready to Power Up Your Math Community

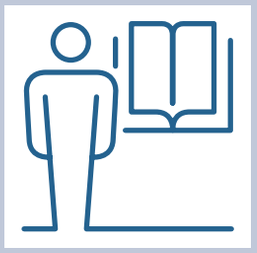
Welcome to a yearlong math learning adventure! Each chapter in this book is designed to help you and your students grow a specific mathematical power. Across the school year, we'll be by your side as you power up your mathematical understandings, skills, and habits. As you participate in these mathematics learning activities with students and colleagues, you'll experience mathematics as fascinating, fun, and relevant to real life. You'll develop new eyes for your own mathematical abilities and the power of your math learning community. We look forward to doing and learning math with you!

—Holly and Sue

HOW TO USE EACH CHAPTER

Power Up Your Math Community is a yearlong **practice-based professional learning** guide to strengthen math teaching and learning throughout your school.

In each chapter, you'll find a month's worth of activities and resources to grow your school's mathematics program. These activities and resources are designed to be used in three contexts:

On Your Own	Together With Your Teaching Community	In Your Classroom
		
Short readings and reflection exercises to introduce the month's learning focus Features: • Let's Do Some Math!	Ready-to-use professional learning activities for collaborative settings Features: • Since We Met Last • Let's Do Some Math Together! • Building Our Expertise • Let's Try It • Math Talks • Manipulatives and Models Matter • Game Time	Actionable steps teachers can take to help students grow as mathematicians Features: • Anchor Lesson • Let's Do Some Math Across Our School! • Teaching Move • Classroom Routine • Station Activity • Literature Connections • Spotlight on Brain Science • Spotlight on Equity • Mathematical Me: Student Journal and Portfolio • Family Newsletter

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Each month's professional learning activities are designed to be used in sequence but can also be used flexibly in support of the specific needs and interests of your school community.

This book is meant to sit alongside your math curriculum, not as something more to teach but to offer ideas and tools to support you in helping your students to strengthen their math habits, identities, and agency so they can develop the attitudes, dispositions, and mindsets that are prerequisite to high levels of math achievement. Here are suggestions for using the activities you'll find in each chapter.

Suggestions for Using the Chapter Title Page

Chapter Subtitles

On the first page of each chapter, the chapter subtitle is offered in the form of a mantra that can be used to spotlight that month's learning focus. You may choose to post this empowering statement in classrooms, use it to create bulletin board displays, and/or include it in morning announcements or other start-of-the-day routines.

A Note About Monthly Mantras

In the Apple TV series *Ted Lasso*, the coach and namesake of the show inspires his soccer team with witty sayings, compassion, and kindness. Fans of the show will recognize his signature sign posted in the locker room. The single word "believe" serves as a mantra for the players to capture the essence of the mindset needed for team success.

Imagine mathematical mantras in your school or classroom that inspire leaders, teachers, and students to see themselves as learners and doers of mathematics. We invite you to consider each month's chapter subtitle as a mantra, a concise statement of belief that will help grow mathematical mindsets within your school community.

In Season 3 of *Ted Lasso*, the soccer team is shocked to find their beloved Believe sign ripped from the wall. Ted says to his players, "Belief doesn't just happen because you hang something up on a wall. Alright? It comes from in here (heart). You know? And up here (brain). Down here (gut)." The mantra becomes ingrained in the players to guide them ahead with purpose (Lawrence et al., 2020).

This is what we want for our students. We want all students to see themselves as mathematicians in their hearts, their minds, and their guts. When students

believe they are mathematicians, they seek out the habits of math learners and, in turn, find that mathematics is fascinating, enjoyable, and rewarding.

Essential Questions

Essential Questions help you and your students to begin thinking about the month's learning focus. They serve as guideposts for learning across the month.

This Month's Focus

This Month's Focus is a concise explanation of the month's learning focus and why it is important for both students and educators.

Mathematical Me: Educator Journal

Regardless of your role in improving mathematics teaching and learning, we suggest that you keep a journal as you read and interact with this book. Doing so will deepen your understanding of the ideas shared. It will also provide a record of your thinking across the year, a learning log, that you can refer back to as you continue your learning journey. You will find educator journaling activities on the first and last pages of each chapter.

Suggestions for Using *On Your Own*

A powerful math community positions all educators (teachers and leaders) as math learners. In this section of each chapter, you'll find short readings and reflective exercises to introduce the month's professional learning focus. You may find it helpful to record your responses to the reflective exercises in your Mathematical Me journal.

Read and think about this section before meeting with colleagues to engage in the professional learning activities in the Together With Your Teaching Community section of each chapter. Alternatively, your school or team might decide to set aside time during a team meeting or professional learning session for team members to do this reading.

Let's Do Some Math!

In Let's Do Some Math! you are invited to tackle an engaging mathematics problem that you will later discuss with colleagues and then use with students. This mathematics problem is also available as a downloadable resource from the companion website (**https://qrs.ly/vqfn1s2**).

Suggestions for Using *Together With Your Teaching Community*

In this second section of each chapter, you will find ready-to-use professional learning activities for collaborative settings: faculty meetings, professional learning community (PLC) meetings, grade-level meetings, vertical-team meetings, and other professional learning contexts. The first four activities are designed as an hour-long professional learning session for a teacher team or faculty.

Since We Met Last (10 minutes)

Since We Met Last will guide you and your colleagues in sharing and analyzing specific classroom data related to the prior month's professional learning focus.

Let's Do Some Math Together! (10 minutes)

Let's Do Some Math Together! will guide you and your colleagues in sharing and discussing your mathematical thinking from the mathematics task you completed in On Your Own. Reflect with colleagues on your math learning.

Building Our Expertise (30 minutes)

Building Our Expertise describes a collaborative professional learning activity designed to help you and your colleagues transfer what you're learning to classroom practice.

Let's Try It (10 minutes)

Let's Try It will guide you and your colleagues in committing to a simple action step related to the month's learning focus and deciding on the data you will bring to next month's meeting to look at the impact of your actions on student learning.

Doing math together with our teaching colleagues provides in-depth insight into the power and wonder of mathematics. We are a more powerful math community when we grow and learn together!

Suggestions for Using *Additional Professional Learning Activities*

Following the professional learning session outline, you will find three additional professional learning activities to extend teacher learning related to the month's learning focus. These activities mirror recommended classroom teaching practice, building teachers' mathematical understandings

while providing a model of recommended strategies to use with students. School leaders and instructional coaches will find these additional activities helpful in preparing monthly professional learning sessions for teachers. Teachers will find this section useful as a guide for personalized professional learning.

Math Talks

Each math talk is an engaging mental math activity or problem designed to promote teacher discussion of mathematical ideas and various solution strategies.

A math talk is a classroom discussion of a mathematical problem or idea. It is brief, five to 15 minutes, and typically takes place at the start of math time. In a math talk, students' mathematical reasoning and explanations take center stage. The teacher uses questioning and other facilitation moves to clarify and deepen thinking, orient students to each other's ideas, and support the group in co-constructing mathematical understanding.

A math talk is a mathematical playground of sorts, a place where students can try out math thinking and build computational fluency in a low-stakes, recess-like environment. As they engage in a math talk, students gain both skill and confidence in mathematical reasoning and in talking about their math thinking while practicing the habits of mathematical learners. They also experience doing mathematics as a joyful endeavor, thus, strengthening their relationships with mathematics and their identities as mathematicians.

Math talks are a powerful vehicle for teacher professional learning. Math talks can be used to instantly engage educators in a fun, learning-focused experience at the start of a team meeting, PLC, or faculty meeting. Math talks with teaching colleagues spark smiles and laughter, so important to educators' emotional well-being and sense of community. Just as this quick learning routine does with students, math talks build teachers' mathematical understandings and reasoning abilities while strengthening their awareness of themselves as mathematical beings.

A Mathematical Question to Consider: If your school spent just 10 minutes at the start of each weekly faculty meeting in a collegial math talk, how might this yearlong investment of 360 minutes or six hours impact educators' math content knowledge, pedagogical expertise, and collective efficacy?

How might this enhanced educator expertise and confidence impact students' math learning and their relationship with math?

Manipulatives and Models Matter

This professional learning experience engages teachers in using a specific math manipulative or model to build familiarity with different mathematical tools and math content knowledge across grade levels.

Manipulatives and other types of mathematical models matter because they are essential supports to math learning (Hiebert et al., 1997; Karp et al., 2021; Tapper, 2022; Van de Walle et al., 2019). According to *Visible Learning for Mathematics* researchers Hattie et al., "Teachers and students can and should use [manipulatives] to make concepts concrete and visible, look for patterns, make connections, and form generalizations. They can likewise be used when constructing viable arguments and critiquing others' reasoning" (2017, p. 170). Manipulatives and models allow students multiple entry points to complex math problems and therefore increase access to rigorous learning. Strategic use of manipulatives and models as learning scaffolds supports equity in the math classroom (Chapman & Mitchell, 2021).

Manipulatives and other mathematical models and tools are spotlighted in the Together With Your Teaching Community section of each chapter as a way of building teachers' representational fluency and their understanding of how mathematical tools support thinking about, talking about, and solving mathematical problems. Many of us had little experience using concrete manipulatives and mathematical tools as mathematics learners in elementary school. When teachers are given opportunities to use mathematical models in support of their math professional learning, their math content knowledge deepens. They become better equipped to use these learning tools effectively in their math instruction and to support all students, K–5, in learning how to strategically choose and use a variety of mathematical models and tools.

Game Time

In Game Time, teachers play a math game to deepen their understanding of mathematical ideas and the month's learning focus. Teachers can then choose to use this same game in their classrooms. Each game is also available as a downloadable resource from the companion website.

Math games are offered as a professional learning experience to deepen understanding of the month's learning focus and to grow educators' pedagogical and math content knowledge. Whenever possible, the games that are shared are appropriate for use across grade levels so they can be enjoyed for learning and used recreationally.

We advocate for the use of math games in all mathematics classrooms because they benefit students in so many ways:

- Math games provide meaningful practice of essential math skills.
- Math games offer students opportunities to engage in mathematical reasoning and communication.
- Math games support the development of social skills.
- Math games strengthen students' mathematical identities and agency.

When introducing a new math game to adults or children, play the game together as a whole group. Once the rules of the game are understood, play can continue with partners. As teachers or students become comfortable with the game, encourage discussion of strategies as a way of surfacing the mathematics in the game. In the classroom, once a game is familiar to students, it can be used as a station or menu activity (Burns, 2023).

The Marilyn Burns podcast *Why play games in math class?* offers additional suggestions for using games to support students' math learning (https://bit.ly/4c3RrgK).

Suggestions for Using *In Your Classroom*

In the third section of each chapter, you will find actionable steps to help students grow as mathematicians and to strengthen classroom mathematics learning communities. You can use this section to choose learning activities and teaching moves to implement on your own or together with colleagues. This section is a resource of specific teaching strategies to strengthen mathematics instruction in individual classrooms and across the school.

Anchor Lesson

An Anchor Lesson develops student understanding of the month's learning focus.

Let's Do Some Math Across Our School!

This section includes a mathematics problem related to the problem you explored on your own and with colleagues. If possible, display students' problem-solving work outside your classroom or in a public area so that other students, teachers, and school visitors can admire the mathematical brilliance that exists across the school community. You might organize "field trips" for students to look at work from other classes or grade levels, perhaps leaving sticky notes with positive feedback, as a way of helping students to see each other as fellow mathematicians and mathematics as an activity that people of all ages enjoy and want to talk about.

Teaching Move

Beginning in Chapter 3—September, you will find suggestions for specific teaching moves to support the month's learning focus.

Classroom Routine

Beginning in Chapter 3, you will find suggestions for classroom routines to support the month's learning focus.

Station Activity

Beginning in Chapter 3, you will find a suggested station activity that students can do independently to deepen understanding of the month's learning focus. Each station activity is also available as a downloadable resource from the companion website.

Literature Connections

Literature connections offers suggestions for children's literature related to the month's learning focus.

Spotlight on Brain Science

Spotlight on Brain Science offers a simple explanation for students of an idea related to the month's learning focus and brain research. The student reading for each Spotlight on Brain Science feature is available as a downloadable resource from the companion website.

Spotlight on Equity

Spotlight on Equity gives specific suggestions for teaching moves related to the month's learning focus to build equitable math classrooms.

Mathematical Me: Student Journal and Portfolio

The student Mathematical Me activities offer journal prompts and suggestions for student portfolio work to document the learning that takes place across the year. A simple math journal template is available on the companion website for duplication, or you may decide to have students use composition books or spiral notebooks for their math journals.

File folders or 18" × 24" sheets of construction paper folded in half can serve as math portfolios. We recommend that students' math journals and portfolios be stored in a central location in the classroom rather than in students' desks to preserve these important learning records across the year.

Younger students who are not yet writing may draw a picture in response to journal prompts. Kindergarten and first-grade teachers may also want to partner with a buddy class of older students who could visit once a month to scribe younger students' journal and portfolio reflections.

Family Newsletter

The Family Newsletter is a one-page explanation of the month's learning focus for families that also provides ideas to use at home. Each Family Newsletter is also available as a downloadable resource from the companion website.

Suggestions for Using *Checking In On Our Learning*

This final section of each chapter takes readers back to the month's Essential Questions and the opportunity to reflect on the learning that has taken place. It also previews next month's learning focus.

Downloadable Resources

To support your work, a variety of downloadable resources are available on the *Power Up Your Math Community* companion website at **https://qrs.ly/vqfn1s2**.

PREPARING FOR YOUR LEARNING ADVENTURE

The educator and student learning activities in this book are designed to make it easy for you and your team to get started on this exciting learning adventure. Here are a few logistical details you'll want to think about before beginning.

How Will You Make Time for Monthly Professional Learning?

Time is a limited resource in schools. The monthly professional learning sessions are designed to take just one hour with this reality in mind.

(Note that additional professional learning activities provide options for extending this.) You'll want to make decisions upfront about whether the monthly professional learning will take place with your entire faculty, in grade-level teams, in a vertical math team, or in another setting.

The professional learning activities in this book will deepen educators' understanding of mathematics and mathematics education. But, just as important, these regular professional learning sessions offer your teams and faculty the chance to share what they're trying in the classroom and how their actions are impacting student learning. These discussions position your teaching community to co-construct important professional knowledge that can maximize mathematics learning across your school.

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How Will You Introduce the Power Up Your Math Community Learning Initiative to Your School Community—to Staff Members, Students, and Parents?

This year will be an important event in the life of your school. Community members will have the chance to come together to create a shared definition of what mathematics is and to strengthen their personal relationships with mathematics. You'll want to let everyone know what you'll be doing and why it's important.

In an early faculty meeting, you might read and discuss the definition of a Powerful Math Community and the rationale for this important work offered in the Preface. You'll want to tell students on the first day of school that every member of the school community—students, teachers, and families—are all mathematicians and that you'll all be growing your mathematical powers across the year. You'll want to tell parents about the importance of this community-wide learning work. Let them know that you'll keep them posted with monthly newsletters and that they can look forward to an end-of-year celebration of their child's math learning.

How Will You Keep the Math Conversation Going?

Growing a team of educators who are passionate about improving mathematics teaching and learning will be essential to the success of your Powerful Math Community. Building your school-wide mathematics program can feel daunting; the collective efforts and shared commitment of a team of teacher-leaders will be key to sustaining this important work. Create routines and structures to keep the math conversation going within your school community to build a school culture for continuous improvement of your mathematics instructional program.

FAST FORWARD TO THE END OF THE SCHOOL YEAR

"Recognizing and celebrating success contributes to building a culture for learning."

—Killion et al. (2023, p. 169)

Planning Ahead for Your End-of-Year Math Celebration

As your school year comes to an end, it will be important to pause and celebrate the learning that occurred. In the Let's Do Some Math Across Our School! section of Chapter 11—May, you'll find suggestions for a school-wide end-of-year celebration of math learning together with families. This celebration could take place during a family math night and/or student-led conferences. Students' Mathematical Me journals and portfolios will be important learning artifacts during this celebration as will the classroom anchor charts that teachers and students create throughout the year. It's a good idea to make tentative plans now for this celebration. Put the date on your school calendar and decide how you will collect and curate evidence of student and teacher learning each month.

Planning Ahead for Next Summer

If possible, make plans now for when and how you will bring your faculty or leadership team together at the end of the school year to reflect on your learning and begin planning for the following school year. You might dedicate time during a professional learning day or staff retreat. Finding a way to involve all teachers in reflecting on and planning for professional learning in support of students' math learning will embed a continuous-improvement mindset within your school culture to continue powering up your math community.

The downloadable resources available on our companion website include a bonus chapter resource called "Chapter 12—This Summer's Focus: Powering Up for a New School Year!" This resource will support you and your teaching community in preparing for this important reflecting and planning conversation. In addition, the Appendix at the end of this book offers a short list of outstanding professional books to support your school's next steps in powering up mathematics teaching and learning.