TIMOTHY D. KANOLD
Series Editor

BEYOND THE COMMON CORE

A HANDBOOK FOR

Mathematics

in a PLC at Work™

LEADER'S GUIDE

Hawker Brownlow
EDUCATION

Timothy D. Kanold
Matthew R. Larson

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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 superintendent, principal, assistant principal, school site administrator, central office mathematics program leader, mathematics instructional coach, grade-level or course-based team leader, or central office administrator and leader is one of the most important and, at the same time, 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 school leaders, leadership teams, and teacher teams 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 leadership serves a significant contribution to the K–12 solution and effort. This handbook describes how, just as each teacher must teach and lead his or her students, there is a parallel expectation that you will teach and lead your faculty. The teacher might be on the front line, but you are the broker of the support, accountability, resources, inspiration, time, and energy necessary for teacher success. They need you.

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 school leader in your local school and district takes you *beyond* your states' 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 a leader of the mathematics teaching faculty and staff in your school or district, serve the critical role of ensuring the essential conditions for success are in place.

Thus, this mathematics teaching and assessing handbook is designed to take you *beyond the product* of standards themselves by providing you with the guidance, support, and leadership tools necessary to help the adults in your system achieve mathematics program greatness within the context of higher levels of demonstrated student learning and performance.

Whether your leadership work occurs in a state that is participating in one of the CCSS assessment consortia or in a state that uses a unique mathematics assessment designed only for your state, it is our hope this handbook provides a continual process that allows your mathematics program to become one of great mathematics teaching and learning.

Your daily leadership work begins by understanding there are thousands of instructional and assessment decisions your teachers and teacher teams (those adults closest to the action) will make every day in every unit. Do those decisions make a significant difference in terms of increased levels of student achievement? Your leadership role 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 the CCSS-type state standards 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 and culture support 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 your state standards reside in the engine that drives the PLC school culture: the teacher team. In your sphere of influence, your primary role is to monitor, provide feedback, and expect team action.

There is a never-ending aspect to your professional leadership journey and your ability to help teacher teams know how to become more transparent in their practice. 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)

Thus, your role as a school leader and teacher is to also "know thy impact" on teacher/adult learning in your school. Your leadership role (Warren Little, 2006) is to create the conditions necessary for adult knowledge capacity building through a professional development experience that includes four main characteristics. The teacher professional development experience should be:

1. Ongoing and sustained rather than episodic
2. Collective rather than individualistic
3. Job-embedded so learning is at point of use
4. Results-oriented with activities linked to improved student achievement

Your work then, as a school leader, is to push hard to create an open and transparent school culture, monitor the effectiveness of teacher team discussions and actions, and focus the teacher teams' work on results. This handbook provides you with the tools to create such a culture. Our experience reveals this work will help you in other areas of curriculum leadership as well.

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 mathematics department and in your school. What exactly will you say?

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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 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?

In our 2012 *Common Core Mathematics in a PLC at Work* series, we explain how understanding *formative assessment* as a research-affirmed *process* for student and adult learning serves as a catalyst for successful CCSS mathematics content implementation. In the 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 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 teacher teams throughout the year as they seek to answer the four critical questions of a PLC.

A mathematics unit should not last longer than three to four weeks, and at most should be analyzed based on content standard clusters—that is, three to five essential standards (or sometimes a cluster of mathematics standards) for the unit. Thus, you should monitor your grade-level or course-based teacher teams for this type of analysis about eight to twelve times per year, and an administrative central office team or district office team might do this type of analysis on a larger cycle, such as every nine weeks.

As indicated, one of your primary leadership jobs will be to know when the unit transition moments are occurring for your grade-level or course-based teams and to provide the essential time teams need to meet to do the work of ending and reflecting on one unit and beginning and preparing for the next unit throughout the school year.

This Mathematics at Work™ handbook consists of three chapters that fit the natural rhythm of your ongoing school year work as a school or district leader. The chapters bring a focus to ten high-leverage team actions that your grade-level or course-based teams take either before, during, or after a unit of instruction as they respond to the four critical questions of a PLC throughout the year. Figure I.1 lists the ten HLTAs 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.

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Before the Unit

In chapter 1, we provide insight into the work of your collaborative teams *before* the unit begins, along with the tools you need in this phase. Your collaborative teams should (as best they can) 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 you and your teams have 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 teams *during* the unit. This chapter emphasizes deeper understanding of content, discussing the Common Core Mathematical Practices and processes and using higher-level-cognitive-demand mathematical tasks effectively. It helps your teams with daily lesson design as ongoing in-class student instruction becomes part of a teacher-led and student-engaged formative process.

This chapter introduces three during-the-unit high-leverage team actions teams work through on a daily 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. Your teachers pass back the assessments scored and with feedback. Then what? What are students to do? What are teacher team members to do?

After the Unit

What is happening in your school or across schools in the district when a unit of mathematics ends for each grade level or mathematics course?

After instruction for a unit is over and teachers have given the common assessment, students should be expected to reflect on the results of their work and take action on the formative feedback from the mathematics unit assessment instrument to advance their learning of the essential standards. Your teacher

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teams need to establish a culture in which students welcome error as an opportunity to learn. You will need to monitor this process to ensure it is happening with all of your grade-level or course-based teams.

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 [teacher collaboration] is not critical reflection, but critical reflection *in light of evidence* about their teaching" (p. 19, emphasis added).

From a practical point of view, the collaborative teams best serve the act of "reflection in light of evidence" by performing an end-of-unit analysis of students' common assessment results. Then through this analysis, you help teams focus their teaching and assessing actions for the next unit of student learning and help revise their instructional plans in advance of teaching the unit next year.

Thus, there are two end-of-unit high-leverage team actions for reflection and action that teams work 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: building the knowledge capacity of every teacher. More importantly, however, you must help your teachers to intentionally *act* on that knowledge and transfer what they learn into daily classroom practice. The ten high-leverage team actions we present in this handbook are one way to do so. For more information on the connection between these two documents, see appendix E (page 143).

Although given less attention, the difficult work of collective inquiry and action orientation and experimentation has a more direct impact on student learning than when you allow teachers to work in isolation. Collective inquiry and action orientation and experimentation may also contribute to a reduction in traditional achievement gaps (Hattie, 2009; Moller, Mickelson, Stearns, Banerjee, & Bottia, 2013). It is through your commitment to guiding your teacher teams through the PLC at Work process that teacher inquiry and experimentation will flourish and teachers will find meaning in their collaborative work with colleagues.

In *Great by Choice*, Jim Collins (Collins & Hansen, 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 to focus your leadership time, energy, choices, and pursuit of a great teaching journey for every teacher.