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Series Editor

BEYOND THE COMMON CORE

A HANDBOOK FOR

Mathematics

in a PLC at Work™

GRADES 6–8

Hawker Brownlow
EDUCATION

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Introduction

You have high impact on the front lines as you snag children in the river of life.

—Tracy Kidder

Your work as a middle school mathematics teacher is one of the most important, and at the same time, one of the most difficult jobs to do well in education. Since the release of our 2012 Solution Tree Press series *Common Core Mathematics in a PLC at Work*™, our authors, reviewers, school leaders, and consultants from the Mathematics at Work™ team have had the opportunity to work with thousands of grade 6–8 teachers and teacher teams from across the United States who are just like you: educators trying to urgently and consistently seek deeper and more meaningful solutions to a sustained effort for meeting the challenge of improved student learning in mathematics. From California to Virginia, Utah to Florida, Oregon to New York, Wisconsin to Texas, and beyond, we have discovered a thirst for implementation of K–12 mathematics programs that will sustain student success over time. Your focus on middle school mathematics is one of the most significant components of the K–12 effort toward improved student learning.

Certainly, the Common Core State Standards (CCSS) have served as a catalyst for much of the national focus and conversation about improving student learning. However, your essential work as a middle school mathematics teacher and as part of a collaborative team in your local school and district takes you well *beyond* your state's standards—whatever they may be. As the authors of the National Council of Teachers of Mathematics (NCTM, 2014) publication *Principles to Actions: Ensuring Mathematical Success for All* argue, standards in and of themselves do not describe the essential conditions necessary to ensure mathematics learning for all students. You, as the classroom teacher, are the most important ingredient to student success.

This middle school mathematics teaching and assessing handbook is designed to take you *beyond the product* of standards themselves by providing you and your collaborative team with the guidance, support, and *process* tools necessary to achieve mathematics program and department greatness within the context of higher levels of demonstrated student learning and performance.

Whether you are from a state that is participating in one of the CCSS assessment consortia or from a state that uses a unique mathematics assessment designed only for your state, it is our hope that this handbook provides a continual process that allows you to move toward a local program of great mathematics teaching and learning for you and your students.

Your daily work begins by understanding there are thousands of instructional and assessment decisions you and your teacher team (those adults closest to the action) will make every day and in every unit. Do those decisions make a significant difference in terms of increased levels of student achievement? Your role as a middle school teacher is to make sure they do.

The Grain Size of Change Is the Teacher Team

We believe the best strategy to achieve the expectations of CCSS, state, or local standards for mathematics is to create schools and districts that operate as professional learning communities (PLCs), and,

more specifically, within a PLC at Work™ culture as outlined by Richard DuFour, Rebecca DuFour, Robert Eaker, and Tom Many (2010). We believe that the PLC process supports a grain size of change that is just right—not too small (the individual teacher) and not too big (the district office)—for impacting deep change. The adult knowledge capacity development and growth necessary to deliver on the promise of standards that expect student demonstrations of understanding reside in the engine that drives the PLC school culture: you and your teacher team.

There is a never-ending aspect to your professional journey and the high-leverage teacher and teacher team actions that measure your impact on student learning. This idea is at the very heart of your work. As John Hattie (2012) states in *Visible Learning for Teachers: Maximizing Impact on Learning*:

> My role as a teacher is to evaluate the effect I have on my students. It is to "know thy impact," it is to understand this impact, and it is to act on this knowing and understanding. This requires that teachers gather defensible and dependable evidence from many sources, and hold collaborative discussions with colleagues and students about this evidence, thus making the effect of their teaching visible to themselves and to others. (p. 19)

Knowing Your Vision for Mathematics Instruction and Assessment

Quick—you have thirty seconds: turn to a colleague and declare your vision for mathematics instruction and assessment in your middle school mathematics department for your school. What exactly will you say? More importantly, on a scale of 1 (low) to 6 (high), what would be the degree of coherence between your and your colleagues' visions for instruction and assessment?

We have asked these vision questions to more than ten thousand mathematics teachers across the United States since 2011, and the answers have been consistent: wide variance on mathematics instruction and assessment coherence from teacher to teacher (low scores of 1, 2, or 3 mostly) and general agreement that the idea of some type of a formative assessment process is supposed to be in a vision for mathematics instruction and assessment.

A favorite team exercise we use to capture the vision for instruction and assessment is to ask a team of three to five teachers to draw a circle in the middle of a sheet of poster paper. We ask each team member to write a list (outside of the circle) of three or four vital adult behaviors that reflect his or her vision for instruction and assessment. After brainstorming, the team will have twelve to fifteen vital teacher behaviors.

We then ask the team to prepare its vision for mathematics instruction and assessment inside the circle. The vision must represent the vital behaviors each team member has listed in eighteen words or less. We indicate, too, that the vision should describe a "compelling picture of the school's future that produces energy, passion, and action in yourself and others" (Kanold, 2011, p. 12).

Team members are allowed to use pictures, phrases, or complete sentences, but all together, the vision cannot be more than eighteen words. In almost every case, in all of our workshops, professional development events, conferences, institutes, and onsite work, we have been asked a simple, yet complex question: "*How*?" How do you begin to make decisions and do your work in ways that will advance your vision for mathematics instruction and assessment in your middle school? How do you honor what is inside your circle? And how do you know that your circle, your defined vision for mathematics instruction and assessment, represents the "right things" to pursue that are worthy of your best energy and effort?

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In *Common Core Mathematics in a PLC at Work, Grades 6–8* (Kanold, Briars, Asturias, Foster, & Gale, 2013), we explain how understanding *formative assessment* as a research-affirmed *process* for student and adult learning serves as a catalyst for successful mathematics content implementation. In the *Common Core Mathematics in a PLC at Work* series, we establish the pursuit of assessment as a process of formative feedback and learning for the students and the adults as a highly effective practice to pursue (see chapter 4 in any book of the series).

In this handbook, we provide tools for *how* to achieve that collaborative pursuit: how to engage in ten *high-leverage team actions* (HLTAs) steeped in a commitment to a vision for mathematics instruction and assessment that will result in greater student learning than ever before.

A Cycle for Analysis and Learning: The Instructional Unit

The mathematics unit or chapter of content creates a natural cycle of manageable time for a teacher's and team's work throughout the year. What is a *unit*? For the purposes of your work in this handbook, we define a *unit* as a chunk of mathematics content. It might be a chapter from your textbook or other materials for the course, a part of a chapter or set of materials, or a combination of various short chapters or content materials. A unit generally lasts no less than two to three weeks and no more than four to five weeks.

As DuFour, DuFour, and Eaker (2008), the architects of the PLC at Work process, advise, there are four critical questions every collaborative team in a PLC at Work culture asks and answers on a unit-by-unit basis:

1. What do we want all students to know and be able to do? (The essential learning standards)
2. How will we know if they know it? (The assessment instruments and tasks teams use)
3. How will we respond if they don't know it? (Formative assessment processes for intervention)
4. How will we respond if they do know it? (Formative assessment processes for extension and enrichment)

The unit or chapter of content, then, becomes a natural cycle of time that is not too small (such as one week) and not too big (such as nine weeks) for meaningful analysis, reflection, and action by you and your teacher team throughout the year as you seek to answer the four critical questions of a PLC. A unit should be analyzed based on content standard clusters—that is, three to five essential standards (or sometimes a cluster of standards) for the unit. Thus, a teacher team, an administrative team, or a district office team, does this type of analysis about eight to ten times per year.

This Mathematics at Work handbook consists of three chapters that fit the natural rhythm of your ongoing work as a teacher of mathematics and as part of a teacher team. The chapters bring a focus to ten high-leverage team actions your team takes before, during, and in the immediate aftermath of a unit of instruction as you respond to the four critical questions of a PLC throughout the year, as highlighted in figure I.1 (page 4). Figure I.1 lists the ten high-leverage team actions within their time frame in relation to the unit of instruction (before, during, or after) and then links the actions to the critical questions of a PLC that they address.

High-Leverage Team Actions	1. What do we want all students to know and be able to do?	2. How will we know if they know it?	3. How will we respond if they don't know it?	4. How will we respond if they do know it?
Before-the-Unit Team Actions				
HLTA 1. Making sense of the agreed-on essential learning standards (content and practices) and pacing	■			
HLTA 2. Identifying higher-level-cognitive-demand mathematical tasks	■	◧		
HLTA 3. Developing common assessment instruments	◧	■		
HLTA 4. Developing scoring rubrics and proficiency expectations for the common assessment instruments		◧		
HLTA 5. Planning and using common homework assignments	◧	■	◧	◧
During-the-Unit Team Actions				
HLTA 6. Using higher-level-cognitive-demand mathematical tasks effectively	◧	■		
HLTA 7. Using in-class formative assessment processes effectively	◧	◧	■	■
HLTA 8. Using a lesson-design process for lesson planning and collective team inquiry	■	■	■	■
After-the-Unit Team Actions				
HLTA 9. Ensuring evidence-based student goal setting and action for the next unit of study			■	■
HLTA 10. Ensuring evidence-based adult goal setting and action for the next unit of study			■	■

■ = Fully addressed with high-leverage team action

◧ = Partially addressed with high-leverage team action

Figure I.1: High-leverage team actions aligned to the four critical questions of a PLC.

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Before the Unit

In chapter 1, we provide insight into the work of your collaborative team *before* the unit begins, along with the tools you will need in this phase. Your collaborative team expectation should be (as best you can) to complete this teaching and assessing work in preparation for the unit.

There are five before-the-unit high-leverage team actions for collaborative team agreement on a unit-by-unit basis.

HLTA 1. Making sense of the agreed-on essential learning standards (content and practices) and pacing

HLTA 2. Identifying higher-level-cognitive-demand mathematical tasks

HLTA 3. Developing common assessment instruments

HLTA 4. Developing scoring rubrics and proficiency expectations for the common assessment instruments

HLTA 5. Planning and using common homework assignments

Once your team has taken these action steps, the mathematics unit begins.

During the Unit

In chapter 2, we provide the tools for and insight into the formative assessment work of your collaborative team *during* the unit. This chapter teaches deeper understanding of content, discussing the Mathematical Practices and processes and using higher-level-cognitive-demand mathematical tasks effectively. It helps your team with daily lesson design and study ideas as ongoing in-class student assessment becomes part of a teacher-led formative process.

This chapter introduces three during-the-unit high-leverage team actions your team works through on a unit-by-unit basis.

HLTA 6. Using higher-level-cognitive-demand mathematical tasks effectively

HLTA 7. Using in-class formative assessment processes effectively

HLTA 8. Using a lesson-design process for lesson planning and collective team inquiry

The end of each unit results in some type of student assessment. You pass back the assessments scored and with feedback. Then what? What are students to do? What are you to do?

After the Unit

In chapter 3, we provide tools for and insight into the formative work your collaborative team does *after* the unit is over. After students have taken the common assessment, they are expected to reflect on the results of their work and use the common unit assessment instrument for formative feedback purposes.

In addition, there is another primary formative purpose to using a common end-of-unit assessment, which Hattie (2012) describes in *Visible Learning for Teachers*: "This [teachers collaborating] is not critical reflection, but *critical reflection in light of evidence* about their teaching" (p. 19, emphasis added).

From a practical point of view, an end-of-unit analysis of the common assessment focuses your team's next steps for teaching and assessing for the next unit. Thus, there are two end-of-unit high-leverage team actions your team works through on a unit-by-unit basis.

HLTA 9. Ensuring evidence-based student goal setting and action for the next unit of study

HLTA 10. Ensuring evidence-based adult goal setting and action for the next unit of study

In *Principles to Actions: Ensuring Mathematical Success for All*, NCTM (2014) presents a modern-day view of professional development for mathematics teachers. It describes teachers as professionals who continually seek to improve their mathematical knowledge of teaching, knowledge of mathematical pedagogy, and knowledge of students as learners of mathematics through ongoing learning and collaboration with colleagues.

More importantly, however, you and your colleagues can intentionally *act* on that ever-enhancing knowledge base and transfer what you learn into daily classroom practice through the ten high-leverage teacher team actions presented in this handbook. For more information on the connection between these two documents, see appendix E, p. 189.

Although given less attention, the difficult work of collective inquiry and action orientation has a more direct impact on student learning than when you work in isolation (Hattie, 2009). Through your team commitment (the engine that drives the PLC at Work culture and processes of collective inquiry and action research), you will find meaning in the collaborative work with your colleagues.

In *Great by Choice*, Jim Collins (2011) asks, "Do we really believe that our actions count for little, that those who create something great are merely lucky, that our circumstances imprison us?" He then answers, "Our research stands firmly against this view. Greatness is not primarily a matter of circumstance; greatness is first and foremost a matter of conscious choice and discipline" (p. 181). We hope this handbook helps you focus your time, energy, choices, and pursuit of a great teaching journey.

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