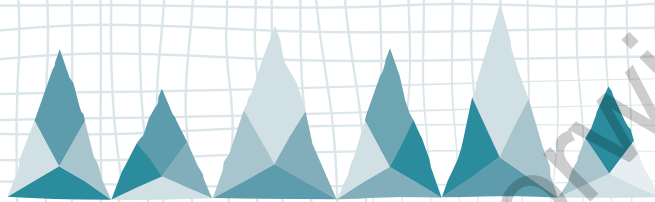


INTRODUCTION

WHY STRUGGLE?

WHY NOW?



Each of us, as teachers and as students, have experienced struggle in some way. Still, it's only recently that new thinking about the role of mindset and grit have helped us truly "find" the value of struggle. That movement has been invaluable in setting the stage for us to nurture consistent, *productive* struggle and perseverance on the part of students in mathematics classrooms. In spite of this progress, direct actions to provoke, support, and develop students' comfort with struggle have been lacking or loosely connected. This lack prompted the three of us to think about how we learned to facilitate and channel students' struggle in productive ways.

We wrote this book to help colleagues realize "productive struggle success." We wanted to provide specific strategies and routines to put into action and a coherent approach for doing so. But before we could get started, we had to make better sense of who we were and who we are now relative to struggle. We had to think about our journey with struggle as students, as teachers, and as professional developers.

The Struggle Experiences as Students and Teachers

The three of us (John, Susie, and Kevin) grew up in different parts of the United States. We went to different schools. We are different ages. Yet, each of us remembers that learning math meant acquiring steps and procedures for doing math. Although we didn't realize it at the time, what we lacked back then was a deep understanding of the concepts behind the steps. As the saying goes, ours was not to ask why. We could *do* math but that isn't to say that we *knew* math.

We were led to believe that there was a right way to do math. We were told that we would get the answer if we just followed "these steps." We developed notions that certain people were good at math and those people were almost always faster than others. We were led to believe that struggle was bad. Good math students didn't struggle.

But we did struggle from time to time. We struggled with counting coins and making change to computing and comparing fractions through mechanical manipulation of common denominators. Relying on the "FOIL method" for multiplying binomials and factoring polynomials didn't help us understand what we were doing or why. Our "understanding" was fleeting and fragile. It faded quickly. This loss of understanding undermined our confidence.

We aspired to teach and trained to be teachers. We landed in primary, intermediate, and middle school classes where our primary challenges were to find clever ways to engage students, figure out how to make math clear, and know what to do when our students didn't get it.

All three of us remember getting accolades as student teachers for being able to explain math in different ways when our students didn't get it the first time. We carried those to our first posts. And we soon became frustrated with our students because it felt as though we were doing all of the work. They had become our mathematics dependents. They waited to be told what to do. They said "I don't know," and we jumped to rescue them.

We were also uneasy about district and state tests. Lacking the confidence that our students retained what they seemed to know only a few weeks before, we felt the need, if not the requirement, to cram and review, knowing that we would be judged by others based on those results, just as we judged ourselves as well on a daily basis. Like most teachers, we were satisfied when our students got it. We were frustrated and dejected on days when they didn't. In many ways our early experiences of teaching math were strikingly similar to the experiences we had as students. Our focus, at its core, was still mastering procedures and steps.

What We've Learned About Teaching Math and Struggle

As we pursued opportunities to learn and grow our craft, attending numerous professional learning sessions, reading countless books and articles about teaching math, and attending graduate school, exchanging ideas with colleagues and mentors, our awareness of our own struggles and our own learning grew. We noticed our professors valued discussion, insight, and making sense over leading us directly through steps and solutions. We were reminded of the satisfaction of overcoming challenges in learning settings. These experiences strengthened our value of struggle, recognizing it as meaningful, worthwhile, and productive.

Our work with teachers, coaches, principals, parents, and students across the country has only deepened and enhanced our understanding of struggle. We have learned that all teachers are challenged with understanding the very notion of productive struggle. How can struggle be productive? Is struggle a sign of failure? Of poor teaching? But maybe the biggest issue teachers face with struggle is their own desire to see their students succeed. Caring so very much about their students, teachers become uneasy when they see their students struggling, wondering if it will erode students' confidence in their own capabilities. Lacking confidence in the value of such struggle, teachers resort to what they know, focusing on what they, and we all have, assumed are tried-and-true approaches: memorization, step-by-step instructions, and guiding students down the path to the correct answers, rather than guiding their thinking so they can find their own path. We learned that well-intended teacher actions can compromise or even completely avoid struggle in order to achieve what might on the surface look like success.

This avoidance can have profound consequences for equity and access. Depriving some students of experiencing struggle robs them of valuable learning opportunities. *All students deserve the right to struggle.* It cannot be reserved for the students who appear to need extra challenge or enrichment. Conversely, those students who need extensive reteaching may be left to engage in a constant state of *unproductive* struggle. And young students, just because they are new to formal learning, cannot be sheltered from struggle. Each and every student must have access to high-level mathematics—opportunities to think, discuss, and learn how to struggle productively. It begins with student identity, agency, and the belief that one can.

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The Current Challenge

Beliefs that struggle can be productive have gained momentum in recent years, and notions about growth mindset and making mistakes are alive and well. These are important first steps. Yet, proclamation is not realization. Words and actions have not intersected as much as we would like.

In many classes today, students express awareness that effort matters and acknowledge the importance of taking chances and accepting mistakes. But while their attitudes relative to mistakes and effort are changing, their actions and reactions have not yet caught up. Teachers are challenged to provide effective responses that help students engage in struggle and push through it. Teachers need help with how to take action. Their need comes as no surprise.

Teacher preparatory programs do many things well. Preparation tends to focus heavily on areas of teaching as lesson planning and improving instructional resources. However, supporting students through differentiation and permanent scaffolding in order to *avoid* struggle seems to take precedence over responding to and navigating struggle. On top of this, many programs require only a single course in mathematics pedagogy and content. These limitations hamper preservice teachers' opportunity to learn about planning for, supporting, and even embracing struggle. Simply put, new teachers are not readily prepared to handle the situations of struggle in their own classrooms.

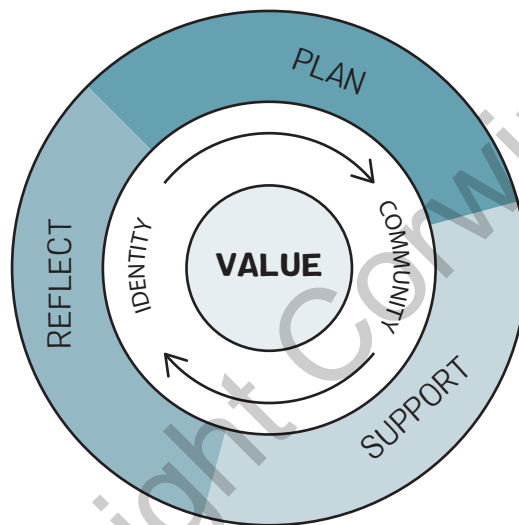
Once on the job, teachers can find that professional learning about productive struggle to be lacking. Administrators, curriculum offices, and district initiatives compete for valuable professional learning minutes. There is only so much time allotted to develop mathematics content and pedagogy. And even though there is increasing recognition of the value of productive struggle in the learning sessions that are offered, teachers may find that more cheerleading and messaging in support of struggle are delivered than actual specific insights, actions, and strategies for navigating it and even helping it thrive in the classroom.

There are many misconceptions about promoting struggle in the classroom. One is that struggle is something that happens "in the moment," seemingly spontaneously and unpredictably *during* the lesson and so is impossible to plan and prepare for. But we are here to tell you that struggle is not something that happens by chance. Indeed, we have learned that by making purposeful decisions before, during, and after the lesson, teachers can teach students, all students, to engage in productive struggle. There are distinct actions within those three phases. This book outlines six essential actions for nurturing productive

struggle *before* (Actions 1, 2, 3, and 4), *during* (Action 5), and *after* the lesson (Action 6). The relationship between these actions might be thought of as shown in Figure i.1.

- Action 1: Value Productive Struggle
- Action 2: Foster Identity
- Action 3: Build Community for Productive Struggle
- Action 4: Plan for Productive Struggle
- Action 5: Support Productive Struggle
- Action 6: Reflect on Productive Struggle

Figure i.1 • Productive Struggle Actions



How This Book Can Help

“The struggle is real” is a popular catchphrase in education. But all too often it is just that, a saying that isn’t accompanied with what actions a teacher can take. This book intends to help you take action to support productive student struggle by describing what these six actions entail and how you can bring them to life in your work through the collection of specific activities. It provides opportunities for you to reflect on where you are with productive struggle and help you consider what aspects of your professional practice work well and where you would like to grow.

It is important to keep in mind that this book isn’t a recipe for success. Navigating productive struggle is hard and complex. It takes time. Student struggle is not something that is “fixed” by the teacher. It is a process that is facilitated by the teacher. While there is no magic bullet to produce

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productive struggle, we do believe that there is a game plan for it. These actions and activities can help you develop your game plan for struggle.

The many vignettes in this book are based on our own experiences as teachers and experiences of others we have observed and talked to. They are meant to illustrate concepts offered in each chapter and the practices that may to varying degrees support or not support them. To be clear, we *all* have been to some extent each teacher in each vignette. Neither teacher is good or bad, better or worse. They simply reveal different approaches and perspectives. Some may promote productive struggle while others might undermine, restrict, or avoid it. The vignettes are intended to help you, as they have helped us, think about what we want to do to enhance our practice.

Three Things Before You Begin

Before you dig in, take a moment to reflect on how you feel about the idea of struggle by addressing the question below and completing the inventory that follows. We'll ask you to come back to these thoughts in different parts of the book. At the end of the book, we'll invite you to revisit the reflection, definition, and inventory that you complete here. It will be an opportunity for you to get a sense of how this work has helped you grow professionally. Perhaps your struggle with struggle is just beginning. Maybe you are using this book as an opportunity to revisit or reinforce or enhance approaches you are already trying out. Wherever you are on this professional journey, we invite you to join us in the struggle.

Reflection Question:

What is a struggle experience you have had as a student and one you have had as a teacher? What effects have each of these experiences had on you?

Definition:

How do you define productive struggle?

Figure i.2 • Productive Struggle Self-Inventory

Productive Struggle Self-Inventory

Where are you with productive struggle? Take a moment to rate yourself on the teacher survey below. Rate each question from 1 to 10, with 1 being never and 10 being always.

I am aware of my math identity.									
1	2	3	4	5	6	7	8	9	10
Never									Always
I am aware of my students' math identities.									
1	2	3	4	5	6	7	8	9	10
Never									Always
I actively and consistently reinforce math community.									
1	2	3	4	5	6	7	8	9	10
Never									Always
I select high-quality mathematics tasks.									
1	2	3	4	5	6	7	8	9	10
Never									Always
I modify tasks to provoke struggle.									
1	2	3	4	5	6	7	8	9	10
Never									Always
I modify tasks to make them easier for students to work with.									
1	2	3	4	5	6	7	8	9	10
Never									Always
I complete the math task before I use it with my students.									
1	2	3	4	5	6	7	8	9	10
Never									Always
I anticipate what students will do and think about questions to ask them in response.									
1	2	3	4	5	6	7	8	9	10
Never									Always
I pause in the middle of group work to discuss progress and challenges.									
1	2	3	4	5	6	7	8	9	10
Never									Always
My students ask questions or refer to resources when they are struggling.									
1	2	3	4	5	6	7	8	9	10
Never									Always
We reflect on struggles and strategies for overcoming them during class discussions.									
1	2	3	4	5	6	7	8	9	10
Never									Always
I reflect on my students' struggles and the strategies they use to overcome them.									
1	2	3	4	5	6	7	8	9	10
Never									Always



This self-inventory can be downloaded at resources.corwin.com/productivemathstruggle