

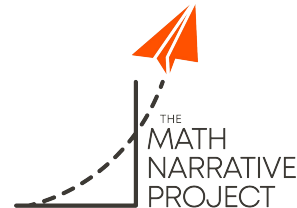


# Math Narrative Project Messaging Guide

A narrative change approach for people working to  
improve students' experiences learning math

March 2024

BILL & MELINDA  
GATES *foundation*





# ABOUT THE MATH NARRATIVE PROJECT

## Math is a deeply emotional subject for students, teachers, and parents\* alike.

*“When am I ever going to use this?”*

*“Math is so frustrating.”*

*“I’m just completely lost.”*

In America’s K-12 public schools, well-documented and persistent disparities in resources and learning outcomes have negatively affected students who are Black and Hispanic, and students from lower-income households.

The subject of math stands out as one uniquely rife with inequities and emotion. With the support of [The Bill & Melinda Gates Foundation](#), researchers from [Goodwin Simon Strategic Research](#) (GSSR) and [Wonder: Strategies for Good](#) (Wonder) investigated how cultural narratives impact how students see themselves, their abilities, and their potential as it relates to learning math.

**The Math Narrative Project** aims to advance an evidence-based messaging and narrative change strategy to improve math instruction and outcomes for 6th to 10th grade Black and Hispanic<sup>^</sup> students of all incomes and Asian American and Pacific Islander (AAPI) and white students from lower-income backgrounds. The project focuses on these students, as they are most likely to encounter systemic barriers to accessing high-quality math education and math resources.

From 2022 to 2024, Wonder and GSSR conducted research with 6th to 10th grade public school students, and the math teachers and parents who influence their learning experiences. The first phase of research focused on developing an understanding of how these groups think and feel about learning and teaching math. Researchers used insights from this first phase to develop hypotheses and then test narrative interventions and messages, with the goal of changing emotions and beliefs standing in the way of students’ math learning.

The recommendations that come from this research are aimed at shifting narratives, **so that more students have more positive experiences learning math.**

*\*Throughout this guide, the research team uses ‘parent’ to refer to both parents and guardians.*

*<sup>^</sup>Throughout this guide, the research team uses the term ‘Hispanic’. Consistent with what the research team heard in focus group discussions and in surveys, a 2022 [Pew Research survey](#) of 3,030 U.S. Hispanic adults found that 53 percent of Hispanics prefer to describe themselves as “Hispanic,” 26 percent prefer “Latino,” two percent prefer “Latinx,” and 18 percent have no preference.*



# ACKNOWLEDGMENTS

The Math Narrative Project received expert guidance from adult and youth advisors.

## Advisory Group

The project Advisory Group was made up of professionals working in the areas of math pedagogy, adolescent development, math identity formation, media, learning sciences, and educational psychology. Advisors provided feedback on research tools, messaging materials, and research findings, and informed the direction and understanding of the research in every phase.

**Dr. Kyndall Brown**, Executive Director, California Mathematics Project

**Grace Doramus**, Chief Innovation Officer, Beyond100K

**Sergio Estrada**, Science Design Fellow and Co-Lead facilitator, FUSE

**Dr. Knatokie Ford**, Founder, and CEO, Fly Sci Enterprise

**Dr. Jalisha Jenifer**, Associate Director of Faculty Development, Columbia University School of Professional Studies

**Dr. Avi Kaplan**, Professor of Educational Psychology, Temple University

**Dr. Dave Paunesku**, Co-Founder & Executive Director, PERTS

**Tawanna Rowe**, Algebra Teacher, Crystal Lake Middle School (Broward County, FL)

**Dr. Maria del Rosario Zavala**, Associate Professor of Elementary Education, San Francisco State University

## Youth Advisory Panel (YAP)

The project also benefited from the guidance and participation of young people participating in BUILD's youth fellowship program. The program aims to help empower young people as changemakers and CEOs of their own lives. For this project, YAP members received training in the research methodologies used for the project, and support from BUILD staff members Tiffani Hutton, Lydia Phillips, and Cindy Pineda. YAP members contributed to shaping research tools, developed test messages with the research team, and shared their personal stories about learning math. Their participation in this project was invaluable.

**Alejandra Ochoa**

**Aury Fernandez**

**Eddie Chable**

**Franciliana Barbosa**

**Judith Vasquez**

**Lourdes Hernandez**

**Marianny Solis**

**Mehrin Maisha**

**Monique McLean**

**Norma Martinez**





# ABOUT THIS GUIDE

**What is a messaging guide?** A messaging guide is a tool to improve communication around emotionally-complex issues – like advanced math learning. This messaging guide is not a script or a replacement for real and genuine conversations, but rather a collection of evidence-based best practices and tips for improving the effectiveness of these conversations. This guide was written by researchers and narrative strategists from GSSR and Wonder to provide guidance on how to effectively communicate with 6th to 10th grade students, parents, and math teachers. The recommendations are informed by messaging interventions developed and tested by Wonder and GSSR during this research project.

**Who should use this guide?** The following messaging recommendations are meant for anyone working to improve math education for 6th to 10th grade students — teachers, advocates, curriculum or professional development experts, researchers, district leaders, and funders.

**How can this help me?** By using these messaging recommendations in your work, you can help students to interpret their math experiences more positively and see that higher-level math (like algebra or above) is relevant to their lives. You can also support adults — math teachers and parents — to understand how their actions impact students' learning experiences.



Visit [mathnarrative.org](https://mathnarrative.org) for more details on methodology, the research team, narrative change, and more.



# Guide At-A-Glance

This section previews the main concepts shared in this Messaging Guide, the Research Insights and Messaging Recommendations.



## GUIDE AT A GLANCE (1 OF 2) : RESEARCH INSIGHTS

Among all three audiences — students, teachers, and parents — the research has yielded important insights about the nature of learning and teaching math.

- Learning and teaching math is a **deeply emotional experience** for students, parents, and teachers.
- Students' experiences of learning math are **informed by the context in which they live** and learn — including, for instance, learning interruptions from COVID-19, home life outside of the classroom, or the lack of availability of outside help for math learning.
- **Teachers and parents often struggle** — and sometimes do not think there is a need — to make math feel relevant to students' lives and futures.
- For many students and parents, **struggling** while learning math is **perceived as negative** and is often interpreted by others as an indication of one's capability to do math.
- Teachers sometimes **misinterpret students' struggles** learning math as “checked-out” behavior and may not always communicate to students that needing help is an inherent part of learning math.





# GUIDE AT A GLANCE (2 OF 2) : MESSAGING RECOMMENDATIONS

Based on the research insights and subsequent message testing, the research team developed messaging recommendations that provide guidance for practitioners working with students, teachers, and parents on how to effectively disrupt harmful narratives and replace them with more positive ones. For more detail, see page 28 -37.



**ELEVATE STUDENT AGENCY**



**ACKNOWLEDGE REAL-WORLD CONTEXT**



**ACKNOWLEDGE EMOTIONS IN MATH LEARNING**



**MAKE MATH RELEVANT**



**AFFIRM THE VALUE OF MISTAKES**



**ENCOURAGE HELP-SEEKING**



**REFRAME STRUGGLE AND CAPABILITY**



**REASSESS ASSUMPTIONS**

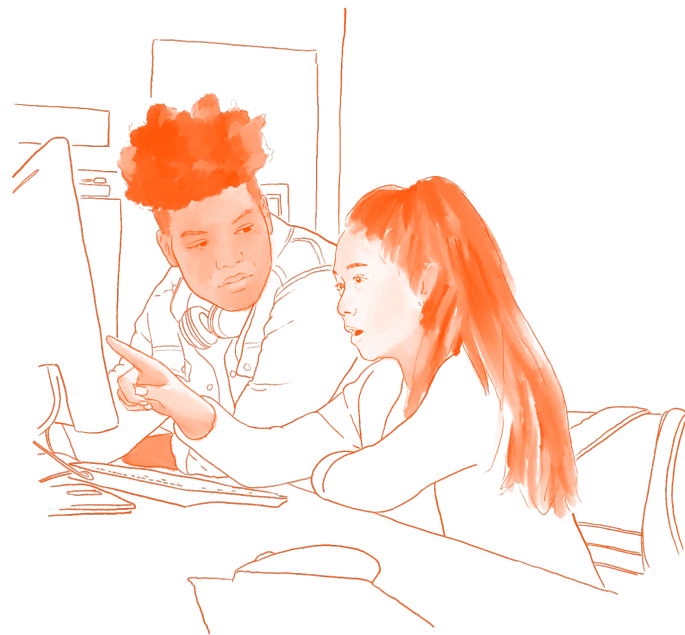


**PRIORITIZE BUILDING RELATIONSHIPS**



# TABLE OF CONTENTS

In Students' Own Words	9
What is Narrative Change?	13
Research Insights	17
Messaging Recommendations	27
Test Messages	38
Thanks from the Research Team	42







# IN STUDENTS' OWN WORDS

**"[Math is] fun because I like the games. Then sometimes it can be stressful because you just don't know what's going on. And then sometimes it's draining if you get too much work. Then sometimes peaceful when you get to class and you know what's going on."**

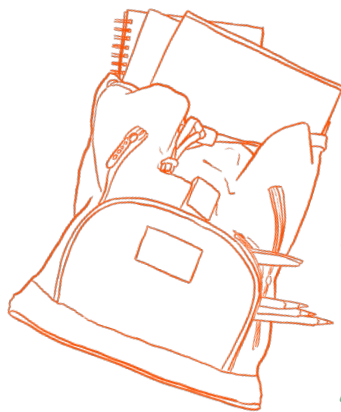
**Black Female, Student, FL**

*Source: MNP Student Qualitative Research*

**"It's really draining in trying to keep up with the others after they're getting it and you're not...we have to teach ourselves in a certain period, like in a certain time before it gets off to the next thing."**

**Hispanic Female, Student, CA**

*Source: MNP Student Qualitative Research*



**"I get anxious when asking questions in class because I don't want to look stupid...and math is one of my tougher classes to learn."**

**Hispanic Male, Student, TX**

*Source: MNP Student Survey Data, n1091 respondents*

**"The good stuff about math is, after reading it, you feel a completion and it feels you're actually doing something with math."**

**Black Male, Student, NY**

*Source: MNP Student Qualitative Research*

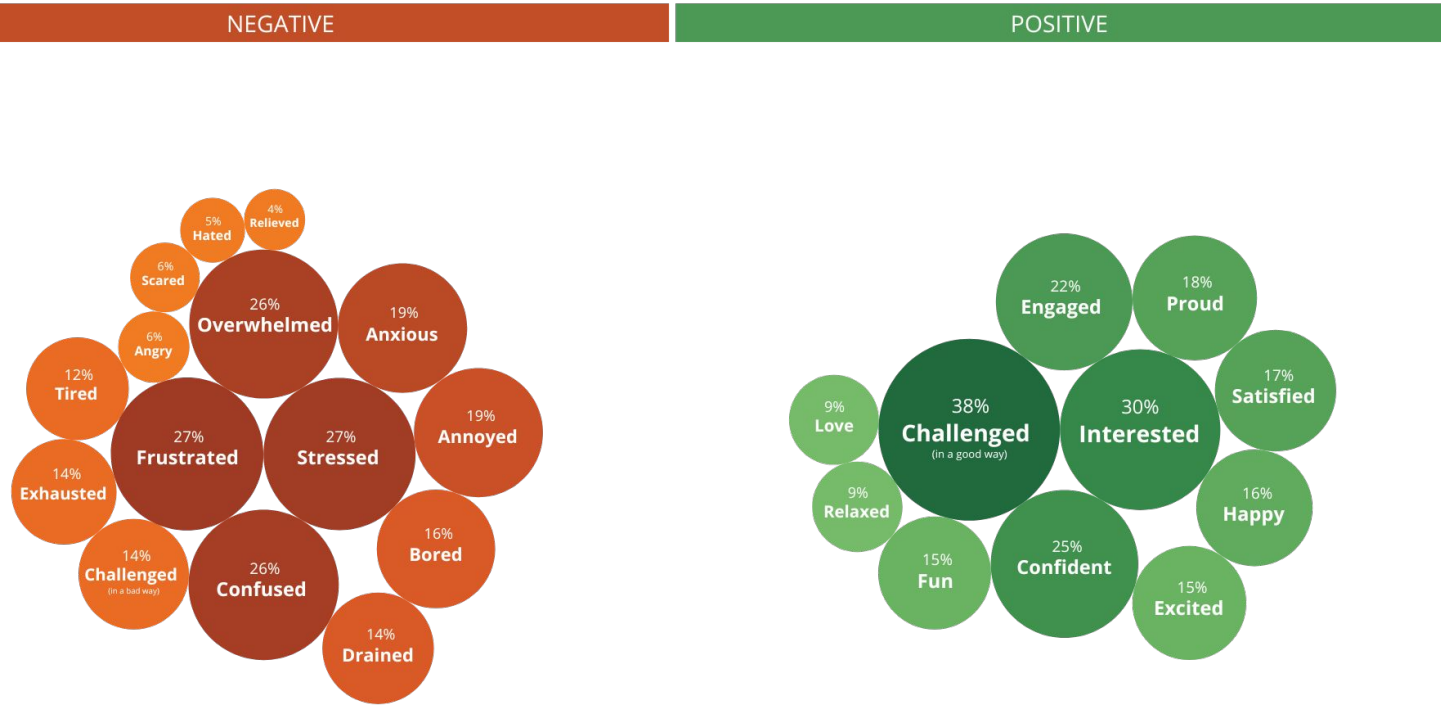
**"I think one of the things that can make math really stressful for students is that they have a fear of making mistakes. I find that relatable."**

**AAPI Female, Student, TX**

*Source: MNP Student Qualitative Research*

# STUDENT EMOTIONS ABOUT LEARNING MATH

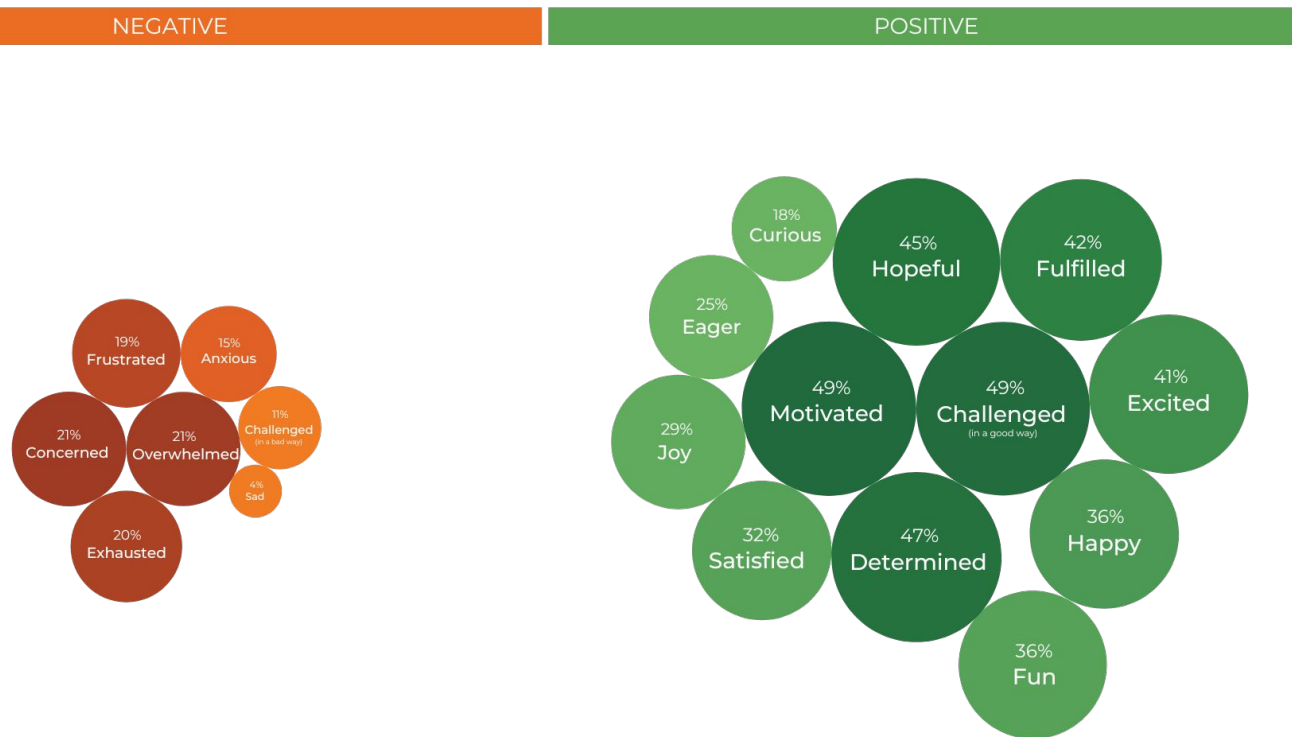
In a survey of 6th to 10th grade students, the research team asked how students feel when learning math.



The size of each bubble corresponds with how often the emotion was mentioned by research participants.  
Source: MNP Student Survey Data, n1091 respondents

# TEACHER EMOTIONS ABOUT TEACHING MATH

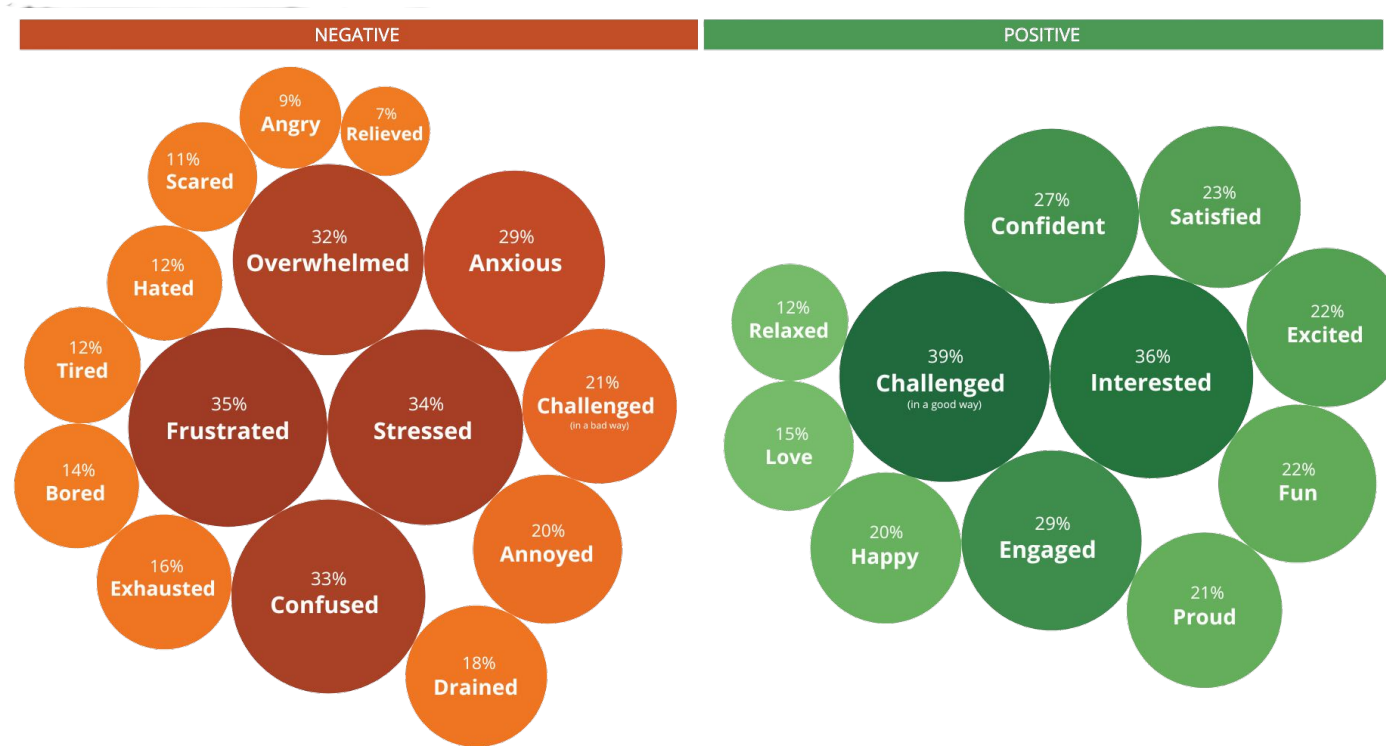
In a survey of 6th to 10th grade math teachers, the research team asked what emotions teachers have when they are teaching math.



The size of each bubble corresponds with how often the emotion was mentioned by research participants.  
Source: MNP Teacher Survey Data, n820 respondents

# PARENT EMOTIONS ABOUT LEARNING MATH

In a survey, parents of 6th to 10th grade students were presented a list of words and asked to describe the feelings they had when *they* were learning math.



The size of each bubble corresponds with how often the emotion was mentioned by research participants.  
Source: MNP Parent Survey Data, n2312 respondents

# What is Narrative Change?

This section defines narrative change as a tool to improve existing math learning experiences and describes the way students, teachers, and parents all interact within a narrative ecosystem.





# NARRATIVES, NARRATIVE CHANGE, AND NARRATIVE INTERVENTIONS

**Narratives** are systems of stories that shape our attitudes and behaviors and help us make meaning of the world around us. Narratives powerfully impact how students see themselves, their abilities, and their potential — and how teachers and parents think feel about learning and teaching math. Some narratives help students to persist in math, while others can be barriers to their learning.

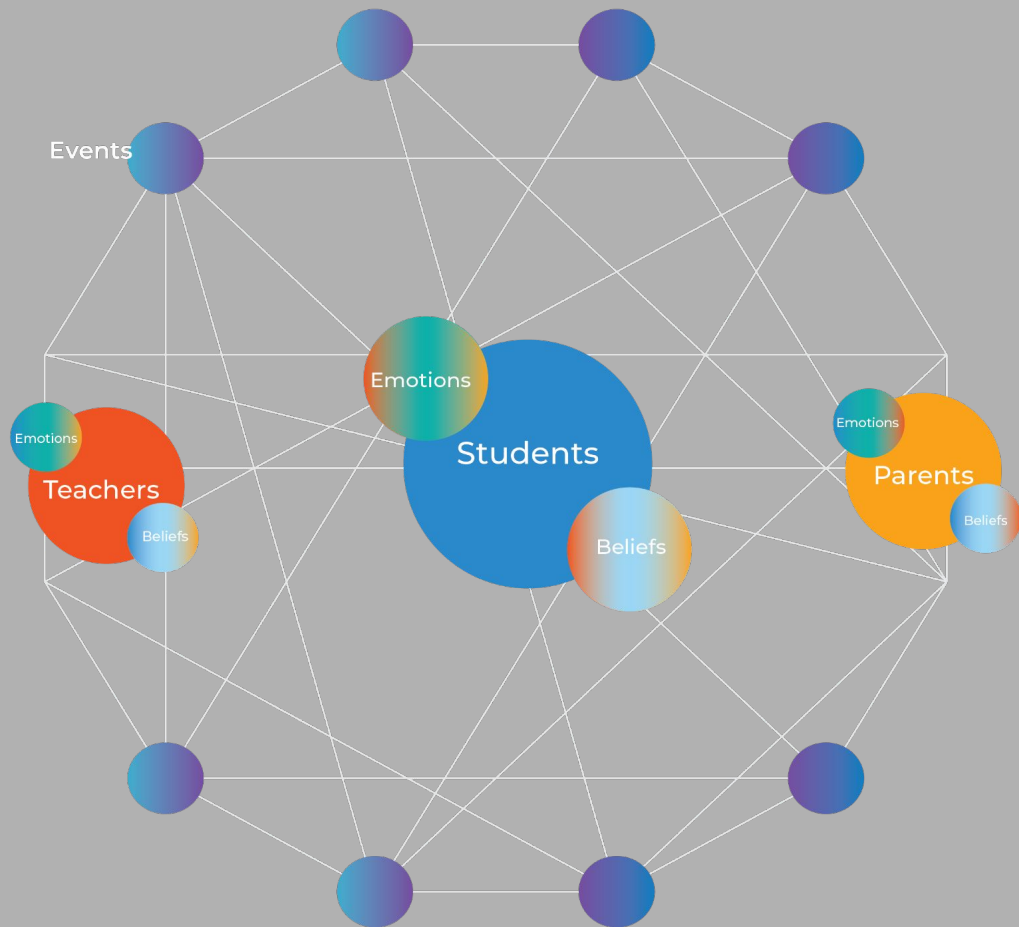
**Narrative change** is an effort to counter, modify, or replace existing narratives by creating and deploying new or different narratives. While many factors influence how students experience math instruction, the work of the Math Narrative Project is focused on the possibilities of *narrative change*. Narrative change can improve existing math learning interventions and facilitate the adoption of new interventions.

**Narrative interventions** are stories, messages, language, frames, and other narrative tools that are designed to connect to people's experiences and values — and act to change dominant narratives. Narrative interventions seed or model the beliefs necessary to help our audiences change how they think and feel about learning and teaching math. Examples include instructional materials, classroom teaching, teacher training and professional development, or online resources for students, teachers, and parents.

**Any intervention must be credible across all three audiences. Otherwise, a narrative shift effort may receive pushback from one of the audiences, undermining the ability to drive narrative change among the other audiences.**



## Experiences



# NARRATIVE ECOSYSTEM

Narrative ecosystems are systems of stories that shape the environments of how people feel about math. Adults create learning environments for students (teachers at school and parents at home).

The messaging recommendations in this guide aim to create an enabling environment for positive behavior change so that more students can learn more math.

For students, this can change how they see the relevance of higher-level math in their lives.

For adults, this can help them:

- Understand how their actions impact students' beliefs and learning experiences.
- Feel more motivated to help students persist when learning math feels hard.
- Feel equipped with positive narratives for themselves and to share with students.



# NARRATIVE CHANGE OPPORTUNITIES

Throughout this research, the research team worked to identify which narratives support or interfere with student motivation and learning, as well as the beliefs among adults that support or undermine student's ability to persist. Some narratives can be helpful (support math learning) or problematic (present a barrier to learning math).

For instance, to the right are some of the narratives about math learning that are problematic, and are interfering with the goal of ensuring more kids learn more math. The opportunity for narrative change is to disrupt or reframe these narratives.

There are also **real-world factors** influencing students, teachers, and parents everyday that narrative alone may not be able to impact (a few examples in the table below).

Students	Teachers	Parents
<ul style="list-style-type: none"> <li>• Help sometimes unavailable</li> <li>• COVID learning interruptions</li> <li>• Adolescence - social dynamics</li> </ul>	<ul style="list-style-type: none"> <li>• Students with different levels of math knowledge and language proficiency</li> <li>• Admin. and district requirements</li> <li>• Intervention fatigue</li> </ul>	<ul style="list-style-type: none"> <li>• Not all parents feel equipped to help</li> <li>• Shift to Common Core</li> <li>• Kids in adolescent development</li> </ul>

## EXAMPLES OF PROBLEMATIC MATH NARRATIVES FROM THE RESEARCH:

- Some people are **good at math**, and some people are not.
- If a student **struggles** while learning math, no amount of **support** will help them get better.
- A **teacher's job** is to teach; a **student's job** is to learn.
- Higher-level math like algebra is **only valuable** as a **gatekeeper** subject.
- Higher-level math is **only relevant** to a few **STEM careers**.
- **Math learning** is rational, **not emotional**.



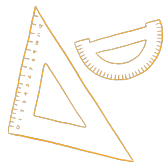


# Research Insights

This section details the research findings among all three audiences – students, teachers, and parents – about the nature of learning math, as well as the beliefs and cultural narratives held by these audiences.



# RESEARCH INSIGHTS: AN OVERVIEW



Insights from this research provide a rich evidence base for anyone working to strengthen math instruction and help students have better experiences learning math (e.g., math curriculum and technology designers, professional development and teacher prep, district leaders, or funders).

Across all three audiences — students, teachers, and parents — the research has yielded important insights about the nature of learning math. Most prominently, the research team discovered that **learning and teaching math is a deeply emotional experience** for all. Students reported a wide range of emotions about learning math, with a majority reporting having only negative or mixed emotions, rather than having only positive ones, and parents have distinct (often negative) memories of learning higher-level math. For teachers, their negative emotions can interfere with them being able to better support students who may be struggling to learn higher level math.

Students' experiences of learning math are **informed by the context in which they live and learn** — including, learning interruptions from COVID-19, home life outside of the classroom, class sizes, testing, or the lack of availability of outside help for math learning. There is also a heightened sensitivity towards social dynamics and fear of embarrassment during adolescence.

**Teachers and parents often struggle to make math feel relevant to students' lives** and futures. Sometimes, they do not think there is a need to connect learning math to things students understand, believe are real, and care about.

For many students and parents, **struggling while learning math is perceived as negative** and is often interpreted by others as an indication of having a limited capability to learn math. Many students report that understanding math concepts quickly and with ease is an indicator of being “good at math.”

When students struggle to learn math, teachers sometimes **misinterpret those struggles** as “checked-out” behavior and may not always communicate to students that needing help is an inherent part of learning math.



# RESEARCH INSIGHTS: STUDENTS

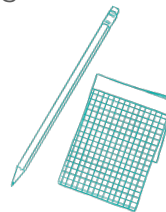
**“You wouldn’t need the Pythagorean theorem to change a tire or something. It’s kind of useless sometimes.”**

**Hispanic Male, Student, Texas**

*Source: MNP Student Qualitative Research*

## Many students believe that...

- ...most adults don’t need higher-level math (like algebra or above) in their lives. Sometimes they even hear that from adults themselves.
- ...higher-level math is only relevant to STEM careers or other highly specialized and technical fields/careers.
- ...making mistakes or not immediately “getting” new math concepts means they are not good at math.
- ...asking questions is embarrassing and means they are not smart enough to learn math.
- ...struggling to learn math is a sign that they are not good at math.
- ...If they are not good at math, they will never get better.



## Many students report...

- ...not knowing about negative stereotypes based on race or gender in math.
- ...assessments of their own math capability are fluid, not static, and are based on shifting external factors, including the teacher they have for math that year and the topic they’re currently learning about in math.
- ...that when they struggle in math, it means they probably won’t ever “get” the concept they’re struggling with.





# THE JOURNEY: CURRENT BELIEF TO DESIRED BELIEF

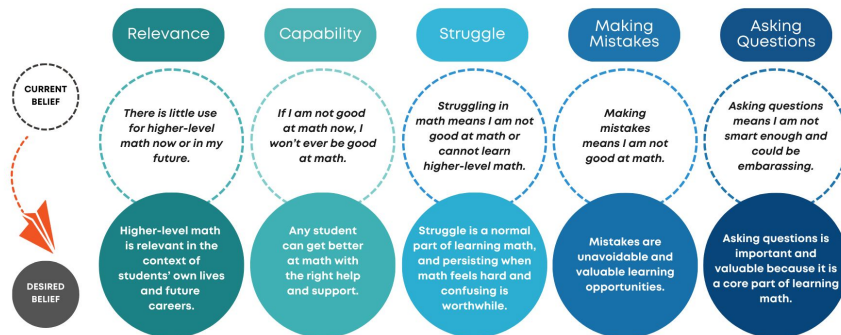
In order to create better math experiences for students, it is important to know the current **beliefs about math** each audience holds, as well as determining the desired beliefs they will hold when our narrative interventions are successful.

Each insights slide is followed by the beliefs pathway for their respective audience.

How the audience currently relates to the topic (e.g., the relevance of math)

Beliefs that support positive math experiences for students.

## Belief Pathway: Student



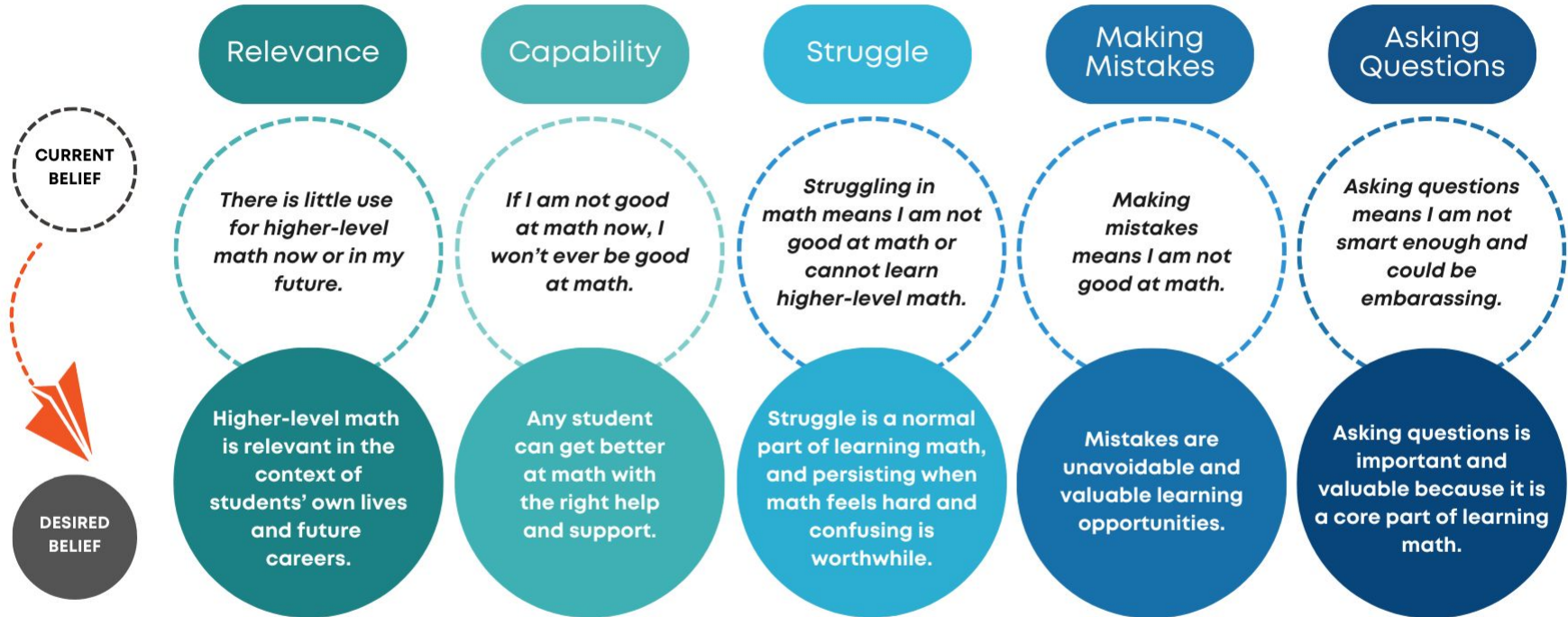
### Student Emotions



Learning math is emotional for students. Negative emotions often interfere with math learning.



# Belief Pathway: Student



## Student Emotions



Learning math is emotional for students. Negative emotions often interfere with math learning.



# RESEARCH INSIGHTS: TEACHERS

## Many teachers believe that...

- ...students' emotional experiences are not relevant to learning math — or at least that teachers don't have a role in helping students understand and manage their emotions about math.
- ...it is a student's responsibility to seek or ask for help when they need it.
- ...some students just can't get higher-level math.
- ...they are students' first support for learning — and also that students are in class only a small percentage of the time. Many express a desire for more parental involvement in math learning at home.
- ...relationships and feeling they belong in the classroom are important for their students, but there are many things outside their control that can get in the way of making those things a priority (e.g., administrative demands, standardized testing, and pacing).
- ...in order to balance the demands placed on them with the needs of their students (who often have vastly different levels of math knowledge and capability) teachers often feel they need to prioritize students whom they perceive as putting in effort.

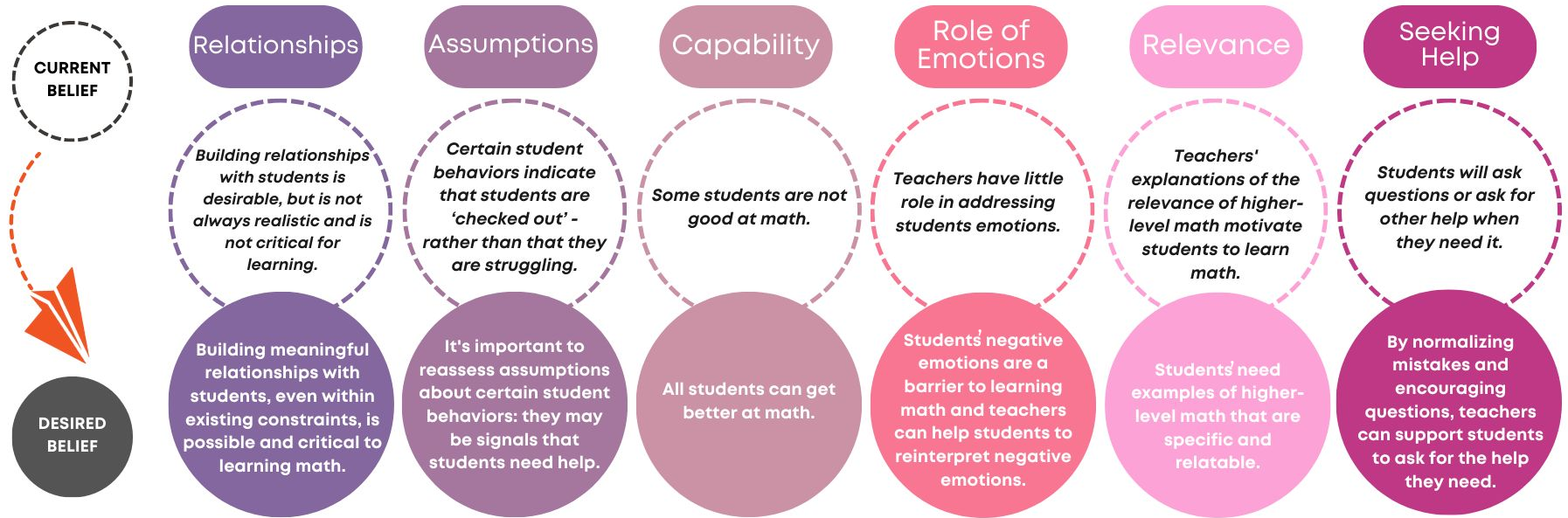
**“We all have that math brain. It comes easier to us. You’ve heard that some people are math-brained — left brain, right brain, and all that.”**

**White Male, Teacher, New York**

*Source: MNP Teacher Qualitative Research*



# Belief Pathway: Teacher



## Teacher Emotions



Teaching math is emotional for teachers. Many of these emotions are positive, but negative emotions can interfere with teachers' capacity to help students learn math.



# RESEARCH INSIGHTS: PARENTS

## Many parents believe...

- ...basic math skills such as addition, multiplication, and percentages are valuable and useful, especially for dealing with money and finances, but most people won't ever need higher-level math like algebra.
- ...they haven't personally needed higher-level math to get by as an adult, especially those who struggled with math growing up, and have still done "just fine" in life. As a result, they believe their children will not need higher-level math either.
- ...in the idea of a "math person" and feel it is someone who is both good at math and who likes math and that these traits are innate, rather than malleable, and shaped by students' environments and experiences.
- ..."good parents" should be able to help their children with learning math, but many feel they personally are not able to, or believe their child's teacher is more equipped to help.
- ...a parent's role is to protect their children, and some parents see high expectations for their child's math learning as placing unnecessary stress on children who are struggling.
- ...when they see their children struggle at learning math, they think their children are not good at it.

**"Some things just come to people naturally...I think it's a mix between understanding that maybe this person is just inherently not strong in a certain subject, but also identifying the ways that they do learn to maybe expand how the subject is taught."**

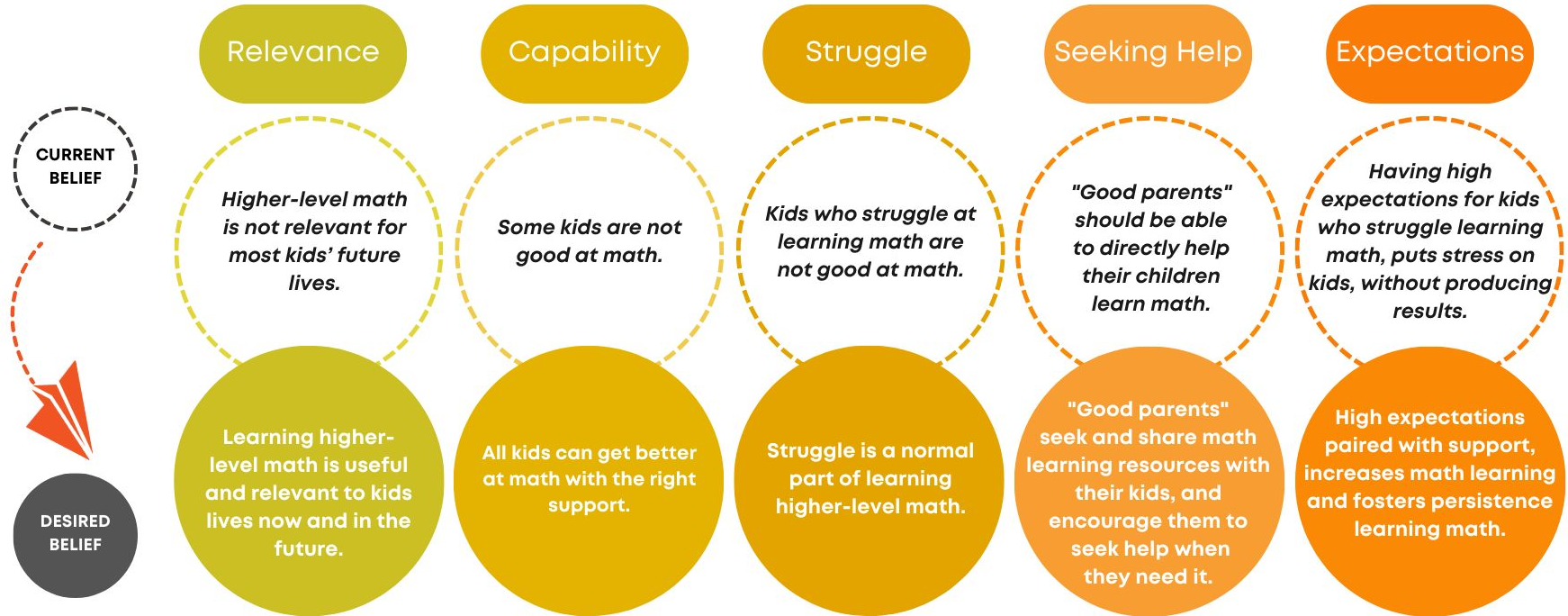
**Black Female, Parent/Guardian, California**

*Source: MNP Parent Qualitative Research*





# Belief Pathway: Parent



## Parent Emotions



Math is emotional for parents. Many parents have had negative experiences learning math.



# Messaging Recommendations

This section shares messaging recommendations (guidance on how to disrupt problematic math narratives). The messages were derived from the research insights shared on previous slides and from testing messages.



# MESSAGING RECOMMENDATIONS OVERVIEW



**ELEVATE STUDENT AGENCY:** Messaging should elevate student agency and center students' emotions and experiences, which are critical to their math learning.



**ACKNOWLEDGE REAL-WORLD CONTEXT:** Empathize with students, teachers, and parents by acknowledging and naming the real-world challenges they face.



**ACKNOWLEDGE EMOTIONS IN MATH LEARNING:** Normalize the emotional nature of learning math, and provide examples of how negative emotions can be reinterpreted.



**MAKE MATH RELEVANT:** Deliver credible and motivational messaging on the relevance, value, and utility of higher-level math for students' lives, desired careers, and futures.



**AFFIRM THE VALUE OF MISTAKES:** Normalize making mistakes as an important and valuable part of learning, including learning math.



**ENCOURAGE HELP-SEEKING:** Build student confidence to seek the help they need to learn math and equip parents and teachers with messaging that supports and encourages students to seek out help.



**REFRAME STRUGGLE AND CAPABILITY:** Reframe struggle from a sign of lacking capability to a sign of needing support.



**REASSESS ASSUMPTIONS:** Encourage teachers to reexamine their assumptions about what certain student behaviors mean and the impact of students' negative emotions on their math learning experience.



**PRIORITIZE BUILDING RELATIONSHIPS:** Show teachers the impact of their relationships with students on math learning, and support teachers to prioritize building relationships in their classrooms.



# RECOMMENDATION #1: ELEVATE STUDENT AGENCY



**ELEVATE STUDENT AGENCY:** Messaging should elevate student agency and center students' emotions and experiences, which are critical to their math learning.

**FOR STUDENTS:** Position students as active participants in their math learning with messages that:

- Feature peers who describe their own experiences learning math, and how their choices have enabled them to be persistent when math gets difficult.
- Elevate near-peer student messengers (an older student close in age) who have a range of experiences and feelings about math to help students relate more positively and quickly to the message.

Messages about math learning should balance honesty with agency.

- For example, messages should be honest about the aspects of students' math education over which they have little or no control (e.g., the stakes of making a mistake on a test, state-wide testing, a district requirement that they take certain classes to graduate) and also emphasize the parts of their lives over which they do have control (e.g., asking for help from a teacher, finding resources online, getting help from a friend).

**FOR TEACHERS:** Encourage teachers to be curious and have empathy about students' emotions and experiences learning math, in part by positioning students as critical messengers. You can:

- Share a diversity of first-person student stories that give teachers insight into students' emotional experiences learning math.
- Show teachers the barriers that discourage some students from seeking help and the impact teacher behavior has on students' learning environment.
- Create opportunities for teachers to hear from young people (who are not their own students) about their math classroom experiences to foster empathy and understanding.

**FOR PARENTS:** Encourage parents to get curious about their child's math learning experience.

- Equip parents with questions they can ask to get their child to share more about their experiences learning math.
- For example, parents can describe steps they took to get their kids to open up about their experiences learning math, and the changes they then took to better support their child's math learning.

Show parents how kids can exercise agency in their math learning.

- Share short stories that center a diversity of choices a student can make to positively impact their learning. (e.g., include decisions a student makes every day in math class: asking for and accepting help, seeking or accepting resources, whether to do homework or not, deciding to practice a sport, music, theater, dance, etc.)



## RECOMMENDATION #2: ACKNOWLEDGE REAL-WORLD CONTEXT



**ACKNOWLEDGE REAL-WORLD CONTEXT:** Empathize with students, teachers, and parents by acknowledging and naming the real-world challenges they face.

**FOR STUDENTS:** Acknowledge the realities students face.

Examples reported by research participants include:

- Help is sometimes unavailable when students seek it
- Having a bad math teacher for one or more classes can interfere with math learning
- COVID learning interruptions and knowledge gaps
- Large class sizes/high student-to-teacher ratios
- Pacing of teaching and emphasis on testing and standardized testing outcomes

**FOR TEACHERS:** Acknowledge the constraints that teachers experience to help reduce their skepticism and make them more open to suggested changes. Some constraints reported by teachers include:

- Large class sizes
- Students with different levels of math knowledge and language proficiency in the same classroom
- Gaps in learning from COVID-19 pandemic
- Student absences
- Administrative and district pressure and requirements
- Pacing and curriculum requirements
- Emphasis on testing and standardized testing outcomes

**FOR PARENTS:** Affirm parents' desire to be a “good parent” implicitly or explicitly. Affirm that parents face many challenges, have good intentions, and want to do right by their children.

- Acknowledge that most parents strive to be “good parents,” and want to be able to help their children succeed, including finding resources to support their child when learning math gets hard.
- Emphasizing the ways parents can support their child’s math learning with other resources, rather than needing to be able to directly help them.

Acknowledge the factors that may influence how parents feel about supporting their child’s math learning, including:

- Parents' own experience with learning math and perception of their own math capability.
- The shift to Common Core, and how this makes it more difficult for some parents to help their children learn “new math”.
- Adolescent development, and the changes that young people go through physiologically, emotionally, and biologically between 6th and 9th grades.
- Emphasizing the ways parents can support their child’s math learning with other resources, rather than needing to be able to directly help them.





# RECOMMENDATION #3: ACKNOWLEDGE EMOTIONS IN MATH LEARNING



## **ACKNOWLEDGE EMOTIONS IN MATH LEARNING:**

Normalize the emotional nature of learning math, and provide examples of how negative emotions can be reinterpreted.

**FOR STUDENTS:** Position students as active participants in their math learning with messages that:

- Feature peers who describe their own experiences learning math, and how their choices have enabled them to be persistent when math gets difficult.
- Elevate near-peer student messengers (an older student close in age) who have a range of experiences and feelings about math to help students relate more positively and quickly to the message.

Messages about math learning should balance honesty with agency.

- For example, messages should be honest about aspects of students' math education over which they have little or no control (e.g., the stakes of making a mistake on a test, state-wide testing, a district requirement that they take certain classes to graduate) and also emphasize the parts of their lives over which they do have control (e.g., asking for help from a teacher, finding resources online, getting help from a friend).

**FOR TEACHERS:** Encourage teachers to empathize with students' negative or mixed emotional experiences learning math.

- Use stories of peer teachers to show teachers they have a role in helping students reinterpret their emotions.
- Provide teachers with examples of concrete things they can say to students to help them reinterpret their emotions in real-time. For example, teachers may adapt the following statements:
  - When you're feeling frustrated, confused, or overwhelmed, that's a signal to ask questions and get extra help.
  - When you feel lost in class or don't understand, it can be embarrassing to ask for help. Those moments are the best time to get extra support. Even though it's hard, it's important for you to ask for the help you need.

**FOR PARENTS:** Help parents reduce their stress and manage their own negative emotions about learning math by showing how they can provide support to their child(ren) without passing down their own negative emotions.

Acknowledge negative emotions and affirm struggle as a normal part of children's math learning process. This can help debunk the notion that some students are naturally good at math and help to reduce parents' stress about their child's math learning. You can do this by:

- Offering suggestions for how to speak with their child about their math learning experiences.
- Pairing messages that address or acknowledge students' negative emotions with messages about higher-level math relevance, student capability, and available resources.



# RECOMMENDATION #4: MAKE MATH RELEVANT



**MAKE MATH RELEVANT:** Deliver credible and motivational messaging on the relevance, value, and utility of higher-level math for students' lives, desired careers, and futures.

**FOR STUDENTS:** Deliver credible messaging on higher-level math's relevance, value, and utility for students' lives and futures.

- Include examples of relevance that students understand, believe are real, and care about, such as: keeping your career options open; financial literacy; and having greater financial power so you don't get scammed or cheated.

Alleviate heightened stress about learning math by pairing messaging about relevance with messages that show students where and how they can get help, support, and resources.

Use different examples that resonate to different degrees with different young people:

- Examples should show how math is used in that specific instance.
- Examples should include a mix of concepts and applications so that students at different points in their math education can relate.

**FOR TEACHERS:** Affirm that teachers get asked frequently about the relevance of math and find it challenging to provide answers that students find credible.

- Provide a range of different examples about the relevance of math so that different students have more opportunities to connect (e.g., the immediate relevance of learning higher-level math may resonate more with middle school students compared to career-oriented examples, though it is helpful to use both).

Frame messages about the relevance of math for students as a “toolbox” for teachers, which reinforces the idea that no single example of relevance will work for all students or for all teachers.

Provide examples about the relevance of math connected to contexts students understand, believe are real, and care about.

**FOR PARENTS:** Share credible examples with parents of how higher-level math is relevant for students' lives, futures, agency, and “adulting.” Effective examples for parents about the relevance of math connect to contexts that they and their children understand, and believe are real.

Frame higher-level math as opening more career paths to young people rather than being a requirement for a good career (e.g., “higher-level math helps students have more choices about what they do in their lives.”)

**DOWNLOAD:** [How to talk to students about math relevance](#)





# RECOMMENDATION #5: AFFIRM THE VALUE OF MISTAKES



**AFFIRM THE VALUE OF MISTAKES:** Normalize making mistakes as an important and valuable part of learning, including learning math.

**FOR STUDENTS:** Normalize making mistakes as an important and valuable part of learning.

- Remind students that most people make mistakes when learning something new.
- Draw parallels to learning other subjects or skills, including sports, gaming, music, and other activities that students enjoy and feel positively about.
- Use messages from teachers and near-peers to help ease students' negative feelings about making mistakes.
- Be honest that mistakes carry different consequences in certain contexts, like homework or in the classroom; failing to acknowledge that mistakes on tests are higher stakes can undermine the credibility of the messaging.

Affirm that making mistakes is not a reflection of a student's overall capability or potential but rather an indication that you need more help or support.

- Include messaging that encourages asking questions and seeking support.

**FOR TEACHERS:** Show teachers how to respond positively when students make mistakes and address negative emotions such as embarrassment or fear that students often experience when they make mistakes.

- Acknowledge mistakes that students — or adults — make as opportunities for learning.
- Model how you can unpack a mistake to learn from it.
- Affirm that making mistakes does not reflect a student's overall capability but rather indicates needing more help or support.
- Acknowledge that some mistakes come with higher stakes than others: mistakes in homework or in the classroom can be learning opportunities, whereas mistakes on tests are more consequential. Not acknowledging these differences can undermine the credibility of the messaging.

Help teachers realize that students need to hear explicit messages that reframe making mistakes as a valuable part of the math learning process. You can:

- Share stories from students describing how they feel when they make mistakes and how teachers respond.
- Include negative experiences, such as a student who feels embarrassed or ashamed about mistakes, to help teachers build empathy for students.
- Include positive experiences, such as a student who feels good when a teacher responds non-judgmentally to a mistake by breaking down the specific steps to solving a problem.







# RECOMMENDATION #6: ENCOURAGE HELP-SEEKING



**ENCOURAGE HELP-SEEKING:** Build student confidence to seek the help they need to learn math and equip parents and teachers with messaging that supports and encourages students to seek out help.

**FOR STUDENTS:** Encourage students to recognize that asking questions is a valuable part of the learning process and that everyone has questions at some point in their learning.

- Share stories of students who demonstrate and model confidence and have the agency to ask questions in and out of the classroom.

Take the stigma out of asking questions during math learning:

- Convey that everyone needs to ask questions when they are learning new things, with messages such as “questions are part of understanding new ideas.”
- Utilize teacher messengers who model supportive responses to students’ questions.
- Acknowledge that fear of embarrassment and social anxieties are a normal part of adolescence and may be present for many students.

Share stories of students who asked a question despite their concerns of being embarrassed and had a good experience. Or share instances in which students found ways to ask a teacher for help privately or to ask their peers.

Expand students’ perceptions of the places and people who can assist them with learning math.

**FOR TEACHERS:** Encourage teachers to understand better the barriers to seeking help that many students experience. You can:

- Use student stories or reflection questions to motivate teachers to encourage students to ask questions in the classroom and notice how they may be inadvertently discouraging questions.
- Remind teachers about the realities of students’ developmental age.

Guide teachers to feel better equipped to encourage students to seek help by using messaging interventions that:

- Share stories of peer teachers who have successfully created classroom environments where students regularly ask for help.
- Point out the sources students can easily access to seek help (e.g., in school, after school, online, one-on-one at the teacher’s desk, etc.)

Motivate teachers to create an environment in which students feel more comfortable asking questions with messaging interventions that highlight stories of other teachers who started more actively soliciting questions in group settings or one-on-one, which took shame and embarrassment out of learning.

**FOR PARENTS:** Affirm parents’ desire to be “good parents” who can help their child learn math, even if the help is not direct support for homework. Build confidence among parents to seek resources and support for their children when learning math feels hard.

Provide parents with lists of resources that include a diversity of options with varying levels of financial cost and time commitment.





# RECOMMENDATION #7: REFRAME STRUGGLE AND CAPABILITY



**REFRAME STRUGGLE AND CAPABILITY:** Reframe struggle from a sign of lacking capability to a sign of needing support.

**FOR STUDENTS:** Normalize the experience of struggle while learning math by acknowledging that struggle while learning is a common experience and not inherently a sign that you're bad at something.

Reframe struggle from a sign of lacking capability to a sign of needing support.

- Affirm that persisting through struggle with support is important for building stronger math skills.
- Encourage students to reflect on other parts of their lives that they enjoy (ex: sports, gaming, music, dance, etc.) where they have already demonstrated that they can engage with struggle in positive ways.

Use messengers, including adults and near-peers, who share their own experiences of struggle and describe how they overcame this and what resources helped them. These messengers can validate students' experiences of struggle, model how to reinterpret struggle, and point students toward resources that can help them.

**FOR TEACHERS:** Encourage teachers to reflect on when and why they determine that some students are unable or less likely to be able to learn higher-level math, like algebra. You can:

- Share stories of peer teachers who describe their own motivations to reconsider how they determine students' capability in the classroom.
- For example, spotlight stories where a teacher shares: when they realized they were assuming specific students could not or would not understand the materials; ignored students who struggle often or don't appear to get math. Then counter this with what led the teacher to question their own behavior, and how small changes helped them to engage with this student differently in order to get them the help they needed.

**FOR PARENTS:** Motivate parents to encourage their children to persist when learning math gets hard, by elevating three core messages as a package: 1) higher-level math is relevant and valuable, 2) anyone can get better at math with the right support, and 3) effective resources are available.

Tap into parents' existing beliefs about the value of persistence and apply it to learning higher-level math, using messaging that helps parents:

- Share the idea that mistakes are learning opportunities. Make comparisons to learning other skills or even something like exercise (e.g., "If your muscles are sore or you are short of breath, it just means you're challenging your body as you strive to get stronger.")
- Acknowledge negative feelings like frustration, but also try to surface other more positive feelings, like the satisfaction of persisting through something hard and eventually succeeding.





## RECOMMENDATION #8: REASSESS ASSUMPTIONS



**REASSESS ASSUMPTIONS:** Encourage teachers to reexamine their assumptions about what certain student behaviors mean and the impact of students' negative emotions on their math learning experience.

**FOR TEACHERS:** Encourage teachers to get curious about how students feel about learning math and the connection between student behaviors and student emotions.

You can:

- Help teachers to explore potential alternative reasons for student behaviors in class by reflecting on questions such as:
  - What do I believe confusion and frustration look like in my students?
  - Could this student feel lost or stuck on a problem or a concept or frustrated and overwhelmed, so they have given up?
  - How can I find out if something else is going on for this student?

Provide opportunities for teachers to reflect on how they interpret certain student behaviors.

You can:

- Share stories from students' perspectives that describe the behaviors they do when they feel stressed or overwhelmed, such as doodling, submitting a blank worksheet or test, or talking to another student in class.
- Encourage teachers to reflect on their own assumptions about what these behaviors (above) represent.



# RECOMMENDATION #9: PRIORITIZE BUILDING RELATIONSHIPS



**PRIORITIZE BUILDING RELATIONSHIPS:** Show teachers the impact of their relationships with students on math learning, and support teachers to prioritize building relationships in their classrooms.

**FOR TEACHERS:** Position building relationships as critical to learning math, an element of math learning that significantly helps students learn higher-level math effectively and successfully.

Leverage teachers' desire to help their students to motivate and encourage teachers to take on and try out interventions. You can:

- Show the power of small changes teachers can make to build and strengthen relationships with students
- Provide a range of small-scale interventions aimed at teachers and share how these interventions have been successfully adapted by other teachers with minimal preparation and time investment.

Show teachers how developing good relationships with students has a positive impact on their math learning and support teachers to prioritize building relationships with students in their classrooms.

You can:

- Tap into the beliefs most teachers have about the importance of belonging and relationships for students' learning.
- Utilize stories from both students and peer teachers to emphasize the importance of building empathy and trust in the classroom, and how once built, trust yields positive learning outcomes.
- Provide examples that match the varied needs and realities of different types of teachers (e.g., new and seasoned), working with different student demographics, in different geographic and political contexts.

The slide features a solid orange background. On the left side, there are two intersecting dashed lines that form a large 'X' shape. In the upper right quadrant, a white paper airplane icon is shown, with a dashed line trailing behind it from the top left towards the right, suggesting movement or direction.

# Test Messages

This section provides evidence for why the messaging recommendations were effective with students, teachers, and parents. A few example test messages are deconstructed to demonstrate how the test messages informed the messaging recommendations.



# WHY THIS MESSAGE WAS EFFECTIVE

## Sample video message of Hispanic female near-peer tested with student audience

"When I think about math, I feel anxious, nervous, and honestly, I don't really like it. And I think this is because always in the math classroom from a young age, I just felt dumb or just super slow compared to the rest of my classmates. There's just so many steps and so many things to remember, and I feel like there's even just this pressure where it's like, math is so useful...it just makes it that much more difficult to learn. I would feel like I just wanted to cry.

In middle school, I had a lot of substitutes, and anytime that I needed just help, I wasn't able to get it. And when moving on to high school, it just made it that much more difficult because I didn't have the basic math. When math got difficult, I didn't really go to my parents just because they didn't really know much about math, so I would go to my siblings.

My brother was in college, and it was really nice because he would be able to break down the steps and really help me and be like, oh, no, you need to understand this part in order to continue on. I just needed that clarification and make sure that I was doing things correctly, because sometimes I would just doubt myself. And that doubt made it so that I would get that answer wrong.

My best resource was also Google because there's a lot of applications or websites that you can download, and I would use them just to check my work because sometimes it's just a little tiny thing that you get wrong, and it makes the rest of the problem incorrect. For me, mistakes were helpful because once I made that mistake, it stuck with me. I was like, I'm never going to make this ever again. So I would always recheck the problem and be like, let me make sure that the mistake that I made last time isn't happening again. But when I finally get a math problem that I've been struggling with correct, it's like, I feel like I've conquered the world...

What motivated me to ask for help was because I knew nobody else was going to help me. A lot of people have told me I have this really calm face, or they don't know how to read me, so just knowing that I knew that people weren't going to know if I was confused or not, so I had to seek it out because nobody else was going to do it for me.

Even though I don't really like math, it did come in handy once my senior year knowing how to read my financial package and what the numbers meant. I'm not super rich, so I need to make sure that the amount that I would have to pay wasn't too high."



**Acknowledge emotions in math learning:** The messenger talks about her own negative emotions learning math, which helps to normalize them. She then goes on to say that her eventual response was to seek help, and when she was able to succeed after getting help and get a problem correct, she had more positive emotions.

**Acknowledge real-world context:** The messenger shares her experience having to learn without a consistent math teacher, and without much help from her parents, which is an experience many students can relate to.

**Encourage help-seeking:** The messenger models some of the different ways she was able to get help when her parents couldn't help her.

**Affirm the value of mistakes:** The messenger reflects on mistakes she's made, and says both that mistakes are not a sign of lacking capability (often just a "little tiny thing"), and also that making a mistake in practice can be valuable because it helps you remember that concept for the future.

**Elevate student agency:** The messenger talks about how she decided to take action in her math education after realizing that she is the one with the power to seek out what she needs to learn math.

**Make math relevant:** The messenger gives a concrete and relatable example of how learning higher-level math can be helpful in the real-world.



# WHY THIS MESSAGE WAS EFFECTIVE

## Excerpt from sample message statement as part of a news article tested with parent audience

For this article, Maria [a local mother] and Mateo [her son who has been struggling with algebra] agreed to meet Dr. Harris [a child psychologist and education researcher who specializes in adolescent development] and talk with her, together, about what was going on with Mateo and math, while this reporter listened in. After introductions, Dr. Harris asked open-ended questions of both, like, “Describe yourself as a parent,” and, “Describe how math class has been making you feel.” After both Maria and Mateo responded to these questions, Dr. Harris gave Maria time on her own to discuss how she might include some of these tips in her parenting – for all three of her kids.

- 1) **Parents need to listen to their child.** Although it's natural for parents to feel impatient or lose their tempers, try to avoid sounding confrontational. Find out what's going on through gentle prompts, like, “What is most confusing to you about math?” “Do you feel like you can ask questions?” “Does your teacher offer extra hours for you to stop by and ask for help?” When Maria and Mateo practiced this part, Maria discovered that Mateo had struggled with long division and fractions in elementary school, but had somehow powered through until he got to algebraic concepts and equations. This time around, nothing he did seemed to help and he just ended up feeling more and more lost.
- 2) **Parents need to be careful about how they pass on their own math experiences to their children.** Some parents excelled at math, others struggled for years, and still others were just okay. No matter what parents' own experiences were, they will likely impact how they talk about math with their kids. “I was a good math student, but I had a really tough time with calculus,” admits Maria. “But I realized that it wasn't helpful for Mateo to hear that I sailed through algebra and then hit a brick wall with calculus. What was helpful was for me to convey to Mateo that both success and struggle are normal and sometimes even helpful.” Mateo nodded in agreement when Maria said this, saying, “It was such a relief to hear that my mom had struggled with math, too, even though it wasn't the same struggle I was having. It made me realize that maybe struggle is just a part of life, even though it feels really stressful in the moment.”
- 3) **Parents can find different ways to support their kids to learn math.** “We're not a wealthy family, although we do all right,” says Maria. “I know that a lot of moms are like, ‘just hire a tutor!’ because that's what they do for their kids. And I will, but Mateo and I talked about what else he might try first. Like, he said the teacher did offer extra help sessions and he had been a little bit shy about going, but I encouraged him to check it out. When he went for the first time, he brought home a list of online resources the teacher recommended, and one of them, Khan Academy, was free. He checked out the videos and was amazed at how simple and clear the explanations were of different concepts.”

Both Maria and Mateo felt that the guided conversation with Dr. Harris was helpful. Maria felt like she had a better idea of what Mateo was feeling, and how to support him navigating a hard time in his education with empathy and care. Since that time, Mateo's grades have improved, although he still finds algebra hard at times. However, now when those moments happen, he both has more resources to check out, and most importantly, he and Maria can talk about what to do.

→ **Elevate student agency:** The psychologist in this article encourages parents to get curious about their child's experience learning math – and with that information, the mom is able to help her son take action to get the help he needs.

→ **Reframe struggle and capability:** The mother in the article models a conversation with her son where she shifts the way she talks about her own experiences with math to show her son that struggling when learning something new is not a bad thing.

→ **Encourage help-seeking:** The article lists several different ways that the student was able to get help, both paid and free, with different mediums.





# WHY THIS MESSAGE WAS EFFECTIVE

## Sample video message featuring multiple teachers, tested with teacher audience

### Black male teacher:

Kids I teach range from low socioeconomic kids to high income middle income kids. The one commonality between all of them is just math in general is just not a strong subject for a lot of learners...So what I stopped doing is I stopped assuming that all the students had a strong foundation. I understand how it feels to be in that environment and knowing you have a pacing calendar, you have district benchmarks, you have unit assessment tests you have to get through. The thing I did is I challenged myself to stop saying that I don't have the time. Part of what motivated me to become a teacher, specifically a math teacher, it's like I remember how it felt to be sitting in a math class and not know what's going on and being too embarrassed to ask the question because I was afraid of not only what my peers are going to say, but how my teacher might respond and what that may do to me in front of my peers. So being honest about, Hey, this is what this feels like. Tell me how you feel right now. Because I remember when I was in ninth grade, I felt like this, and this is what helped me, really helped them see that I was, no, I didn't come out as a grown man algebra teacher. I used to be in their shoes too. And so building the relationship is by far the most important thing you can do. So why do you have to learn this? Because the world is ever changing. I don't know what your life's going to be like outside of this classroom. You don't know that either. So the more tools you can have in your toolbox, the wider you can develop your skill set, the better off you'll be. When life gives you a detour. Maybe you were going in one direction and something changed your mind. Now you want to go in a different direction. I want you to be prepared for whatever comes your way.

### AAPI male teacher:

I've talked for a good amount of years. I know when the concept gets really challenging and students make a lot of common mistakes, I just preload them and prefund them and be like, Hey guys, this unit's going to be really tough. This is the hardest unit of this section, but just know that you're going to make a lot of mistakes. I'll make mistakes too, but making mistakes is part of the learning process. These mistakes are how we learn as students and how we grow as people. So continue to make mistakes because it's better to make mistakes now on the practice, on the assignments, on the quizzes, and to make mistakes on the tests. I think when I built that solid connection with students, they're able to engage more with the curriculum because they understand that I deeply care for them and I'm truly invested in their growth and in their success.

### White male teacher:

I used to be just like, oh, that kid isn't trying, and I don't know, I can't try for them. I guess they're just not trying. I got to keep doing the thing and then just wait for them to start trying. And you start to realize over the years that there's a reason for everything. Very rarely is a kid truly just lazy. Oftentimes there's something going on at home or they are completely lost and they feel shame about being lost. They know they shouldn't be lost, and then that just makes them kind of close up. So there's always some reason why a kid is behaving the way they're behaving. It takes checking in with that kid.

### AAPI female teacher:

I've been teaching for 10 years now. I generally do believe that all students can learn high degrees of math with the right guidance. I really do believe that. I really like seeing my students feel proud of themselves. When I first started teaching, I was pretty quick to rescue the kids. It's really easy as a teacher to just tell them what the formula is. I think kids actually understand more than they think they do. When I hear kids say, I don't get it. I just ask them, what do you get? Try to figure out what they do understand and start working from there and help guide them into how they can apply what they already know. Over time, you just see kids changing their mindsets and it was just like a really beautiful thing to see.

→ **Acknowledge real-world context:** This messenger names some barriers that many teachers face (pacing, district benchmarks, etc.) and talks about how he was able to make some changes to help students despite these barriers.

→ **Prioritize relationship building:** Despite the challenges and constraints mentioned earlier, this teacher talks about small ways he is able to build relationships with students by sharing his own experiences

→ **Make math relevant:** This messenger gives an example of something he says to make math feel more relevant to students – that learning higher-level math can open more doors in their future.

→ **Affirm the value of mistakes:** This messenger models how to tell students that mistakes are a normal part of the learning process and that everyone makes them. Importantly, he names that making mistakes while *practicing* has different stakes than mistakes on a *test*. This makes the statement more credible.

→ **Reassess assumptions:** This messenger reflects on how he has made assumptions about whether students are trying – but then realized some other reasons a student could be behaving in a way that seems checked out. He encourages teachers to check in with kids when they are making those assumptions.

→ **Reframe struggle and capability:** This messenger begins by providing the motivation for reassessing some of her approaches in the classroom. Then she normalizes typical teacher behavior and shows others how to pivot to a different approach in small steps (e.g., it does not require a complete overhaul to their pedagogy) 40





## Thanks from the research team

The research team is incredibly grateful to our advisors, as well as all of the students, parents, and teachers across the country who shared their stories, opinions, and feelings about learning math.

Their contributions helped us not only center student voice and experience in this project, but also helped us understand why this research matters--so that more students can have positive experiences learning math, in ways that can help open more doors for them in their future lives.

For more information about The Math Narrative Project, visit [mathnarrative.org](https://mathnarrative.org) or write to [hello@mathnarrative.org](mailto:hello@mathnarrative.org).

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