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Please enjoy this complimentary excerpt from Power Up Your Math Community.

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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.

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

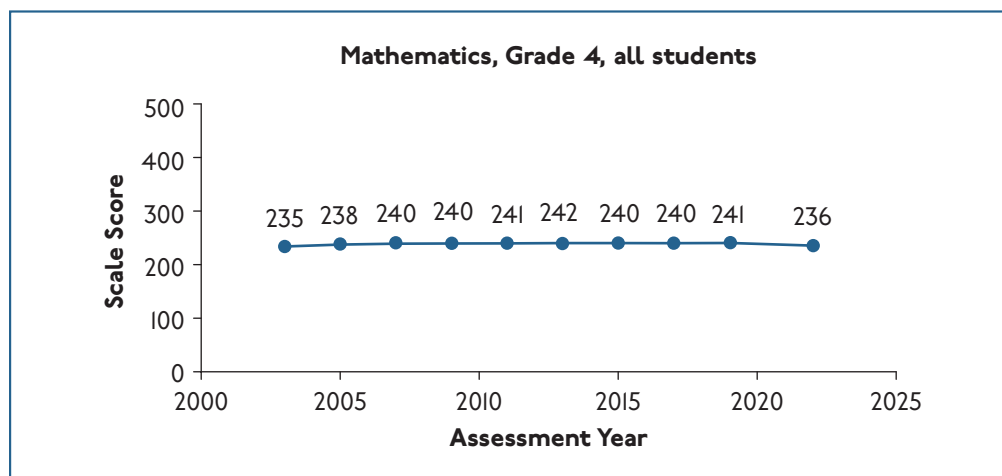
- Fourth-grade mathematics scores declined across all regions of the country and in 43 states/jurisdictions.
- Fourth-grade mathematics scores declined in 23 of 26 participating urban districts.
- One quarter of fourth-graders performed below NAEP Basic in mathematics—a larger percentage compared to 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

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.

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



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 “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.

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.

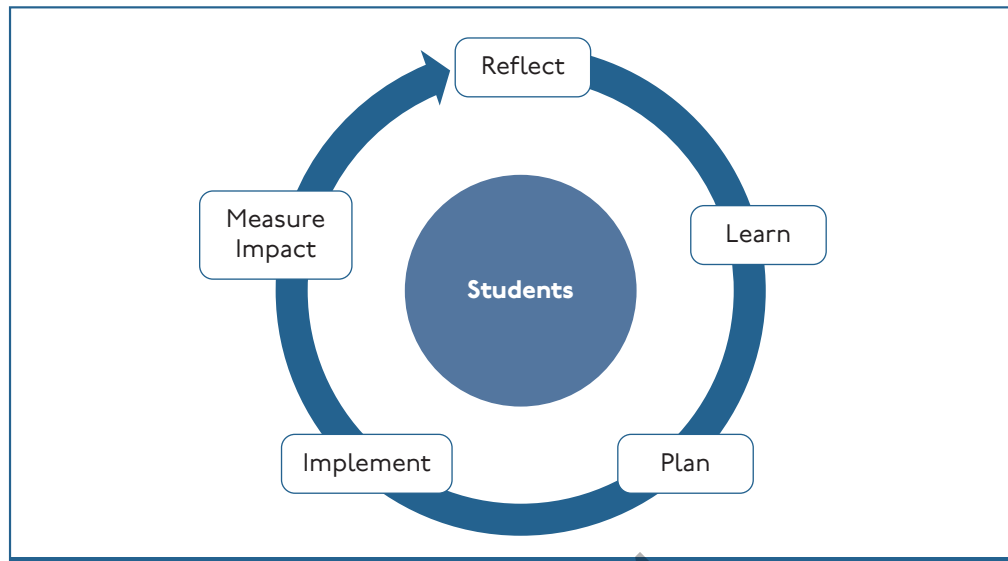
Practice-based professional learning is teacher driven and inquiry based, designed to address challenges educators uncover in their efforts to support student learning. The process of practice-based professional learning occurs in learning cycles that iterate into new learning cycles (see Figure P.2). 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.

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 "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)

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!

