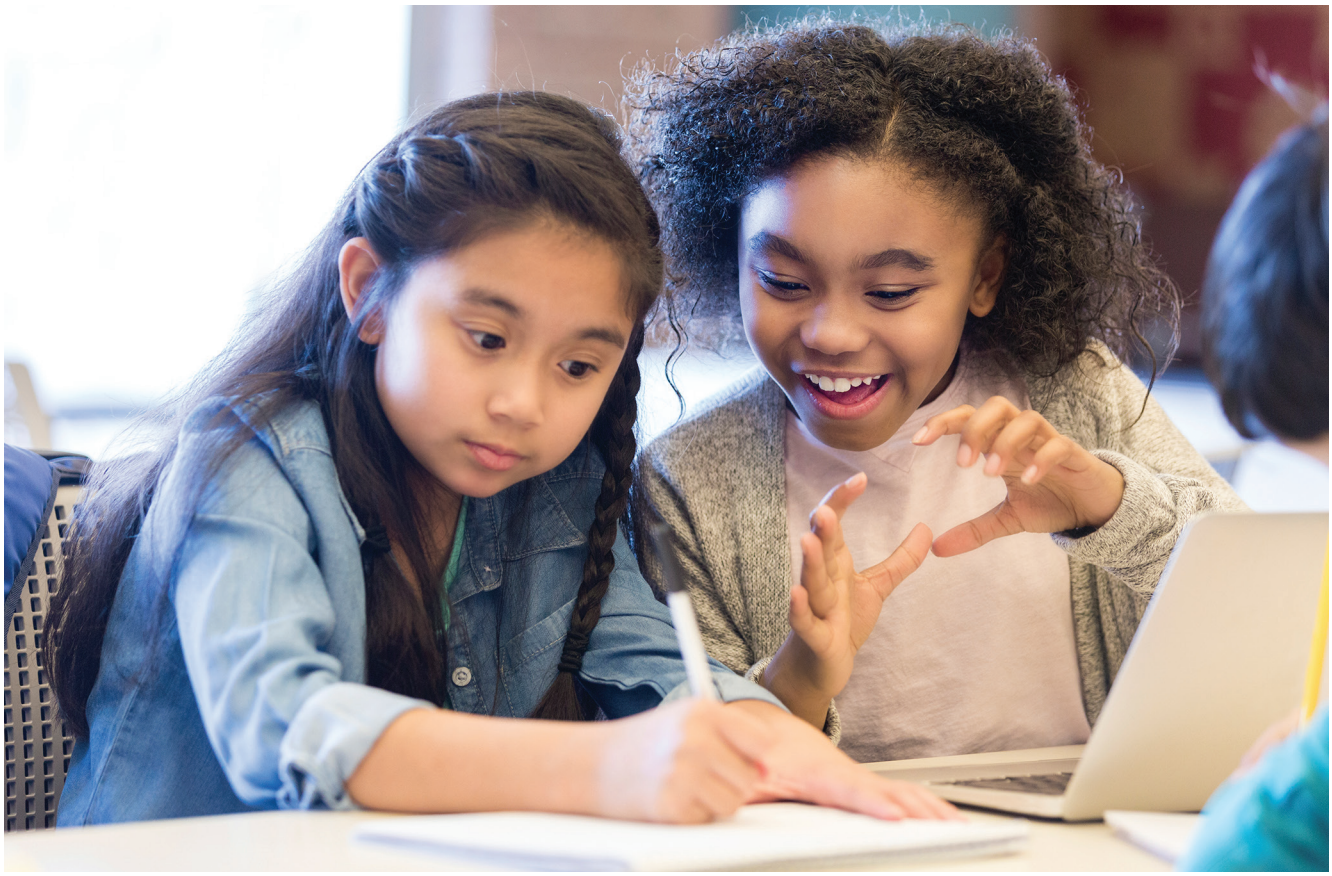

STEPS TO SELF-RELIANCE

COACHING PROCESS STRENGTHENS MATH STUDENTS' CONFIDENCE

BY SUE CHAPMAN AND MARY MITCHELL

All teachers of mathematics want to know that our teaching is causing students to develop deep and lasting understanding of math concepts, fluency with mathematical procedures, competence in solving problems, and a positive relationship with mathematics.

Unfortunately, the relationship between teaching and learning is not always clear. The dynamics of a classroom are complex, making it difficult to know which teaching moves lead to specific student outcomes. When we try to link our teaching to students' learning, we may feel we are looking into a black box, a space containing countless elements that may or may not positively affect student achievement (Black & Wiliam, 2010).

Through deliberate reflection, however, we can examine the influence of specific teaching practices on student learning outcomes (Huinker & Bill, 2017), and it is essential that we do so to address issues of equity and access.

According to the National Council of Teachers of Mathematics landmark publication *Principles to Actions: Ensuring Mathematical Success for All,* "The question is not whether all students can succeed in mathematics but whether the adults organizing mathematics learning opportunities can alter traditional beliefs and practices to

promote success for all" (2014, p. 61).

Focused reflection is teacher-directed professional learning that uses ongoing formative assessment aligned with research-based instructional practices and standards. It allows teachers to operate as researchers and hold ourselves accountable for what we are teaching and what students are learning. The table at right outlines the focused reflection theory of change (Killion, 2008), which includes four stages of planning and reflection, each guided by a set of core questions for reflection and discussion.

The work of focused reflection is complex and best suited for collaborative settings, such as in partnership with an instructional coach or in a professional learning community.

To illustrate how these steps play out, this article tells the story of Lindsey, a composite of teachers we have worked with over the years, and the process she goes through, which is representative of the process we strive for when coaching teachers.

FOCUSED REFLECTION:
A LAB APPROACH TO IMPROVING STUDENT LEARNING

Teaching	**PLAN FORWARD**	• What can students do now? • What do we want to see them do more?	Learning
	LEARN TOGETHER	• What are we going to try? • What is our data collection process? • What measurable goal are we shooting for?	
	APPLY AND MEASURE	• What happened? • How do we know?	
	REFLECT	• What did we learn? • What are our next steps?	

FOCUSED REFLECTION IN ACTION

With the help of her math coach, Lindsey worked hard to build a culture of respectful discourse in her 5th-grade math classroom and help students see themselves as mathematicians, regardless of background, special needs, or interests. However, Lindsey and her coach noticed that, when students worked in collaborative small groups, some students regularly took a more active and vocal role while others tended to mostly observe and listen, writing down the more vocal students' explanations so they could report out during whole-class discussions if called on.

Knowing that students' confidence and willingness to make conjectures and challenge others' ideas is critical to the students' success in school and life, Lindsey and her coach shared their concerns with Lindsey's grade-level team and learned that other teachers were noting the same patterns.

They decided to use focused reflection to investigate and address this issue. Here's what happened as they applied the four phases of focused reflection.

PHASE 1: PLAN FORWARD.

The core questions that guide this phase are: What can students do now? What do we want to see them do more?

Lindsey and her coach started by brainstorming the specific verbal moves they wanted to hear from students as they worked in collaborative small groups, interactions that would indicate mathematical self-reliance. Together they developed this list of things they wanted students to be able to do, regardless of whether they were quiet and shy or more extroverted:

- Offer mathematical conjectures, strategies, or ideas to the group;
- Explain their mathematical thinking to the group; and
- Question or challenge another student's mathematical conjecture, strategy, or idea.

Lindsey agreed to gather some baseline data about individual students' proficiency with these behaviors to help determine what support students might need. Because this data collection would require focused listening, Lindsey would listen in on one small group each day so that she would have

data on each student by the end of the week (see the table at right).

The data confirmed her hunches: 43% of students didn't exhibit any of the targeted behaviors during the time they were observed. A small portion of students initiated much of the mathematical thinking within their small groups. In the most extreme cases, more assertive students led other group members through a series of steps to find the solution to a problem, thereby removing an opportunity for the less vocal or confident students to make personal sense of the mathematics. In every group, there was at least one student who took a back seat to others in mathematical thinking.

SAMPLE OF STUDENT DATA COLLECTED IN LINDSEY'S CLASSROOM

Data collection			
	Offer mathematical conjectures, strategies, or ideas to the group	**Explain their mathematical thinking to the group**	**Question or challenge another student's mathematical conjecture, strategy, or idea.**
Students/groups			
Harold			
Derek		✓	
Robin	✓	✓✓	✓✓
Stuart			
Oliver			
Tommy		✓	
Tomeka			
Robbie	✓	✓✓	
Andre	✓	✓	✓✓

PHASE 2: LEARN TOGETHER.

The questions guiding this phase are: What are we going to try? What is our data collection process? What measurable goal are we shooting for?

Lindsey and her coach began with some professional reading about equity-based instructional practices for mathematics classrooms, then agreed to implement the following instructional practices:

- Review the mathematics tasks in use to make sure they were low-threshold, high-ceiling tasks and that they supported the use of multiple approaches and representations.
- Be explicit with classes about the goal of helping all students learn to rely on their own mathematical thinking and expect mathematics to make sense. Explain why this ability is important both now and in the future. Explain the three specific behaviors that indicate mathematical self-reliance and post these on an anchor chart. Tell students that they would receive feedback on their use of these important learning moves.
- Give students opportunities to self-assess their mathematical self-reliance in terms of these three behaviors and monitor their growth in mathematical self-reliance. (See the table on p. 65.)
- Provide support for students to try out the identified behaviors by establishing discussion protocols and a rotating group facilitator role for small-group work. Provide sentence frames to support conjecture-making, strategy sharing, and respectful questioning of another student's idea.
- Repeat the original data collection process once a month until the goal was met.

Lindsey's goal was that 100% of students would demonstrate one or more of the targeted behaviors during each collaborative group lesson.

PHASE 3: APPLY AND MEASURE.

The third phase is an interactive process of asking: What happened and how do we know?

After a month, Lindsey saw growth in students' mathematical self-reliance and their awareness of this important learning disposition. Eighty-seven percent of students exhibited one or more of the targeted behaviors during the observation period. While Lindsey was pleased with these results, she continued working toward the goal of all students participating and becoming self-reliant. In addition to continuing the practices she had started, she added the following:

- Conferencing individually with each of the students who were not yet exhibiting mathematical self-reliance to support them in setting manageable goals for taking risks in collaborative group settings.
- Providing a weekly guided math lesson for students who were hesitant to share their mathematical thinking in collaborative groups to give them opportunities to practice this skill with teacher support. Encouraging students' use of mathematical representations to support their communication of mathematical ideas.

SELF-ASSESSMENT OF MATHEMATICAL SELF-RELIANCE					
Today, I ...					
Offered mathematical conjectures, strategies, or ideas to my group.		**Explained my mathematical thinking to my group.**		**Respectfully questioned or challenged another student's idea.**	
Yes	No	Yes	No	Yes	No
Tomorrow I will work on ...					

In the third month, Lindsey assessed again (because focused reflection is an iterative process) and observed that all students exhibited one or more of the targeted mathematical self-reliance behaviors, even though some students were clearly not yet comfortable with these moves. She had met her goal.

In analyzing the data, Lindsey and her coach noticed more examples of students explaining their mathematical thinking than either of the other targeted behaviors. This is perhaps a natural first step toward building mathematical self-reliance, but it made them aware of the opportunity to provide some focused support for the skills of question asking and conjecturing.

PHASE 4: REFLECT.

Reflection occurs throughout the process, but in the fourth phase it focuses on driving next steps, using the questions: What did we learn? What are our next steps?

Overall, Lindsey and her coach were pleased with students' growth. Students' reliance on their own thinking had begun spilling over into other classroom routines, with more students participating in whole-class discussions than ever before.

The students' literacy teachers reported that the students' newfound confidence was also making a difference in how students approached their reading and writing work. Lindsey was also delighted by the support that the more confident students began showing to reluctant students and the sense of community that grew stronger in the classroom.

Lindsey's insights through the focused reflection process included the power of teacher collaboration, the importance of encouraging students to be agents in their own learning, the value of identifying data to monitor students' growth related to mathematical practices and dispositions, and the use of this data to guide instructional work.

She and her coach decided to spend the rest of the month observing students and thinking about a next goal to help them grow as mathematicians. They also planned to meet again in a couple of weeks to plan a new focused reflection project.

THE IMPORTANCE OF FOCUSED REFLECTION

Researcher John Hattie refers to the kind of work these teachers did — the hard work of looking at the impact of their teaching on student learning — as visible learning. As he puts it, "Fundamentally, the most powerful way of thinking about a teacher's role is for teachers to see themselves as evaluators of their effects on students" (2012, p. 18).

Key to doing this work, he writes, is teachers' mindsets: "It matters what teachers do — but what matters most is having an appropriate mind frame relating to the impact of what they do. An appropriate mind frame combined with appropriate actions work together to achieve a positive learning effect" (2012, p. 18).

The thoughtful work of these educators also embodies the definition of professionalism as defined by the National Council of Teachers of Mathematics because the teachers "hold themselves and their colleagues accountable for the mathematical success of every student" (NCTM, 2014, p. 99).

When we adopt a visible learning mind frame and engage in focused reflection on teaching and learning, we are able to acknowledge our ability and responsibility to gauge and improve our effectiveness as teachers, and we empower ourselves and our students as learners and as mathematicians.

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