
Preface

Mathematics is the new literacy. Studies show that achievement in mathematics is strongly linked to career opportunities and personal economic success (National Mathematics Advisory Panel, 2008). To ensure bright futures for all students, mathematics learning, understanding, and achievement must increase. Under pressure to improve mathematics achievement, district leaders, campus leaders, and mathematics teachers are vulnerable to grasping at quick fix ideas that may waste financial resources and time. Unfortunately, there is no magic elixir or silver bullet. Increasing mathematics achievement is a rigorous and challenging goal that will take concerted effort and time, yet it can be reached.

Mathematics coaching shows promise as an effective method of changing teacher practice and improving student achievement. Mathematics coaches are positioned to see and impact the daily teaching practice of classroom teachers. Yet they also are positioned to see the much broader picture of what is happening schoolwide and at the district level. They are able to view the content organization and delivery both horizontally and vertically. They are positioned to be an important component in improving student learning. However, the roles, responsibilities, and duties of mathematics coaches are not always clear to coaches and the teachers who work with them.

If mathematics coaches turn to current research to better understand their roles and to determine a direction for their work, they will be disappointed. The research that is available focuses primarily upon either principals and effective leadership strategies or generalized content coaching recommendations. The guidance and suggestions offered are not specific to mathematics, nor are they presented as part of a developmental process that has been thoughtfully designed.

Confusion about their roles and the lack of a developmental process are key challenges faced by mathematics coaches. These challenges are exacerbated if school leaders have launched a coaching initiative with little

preparation or planning for success through supportive internal structures. Coaches, formerly strong and effective classroom teachers, occupy a unique place in the education system, a place that is sometimes defined by what they are not. Coaches are not classroom teachers, supervisors, coordinators, or administrators. Even more, they may not actually “belong” to any particular school, nor do they “belong” to a central office. In all likelihood, messages about what they are not have already been made vividly clear to coaches in both obvious and subtle ways. What has failed to be communicated is who mathematics coaches *are* and what they can do. Instead, many coaches have been left to their own devices to figure out their job—where to work, who to work with, what to do, and how to actually increase student learning.

Effective coaching requires a range of skills, strategies, techniques, and practices. It is much more than any one method, such as conducting demonstration lessons for classroom teachers to emulate behind closed doors. Coaches tackle the necessary work of removing the walls that isolate teachers and initiating processes of productive collaboration. The good news is that professional, adult contact is valued and appreciated by most teachers. They want and need feedback on their instructional performance if they are to be effective, and they seek to constantly improve. Rather than offering feedback that is primarily evaluative, mathematics coaches offer supportive, nurturing, and practical guidance. Providing this support and information is a job that is tailor-made for coaches. Even so, entering classrooms and working with teachers poses challenges. Coaches may wonder “How can I build trust with my teachers? How do I get them to welcome me into their classrooms? How do I provide meaningful feedback? What is my responsibility in working with reluctant or difficult teachers?”

While countless books on effective leadership have been published in recent years, most of these address leaders in line authority positions, such as principals and superintendents—those with the power to hire or fire, reward or punish, and promote or demote. Other staff members, such as coordinators and supervisors, have lesser decision-making authority. Mathematics coaches hold a unique position as leaders. Their primary responsibility is to work with classroom teachers to increase student learning by implementing decisions made by leaders in line authority positions. Mathematics coaches influence instruction by building trusting relationships, challenging ineffective instructional practices, supporting teachers as they learn new practices, providing meaningful and focused feedback, and implementing manageable, effective improvement processes. As any practicing mathematics coach knows, the role is complex and challenging.

Yet coaches *can* successfully initiate effective mathematics teaching and focus on critical coaching actions that will close the achievement gap and lead to equity. Engaging teachers in the processes of clarifying and aligning the curriculum and planning and teaching effective lessons will help transform mathematics classrooms and ensure equity.

This book was written to offer manageable, practical advice to mathematics content coaches in order to clarify, define, and fulfill their very important role. The primary audiences for this book are mathematics coaches; those who work with or supervise mathematics coaches, such as principals and central office personnel; and those making districtwide or school decisions about mathematics coaching. A developmental, sequential process for engaging in the work of mathematics coaching is presented. The process provides coaches with a leverage point—a place from which to begin the work with teachers and have an immediate impact on student achievement, thereby providing opportunities for more effective coaching contact in the future. The information presented here is intended to help clarify expectations and to increase the likelihood that mathematics coaching will have the desired impact on student learning.

Each chapter builds on the guidance and recommendations of the previous chapter toward a high-quality mathematics program. This process incorporates the National Council of Teachers of Mathematics' principles of equity, curriculum, teaching, learning, and assessment as described in *Principles and Standards for School Mathematics* (2000) as well as the leadership principles advocated by the National Council of Supervisors of Mathematics and published in *The PRIME Leadership Framework: Principles and Indicators for Mathematics Education Leaders* (2008).

The knowledge, skills, and complementing actions that are addressed throughout the chapters of the book are separated into three parts:

I. Preparing the Foundation

Chapter 1: Defining Mathematics Coaching

Chapter 2: Bridging From the Present to the Future

Chapter 3: Building Rapport With Teachers

II. Mathematics Coaching Model

Chapter 4: Focusing on the Curriculum

Chapter 5: Implementing the Curriculum as Designed

Chapter 6: Planning and Coteaching Lessons

Chapter 7: Making Student Thinking Visible

Chapter 8: Analyzing and Reflecting on Lessons

Chapter 9: Charting Long-Term Progress

III. Continuing the Work

Chapter 10: Working Within the Education System

Chapter 11: Sustaining Momentum

CHAPTER DESCRIPTIONS

Chapter 1 defines a *mathematics coach* as an individual who is well versed in mathematics content and pedagogy and who works directly with classroom teachers to improve student learning of mathematics. In order to fulfill this role, mathematics coaches need to possess certain characteristics, including knowledge of adult learning styles and strategies, group dynamics, and social norms. They must understand data acquisition, analysis, interpretation, and application. And they need to know about confidentiality and trust-building.

In Chapter 2, “Bridging From the Present to the Future,” we show coaches how to assess the current state of schools and classrooms on an improvement continuum, and we offer a framework for the development of a high-quality mathematics program.

The content of Chapter 3, “Building Rapport With Teachers,” provides practical advice to help coaches establish and build trust and rapport with classroom teachers. Coaching scenarios demonstrate how coaches can respond effectively in a variety of situations. Examples are drawn from real-life situations that coaches are likely to encounter.

Chapter 4, “Focusing on the Curriculum,” provides a process by which coaches may initiate working with teachers in a nonthreatening way that directly and positively impacts student learning and achievement. Ensuring that all students have the opportunity to learn is an important part of the work of coaches and a critical point in moving toward equity.

In Chapter 5, “Implementing the Curriculum as Designed,” coaches are shown how to gather data about the extent to which teachers are implementing the mathematics curriculum and how to provide feedback to classroom teachers. An aligned curriculum forms a solid foundation and leads to the next step in the process, planning and coteaching lessons.

Chapter 6, “Planning and Coteaching Lessons,” focuses on the implementation of effective classroom instructional strategies to increase

student learning. By helping teachers plan effective lessons, coaches are able both to assess what teachers are currently able to do and to encourage adjustment in lessons, so instruction is more research based and provides for active student participation. As lesson planning with teachers continues, it becomes quite natural for coaches to become coteachers for selected lessons. This joint planning reduces the stress levels and purposely moves coaches into classrooms.

Chapter 7, “Making Student Thinking Visible,” provides strategies for helping teachers move from a traditional, less effective model of mathematics instruction to an alternative method of instruction that incorporates high-effect, research-based instructional strategies and helps teachers better understand student thinking and respond accordingly.

“Analyzing and Reflecting on Lessons,” discussed in Chapter 8, follows from collaborative planning and coteaching. Coaches initiate a lesson analysis process by discussing their part of the lesson, thereby modeling the process of reflecting upon student actions and evidence of student learning.

By this stage of the process, coaches will have established professional working relationships and a high degree of trust and rapport with teachers. This degree of rapport and trust lays the groundwork for “Charting Long-Term Progress,” discussed in Chapter 9. Coaches, in order to stay focused on critical elements of change, draw upon trend data. Teachers are developing a true sense of efficacy and can see a relationship between their actions in the classroom and student learning. Teachers also are better able to consider areas for improvement. This connection and sense of efficacy are vitally important to sustaining change initiatives, and they complete the Mathematics Coaching Model.

In Chapter 10, “Working Within the Education System,” we examine how mathematics coaches build collegial partners and groups for planning, analyzing, and reflecting, actively assisting teachers and leaders in establishing both formal and informal networks.

The book ends with Chapter 11, where coaches are given strategies and encouragement to continue “Sustaining Momentum” for change. This chapter examines processes that support adult change and institutional change. We discuss the reality of fluctuations in change: spurts of improvement followed by brief periods of stagnation or even decline. We encourage coaches to focus on the bigger picture of trend changes rather than daily fluctuations of individual behaviors.

The end of the book is actually a beginning, since the process described is highly recursive. We encourage coaches to repeat the process, cycling through the activities and recommendations, at increasingly higher levels of performance. We challenge coaches to critically analyze where they are

in terms of communication and understanding about their job, to think about the rapport they have established and where more attention is needed, and to use trend data to determine which areas of the mathematics curriculum are still misaligned. Coaches may do the same for planning, teaching, and analyzing. The improvement cycle does not end, but spirals upward.

The recommendations and actions contained within this book reside within the control of mathematics coaches and may, therefore, be immediately implemented. Through their positive, supportive actions, mathematics coaches can bring hope and encouragement to classroom teachers and play a critical role in advancing mathematics achievement for all students.

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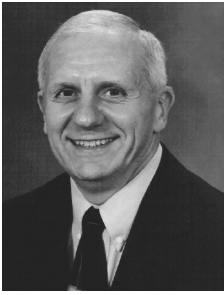
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Ted is a regular presenter at local, state, and national meetings. He has written numerous articles for the newsletter of the National Council of Supervisors of Mathematics (NCSM), including “Understanding the Six Steps of Implementation: Engagement by an Internal or External Facilitator” (2005) and “Leadership Equity: Moving Professional Development Into the Classroom” (2005) as well as “Manager to Instructional Leader” (2007) for the *NCSM Journal of Mathematics Education Leadership*. He published “Teacher Input Into Classroom Visits: Customized Classroom Visit Form” in the *Texas Mathematics Teacher* (2006). Ted was also a contributing author for publications from the Charles A. Dana Center: *Mathematics Standards in the Classroom: Resources for Grades 6–8* (2002) and *Middle School Mathematics Assessments: Proportional Reasoning* (2004). He is an active member of the Texas Association of Supervisors of Mathematics and served on the NCSM board of directors as regional director for Southern 2. Ted lives with his wife, Susan, in Pflugerville, Texas.



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Ruth Harbin Miles coaches rural, suburban, and inner-city school mathematics teachers. Her professional experience includes coordinating the K–12 mathematics teaching and learning program for the Olathe, Kansas, public schools for over 25 years; teaching mathematics methods courses at Virginia's Mary Baldwin College and at Ottawa, Mid America Nazarene, St. Mary's, and Fort Hays state universities in Kansas; and serving as president of the Kansas Association of Teachers of Mathematics. She represented eight midwestern states on the board of directors for NCSM and has been a copresenter for NCSM's leadership professional development national conferences. Ruth is the coauthor of *Walkway to the Future: How to Implement the NCTM Standards* (Jansen Publications, 1996) and is one of the writers for NCSM's *PRIME Leadership Framework* (2008). As co-owner of Happy Mountain Learning, she specializes in developing teachers' content knowledge and strategies for engaging students to meet high standards of achievement in mathematics. Ruth resides with her husband, Samuel, near the Blue Ridge Mountains in Madison, Virginia.

