CHAPTER

3

Math and Academic Safety

Erdős himself would appear, a short, frail man in a shapeless old suit, clutching two small suitcases that contained all of his worldly possessions. Stepping off the plane he would announce to the welcoming group of mathematicians, "My brain is open!"

—Bruce Schecter, *My Brain Is Open: The Mathematical Journeys of Paul Erdős*

We were sitting around a tight array of desks in a sunlit room after school, debriefing the day's events. There were six of us, part of a small learning community of teachers. I was facilitating a conversation in which teachers could present a problem or dilemma.

"I'm really struggling with groupwork right now," John said. "I've done all I can to try to make my classroom an environment in which kids want to work together. For most of them, it's working. I'd say 90 percent of my students are excellent at working together and solving problems. But 10 percent of the kids sit back and refuse to do anything. They'll fold their arms and say they're not working with the others. I've tried everything to help them out and encourage them to rejoin the groups. At this point, they simply refuse to work with other students. They literally would *rather take a zero* than be an active group member." There was a

hint of exasperation in his voice. John was a thoughtful teacher who no doubt wanted the best for his students.

Lorena shared her experience with the same group of students. "I know some of the students to whom John is referring," she said. "I had the toughest time working with them. I talked to a couple of them one day. They've been in the same district for years now. This cohort of students attended the same middle school and the same elementary school, for the most part. They told me they weren't participating in groupwork because over the years, they've learned not to. In middle school when they tried to fit in, the other group members would take over the project.

"A couple of them did admit that they were probably bad group members at the time, but once that stigma was attached to them, it became impossible to break out of it. Eventually the more productive students would complain if they were partnered up. It became an issue of 'Oh yeah? You don't think I'm a good student? Let me just show you how I'm not a good student.' They withdrew from groupwork and most academic work entirely."

John's dilemma—a problem of effective groupwork—reflected a breakdown of *academic safety and status*. The students to whom John was referring had no academic status in the classroom. They saw themselves as failed students. Their peers saw them as failed students. It didn't take much for these assessments—from themselves and from their classmates—to become calcified and eventually self-reinforcing. Academic stigma is particularly sticky. Consider the humiliation and defensiveness these students must have felt when their peers complained audibly about being grouped with them.

It was hard to know where the trouble had started for the students in question. It's possible that at some point in sixth grade they were behind their classmates in a particular slice of content, and that the gap widened during unstructured or unproductive groupwork. Maybe one of the students missed a week or two of school, or transferred in from another school, or had a difficult situation at home. Or maybe the group had a long-term substitute during a lengthy or crucial time. Perhaps none of these things happened and they just didn't like school. Regardless of the root cause, John wanted to invite them into groupwork.

The discussion of John's dilemma yielded no easy fixes, but it did uncover new understanding and better appreciation of what students experience. From that point forward, John engaged in empathetic conversations with students who weren't participating in groupwork. He became curious, rather than jumping directly to solutions or strategies for group management. He also worked to identify and publicize moments in which these students were displaying academic brilliance. The dilemma protocol the team used is in Appendix C.

John's story reveals just what a complex system students pass through. Too often we treat the symptom of troublesome issues rather than attending to the underlying

social and emotional safety and the regard students have for themselves. An academically safe classroom honors the individual as a mathematician and welcomes him or her into the social ecosystem of math. In Chapter 2 we examined what it means to be a mathematician with the aspiration that all students see themselves as mathematicians. That is the foundation for academic safety; in this chapter, we build on that foundation.

Academic Safety: Each and Every Student

An academically safe classroom honors the individual student while leveraging social interactions to build up self-regard. Students are tragically insightful and aware of where they reside in the academic hierarchy—they have been conditioned to believe that their place within the hierarchy is determinative. They enter classrooms with preconceived ideas about their abilities as mathematicians and a corresponding willingness (or unwillingness) to engage with the teacher, their peers, and the content. An academically safe environment has to chip away at this exterior and soften the interior to ensure that every child believes he or she can succeed in mathematics.

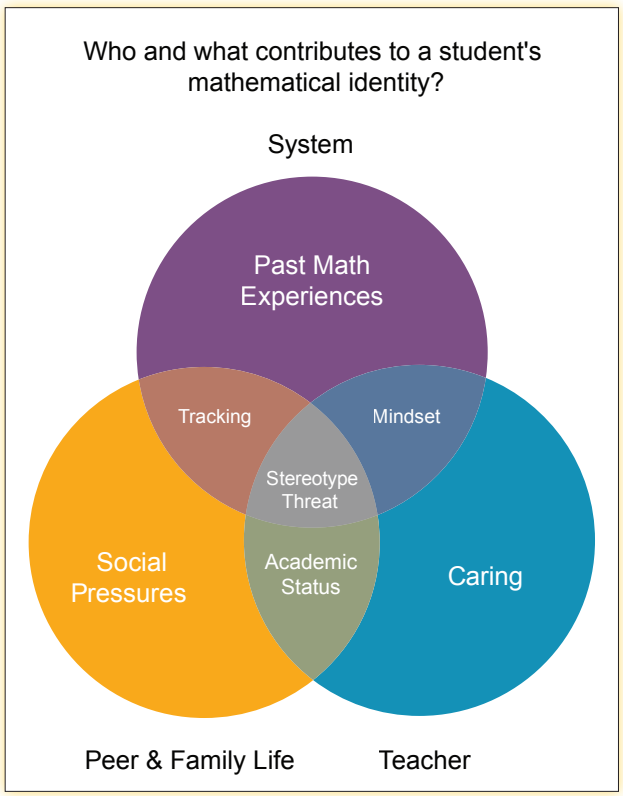

FIGURE 3.1 Multiple players are responsible for a student's sense of academic safety, which is made up of several elements.

We must better understand the complexities of academic status that go beyond our teacher training manual or curriculum maps. Issues of mindset, race, gender, identity, and social pressures affect how students learn in math (and all subjects). In this chapter, we'll dig deep to identify and understand such issues. We'll do this primarily because we care for students; achieving better outcomes is just a nice side benefit. Our journey toward academic safety will take us in a lot of different directions (Figure 3.1), illustrating the complexity of the system and our students (while giving you a preview of what's still to come in this chapter). Many elements influence a student's self-regard as a mathematician, and multiple players are responsible—in part or in whole—for these elements. Some factors are opportunities for us to act, and others are things to be aware of and curious about. Most are both. This work may take us to uncomfortable places. Ultimately, it's worth it. Our students are worth it.

We'll begin this journey with mindset.

Mindset

Sometimes I hear comments along the lines of "The first week of school is great because students are a blank slate." This is incorrect—think back to John's dilemma. His students had disengaged long before because they figured "What's the point?" Our students enter our classrooms with accumulated years of experiences and messages around math. By the time they are in middle school, students have already sorted themselves academically and believe that they are one of the smart kids or one of the not-so-smart kids. Students in such cases have what Carol Dweck refers to as a *fixed mindset* (2016). They believe that their math ability is unchangeable, so they tend to muddle through, hoping to get enough passing grades to move on to the next course. In these students' defense, it's understandable why they would have such a view. Student achievement and course placement is quite fixed. A student who enters a class with middling grades and achievement scores will often exit the class with middling grades and achievement scores. Year after year of this experience naturally leads them to believe that their abilities in mathematics are locked in place.

As understandable as this mindset is, we now have research studies suggesting the opposite: that a student's ability to learn math is fluid and expandable. The human brain can quickly acquire and retain new information (Abiola and Dhindsa 2011; Woollett and Maguire 2011). This is true generally and it is true for the learning of mathematics (Blackwell, Trzeniewski, and Dweck 2007). Dweck calls this attitude—that the brain can grow and that everyone has the capacity to do math at a high level—a *growth mindset*. One who has a growth mindset believes the following:

- By working hard, one will be able to achieve success.
- Mistakes are welcomed as opportunities to grow and learn.
- Challenges help one get better at a given task.

Students who have a growth mindset achieve higher scores on tests (Organization for Economic Co-operation and Development 2012). But even adult experts, such as teachers, can display fixed-mindset thinking, whether they know it or not. Take the example of the "two" musicians.

The "Two" Musicians

Tsay and Banaji (2011) conducted an experiment in which professional musicians listened to two excerpts of music. For the first excerpt the professional musicians were given a profile of the performer that suggested (via "weak clues") an innate, natural ability in musicianship. They were informed that the second musical excerpt was from

a musician who had had to struggle and overcome a lot and had put in extra work to achieve this level of musicianship. When asked questions about "likelihood of future success" and "talent," the professional musicians rated the first performer more highly. In actuality, *the excerpts were from the exact same performance by the same musician*, and the profiles given had been taken from different aspects of the same musician's biography. Yet the professional musicians displayed a bias toward talent over effort.

Individual classrooms and whole schools have structures in place that reinforce this type of fixed mindset, despite the presence of individuals who believe otherwise. Our system of schooling has so entrenched itself as a promoter of fixed-mindset practices that it can seem daunting to swim against the stream. Nevertheless, we'll see how teachers and math departments are deploying strategies to combat fixed mindset and send messages of growth mindset—in students and in ourselves.

From Fixed to Growth Mindset: Practical Steps for Change

It can be a challenge to rethink practices that unintentionally reinforce a fixed mindset. In particular, the practices around *time*, *correctness*, and *grades* are rooted in fixed mindsets. Let's look at strategies to transform these historic practices to ones that prioritize academic safety and instill growth mindsets.

FIGURE 3.2 Dina values thoughtfulness, effort, and demonstrations of knowledge over speed, correctness, and grades.

From Speed to Thoughtfulness

Adults and adolescents alike often wrongly associate speed with understanding. We all remember—and many of us felt the trauma of—"minute math" as elementary school pupils. But secondary classrooms and systems also emphasize speed in a destructive manner. For example, if a student needs additional time to work through a problem once the end-of-period bell rings, she's out of luck. Another class is outside the door, ready to file in. And she'd better get to her next class in time or else she'll be counted as tardy. She'll have to complete her work at home, where she'll likely face additional distractions and limited support.

Dina, from Samueli Academy in Santa Ana, California, makes "Speed is not important" the norm in her class and reinforces it with the way she plans her lessons, assessments, and curriculum. "My lessons don't have an expiration date," she tells me. "If we need to go over the same content the next day, that's what we'll do. If a student

needs more time, they get more time. Sometimes I'll even grade them *only* on the problems they completed or the work they've shown."

"Does that encourage students to work slowly?" I wondered.

"I haven't had that problem. I've found that kids tend to work better and more deliberately when they know they're being graded only on what they've demonstrated. Students actually work *harder*."

Combating the need for speed:

- Review content from prior days' lessons.
- Grade only what students produce.
- Prioritize standards.
- Give students all the time they need for assessments.
- Establish "Speed is not important" as an explicit and lived-out norm.

From Correctness to Effort

Secondary classrooms often use correctness as the ultimate distinguisher for math understanding, even though we know—as Ridgeland teachers discovered in Chapter 2—that "Mathematicians don't always get the answer." Even the teacher who awards "partial credit" when students attempt a solution may be indirectly valuing correctness over effort. I often gave a point for the correct solution and a point for an attempt. With the benefit of hindsight, I realize what I should have realized then: one out of two points is 50 percent. I can't say I'm truly honoring effort when a student will still receive a failing grade.

One strategy to push back against the supremacy of correctness is to allow for revisions for full credit. Rather than allowing students to retake an exam for, say, a maximum of 70 percent, just give them the whole grade they earned that second time around. And make the same allowance for all students.

Clearly, we want students to achieve correct and repeatable solutions on content for our class. Yet we must square this desire with the need to ensure that every student believes they can do well in math if they put in the effort. Dina goes so far as to take the issue of correctness off the table entirely: "I just give them the answers," she tells me.

"Come again?" I ask. Once again, my stubborn skepticism shines through.

"Sure. I just give them the answers. Here are the questions, here are the answers. Now, how do you get that answer?" Dina's ideas are so profound and so simple. "Their answers are naturally going to be correct because they're right there on the paper.

I'm more interested in how they get there." Dina's students typically try a problem on their own and check their answer. If it doesn't match up, they'll go back and see where they got it wrong.

"Since I've started giving them the answers, I've had students going back and trying to figure out where they went wrong. Before, I would hand back an assignment and it would say 'seven out of ten' and they'd just crumple it up and toss it, like, 'Well, I guess that's what I got.' Now students see it as a challenge." Using card sorts (Chapter 5) also naturally allows for a check for correction, since the answers are right there.

Combating the need for correctness:

- Allow for revision to proficiency.
- Allow for full credit on exam retakes.
- Facilitate peer-editing protocols before submitting a problem.
- Provide the answers and ask for the solutions.
- Celebrate alternative solution methods.

From Grades to Demonstrations of Knowledge

Numerical and letter grades are as much a part of our secondary system of instruction as attendance and bus routes. At the end of a grading period, students receive a numerical score (or a letter) that indicates their performance in that class. Not only does that grade reveal very *little* about what the student did or understands, but it also serves to reinforce preexisting notions of what "type" of math learner a student is: a good student or a not-so-good student. It's hard to break the cycle of fixed mindsets when every six weeks students receive yet another data point permanently affecting their GPA for their high school career. So long as colleges demand GPAs as a primary determiner of admittance, it's hard to stray from this ingrained system.

So how can we dampen the harmful effects of grades? Or even make grades work for students?

Dina starts off by telling me that she "allows" for revised work. "Sometimes, I *demand* it." She tells me she regularly returns work that was imprecise and has students revise it until they get a ten out of ten. "There are times when I demand that students give me 'advanced' work. I call these 'demand excellence' assignments. They know it'll take more time, and most students won't get 100 percent the first time through. It'll have maybe two or three challenging problems, and I take it only when it's 100 percent correct. The grade will remain 'incomplete' until we're both satisfied. By the end of the grading period, every student has a 100 percent on these assignments because I won't take less."

Some teachers grade for effort, or have the students assign themselves a grade for effort. With complex problems, Dina asks students to give themselves a score against a rubric (Figure 3.3) and explain why they gave themselves that score. "I find that students are much harsher on themselves than I am. They know when they've put in effort and they know when they haven't." Dina tells me she has to *raise* her students' self-assigned grades more often than not.

Through her norms and actions, Dina flips the message of grades from a diagnostic tool (yielding messages of fixed mindset) to a standard of excellence that everyone can achieve (yielding messages of growth mindset). We'll learn a lot more about general assessment practices in Chapter 10.

Agency: Develop Growth Mindset

1. Describe the effort or practice you have used for this current task and how it has affected your skills, work quality, or performance. How do you need to put in more effort for this project? In what ways is your effort sufficient?
2. Your reflection will be assessed using the following domains from the agency rubric. Explain next steps you might take to improve.

	Emerging	Developing	Proficient	Advanced
Build Confidence	Struggles to identify academic strengths, previous successes, or endurance gained from personal struggle to build confidence in academic success for a task, project, or class	Identifies an academic strength, previous success, or endurance gained through personal struggle, but does not use these skills to build confidence in success on a task, project, or class	Builds confidence to succeed (on a task, project, or class) by knowing and using academic strengths, previous success, or endurance gained through personal struggle	Consistently confident that success is possible (on a task, project, or class) by knowing and using academic strengths, previous successes, or endurance gained through personal struggle
Use Effort and Practice to Grow	Describes effort or practice in a limited way	Describes effort to practice but does not connect it to getting better at a skill, improved work quality, or performance	Understands how effort and practice relate to getting better at skills, improved work quality, or performance	Understands that effort and practice improve skills, quality, and performance and that the process takes patience and time

FIGURE 3.3 Rubric for student self-reflection

Combating the messaging around grades:

- Allow students to self-assess.
- Grade for effort.
- Use well-designed rubrics (Chapter 10).
- Provide time for students to reflect on growth.

Systemic Change: From Tracking to De-Tracking

FIGURE 3.4 Offering all students a high-quality math education is crucial for creating an academically safe learning space.

I'd like to tell you a bit more about Samueli Academy, the school where Dina teaches, because they have a remarkable story to tell around academic safety. We'll see a lot of Dina and her colleague Kala throughout this book. Dina, Kala, and their department do incredible work to build up students' mathematical identities. And they, with the support of their administration, were able to make a monumental shift at their school in which they eliminated the tracking of students to create a more equitable math environment.

Tracking—the practice of separating students into different academic tracks based on past performance or potential achievement—is a prime example of how noble intentions serve to reinforce issues of fixed mindset. Starting in elementary school, students are identified according to reading ability and math aptitude. There often is a soft movement toward ability grouping in early grades, and a movement toward a more rigid bifurcation of the student body in later grades. Even at fifth grade, such ability grouping "act[s] as a sorting event that sets youths on different developmental trajectories" (Fuligni, Eccles, and Barber 1995, 87). As students enter secondary school, the multiperiod day lends itself to ability grouping: honors and Pre-AP for the achievers, remedial classes for nonachievers, and "regular" classes for the mass of students in the middle.

Research about the effectiveness of tracking is mixed, setting aside the moral quandary for a moment. Offering accelerated math and enrichment courses can lead to high outcomes for high-achieving students (Stinnett 2013). It's clear, though, that the effects of tracking and classifying students according to teacher recommendations or standardized metrics result in worse outcomes for students who have been traditionally underserved (Beaton and O'Dwyer 2002; Oakes 2005).

Even the mechanism of student placement in tracking systems can be arbitrary and imprecise. Dina is describing the process by which students have historically been sorted for high school course placement. "Students take a test at the end of eighth grade and supposedly *that* told us where they ought to be placed: in Math

1, Honors Math 1, or Math 2. It was the only metric that would determine what classes their kids would be placed in. This was our system. This, despite the fact that one year the eighth graders at one of the middle schools had a long-term sub the *entire year*. Of course, they did worse on the test! So, because they essentially didn't have a teacher for a year, they're placed in a lower-level math class? How does that make sense?"

Dina is also quick to point out the inequities that arise along lines of race and socio-economic status. Noting that the class with the long-term sub was from the middle school with more students of color, she describes her unease with this de facto segregation. That is why Dina and her department made the decision to de-track, restructuring their math pathway such that *all* incoming freshmen would take Math 1, no ifs, ands, or buts. There would no longer be a separate class for "honors," nor would kids be accelerated along into Math 2. *Even*—and I find this truly remarkable—*for students who took algebra and geometry in middle school*.

"Wasn't there pushback from parents?" I wonder. My experience as a teacher and as a parent led me to think some parents would be upset that their kids could no longer be accelerated.

"That's why we began communicating early about this change," Dina says. "Our message to parents was that we were trying to create a productive learning environment for *all* kids. We told parents that every kid can achieve highly in math: their kid, others' kids. And that we want to create that environment. Ultimately it will help their kids too. We emphasized that even the kids who had been accelerated in the past had deficiencies when it came to, say, explaining their work or communicating their ideas or collaborating with other students. And those are all skills their students will need in college."

While the teachers were shifting to de-track, they were also intentionally making their classrooms inclusive, academically safe environments. "We have that conversation all the time now: that everyone is a mathematician and that everyone can be good at math. The kids in their group are valuable to their learning and thinking. The classroom is an ecosystem, and everyone is important to the learning process."

According to Dina, the students' academic output has improved as well. "At this point, every student in my class can and will present the solution to a problem. From the shiest kids to the most outgoing, they'll get up there and present for a full five to ten minutes. And students in the audience are quick to ask questions. Kids are much clearer about their explanations, *especially* the kids who would have been accelerated into Math 2 in past years.

"Also, the quality of the work has improved," Dina continues. "When I look at the growth in the quality of work I'm receiving on problems from September to March, across the board I'm seeing better explanations and, yes, more correct solutions!"

Samueli Academy still offers an "honors" program for kids (or, perhaps truthfully, for parents) who want it. Honors students are in class with the rest of the student body, but they are tasked with additional assignments and projects. The rubrics on which they are scored have additional demands.

It's important to note that Dina and her colleagues were all individually compelled by research as well as their own values to make this change at Samueli Academy. It was not a decree from administration or the district that led to the change being so positive. It was an organic decision from a united math department. In addition to the structural realignment of courses, they had to undertake new learning about how to create a welcoming and equitable classroom and attend to those things throughout the year. It's hard to imagine the change being so positive if it were a top-down decision with little support surrounding it.

Self-Worth and Stereotype Threat

It's impossible to discuss issues of academic safety and self-regard without mentioning the very real effects of race, gender, sexual identity, multilingualism, ethnicity, and socioeconomic class in the math classroom. Issues of identity are often unmentioned and unmentionable in professional settings. Living in a country with such a tortured history on these issues and all the discomfort that rides along with them has conditioned us to *not* talk about such topics. But if we are being honest about all the ingredients that go into a student's experience of math, we must recognize that identities play an outsized role in defining how students see themselves as mathematicians. Almost always unintentional, often unspoken, and invariably repeated throughout a student's career, messages and micro-messages around students' identities have an undeniable effect.

I'm talking to Cara about some of the discipline issues she's having in her classroom. She's having difficulty getting a few kids to engage. She's tried hard to make her instruction engaging. She continually conveys positive messages about students' abilities to achieve at high levels. And yet, she has a few students who simply won't participate or turn in work. As the conversation continues, she notes that many of them are students of color in a mostly white student body. This adds extra complexity to an already complex dilemma. Issues of groupwork, self-regard, and academic status comingle with issues of race and equity. Cara's students were suffering from *stereotype threat*.

Stereotype threat occurs when people are placed in a situation where they feel at risk of confirming a stereotype about their group(s) based on societal myths. In addition, when an individual experiences repeated discrimination or is the object of assumptions over a period of time, he or she begins to internalize these myths of math achievement and identity. Stereotype threat can metastasize and become a self-fulfilling prophecy, so teachers must understand it and be vigilant. It's important to remember

that our students have multiple, intersecting identities, each worth understanding. Here, we'll focus particularly on race and gender.

Gendered Stereotype Threat

In 1999, Spencer, Steele, and Quinn published the results of a study that convincingly demonstrated the existence of stereotype threat according to gender. Math tests were administered to college students, and the results were divvied up by gender. In the control group the test was administered as any standardized test might be: instructions were given, a sample problem was identified, and participants took the test. In the experimental group, the test was administered similarly except participants were given the explicit message that men and women had been shown to perform equally on this particular test. The results showed that in the control group men outperformed women, but in the experimental group—where the students were explicitly told that this test yielded no differences in performance based on gender—women and men performed equally. The simple act of telling test takers that this test had no gender bias resulted in no gender bias.

Where does this self-evaluative threat come from? When does it start?

Frome and Eccles (1998) published a study demonstrating that parents often have gender-based perceptions of their own children's abilities in math, and that these perceptions track with their children's self-perceptions. When given a questionnaire asking parents to identify their own child's mathematical ability, parents rated boys higher than girls in math and girls higher than boys in English. Eccles, Jacobs, and Harold (1990) showed that parents' attitudes directly affected student performance as well as a student's desire to take additional future and more challenging math courses. There is undeniable and growing research that suggests that gendered stereotype threat in math is real, that it starts early and develops into a self-reinforcing feedback loop. And all of this can be exacerbated in a school setting.

Dina is telling me what she does to combat stereotype threat. "If I see patterns of behaviors that aren't serving groups fairly, I'll bring that up explicitly in class. For example, if it seems like only boys will answer questions out loud or are more forceful at getting my attention, that's an opportunity to talk about that issue."

She's not kidding either. We're in the middle of a class when she calls a quick time-out to discuss how she's heard only from boys in the first few minutes of a lesson. Right then and there, she calls it out and takes it head-on. I admire her courage, honestly.

Tackling thorny issues of gender bias often requires intentional, direct, and persistent messaging to specific students. Jaime is a teacher in Seattle who has had to train himself to be aware of gendered stereotype threat and actively work to help his girls overcome it. He found that he was spending significantly more time talking to boys in his classroom—both for instruction and reprimanding. Watching a video of himself facilitating, he

noticed that groups of girls might go an entire class without being addressed. "Once I became aware of how girls were experiencing math differently, I knew I had to make changes. It was very convicting, though. I had to first accept that I was contributing to the inequity." Rather than wallow in defensiveness, Jaime began addressing his implicit bias by ensuring that he spent as much time checking in on the work of girls as boys. He wanted to make sure that each girl experienced the following daily:

- A nonacademic conversation, in order to build and rebuild their relationship
- Praise for a specific mathematical action, to build and rebuild equitable assignment of academic status

Initially, these goals required carrying around a clipboard and checklist to ensure he'd achieved his daily outcomes. Eventually it became second nature and he could put away the clipboard.

Other schools have designed math clubs specifically for girls. These clubs can offer a safe space for girls to talk math and be honest if they're having difficulty with a particular mathematical concept. Although a girl may be unwilling to ask questions in front of her peers in the classroom because of stereotype threat, she may be willing to engage with difficult concepts in a smaller, more private setting.

Racial Stereotype Threat

Stereotype threat also manifests harshly for students of color. Steele and Aronson (1995) conducted a study similar to that of Spencer, Steele, and Quinn's (1999) in which they tested the performance of black students based on messaging. Two groups were administered the same test. One group was told that the test was a diagnostic measure of intellectual ability. The other group was told that the test was merely given as a laboratory study in the psychological factors in problem solving. Black students performed significantly worse than their white counterparts in the "diagnostic" group, while they achieved equally in the "laboratory" group.

Negative attitudes about race are pervasive and begin early in life (Baron and Banaji 2006), earlier than the first day students enter your secondary classroom. In school, these negative racial attitudes correlate with data on how students of color are disciplined. Students of color, particularly African American students, are suspended at a higher rate, expelled at a higher rate, and referred to the principal's office at a higher rate than their white counterparts (Lewin 2012; Cody 2013; Lyfe 2012). The same attitudes that lead to imbalanced discipline practices cross over into instructional practice.

One silver lining these studies demonstrate is that the messages teachers communicate have the potential to affect performance in a positive manner. In both studies

discussed here, the mere message of the nature of a test—that it was a laboratory study rather than a evaluative exam—was enough to nearly eliminate the gender and race gap in test performance. What else can we do to reduce the gaps in performance?

Issues of identity require difficult conversations and even more difficult self-examination. Who are you calling on over and over again? In the same way that Jaime watched himself unintentionally attending to more boys than girls, you may wish to keep track of how often and in what ways you're calling on students of color.

On a more macro level, which students are tracked toward or away from advanced math after your class and in your school? If there is a lack of diversity in your upper and advanced math courses, it's worth a difficult conversation with other members of your department. Consider being intentional about inviting students from underrepresented groups into STEM-related clubs and/or advanced math class.

Similarly, when you discuss famous mathematicians, who is being represented? Are your students aware of the work of nonwhite and female mathematicians? In Appendix B, you'll find short biographies to help you get started.

A teacher must examine symptoms of inequity with data and react accordingly. We can't just assume that we're good people and hope for the best. As Jo Boaler puts it, "[I]t may not be enough, as a math teacher, to treat students equally in the pursuit of equity" (2016, 107). It's not that Teacher A is racist or Teacher B is sexist, it's that racism and sexism are the resting state of our society. They are the norm, not the individual outliers. Addressing them requires explicit action, not passivity.

Some math departments I've worked with track who is being called on, and for what: whom is the teacher questioning, and who are the respondents? An observing teacher or instructional coach will make tallies and notes, tracking the conversations and then sharing the resulting data with the classroom teacher. These quick data dives and analyses result in classrooms in which students of color are treated more equitably.

Above all else, listen to the concerns of your students, and listen to what *isn't* being said, because issues of race, sexuality, gender identity, ethnicity, language, and socioeconomic status often go undiscussed and are left simmering beneath the surface. One way to create an environment of honesty and safety is to use restorative circles.

Restorative Circles

Although not a math-specific strategy per se, or one created specifically for identity, restorative circles can go a long way toward repairing the strained relationship students may have with mathematics.

In a restorative circle, seats are arranged in a circle, often around some sort of centerpiece made up of items of importance. In one classroom I observed, the centerpiece included pictures, meaningful mementos students had brought in, and other

markers of individual identity. Typically, some sort of "talking object" is part of that centerpiece. Only the holder of that object may speak. A chime signals the start of the restorative circle. The facilitator—be it a teacher or student—begins by offering some sort of prompt to invite conversation. The first time around a circle, the prompts are low level, yet open ended and insightful. The intention is to get acquainted while opening up the conversation. Here are some examples:

- If you could meet anyone from history, who would it be?
- What animal do you feel like right now (and why)?
- If you could change one thing about your local community, what would it be?

The facilitator asks the prompt and hands the talking piece to a participant. Participants may choose not to answer the prompt and instead silently pass the talking piece.

The second (or third) time around, the prompts may become deeper:

- Have you ever felt foolish in front of your peers?
- Have you wanted to disengage from the class recently?
- What does it mean to be a friend?

These questions induce vulnerability and must be treated as such. You may wish to withhold the deeper questions until you think significant trust has accumulated through the acquaintance questions over the course of a few circles.

Lastly, the circle is closed with a closing prompt, such as the following:

- Give two words that describe your experience in today's circle.
- What's an attitude you want to have for yourself the rest of the day?

After the final question, the facilitator rings the bell, thereby closing the circle.

For restorative circles to work, teachers must make themselves as vulnerable as students, describing failures of their own and being honest about their state of being. This vulnerability works to repair the relationship between students and the system of education that has contributed to past inequities.

Restorative circles are part of a much broader, comprehensive approach to social and emotional learning and identity known as restorative practices or restorative justice. They're also something that can occur only in classrooms where there is ample trust among the students and teacher. Significant norming around restorative circles is essential. Although it's beyond the scope of this book to delve fully into restorative justice, I highly recommend further investigation to learn more about the motivation

and research behind restorative circles. It is a time commitment, but teachers may use it in lieu of a more typical warm-up for the day once a week.

Recruitment of Teachers of Color

Another elephant in the room is the racial dynamic in most US classrooms. The teaching profession is racially homogeneous. About 80 percent of teachers in the United States are white (Goldring, Gray, and Bitterman 2013), compared with about half of the student body (US Department of Education 2016). Meanwhile, we know that students demonstrate higher achievement when they are instructed by a teacher of similar racial background (Grissom, Kern, and Rodriguez 2015; Dee 2005; Pitts 2005; Meier 1993; Weiher 2000). Students also show a positive preference toward teachers of color (Cherng and Halpin 2016). Therefore, the dearth of teachers of color needs to be addressed at a systemic level. This is another way to combat race-based stereotype threat: schools can provide students with a more diverse set of instructors, and society must encourage more students of color to pursue education as a career.

When Social Pressures Seep In

It's hard to overestimate just how much nonclassroom events affect the classroom for a secondary student. Alfredo, an eleventh grader, is a challenging student. He isn't great about turning in his work, particularly his homework. "Teachers don't understand how much other stuff I have going on," he says. One of his closest friends—his "cousin"—is staying on his couch. I don't inquire further about the reason. I suspect the story involves eviction—by either the parent or the bank. Alfredo's friend keeps him up late in the evening, imploring him to play another round of *Fallout*. "I *want* to do well in class, but it's just so hard." I detect an air of pleading in his voice. I've had countless conversations with teachers who have told me that specific students "just don't want to try" or something similarly dismissive. In truth, by and large, students want to do well in class, even in classes they don't particularly like.

One of the drawbacks to a system of secondary education that employs a multiperiod day according to subject matter is that teachers are given only a very small window into the social creature that is the adolescent student. It's possible for a secondary teacher to be ignorant of a student's social groups or how those groups affect classroom performance. We've seen the effect of academic status in terms of self-regard; social status is critical too.

Alfredo also works after school. Although not an explicitly social effect, his job is a physical distraction that manifests as an academic one. Alfredo works three afternoons and evenings a week to help support his family.

"When I'm falling asleep in class, it's not always because I'm bored. It's because I'm exhausted." If I didn't know Alfredo and saw him nodding off in class, I'd probably assume he's insubordinate or has a poor work ethic. In truth, he's the hardest-working individual in this room. Effective teachers know these things about their individual students. This gets us to caring.

Passive Caring Versus Active Caring

Briana is a tenth grader, talking about her middle school math experience. "I was invisible to the teacher," she begins. "I always got my work done. I never got in trouble. I would raise my hand to ask a question, but my teacher would never call on me. It got to the point where I would ask my friend to ask a question for me so I could get something answered." Briana is soft-spoken but clearly motivated. It's tragic but understandable how she would feel "invisible" to her teachers. In the hustle and bustle of a noisy middle school classroom, soft-spoken students get short shrift.

Recently an administrator I know took part in a "shadowing a student" challenge, in which the administrator identified a student and followed her around for an entire day. From the moment she got off at the city bus stop in front of the school until the moment she got back on it at the end of the day, the administrator followed the student around to each class, every passing period, even lunch. Debriefing the experience, the administrator was stunned by how little interaction with teachers the student had. Other than a greeting here or there, the student received few words from her instructors.

Again, it's quite understandable: a secondary teacher may have upward of 130 students enter and exit his or her classroom per day. It's a challenge to have meaningful conversations with *half* that number in a given day. Few secondary educators are explicitly uncaring. But many aren't *actively caring*. Active caring distinguishes the truly safe academic environments from classrooms that unintentionally further the status quo and reinforce access and achievement gaps.

Passive caring refers to nonspecific attitudes of care from teachers. Teachers are "welcoming" in the sense that they don't actively work to harm students, but they also don't do anything specific to care for students. The relationship is one sided or dependent: the student must care for the work of school before the teacher will demonstrate personal care or interest.

Active caring demands a two-way relationship independent of the student's academic dispositions. Students who don't demonstrate a preternatural appreciation for the subject receive the same level of personal and cultural care as those who do.

The question of passive versus active caring cuts deep. Most secondary teachers demonstrate passive caring. They love their subject and don't hate the company of students. Teachers have special relationships with a few students, typically those who

demonstrate enthusiasm for the material or have naturally attractive personalities. The rest of the teacher's students don't experience active harm or trauma, but the state of the classroom serves to reinforce long-standing gaps in status. Students who like math or like schooling are elevated, whereas struggling students slide further behind in achievement and/or self-regard.

Fewer teachers demonstrate active caring, which represents a disruption of social and academic norms. Teachers actively work to demonstrate specific caring for individuals as individuals. In Chapter 1 we saw how Leanne greets each student at the door, shaking his or her hand and welcoming them into the classroom after a brief interpersonal interaction. She does this every day, with every student. She asks about their lives, how their cousin is doing, or how a certain test in another subject area went. That's one of many ways Leanne demonstrates caring for her students throughout the day. Table 3.1 describes additional distinctions between passive and active caring.

Passive Caring	Active Caring
Teacher greets students at the door.	Teacher inquires about students' well-being at the door.
Teacher has positive relationships with good students.	Teacher has positive relationships with each student.
Teacher knows each student's name.	Teacher knows each student's passions.
Teacher knows which social groups students hang out with.	Teacher knows which social groups students struggle with.
Teacher invites all students to participate.	Teacher encourages each student to participate.
Teacher allows retakes on exams.	Teacher allows retakes and reaches out to specific students and encourages them to retake an exam.
Teacher offers general praise.	Teacher offers authentic praise specific to each student.
Teacher cares about how the student is doing in math.	Teacher cares about how the student is doing in all subjects.
Teacher asks how a student is doing generally.	Teacher asks how something specific, such as work, is going.

TABLE 3.1

It's no coincidence that Leanne also holds each of her students accountable and to a higher standard than they're used to. She's built up social capital with her students over the course of the school year and is therefore able to push them when they're not

meeting her standards. When she wants a kid to retake a test because he didn't score high enough for her liking, he comes in at lunch or after school and does it. When a student fails to turn in a homework assignment, she holds her feet to the fire to get it turned in.

Happily, Briana doesn't feel invisible anymore. She's telling me about her teachers now. She says her teachers know her—I mean *really* know her: that she's passionate about dance, that she takes the city bus to get to school, that she waits tables on the weekend at her aunt's restaurant, and so on. In this environment and with these relationships, Briana is flourishing.

Academic Status: Defining and Assigning

Now that we've established a demonstrable practice of active caring for our students, it's time to build them up as mathematicians. We do this through assigning *academic status*. Ilana Horn, a professor and researcher at Vanderbilt University and author of *Strength in Numbers*, offers the following definition of status: "Status is the perception of students' academic capability and social desirability" (2012, 21).

The factors that affect one's learning and understanding of math stem from social- and self-perception. Issues of academic status are a social creation, rather than a truly academic one. Dembo and McAuliffe (1987) show that a lack of *perceived* academic ability is a predictor of participation, whether it's relevant to the task at hand or not. If students believe they are poor math students, or if *they believe that their peers believe* they are poor math students, they are likely to fulfill those low expectations. That's why teachers at Ridgeland High School treat issues of status head-on.

Assigning Academic Status

In the previous chapter, we learned how Ridgeland teachers undertook a process of inquiry about the discipline of math. They discovered that math—according to mathematicians—differs from how it appears in school textbooks. As teachers learned about the discipline, they provided their students with increasingly authentic mathematical experiences.

Now we'll learn how Ridgeland teachers "assigned academic status"—publicly and thoughtfully ascribing mathematical brilliance—to their students. This practice may be considered part of facilitation, so we find ourselves at the intersection between effective facilitation and academic safety (Figure 3.5).

The Ridgeland process of assigning academic status starts at their department meetings. Teachers at Ridgeland meet regularly as a staff to discuss problems of

practice, design tasks, and attend to how their students feel about themselves as mathematicians. They'll tell you that the last of those goals is the most important.

Teachers have a list of class rosters printed out and affixed neatly to clipboards—all their class rosters, in fact. For the entire hour they have together, the teachers run down the list of each class roster and ask the group, "How is this kid smart in math?" Ridgeland is just shy of 900 students; teachers know most of the students in their academy. For each student, two or three teachers chime in with responses such as "Jeremiah is incredibly persistent," "Carlie is quite creative," "Jesse is quick to argue," "He's also good at giving constructive feedback," and so on.

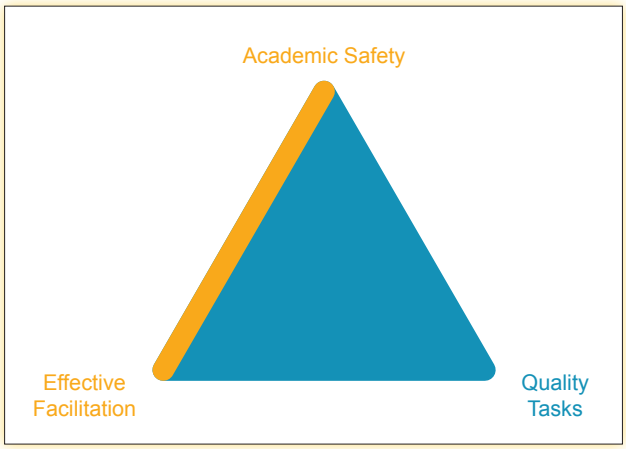

FIGURE 3.5 Here is an example of a connection between academic safety and effective facilitation.

The teachers take dedicated notes based on their peers' input. Throughout the next two weeks, they hold on to those clipboards during class and make a concerted effort to praise each and every one of their students for a mathematical skill or "smartness." Within two weeks (though most complete the exercise within one) every single student of theirs has been praised by his or her teacher for a mathematical skill.

I ask one of the teachers, Kate, about some of the parameters of this exercise. "We want to make it clear that we're not just saying 'good job' for some generic thing a student has done," she told me. "The praise needs to be specific and mathematical in nature. We're not just giving kudos for pretty drawings. We're rebuilding these students' understanding of math and their understanding of themselves as mathematicians."

According to the staff norms, the praise must be

- public,
- specific,
- mathematical, and
- true.

To be an "acceptable" offering of praise, an assignment of academic status, it must meet all four of these criteria.

The practice of assigning status is near and dear to the Ridgeland staff. It's something they talk about often and that they credit with their continued improvement in student achievement over the past half-dozen years or so.

Recall that the math team at Ridgeland spent significant time unpacking what it means to be a mathematician, which informed their practice of assigning academic status in mathematics. After a decade or so of red pen marks on exams, students have received the message that math is about finding the right number after using the right formula. Ridgeland teachers have developed an alternative vision for their students to internalize—a clear manifesto about what it means to be smart in mathematics. One way they transmit this vision is by recognizing students when they exhibit behaviors that are authentic to mathematics.

When I'm in a math classroom at Ridgeland High School, I can hear the voices of the math teachers from the staff meeting through the mouths of students while they're working. They have taken on the same language that their teachers have spent their entire secondary career explicitly using with them:

"That's a really good estimate."

"I don't want to give up quite yet before we ask the teacher."

"Is there another way we could approach this?"

Once the Ridgeland teachers have completed their status-assigning assignment, they print off a new class roster and start again, making sure to let every student whose name is on that clipboard know, again, that he or she is a budding mathematician.

Conclusion

When I'm asked what an academically safe classroom looks like, my response is to answer by describing what an academically safe classroom *sounds* like. Who is doing the talking, and to whom? What is he or she saying? Answer those two questions and you'll have an insight into the culture of the classroom. I know I'm in an academically safe classroom when I see each student speak mathematically without the teacher prompting. The most academically safe classrooms are ones in which students are quick to ask questions of other students and are as quick to listen. Groups work equitably. The teacher engages in one-on-one or small-group conversations with students. Students from different backgrounds work together productively. They continue to work productively when the teacher is elsewhere in the room.

Despite being invisible in any mass-produced curriculum, academic safety is no less important than tasks or facilitation. In fact, it's the most permanent of all three. Adults may not be able to recall specific content or lessons, but they will sure be able to tell you if they disliked math as a child. The root causes of this dislike can stem from one (or several) causes: mindset, stereotype threat, social pressures, tracking, and/or an inaccurate representation of the discipline itself. Teachers have an obligation to communicate to students that they are mathematically smart and that they are welcome at the table. A kind word or other demonstration of authentic caring goes a long way.

As I was writing this chapter, I discussed it with a teacher. I was describing how crucial it is to understand where students are coming from, academically and personally. At one point in the conversation the teacher helpfully offered, "Maybe you should just write 'Give a crap' over and over again." We laughed because it was funny and true. That should be the biggest takeaway from this chapter: to give a crap. Students—particularly adolescents—are such a joy, with all their quirks, their humor, their ups and downs. Let them know it. And let them know that their unique talents are uniquely suited for math.

REVIEW

- Academic safety involves the self-regard of students as mathematicians and contains many, many layers.
- Students must believe that hard work is useful to their learning and must be rewarded by their teacher.
- Many classroom practices can be reimagined to present students a growth mindset view of math, including the following:
  - From an emphasis on speed to an emphasis on thoughtfulness
  - From an emphasis on correctness to an emphasis on effort
  - From an emphasis on grades to an emphasis on demonstration of knowledge
- Tracking students into particular mathematical pathways can lead to issues of equity and access.
- Stereotype threat (race and gender based) is invisible, real, and treatable. It must be addressed in the classroom.
- Adolescents have countless pressures on them, and it's important to understand where they're coming from.
- There's a difference between passively caring for all students and actively caring for *each* student.
- Assigning academic status is a key part of rebuilding a student's mathematical self-worth.