

# Introduction

By Timothy D. Kanold

At the heart of our work as teachers of mathematics for grades preK–2 is developing student self-efficacy. *Student self-efficacy* references students’ *belief* in their capability to learn the mathematics you *need students to know* by the end of each grade and as they prepare for upper elementary standards.

But what exactly *does* a preK–2 mathematics student need to know by the end of each unit of study throughout the school year? And, more important, how does a preK–2 teacher develop his or her personal self-efficacy to adequately plan for and then deliver those mathematics units of study to students?

I have been trying to answer this question throughout my entire professional life.

In 1987, I coauthored my first mathematics textbook (a geometry book for students who found mathematics a difficult subject); it was my first real experience in taking a wide body of content for the complete school year and breaking the standards down into reasonable chunks for every teacher and student to learn.

As I eventually expanded my textbook writing to include K–12 mathematics students and teachers, I realized these manageable chunks of content could vary in time length from twenty to thirty-five days, and these periods often had names like *units* or *chapters* or *modules*. I also realized just how hard it is to address a set amount of content in a specific, set time period in the early elementary grades, where the wide range of student readiness to learn mathematics provides a remarkable challenge and a need for standards to be

spiraled within the curriculum throughout the early grades (meaning students work on some standards throughout the year or for longer periods of time—often to a benchmark or using daily routines).

As you know, mathematics is a vertically connected curriculum, and units of study at each grade level cannot be taught in random order; the units must exist in the right place and the right time in the mathematics story arc for each grade level, each year. There is an order to the flow of your preK–2 mathematics content story. And as preK–2 teachers, your understanding of the *how* and *why* of the content trajectories across these grades builds the foundations critical for future mathematics success in later grades.

During the work our team of mathematics authors and teachers do across the United States, we have observed elementary school mathematics programs in which focused unit planning provides your best chance of success. This book is designed to help you with the planning process for each unit of study and provide a model framework for you to use each day.

Sarah Schuhl, lead author of the unit-planning books in the *Every Student Can Learn Mathematics* series, and I realize every preK–2 mathematics teacher and teacher team needs to work collectively with their textbooks and other resources to *own* the planning process for each unit of study.

Developing *collective teacher efficacy* is at the heart of the Professional Learning Community (PLC) at Work® process. Sabina Rak Neugebauer, Megan Hopkins, and

James P. Spillane (2019) highlight the importance of a collective approach anchored in content with the words, “Social interactions firmly anchored in instructional practice can move teachers beyond contrived collegiality to a culture that can in turn influence a teacher’s sense of efficacy” (p. 13). Teachers have discussions of mathematics content they are teaching each week and then place those episodes into manageable chunks of content for their team’s discussion and work.

In 2019, when Solution Tree asked Sarah Schuhl and me to develop the *Mathematics at Work™ Plan Book* (Kanold & Schuhl, 2020), we jumped at the chance to provide a book that would help you organize your mathematics work and story arc for the entire school year. The weekly planners we created for the book provide helpful organizational tools and may be completely sufficient for your team. However, we also realize you might need more specific direction with the elements of planning we ask you to prepare for each unit of mathematics study.

The coauthors of this Mathematics at Work unit-planning guide for grades preK–2 (Sarah Schuhl, Jennifer Deinhart, Nathan Lang-Raad, Nanci Smith, Matt Larson, and I) serve or have served in many mathematics teaching and leading roles. One such role is to serve on our Mathematics at Work team of national thought leaders. As we travel around the United States helping elementary school teachers improve student learning in mathematics, preK–2 educators often ask us, “How do you collectively plan for a unit of study in mathematics at our grade level?”

The answer to that question is the hope and promise of this book.

## The Purpose of This Book

We want to help your grade-level team learn *how* to work together to perform the following seven collaborative tasks for each unit of mathematics study throughout the year.

### Generate Essential Learning Standards for Each Unit

Unwrap standards into daily learning targets, and write those standards in student-friendly language for essential learning standards. And then use those essential learning standards to drive feedback on common

mathematics assessments, classwork, independent practice, and intervention as a collaborative team.

### Create a Team Unit Calendar

Decide the number of days needed to teach each essential learning standard and the start and end dates for the unit. Determine the dates to administer any common mid-unit or end-of-unit assessments or the dates you might use to administer any ongoing assessments to individual or small groups of students. Establish each date the team will analyze data from any common mid-unit and end-of-unit assessments to plan a team response to student learning.

### Identify Prior Knowledge

Determine and identify the recent prerequisite content knowledge students need to access the grade-level learning in each unit of study. Decide which mathematical activities (tasks or prompts) to use for students to connect the prior knowledge at the start of each lesson throughout the unit. Use these activities to discern student readiness and entry points into each lesson.

### Determine Vocabulary and Notations

Identify the academic vocabulary students will be hearing, reading, and using during discourse throughout the unit. Identify any mathematical notations students will need to read, write, and speak during the unit.

### Identify Resources and Activities

Determine which lessons in the team’s current basal curriculum materials align to the essential learning standards in the unit. Determine examples of higher- and lower-level tasks (including games) students must engage in to fully learn each essential learning standard.

### Agree on Tools and Technology

PreK–2 teachers use many tools to teach mathematics to students. Determine any manipulatives or sources of technology needed to help students master the essential learning standards of the unit. Identify whether the tools or technology needed for the unit will support student learning of the essential learning standards with a focus on conceptual understanding, application, or procedural fluency. Identify which tools

and technology, if any, will be part of instruction or common assessments.

### Record Reflection and Notes

When planning the unit, record notes of things to remember when teaching (by answering, for example, these questions: What are the expectations for quality student work, written or observed? Which mathematical strategies should teachers use throughout each unit for learning?). After the unit, reflect on instruction and assessment changes to the unit, and record ideas to use when planning the unit for next year.

### The Parts of This Book

Part 1 provides detailed insight into how your mathematics team can effectively respond to these seven planning tasks for the essential standards you expect students to learn in grades preK–2.

Part 2 provides four detailed model mathematics units related to foundations of addition and subtraction (one for each grade level) and describes a number reasoning story arc for preK–2 related to joining and separating and addition and subtraction number operations. We hope part 2 provides an inspiring model for your grade-level team.

The epilogue shares an example for how to organize your elementary grade-level team's work on a unit-by-unit basis so you can grow and learn from its work in future years. If your collaborative team does not already have a mathematics unit of study yearlong plan with standards, appendix A (page 137) provides a proficiency map protocol as a way to organize your standards and to determine when students should be proficient with each standard. Finally, appendix B (page 139) contains a team checklist and questions for your team to answer as you plan each mathematics unit. Appendix B summarizes the elements of unit planning shared in parts 1 and 2 of this book and is intended to be a quick

reference to guide the work of your team in your unit planning.

### A Final Thought

You might wonder, “Why is this book titled *Mathematics Unit Planning in a PLC at Work, Grades PreK–2*?” In 1980, my second mathematics teaching job landed me on the doorstep of an educational leader who would later start an education movement in the United States that would spread throughout North America and even worldwide. He was the architect of the Professional Learning Communities at Work movement (along with Robert Eaker) and my principal for many years. Richard DuFour expected every grade-level or course-based team in our school district to answer four critical questions for each unit of study in mathematics (DuFour, DuFour, Eaker, Many, & Mattos, 2016).

1. What do we want all students to know and be able to do? (essential learning standards)
2. How will we know if they know it? (lesson-design elements, assessments, and tasks used)
3. How will we respond if they don't know it? (formative assessment processes)
4. How will we respond if they do know it? (formative assessment processes)

As your collaborative team pursues the deep work, remember it all begins with a robust and well-planned response to PLC critical question 1 (*What do we want all students to know and be able to do?*). That is the focus of our grades preK–2 unit planning book.

We want to help you plan for and answer the first question for each mathematics unit, grade level, and student. We wish you the best in your mathematics teaching and learning journey, *together*.