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Understanding and Clarifying Leadership in Mathematics

Today, equity is a top priority for leaders. Indeed, it is listed first in both *the Principles of the National Council of Teachers of Mathematics* (NCTM) and the *PRIME Leadership Framework* of the National Council of Supervisors of Mathematics (NCSM). This prominent location is no accident. Equity is vitally important for leaders in mathematics education, and so it deserves special attention.

Principles and Standards for School Mathematics includes this statement: “Equity requires high expectations and worthwhile opportunities for all” (NCTM, 2000, p. 12). Equity in mathematics achievement, and in all related areas, is critical to the well-being of our nation. To emphasize this need, during 2007 both the NCTM and the NCSM included equity as a strategic priority or as part of a vision statement. Still, the myriad of definitions of equity from various education-related organizations can leave a reader wondering what *equity* really means within education contexts. NCTM has led the way in attempting to answer the question. In 2008, NCTM issued a position statement titled *Equity in Mathematics Education*, which reads in part as follows:

Excellence in mathematics education rests on equity—high expectations, respect, understanding, and strong support for all students. Policies, practices, attitudes, and beliefs related to mathematics teaching and learning must be assessed continually to ensure that

all students have equal access to the resources with the greatest potential to promote learning. A culture of equity maximizes the learning potential of all students.

The statement notes that joint efforts by educators, students, families, and policymakers are necessary to develop a culture of equity. Such a culture includes, for example, the following characteristics:

- Respecting and valuing each member's contribution
- Acknowledging and embracing experiences, beliefs, and ways of knowing mathematics
- Allocating necessary resources for optimal learning and personal growth
- Expanding the potential for learning through high expectations and culturally relevant practices
- Engaging all students in challenging, rigorous, and meaningful mathematical experiences (NCTM, 2009)

Equity has many important facets, as noted in the above definition, but we have chosen in this book to focus specifically on mathematics leaders' actions that most directly affect student learning and have the greatest chance of closing the achievement gap. This focus is supported by NCSM and detailed in *PRIME Leadership Framework: Principles and Indicators for Mathematics Leaders* (NCSM, 2008). This document stresses that every teacher is responsible for addressing the achievement gap, providing students with meaningful mathematics experiences, and working to erase inequities in student learning.

Every education community has many stakeholders: teachers, students, administrators, parents, and policymakers. Equity is an integral element across the spectrum of the community. Our focus is on the first three stakeholders—teachers, students, and administrators. This focus is not intended to diminish the importance of other stakeholders but to concentrate intentionally on the primary duties and responsibilities of mathematics leaders.

For mathematics leaders, closing the achievement gap must become the highest priority. For decades, the core of our school system has remained fundamentally unchanged. In spite of increased knowledge of inclusive instruction techniques and examples of success, dominant instructional strategies in U.S. schools have remained largely unaltered, thus perpetuating, rather than narrowing, the achievement gap in student performance. In particular, students living in poverty and students of color find it difficult, if not impossible, to succeed in our status quo, noninclusive education system (Achieve, 2006).

Students who do not succeed in mathematics often find that their career opportunities are limited. Advancement, promotion, and pay increases are all linked to one's education (National Mathematics Advisory Panel, 2008). Breaking the cycle of failure in mathematics requires leadership that actively encourages low-income students and students of color to tackle higher-level courses in mathematics—and gives them the tools to succeed with challenging curricula. Such leadership must actively promote a school culture of success, respect, and inclusiveness, along with a healthy appreciation for diversity.

Despite convincing evidence that all students *can* be successful, blaming students for failing rather than seeking ways to help them succeed has been an easy “out” for too many in our education system. Attempts to channel struggling students into so-called remedial programs, though well intentioned, have produced only dismal results. We must—because the future of our nation depends on it—redouble our efforts and reverse the trend of undereducating large numbers of students. A report from the National Research Council (1999) put it this way:

Many students perform at high levels, but the nation's continued vitality as a democracy and its productivity in a global economy will hinge in the coming decades on the knowledge and skills of the majority—the tens of millions of children who are not realizing their full capacities and are therefore unable to meet the intellectual demands of modern life and work. (p. 7)

Equity can be achieved only if leaders actually lead a process of change. Several developmental stages should help leaders stay focused on equity, including clarifying and articulating the mathematics curriculum, monitoring implementation and curricular rigor, ensuring that every student is learning necessary mathematics, bringing people together into collaborative teams, and redefining professional development. These are among the ideas we will explore throughout this book.

WHAT IS LEADERSHIP AND WHO IS A LEADER?

Readers undoubtedly will realize that definitions of leadership abound. More than 50 can be found simply by doing a quick Internet search, and many are vague or contradictory. For us, writing about leadership, it is important to convey our guiding sense that it is not about a person or a group of people. Rather, leadership is a process.

For the process to be effective, those who direct or facilitate it—the leaders—must act in ways that engender a positive dynamic between

them and those with whom they work. Following are two working definitions that we intend to flesh out over the course of this book:

- *Leadership* is the process of influencing work toward a common goal.
- A *leader* is a person who influences individuals or a group to do such work.

These are generic definitions, but they set a foundation. A common goal for mathematics education, and the job most mathematics leaders are hired to do, is to increase student achievement. Implicitly, the goal includes achieving equity by closing the achievement gap. For a leader in mathematics education, reaching this goal requires accomplishing many subgoals. Consequently, leadership must be viewed as a continuous process by which the achievement of one goal leads to taking on a new goal. Leaders are therefore required to be motivators to keep the process going. Leaders empower followers, making them a part of this dynamic process. Each chapter in this book describes a developmental stage or, in some sense, a subgoal of the leadership process.

Throughout this book, we also distinguish between a manager and a leader, in particular an instructional leader. Many people become managers in a variety of educational settings. Their role often is not focused on improving student learning but, in simple terms, on documenting compliance with rules and procedures. This function is necessary, but it is not the focus of this book. *Management* and *leadership* are not interchangeable. Management is a process that keeps organizations, school districts, and schools running smoothly, that keeps things in order and deals with problems that arise within the system. In other words, management maintains the status quo. It does not act as a change agent.

We will assume that successful leaders also practice effective management, as it would be a mistake to disregard this important function. However, we make the distinction between manager and leader to assist educators in seeking and maintaining balance. If only management tasks are completed, needed change does not occur. On the other hand, if excessive change—leaders continually shifting directions—is attempted, then success still will remain elusive. Every mathematics educator has responsibilities in management *and* leadership. To ignore this very important fact would be harmful to the teaching and learning process.

BUILDING A CULTURE OF SUCCESS

Mathematics leaders must guarantee that staff and students are highly valued as individuals and that a culture of success is fostered throughout

leaders' areas of influence in a school or district. A culture of success requires an atmosphere of progress and growth. Students and staff members should sense that they are appreciated and valued as vital members of a learning team. Mathematics leaders should be encouragers and supporters, able to answer the following questions in the affirmative:

- Do students and staff members trust each other?
- Does the school promote social equality?
- Is the atmosphere informative and comfortable?
- Are staff members and students treated equitably?
- Is the school climate positive, and are students and teachers recognized for their contributions?

Effective, lasting academic and social changes are built on caring relationships and supportive school environments. In directing the ongoing activities of a school or district, mathematics leaders should maintain this focus. They will find that by supporting positive, cooperative participation in working toward agreed-on goals, one developmental stage at a time, success can be achieved.

Mathematics leaders must be visionaries. They must constantly ponder and facilitate change. However, leaders also need to self-evaluate. Where are they in their own professional development? Where is their district, school, or mathematics department in the broad professional development landscape? Does the curriculum need to be updated to align with state standards? Successfully answering these questions can help lead to the desired culture of success.

NCTM PRINCIPLES AND NCSM LEADERSHIP PRINCIPLES

Mathematics leaders will quickly realize that the principles articulated by the NCTM and the NCSM are highly interrelated. In the chapters that follow, we have not attempted a one-to-one correspondence with either set of principles. Rather, we have tried generally to interweave the principles from NCTM and NCSM throughout the developmental stages.

A brief overview of the two sets of principles, however, may be helpful to lay some groundwork for the material that follows. NCTM's *Principles and Standards for School Mathematics* (2000) sets forth a vision that includes the following:

- Access to high-quality, engaging mathematics instruction
- Ambitious expectations for all

- Knowledgeable teachers with adequate resources and professional development
- Rich mathematics curricula
- Technology as an essential component

NCSM's *PRIME Leadership Framework* (2008) presents a vision focused on leaders and their role in meeting the vision of the NCTM *Principles*:

- Leading the pursuit of a better mathematics future for every child
- Assuming and exercising professional responsibility and accountability for their own practice
- Assuming and exercising professional responsibility and accountability of the teachers they lead

NCTM addresses matters of mathematics curricula in the *Principles* and a companion document, *NCTM Curriculum Focal Points* (2006). These matters include attention to equity, teaching, learning, assessment, and technology. Following are ways in which these topics are viewed:

Equity: High expectations and strong support for all students

Curriculum: Coherent, focused, and well-articulated curriculum

Teaching: Understanding, challenging, and supporting student learning

Learning: Student learning with understanding, actively building new knowledge

Assessment: Useful information to both teachers and students from assessment data

Technology: Use of technology that enhances student learning

The *PRIME* leadership framework from NCSM includes similar emphases:

- Ensure high expectations and access to meaningful mathematics learning for every student.
- Ensure high expectations and access to meaningful mathematics instruction every day.
- Ensure relevant and meaningful mathematics in every lesson.
- Ensure timely, accurate monitoring of student learning and adjustment of teaching instruction for improved student learning.

The following paragraphs illustrate the relationship between the NCTM *Principles* and included factors, and the NCSM *Leadership Indicators*.

To begin, the NCTM *Principles* advocate *high expectations* and *strong support* for all students. These correspond with the NCSM Equity Leadership Indicators:

Equity Leadership Indicator 1: Every teacher addresses gaps in mathematics achievement expectations for all student populations.

Equity Leadership Indicator 2: Every teacher provides each student access to relevant and meaningful mathematics experiences.

Equity Leadership Indicator 3: Every teacher works interdependently in a collaborative learning community to erase inequities in student learning. (p. 9)

In terms of curriculum, three factors from the NCTM *Principles* stand out—coherence, focus, and articulation. These factors correspond with the NCSM Curriculum Leadership Indicators:

Curriculum Leadership Indicator 1: Every teacher implements the local curriculum and uses instructional resources that are coherent and reflect state standards and national curriculum recommendations.

Curriculum Leadership Indicator 2: Every teacher implements a curriculum that is focused on relevant and meaningful mathematics.

Curriculum Leadership Indicator 3: Every teacher implements the intended curriculum with needed intervention and makes certain it is attained by every student. (p. 59)

NCTM separates the Teaching Principle and the Learning Principle, whereas NCSM has combined them. The correspondence between four key factors noted in the NCTM Teaching Principle and the NCSM Teaching and Learning Leadership Indicators is shown below:

1. Effective mathematics teaching requires *understanding what students know*.

Teaching and Learning Leadership Indicator 3: Every teacher participates in continuous and meaningful mathematics professional development and learning in order to improve his or her practice. (p. 21)

2. Effective mathematics teaching requires *understanding what students need to learn*.

Teaching and Learning Leadership Indicator 1: Every teacher pursues the successful learning of mathematics for every student. (p. 21)

3. Effective mathematics teaching requires *challenging* students to learn mathematics well.

Teaching and Learning Leadership Indicator 2: Every teacher implements research-informed best practices and uses effective instructional planning and teaching strategies. (p. 21)

4. Effective mathematics teaching requires *supporting* students to learn mathematics well.

Teaching and Learning Leadership Indicator 1: Every teacher pursues the successful learning of mathematics for every student. (p. 21)

The correspondence between two factors found in the NCTM Learning Principle and the NCSM Teaching and Learning Leadership Indicators is as follows:

1. Students must learn mathematics with understanding.

Teaching and Learning Leadership Indicator 2: Every teacher implements research-informed best practices and uses effective instructional planning and teaching strategies. (p. 21)

2. Students must *actively build* new knowledge from experience and prior knowledge.

Teaching and Learning Leadership Indicator 2: Every teacher implements research-informed best practices and uses effective instructional planning and teaching strategies. (p. 21)

The NCTM Assessment Principle provides three key factors. The correspondence between these factors and NCSM Assessment Leadership Indicators is shown below:

1. Assessment should *support* the learning of important mathematics.

Assessment Leadership Indicator 1: Every teacher uses student assessments that are congruent and aligned by grade level or course content. (p. 45)

2. Assessment should furnish useful information to teachers.

Assessment Leadership Indicator 2: Every teacher uses formative assessment processes to inform teacher practice and student learning. (p. 45)

Assessment Leadership Indicator 3: Every teacher uses summative assessment data to evaluate mathematics grade-level, course, and program effectiveness. (p. 45)

3. Assessment should furnish useful information to students.

Assessment Leadership Indicator 2: Every teacher uses formative assessment processes to inform teacher practice and student learning. (p. 45)

For a visual comparison of the leadership model of this book and the NCTM and NCSM indicators, see Figures 1.1 and 1.2.

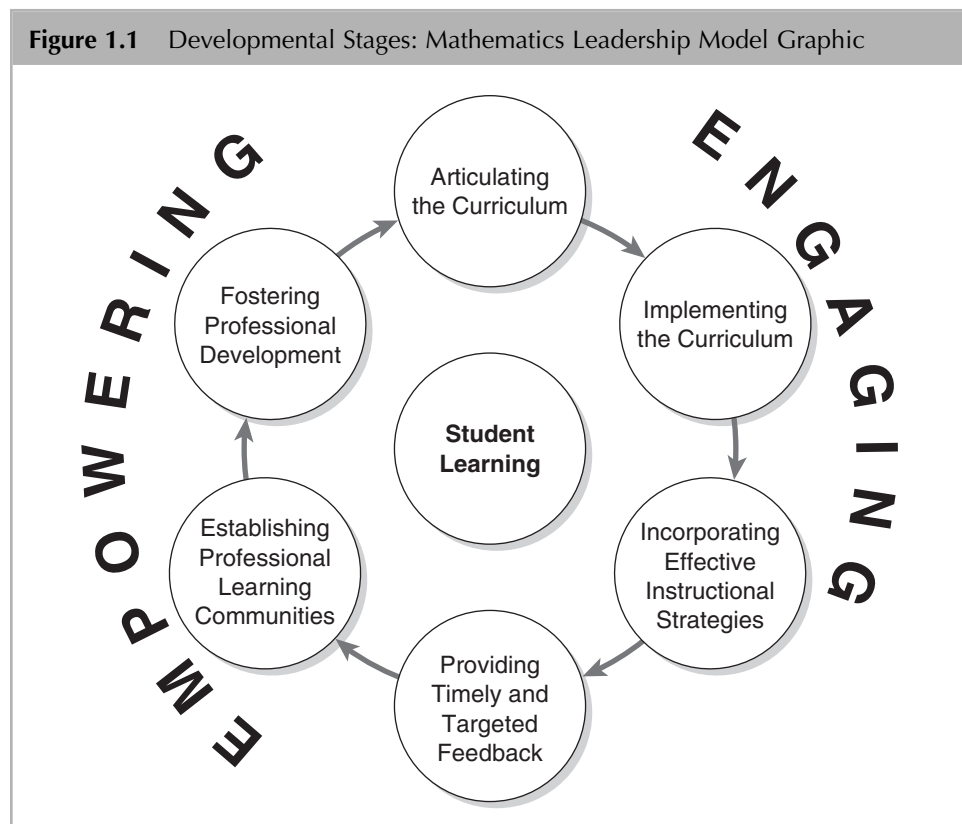


Figure 1.2 Aligning the Stages With the Principles

Stages	NCTM/NCSM Principles
• Articulating the Curriculum	} Curriculum Principle Curriculum Leadership Principle
• Implementing the Curriculum	
• Incorporating Effective Instructional Strategies	} Learning Principle Teaching and Learning Leadership Principle
• Providing Timely and Targeted Feedback	
• Establishing PLCs and Fostering Professional Development	} Pull together elements of each Principle and Leadership Principle for curriculum, teaching, learning, and assessment

The Equity Principle and the Equity Leadership Principle are addressed throughout the stages.

In summary, the first principle and a primary goal is equity, which is approached by ensuring a strong, well-aligned, and successfully implemented mathematics curriculum that provides students opportunities to learn rich, relevant, meaningful mathematics. Implementation of such a curriculum with fidelity requires engaged and empowered teachers who clearly understand mathematics content and possess a wide variety of instructional techniques with which to engage and motivate students.

These same teachers and leaders use data to inform practices—data that help teachers and leaders recognize individual strengths and areas that need attention as well as program strengths and weaknesses. Data analysis and lesson preparation take place in communities of learners who can share ideas and knowledge in a reflective process.

While NCTM and NCSM provide excellent insight into what should be achieved in effective mathematics programs and the goals and actions needed, they do not provide a process for leaders to follow in reaching these goals and performing these actions. This book provides leaders with a plan of action that is reasonable, logical, research based, sequential, and developmental.