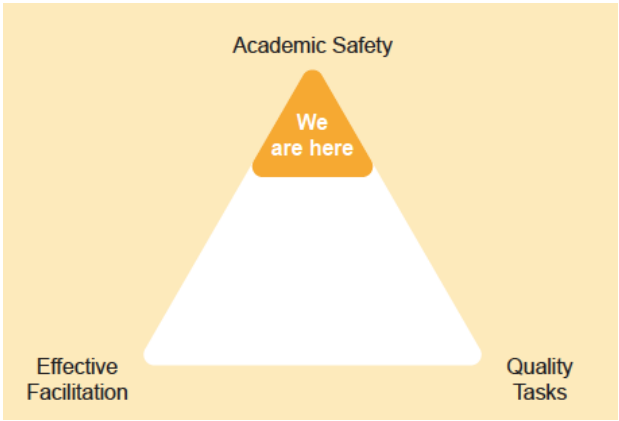
ACADEMIC SAFETY



A card set based on Academic Safety from Necessary Conditions: Teaching Secondary Math With Academic Safety, Quality Tasks, and Effective Facilitation by Geoff Krall

Academic safety is how students view themselves, each other, and the very discipline of mathematics. It encompasses the social and emotional safety of the student as well as the student's perception of his or her own mathematical ability.

Academic Safety has two levers which teachers can influence:
1) creating an accurate representation of the discipline, and
2) communicating to each student and all students - with actions and words - that they have unfettered access to the discipline of mathematics.

Mathematical identity and the social-emotional state of an individual or classroom is a complex tapestry that requires significant unpacking. Personal, interpersonal and systemic structures contribute to a student's state of academic safety.

Being proactive about academic safety is as critical to a student's success in math as it is in any curriculum, and micro-messages that students receive about their ability to perform mathematics (from teachers, peers, family, and society) can be more powerful than any task or teaching move." (p. 10)

Mindset and math attitude survey

Offer students a survey that solicits their attitudes towards math as well as their own self-perception as a mathematician. Offer a mix of multiple choice, agree/disagree, and free response questions that get at students' perception of the discipline. You can also give the same or similar survey near the end of the school year to measure how students' beliefs have shifted.

WHY: Results from such a survey yield insight into students beliefs about math and beliefs about themselves as mathematicians. You may learn about mindsets and beliefs that need to be promoted or worked through. A teacher will be able to make more informed instructional decisions with this evidence in hand.

Some sample questions:

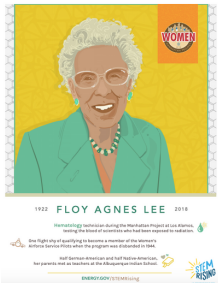
- Free association: When you hear the word math, what words pop into your head?
- Prompt: Do you think you are smart in math? Why or why not?
- (Agree / Disagree / Neutral or Not Sure) "My peers think I am good at math."
- (Agree / Disagree / Neutral or Not Sure) "In math, it's okay if I get an answer wrong."
- (Agree / Disagree / Neutral or Not Sure) "I see mathematics as a subject I will use often throughout life."
- (Agree / Disagree / Neutral or Not Sure) "I value the input of my peers when I'm working on a math problem."

Additional questions can be taken from the Math Mindsets and Attitudes Survey in Appendix L with a facilitation guide in Appendix M.

Do now: implement a math mindset and attitudes survey in your classes and in your math department.

Extend: As a department, analyze the data to make instructional choices. Select a future date to implement it again.

Promote mathematicians with diverse identities



Floy Agnes Lee From DoE Women in Stem poster

Through research, visual displays, or other means, provide students with examples of mathematicians who do not identify as while or male. Let students see the richness of mathematics through mathematicians' biographies from diverse backgrounds.

WHY: Many students, especially students who do not identify as white or male, see the discipline of math as one closed off to them. Many resources, textbooks, and biographies have been presented to students through a myopic lens. Promoting mathematicians of diverse backgrounds helps invite more students into the subject.

Below are a few activities and methods to promote diversity in mathematics.

Research activity: Have students research one notable mathematician and develop a presentation or written paper, noting their background and contribution to the field of mathematics.

Create a poster: Have students create a biographical poster, with pictures, noting an individual mathematicians achievements and contributions (See DoE example below).

Extend: In addition to noting mathematicians' skills and habits, connect it to individual students' strengths as a mathematician.

Supporting resources:

Mathematicians Are Not Just White Dudes from Annie Perkins: https://arbitrarilyclose.com/2016/08/21/the-mathematicians-project-mathematicians-are-not-just-white-dudes/

Selected short biographies in Appendix B of Necessary Conditions

Department of Energy (DoE) Women in STEM poster series https://www.energy.gov/articles/new-classroom-poster-series-spotlights-women-stem

Watch / Read / Listen about math

Individually, as a staff, or as a class, select accessible artifacts created by or about mathematicians. Discuss what you saw, read, or heard to gain an appreciation and understanding of the discipline.

WHY?
Students often have misconceptions about what the discipline of math entails. There's never been as much content about math that's been accessible to everyone. From videos, to books and everything in between, mathematicians are increasingly communicating complex ideas through engaging media.

Books

How Not to Be Wrong: The Power of Mathematical Thinking by Jordan Ellenberg
The Joy of X: A Guided Tour of Math, from One to Infinity by Steven Strogatz
Thinking Statistically by Uri Baum
Women in Mathematics by Lynn Osen
Measurement by Paul Lockhart

Articles

"A Mathematician's Lament" by Paul Lockhart, Mathematical Association of America
"No Such Thing as a Math Person" by Perri Klass, MD, The New York Times
"The Unforgiving Math that Stops Epidemics" by Tara Smith, Scientific American
"How Animals Got Their Spots and Strips – According to Math" by Thomas Wooly, Scientific American
"The Pursuit of Beauty" by Alec Wilkinson, The New Yorker

Videos

Steven Strogatz and Hilbert's Infinite Hotel
"Navajo Math Circles," PBS
"The Mathematics of Love," Hannah Fry
"The magic of Fibonacci numbers," Arthur Benjamin
"Why I fell in love with monster prime numbers," Adam Spencer
"The beautiful minds," Cedric Villani

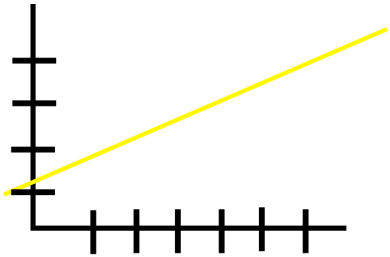
Audio

"Remembering Maryam Mirzakhani," NPR
"Mathematics' Unintended Consequences," In Our Time
"How Much Brain Damage Do I Have?" Freakonomics
"Henri Poincare," A Brief History of Mathematics
"On Average," 99% Invisible

Do now: select one of the provided artifacts to view, read, or listen to. Or, one of each.

Extend: Use the discussion to develop a list of habits of a mathematician.

Teaching for a Growth Mindset



Implement practices in your instruction that promote a growth mindset. Three change categories are presented here (from speed to thoughtfulness, from correctness to effort, and from grades to demonstrations of knowledge).

WHY?
The brain can grow and get stronger with effort and persistence. However, much of math instruction centers around a “fixed mindset.” (Dweck 2016)

From speed to thoughtfulness

- 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

- 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 a demonstration of knowledge

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

Concept: 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” (Krall 2018). This occurs often in secondary math around race and gender.

Seminal research

"Stereotype Threat and Women's Math Performance" (Spencer, Steele and Quinn 1999)
"Parents' Influence on Children's Achievement-Related Perceptions" (Frome and Eccles 1998)
"Gender Role Stereotypes, Expectancy Effects, and Parents' Socialization of Gender Differences")Eccles, Jacobs, and Harold 1990)
"Stereotype Threat and the Intellectual Test Performance of African Americans" (Steele and Aronson 1995)
"The Development of Implicit Attitudes: Evidence of Race Evaluations From Ages 6 and 10 and Adulthood," (Baron and Banaji 2006)
"Black students face more discipline, data suggest" (Lewin 2012)

"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. ... ADDRESSING THEM REQUIRES EXPLICIT ACTION, NOT PASSIVITY. "(KRALL 2018)

How it shows up in school:

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.

Strategies to combat stereotype threat

- Begin implementing restorative circles.
- Track your conversations (via video or an observer).
- Look at the demographics of STEM clubs and upper-level math courses and look for disparities among race and gender.
- Create a STEM club specifically for girls.
- Make sure (document if necessary) that you are interacting with every student in the classroom on an academic and non-academic level.
- Conduct regular empathy interviews with students.

Restorative Circles

Restorative circles are an opportunity for classmates and teachers to connect personally. Restorative circles work best when they are routine and expected.

WHY?
Restorative circles can help students develop relationships among each other and the teacher. Adolescents have so much going on academically and socially they need time to listen and let their voice be heard. The practice is intended to be equitable and open. It's also important to have an understanding of the emotional tenor of the classroom before diving in too deep with restorative circles.

Restorative Circles Process

Step 1: Teacher and students gather in a circle. Often participants place something of importance in the center of the circle.
Step 2: The facilitator (which can be a student) holds a talking piece and gives a discussion prompt. Only the person with the talking piece may talk. The first prompt ought to be welcoming and light.
Step 3: After giving the prompt, the facilitator passes the talking piece to the next participant. After sharing their response, that participant passes the talking piece again, and so on, until everyone has held the talking piece. Anyone may choose to pass (not answer) for any reason.
Step 4: The facilitator gives another prompt, often deeper than the first prompt. Repeat the passing of the talking piece.
Step 5: The facilitator gives a final prompt, potentially one that yields energy for the day or closure to the experience.

Suggestions for Prompt 1:
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?

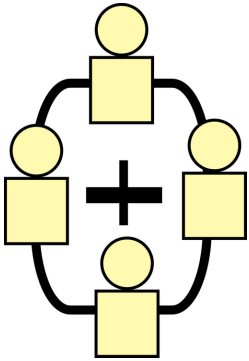
Suggestions for Prompt 2:
How might things be better for you today?
Have you wanted to disengage from the class recently?
What does it mean to be a friend?

Suggestions for Prompt 3:
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?

Do now: Facilitate a restorative circle in your class.

Extend: Establish a restorative circle routine. Learn more about restorative circles at https://www.healthiersf.org/RestorativePractices/

Practice active caring



Active caring demonstrate unique care for each individual student on a personal level. It demands a two-way relationship wholly independent of a students' academic proficiency or social standing.

WHY?
Most teachers demonstrate passive caring, in that they care generally about their students. They don't actively dislike students, and may even have positive relationships with a few (often those who are hard working or have a magnetic personality).

Passive caring vs. 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.

Do now: brainstorm additional distinctions between passive and active caring.

Extend: set aside time in each class period to demonstrate active caring for students. If necessary, document those moments to ensure you get around to each student (either in a day or in a week, depending on your context).

Assign academic status

Offer academic praise to students. The praise must be public, specific, mathematical, and true.

WHY?
Offering public, authentic praise to students help flatten the academic status of the classroom. Rather than just a few students being elevated academically, offer insights into all students' strengths as a mathematician.

Assigning Academic Status

Step 1: Print out a class roster.
Step 2: Brainstorm how each student is mathematically smart, ideally multiple ways.
Step 3: Over the next few days, authentically and publicly praise students for that mathematical smartness. Document the interactions.
Step 4: Repeat throughout the year.

Do now: Follow the steps above to assign academic status.

Extend: Ask peers with the same students to brainstorm together how they are academically smart.