Preface

This book is for leaders responsible for improving the mathematics achievement of students. The process presented in the following pages will be useful to leaders who want their teachers, grade levels, departments, schools, and districts to successfully build a high-quality mathematics program based upon the five principles identified by the National Council of Teachers of Mathematics (NCTM; 2000): equity, curriculum, teaching, learning, and assessment, as well as the four leadership principles identified by the National Council of Supervisors of Mathematics in the *PRIME Leadership Framework* (NCSM; 2008): equity leadership, teaching and learning leadership, curriculum leadership, and assessment leadership.

To facilitate leaders' actions toward positive change, we present in this book a developmental, sequential process, which is shown in Figure 0.1, Outline of Developmental Stages. While the process unfolds over many months and is long term by nature, we also show mathematics leaders how to effectively focus their time and energy so as to achieve shorter-term goals and objectives. Leaders will find guidance for change initiatives that are small enough to manage, yet large enough to matter. We have incorporated NCTM Principles and NCSM Leadership Principles throughout each stage of the process and offer recommendations that are logical, supported by research, and easy to follow. Suggestions for targeting equity are also provided in discussion of each stage of the model.

The improvement process we describe begins with refining, honing, aligning, and implementing the mathematics curriculum. Curriculum improvement is critical to long-term success and student achievement. In addition, the curriculum is a recognized part of the leader's sphere of influence. Initiating improvement within the mathematics curriculum does not require permission to purchase new programs, to adjust schedules, or to seek outside resources. Mathematics leaders need only to make the decision to begin.

About the Authors

Don S. Balka, a former middle school and high school mathematics teacher, is Professor Emeritus in the Mathematics Department at Saint Mary's College, Notre Dame, Indiana. During his career as an educator, Don has presented over 2,000 workshops on the use of manipulatives with elementary and secondary students at national and regional conferences of the National Council of Teachers of Mathematics, state mathematics conferences, and at inservice trainings for school districts throughout the United States. In addition, he has taught classes in schools throughout the world, including Ireland, Scotland, England, Saudi Arabia, Italy, Greece, Japan, and the Mariana Islands in the South Pacific. Don has written over 20 books on the use of manipulatives for teaching K–12 mathematics, and is a coauthor of the Macmillan K–5 elementary mathematics series *Math Connects.* Don has served as director for the National Council of Teachers of Mathematics, the National Council of Supervisors of Mathematics, and the School Science and Mathematics Association. He lives with his wife, Sharon, in LaPaz, Indiana.

Ted H. Hull completed 32 years of service in public education before retiring and opening Hull Educational Consulting. He served as a mathematics teacher, K–12 mathematics coordinator, middle school principal, director of curriculum and instruction, and a project director for the Charles A. Dana Center at the University of Texas in Austin. While at the University of Texas, (2001 to 2005), he directed the research project "Transforming Schools: Moving From Low-Achieving to High-Performing Learning Communities." As part of the project, Ted worked directly with district leaders, school administrators, and teachers in Arkansas, Oklahoma, Louisiana, and Texas to develop

instructional leadership skills and implement effective mathematics instruction. Ted is a regular presenter at local, state, and national meetings. He has written numerous articles for the NCSM newsletter 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 has been published in the Texas Mathematics Teacher (2006) *Teacher Input Into Classroom Visits: Customized Classroom Visit Form.* 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 Texas Association of Supervisors of Mathematics (TASM) and served on the NCSM Board of Directors as Regional Director for Southern 2. Ted lives with his wife, Susan, in Pflugerville, Texas.

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 Ottawa University, Mid America Nazarene University, St. Mary's University, and Fort Hays State University 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 the National Council of Supervisors of Mathematics (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* (Solution Tree Publishers, 2008). As co-owner of Happy Mountain Learning, she specializes in developing teachers' content knowledge and strategies for engaging students to achieve high standards in mathematics. Ruth resides with her husband Samuel near the Blue Ridge Mountains in Madison, Virginia.

Exploration

The teacher gives each group four paper strips of the same length and asks, "What do you know about the strips?" (They are the same length.) Next, the teacher asks each student to pick up one strip and instructs the group leaders to label their strip as 1:

1

The teacher then asks the student to the right of the leader in each group to fold his or her strip in half and asks, "What would you label each section?" (one half):

$\frac{1}{2}$	$\frac{1}{2}$

Next, the teacher says, "Talk in your group about how you would find fourths." Following the group discussion, the teacher instructs the students to fold the third strip into fourths:

$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$

Finally, the teacher says, "Now fold the last strip into eighths and label each section:"

$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$

Holding up strips labeled with halves and fourths, the teacher discusses the equivalent fractions $\frac{1}{2} = \frac{2}{4}$ and writes them on the board.

$\frac{1}{2}$	$\frac{1}{2}$

$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$

The teacher asks, "Why are the fractions equivalent?" (The strips are the same length.) Next, the teacher issues the lesson challenge: "Your group task is, first, to find and record as many equivalent fractions as you can and, second, to organize your findings in a chart."

(Continued)

> *In response to one of the last two responses the mathematics leader might be tempted to ask, "What can I do to help?" However, this response clearly opens the mathematics leader to taking on tasks outside his or her responsibility and ultimately will undermine teachers' trust. Instead, the mathematics leader should again turn the question back to the principal, saying, "What are you planning to do?" The principal might respond in various ways, but the most likely are "I need to go back and check on her" or "I need to get to her class."*

The mathematics leader now has an opportunity to suggest classroom visits. If the principal is seeking evaluative information on Ms. Jones, then he or she should conduct such a visit. If a classroom visit is intended to check for Ms. Jones' use of particular strategies, then a supportive classroom visit—or series of visits—should be suggested. The mathematics leader can perform these supportive visits.

The mathematics leader in this example should be similarly cautious in conversation with Ms. Jones. It is not the leader's role to notify Ms. Jones of the principal's concerns. Confidentiality and discretion go both ways. If the leader were to convey the principal's concerns, it would undermine the principal's trust in the leader.

One effective communication strategy that builds trust in both teachers and principals is for the mathematics leader to suggest that the principal join the leader in taking an "implementation walk." Implementation walks, like the classroom visits discussed in Chapter 4, focus on strategies or programs being used in classrooms. After visiting several classrooms, mathematics leaders and principals share and discuss observed actions in relation to desired actions.

Implementation walks are excellent opportunities to remind principals about the mathematics curriculum and the improvement program being implemented. They also can serve to differentiate between evaluative and supportive data. One suggestion is to ask principals to focus on actions that students are taking, rather than on teachers' actions. This tends to help change an evaluative mindset. If a classroom visit form has been developed, mathematics leaders and principals can both complete the form and discuss their observations, which also can be shared with teachers.

Mathematics leaders who become frustrated with a seemingly slow process of change may be tempted to wish that they had evaluative power because then they could "get things moving—or else!" Of course, in reality this would be counterproductive for a couple of reasons. First, teachers need a source of supportive data so they can take risks without having to worry about a negative performance evaluation. If teachers dare not risk trying something new or different, then no changes can possibly take place. During change initiatives, teachers need someone who is by their side, not looking over their shoulder.