



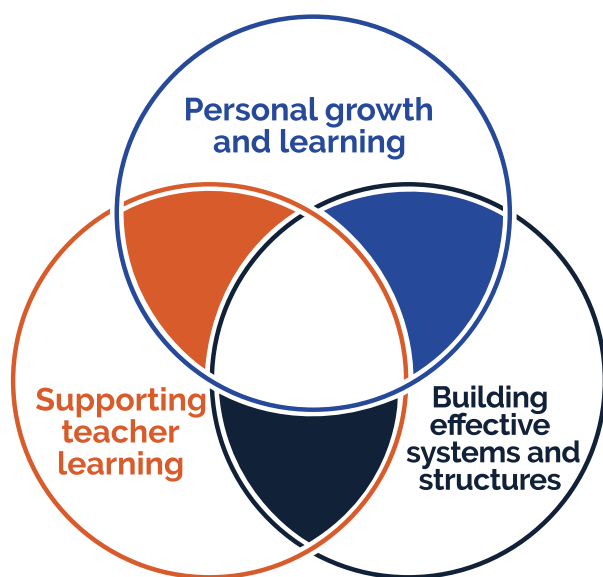
Brief 8:

The Role of Leadership

Supporting Evidence-Based P–12 Mathematics Teaching Practice

Produced for the New York State Education Department
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Leadership Focus: Equitable and Impactful Mathematics Teaching



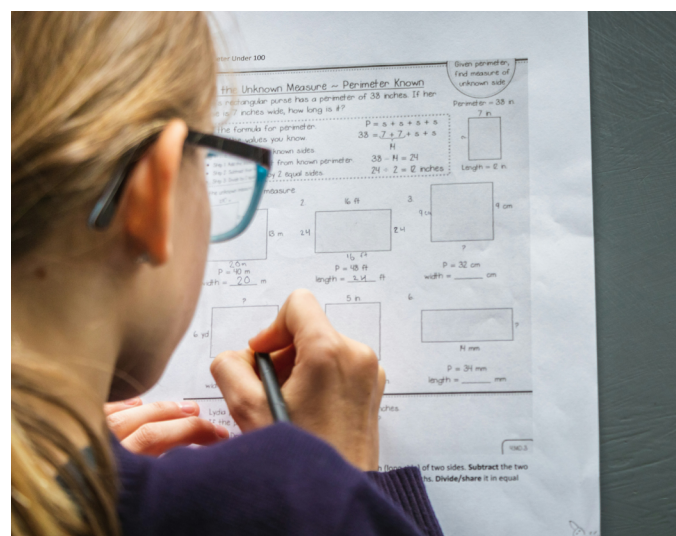
Ensuring that all students have opportunities to thrive mathematically, develop strong identities as mathematics learners, and engage in meaningful collective mathematics learning in tandem with building skill and fluency requires leaders who understand, support, and make space for the continued development of evidence-based mathematics teaching. Teachers must have opportunities for content-specific collaborative learning that provide models of effective mathematics teaching practice paired with coaching and feedback to support their growth (Darling-Hammond et al., 2017; Hill & Papay, 2022). Leaders cannot provide this support alone, but there is work that every leader can do to support equitable and impactful mathematics teaching. The diagram above shows the focal areas for leaders in mathematics teaching and learning.

Leadership Area 1: Personal Growth and Learning

Ensuring equitable and impactful mathematics teaching in our schools requires that leaders at all levels have a vision of evidence-based mathematics instruction and that they understand the tensions inherent in mathematics teaching and learning in schools. Below are three key areas of personal growth and learning for leaders.

Understand effective mathematics teaching and learning

The body of research on equitable and impactful mathematics teaching practice is extensive. Leaders need to be familiar with what is known about such teaching and not just use the common labels. They also need to learn about the differences in effective mathematics teaching across grade levels and develop a clear vision of what effective mathematics teaching looks like at each grade band.



Learn More about the Evidence

Check out other briefs in this series:

- Brief #1: The Research Base for Mathematics Teaching and Learning
- Brief #2: Debunking Myths about Mathematics Teaching and Learning

Look at citations. Read the research that supports particular recommendations. Is it from the field of education or is it from other fields? What claims are made? What groups of students are involved in the studies, and in what sorts of settings? It will often turn out that valid knowledge about what we know about mathematics teaching and learning is much more complex and nuanced. Other resources to investigate include the *Equity in K-12 STEM Education: Framing Decisions for the Future* report by the National Academies of Sciences, Engineering, and Medicine, the Institute of Education Sciences *What Works Clearinghouse Practice Guides*, and the National Mathematics Advisory Panel *Foundations for Success* report.

Understand tensions

Mathematics teachers and leaders must manage several tensions in their work to support student learning. Much of the time, these points of tension between what often feel like competing goals are important but serve different and complementary purposes. Leaders must build their own awareness of: (1) the purposes that each goal serves; (2) why these goals may feel in competition with each other to teachers; and (3) how their messaging to teachers can either heighten or ease the tension. Such tensions include:

- Increasing students' mathematical fluency and automaticity vs. building understanding through problem-based instruction (Hiebert & Grouws, 2007).
- Utilizing explicit instruction vs. centering student thinking and reasoning (National Mathematics Advisory Panel, 2008).
- Increasing test scores vs. developing positive mathematical identities (Yang et al., 2024).
- Ensuring fidelity to the curriculum and pacing guide vs. adjusting pacing and materials to meet the needs of students.

Investigate how communication style and messaging impact teachers' work and support connections

One challenge of leadership is communicating clearly and sensitively, anticipating how the message will be heard and received by teachers. When communicating with teachers about mathematics teaching, leaders must ensure that their message is strong while at the same time acknowledging the nuance and tension involved in teaching. Ensuring that mathematics experts in the building or district are involved in key conversations and messaging can help to ensure that the leader is communicating as intended.

Questions to Consider when Crafting a Message

- Are you communicating about a change in teaching practice in your system? If so, what do you need to do to ensure readiness for the change? If not, how can you communicate that this is not a change, but reinforcing strong practice already taking place?
- In what ways might the message be heard and interpreted by others?
- Is this message part of a leadership-led shift or is it the result of a grassroots teacher effort (different change models require different ways of communicating)?
- Are you acknowledging and addressing the issues at tension with the core of the message and providing assurance that these tensions were considered?
- Are you lifting up expertise in your system, acknowledging the strengths that others in the system bring to the work?

Leadership Area 2: Supporting Teacher Learning

Mathematics teaching that continually provides opportunities for students to thrive mathematically, develop identities as mathematics learners, and engage in meaningful collective mathematics learning in tandem with building skill and fluency requires that teachers have opportunities to learn, reflect, and grow. But schools and systems are not only responsible for mathematics teaching; leaders must balance content-specific teacher learning needs with systems' needs.



Ensure subject-specific learning opportunities for teachers and leaders

Although teaching practices that enable student learning may be the same across disciplines (see Brief #4), enacting those practices in mathematics requires integration of mathematical knowledge for teaching (see Brief #3), an understanding and utilization of the research base for mathematics teaching and learning (see Brief #1), and a shared vision of equitable mathematics teaching. This means that teachers (and leaders) require regular mathematics-specific opportunities to continue to learn about and improve their teaching. Professional learning research (Darling-Hammond et al., 2017; Hill & Papay, 2022) shows that these opportunities should:

- Be content-specific and teaching-practice focused.
- Model and provide examples of effective mathematics teaching practice.
- Allow for teacher collaboration.
- Involve reflection, coaching, and/or feedback.

Ensure curriculum-specific learning opportunities for teachers and leaders

Mathematics teachers and leaders need regular professional learning to support their use and adaptation of curriculum materials (see Brief #7). Too often this professional learning is a brief orientation to the resources available in the curriculum. Although this is necessary, regular professional learning that supports teachers and leaders in examining unit and lesson structures and connections, trajectories of topics and representations across grades, and embedded supports for learners are needed. These may take the form of start-of-unit professional learning sessions, allowing teachers and administrators to focus on the content and materials to be used immediately.

Opportunities to work with colleagues to examine and adjust lessons that focus on high-leverage content (see Brief #3) can help ensure that these crucial mathematical ideas are taught well. Teachers and leaders may meet regularly to try out, unpack, and adjust lessons, ensuring that all teachers understand the structure, purpose, and mathematical goals of essential lessons.

Provide space and structures for practice-focused reflection and feedback

Research on professional learning, coaching, and improvement science all name reflection and focused feedback as key levers for growth. When our goal is to improve mathematics teaching practice, the focus of reflection and feedback should be squarely on teaching practice and its relationship with student learning. However, reflection and feedback do not typically occur spontaneously.



Ways to Create Space for Reflection and Feedback

- Build regular opportunities for reflection and feedback into existing structures like department meetings or staff meetings.
- Encourage mathematics teachers to observe one another's teaching and provide tools and protocols for productive conversations about the observation.
- Provide and use tools that specify agreed-upon work that teachers do when carrying out a specific mathematics teaching practice for both feedback and reflection.
- Develop a shared vision of effective mathematics teaching practice together with mathematics teachers and leaders.
- Consider the balance between facilitative (coach asks questions to prompt teaching thinking), directive (coach provides expertise and does most of the thinking), and dialogical coaching (coach shares expertise as needed and engages in thinking side-by-side with the teacher) (Knight, 2021) and which approach best suits the teachers you support.



Support connections between other frameworks and initiatives

For many teachers, the numerous frameworks and initiatives championed by leaders can feel disjointed, disconnected, and unrelated to their daily work of teaching mathematics. For instance, a system-level initiative focused on developing disciplinary literacy may leave mathematics teachers asking “what does this have to do with me?” if connections are not made between disciplinary literacy, equitable mathematics teaching, and the daily work that mathematics teachers do.

Leaders should:

- Be clear themselves about the connections, overlaps, and distinctions between system frameworks and initiatives. These frameworks include the [Educator Effectiveness Framework](#), the [Culturally Responsive-Sustaining Education Framework](#), the [Social Emotional Learning Benchmarks](#), and the [New York State Next Generation Mathematics Learning Standards](#), all of which are outlined below.
- Provide reflective prompts and processing time for teachers to make sense of the connections, overlaps, and distinctions between frameworks and initiatives and a shared vision of equitable mathematics teaching.

Framework	Description	Connection with equitable mathematics teaching
Educator Effectiveness Framework	To ensure equitable access to effective educators, this framework creates coherent systems of development and support that place instructional practices tied to student learning at their center.	The framework identifies the components of a district system that are reflective of broad root causes that can serve as barriers to equitable access to high-quality mathematics teaching.
Culturally Responsive-Sustaining Education Framework	The framework names principles for teachers in developing a student-centered learning environment that values and utilizes students' many identities as: (1) creating a welcoming and affirming environment; (2) fostering high expectations and rigorous instruction; (3) identifying inclusive curriculum and assessment; and (4) engaging in ongoing professional learning and support.	Equitable mathematics teaching addresses these principles through: • Ensuring environments that build positive mathematical identities; • Utilizing high-leverage teaching practices that engage students in rigorous mathematical work; • Modifying curriculum materials to be inclusive of learners; and • Encouraging continued teacher learning specific to mathematics.
NY Social Emotional Learning Benchmarks	These benchmarks outline social emotional learning indicators and grade-band teaching opportunities aligned to these indicators to help support students to become empowered learners.	The benchmarks and supporting activities are directly tied to equitable mathematics teaching by supporting identity development, reinforcing interpersonal skills required for collaboratively engaging in mathematics, and creating safe and supportive learning environments necessary for sharing thinking.
New York State Next Generation Mathematics Learning Standards	These standards represent the mathematical knowledge, skills, and understanding that students need to function in a world dependent upon the application of mathematics. They reflect a balance of conceptual understanding, procedural fluency, and application, and represent a significant level of achievement in mathematics that will enable students to successfully transition to post-secondary education and the workforce.	The NGMLS are directly tied to equitable mathematics teaching as they emphasize the core strands of content that students should learn and the ways in which students engage with mathematics across the grades. These are closely linked with the mathematical knowledge for teaching required for effective teaching, and the high-leverage teaching practices closely tied to student learning.



Leadership Area 3: Building Effective Systems and Structures

Build systems and schedules that support teacher learning

Leaders make space for teacher learning by building systems and structures that routinely allow for learning, feedback, and growth. Leaders do this by:

- Building regular opportunities for reflection and feedback into the school calendar. Regularity translates into routines, making reflection and feedback a part of the way teachers work. This may be weekly collaborative planning time, monthly problem-solving communities, or quarterly professional learning sessions, among other possibilities. It could also take the form of regularly scheduled learning walks, a means to make teaching practice public.
- Schedule opportunities for mathematics teachers to observe one another's teaching and provide tools and protocols for productive discussion and feedback. This may include supporting teacher observations during prep time, providing release time for teachers to observe one another teaching the same lesson, or providing equipment to record their class to share with each other.
- Develop systems and supports for experienced mathematics teachers to take on mathematics leadership roles, such as peer observation with feedback, formal mentoring roles, professional development leaders, etc.
- Advocate for restructuring the professional work of teaching so that built into the schedule are regular opportunities for the work necessary for effective instruction. In some schools and districts, this might look like a block of time (e.g., half a day) set aside each week for teachers to examine and look for patterns in student work, study data on student learning (Horn & Kane, 2015), design instruction to respond to evidence of student learning, communicate with families, search for and develop materials and resources, engage with colleagues about specific aspects of student learning and instruction, and participate in professional learning. In others, it may look like regularly scheduled professional development days to do this work. Regardless of structure, this will require funding and supplying high-quality supplementary programs for students.

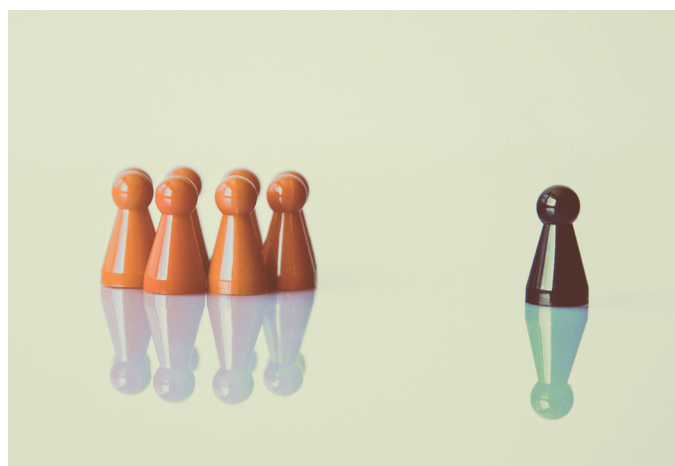
Assessment

Assessment frameworks are abundant (see Brief #5). In fact, the [NYSED's Literacy Initiative](#) outlines [key action steps for leaders](#) around literacy assessment that apply to mathematics assessment, including implementing assessment systems for identifying student progress and needs as well as building systems for effective assessment-instruction links to support educators and serve all learners. Mathematics assessment systems for identifying student progress and needs should make use of screening tools and curriculum-based measures (as called for in response-to-intervention guidance). The National Center on Intensive Intervention includes a review of common screening and progress monitoring tools.

In addition to these action steps that support considering how to use data to impact learning, leaders must understand what mathematics assessments are available (and are being used), know how data from these assessments should impact decisions, and support teachers to engage in collaborative data analysis.

Make use of building resources

Building leaders are not solely responsible for supporting mathematics teaching and learning. Leaders should empower others in their buildings to make use of their expertise to support mathematics teaching. This might involve leveraging experts to provide feedback on teaching, to support the development and implementation of professional learning, or to contribute to collaborative efforts such as curriculum selection and development.





Key Take-Aways

1. Messaging matters! Know what strong mathematics instruction looks like and the research that backs it up and ensure that you are communicating these ideas to teachers with nuance.
2. Mathematics teachers need mathematics-specific teacher learning opportunities. These should be focused on the intersection of mathematics content and teaching practice, allow for modeling of teaching practice, and provide opportunities for collaboration and feedback.
3. Developing and sustaining effective mathematics teaching practice takes time and space. Leaders can use creative scheduling and others with expertise to support this work.



Reflect & Analyze:

1. What messages are you sending your mathematics teachers about instruction? What might teachers be taking away from those messages? How might you improve your messaging and/or understanding of mathematics instruction?
2. Are the professional learning opportunities and supports that you have in place meeting the needs of your teachers? How might you learn more about how teachers are experiencing these supports? What shifts might you make?

Key References

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