



# Math Narrative Project: **Students** Comprehensive Findings

Goodwin Simon Strategic Research;  
Wonder: Strategies for Good  
March 2024

BILL & MELINDA  
GATES *foundation*

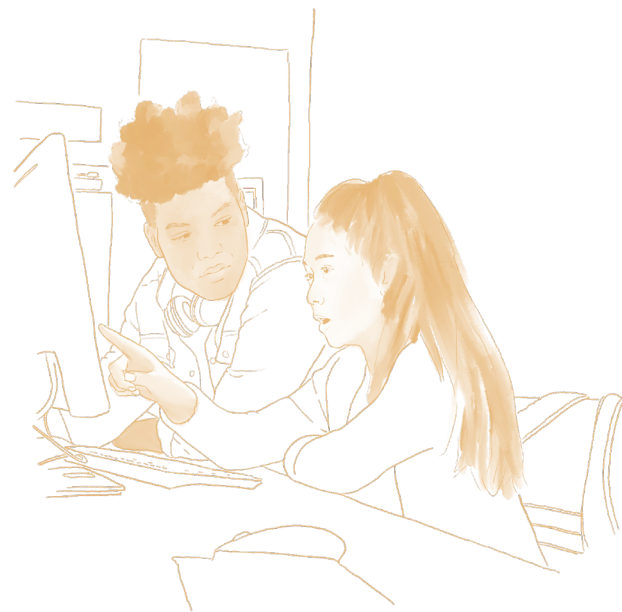




# PROJECT OVERVIEW AND GOALS

The Math Narrative Project uses the Heartwired research approach (see *slide 5*) to understand the cultural narratives that inform how 6<sup>th</sup> to 10<sup>th</sup> grade public school students who are Black or Hispanic\* from any income level, or Asian American Pacific Islander (AAPI) or white from lower-income households, think and feel about learning math, and to discover how and who can disrupt harmful narratives and replace them with positive ones.

To better understand the experiences of young people in this age group, Goodwin Simon Strategic Research (GSSR) and Wonder: Strategies for Good conducted research with students in 6<sup>th</sup> through 10<sup>th</sup> grades. The research team also conducted research with adults who influence students' feelings and mindsets around math: teachers and parents of 6<sup>th</sup> to 10<sup>th</sup> grade students.



\*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.



# TABLE OF CONTENTS

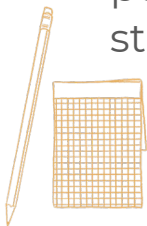
- **Research and Project Goals**
- **Heartwired Research Approach and Research Phases**
- **Methodology Overview**
- **The Power of Narrative Change**
- **Overview: Key Student Findings**
- **Detailed Insights**
- **Detailed Messaging Recommendations**
- **Appendix: Detailed Methodology**



## PROJECT & RESEARCH GOALS

The **Math Narrative Project** aims to advance an evidence-based messaging and narrative change strategy by:

- Developing an understanding of the emotions, beliefs, values, lived experiences, identities, and influences that shape the mindsets of 6<sup>th</sup>-10<sup>th</sup> grade students who are Black or Hispanic from any income level, or AAPI or white from lower-income households, around learning math. This includes conducting research with parents and teachers who influence students' mindsets around learning math.
- Developing and testing a set of messaging interventions that lead to positive math narrative shifts among Black, Hispanic, and AAPI and white students from lower-income households.

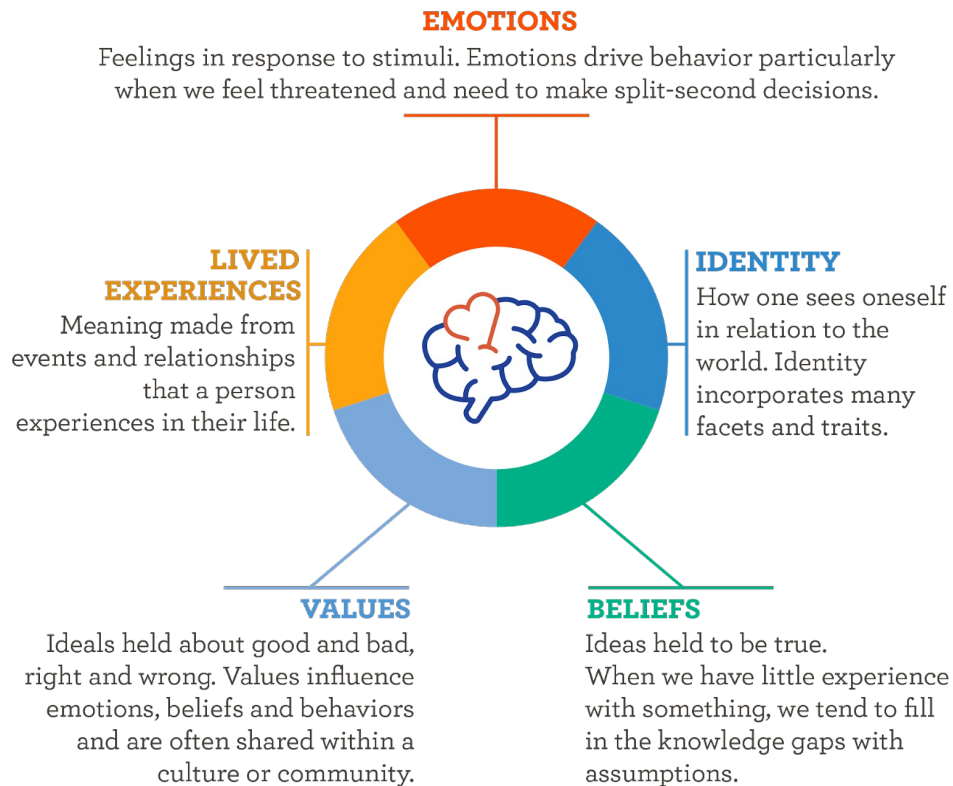




# THE HEARTWIRED RESEARCH APPROACH

The Math Narrative Project deploys an approach to audience research and messaging called Heartwired. Developed by Goodwin Simon Strategic Research and Wonder: Strategies for Good, this approach focuses on the ways that emotions, identity, lived experiences, values, and beliefs combine, and often collide, to shape people's attitudes and behaviors.

Heartwired research uncovers the narratives that shape how people think and feel about a topic, such as math teaching and learning. Heartwired messages and stories connect to people's experiences and values — shaping new narratives that help people change how they think and feel about that issue.





# HEARTWIRED RESEARCH PHASES



## Change

What is the specific change that we (research team and Gates Foundation advisors) want to create to support better math learning outcomes among students?



## Landscape

What is already known about the narrative landscape that is shaping how students, parents, and teachers relate to math and math learning?



## Mindset

What stories, beliefs, people, and lived experiences shape how students, parents, and teachers think and feel about learning math?



## Persuasion

What narrative interventions help students, parents, and teachers think and feel differently about learning and teaching math?



## Action\*

How can the messaging recommendations and research findings be put into action by field partners?

*\*Action Phase is not included in this round of research*



# METHODOLOGY: OVERVIEW

- Research was conducted with participants across the states of California, Florida, New York, and Texas
- Participants:
  - **Students** in 6th-10th grades in public school
  - **Parents** of 6th-10th grade public school students
  - Math **Teachers** of 6th-10th grade students in public schools
- This report is focused on the findings for **students**
- Note that subgroups with base sizes below 50 are not shown
- See the Appendix for the detailed methodology

For qualitative research, Students and Parents were limited to: Black and Hispanic any income, AAPI and white lower income

For qualitative research, Math Teachers were limited to: AAPI, Black, Hispanic, and white teachers primarily from schools serving lower-income students

Population	Interviews	Dyads	Focus Groups	Surveys
Students	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> n 1,091
Teachers			<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Parents			<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>



## PARTICIPANT QUOTES IN THIS REPORT

- Quotes from research participants are shown throughout this report, and they come from one of two sources:
  - Qualitative research (dyads or focus groups): These quotes are taken directly from transcripts of the dyad or group, with minimal edits for readability.
  - Survey: Throughout the survey, respondents are asked to type in their responses to open-ended questions, including at the end of the survey where respondents are asked to reflect generally on anything they're thinking about differently after having viewed all the messaging in the survey. These quotes are verbatim responses that respondents typed, with minimal edits for readability.
- The source of quotes used on each slide is noted at the bottom of that slide.





# THE POWER OF NARRATIVE CHANGE



# WHAT IS NARRATIVE?

- A narrative is a **pattern of stories**
- Narratives are **understood subconsciously or consciously**
- Narratives are **shared by a group of people with a common identity**
- Narratives **shape our attitudes and behaviors about people, places, objects, or ideas**
- Narratives are **established, amplified, and reinforced over time** through the **careful, deliberate curation of narrative tools** like stories, language, messengers, and messages



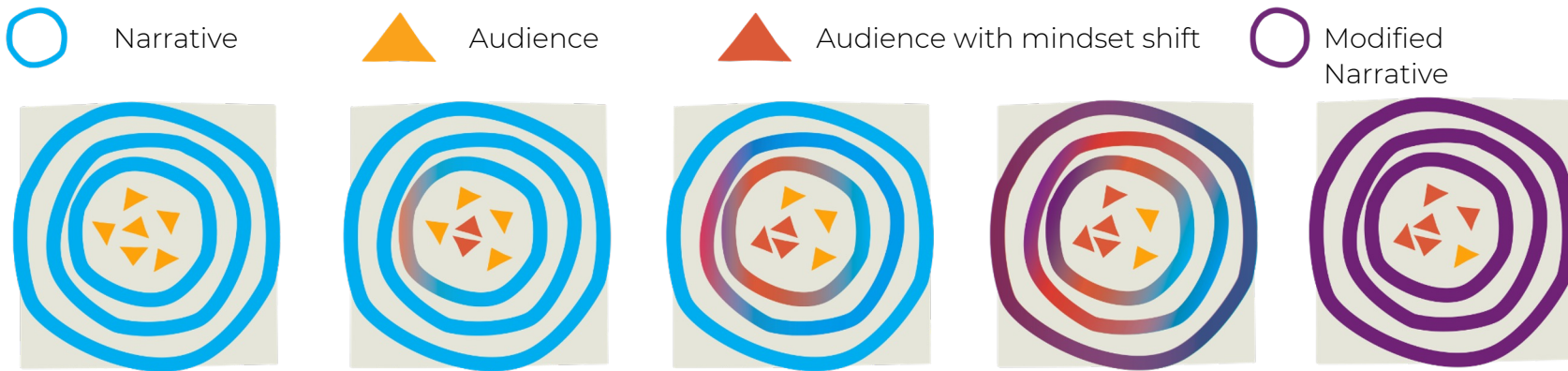
# DOMINANT NARRATIVES

**Dominant narratives** are generated by and help to reinforce the dominant group's power; **dominant narratives** often reinforce inequities in society and uphold the status quo.

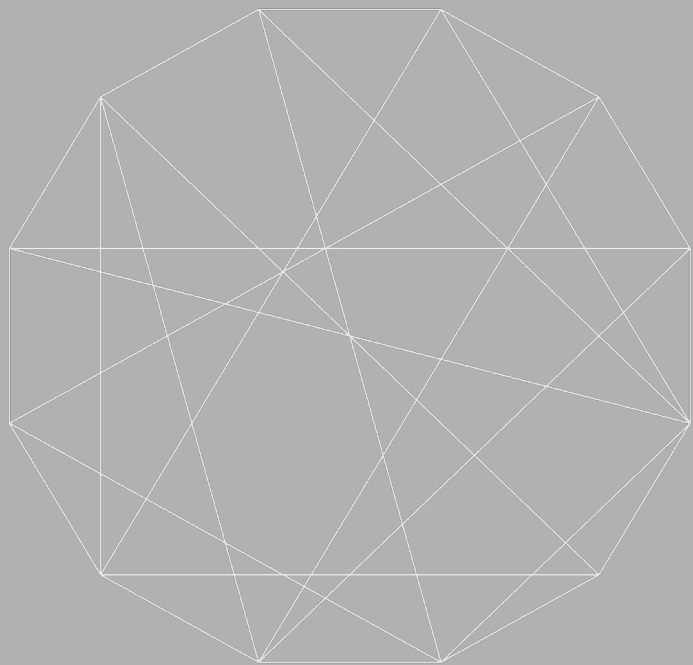


# WHAT IS NARRATIVE CHANGE?

Narrative change is an effort to create a new narrative; amplify or modify an existing narrative; or counter, reframe, or replace existing narratives through deployment of different narratives.\*



\*Source: February 2021, ORS Impact, Measuring Narrative Change, Understanding Progress and Navigating Complexity



# NARRATIVE ECOSYSTEM

An interconnected **system** of **narratives** that **informs students, teachers, and parents' attitudes and behaviors** around math learning.

- Narratives in the ecosystem can be helpful — supporting math learning — or problematic, presenting a barrier to learning math.
- Many dominant narratives about math are problematic.
- Any intervention regarding math narratives must be credible across all three audiences — students, teachers, and parents. Otherwise, a narrative shift effort may receive pushback from one of the audiences in the narrative ecosystem, undermining the ability to drive narrative change among the other audiences.



## Dominant narratives about math learning:

- 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**

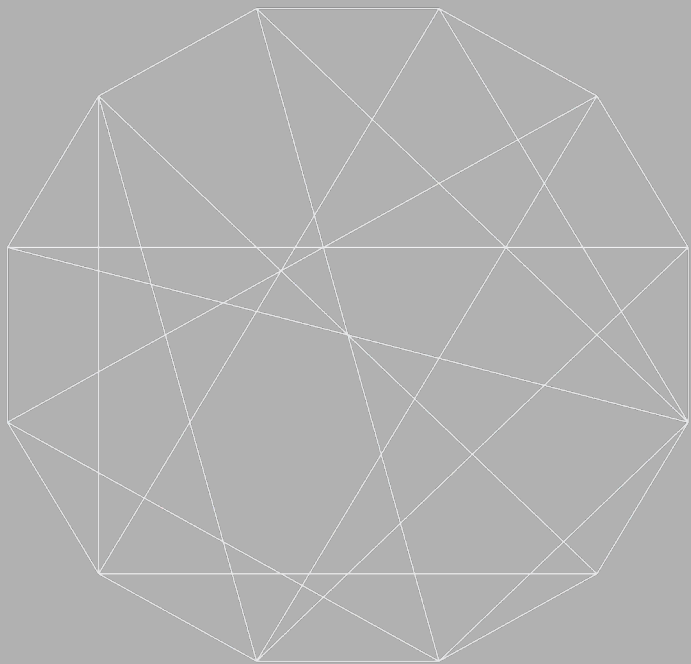
*\* In the survey, 'higher level math' is described for respondents as 'higher-level math like algebra,' in contrast to 'basic math like addition, subtraction, multiplication, and division.'*





# WHAT IS A NARRATIVE INTERVENTION FOR MATH?

- 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
- Narrative interventions are delivered in a variety of ways including curriculum and instructional materials; classroom teaching; teacher training and professional development; online resources for teachers, youth, and parents; popular and social media; print materials like articles and trade journals; policy and budgets, and more



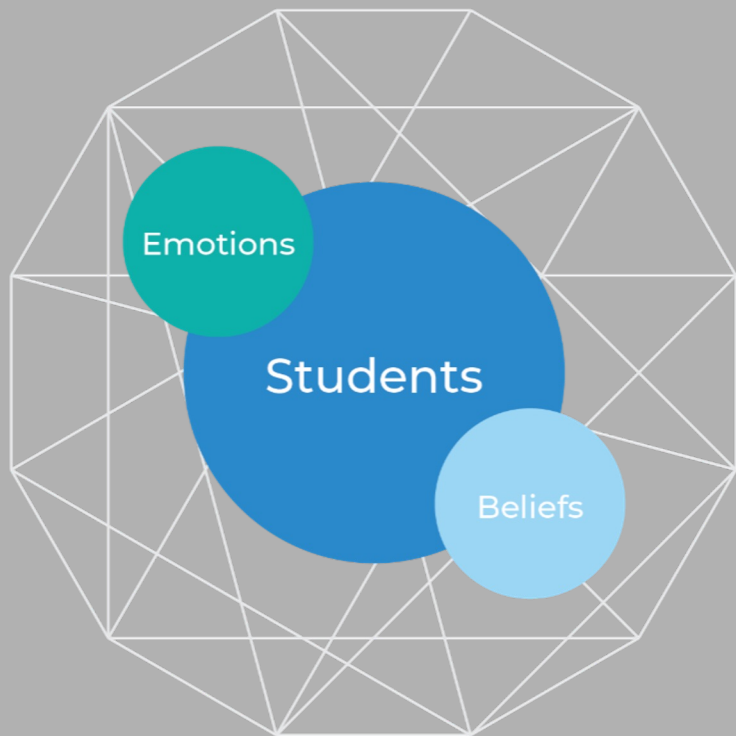
# WHAT IS OUR NARRATIVE CHANGE GOAL?

- To leverage narrative change to improve math instruction and outcomes for 6th to 10th grade Black and Hispanic students, and AAPI and white students from lower-income households
- To positively influence how young people **think, feel, and experience learning math** and **motivate** them to **persist** when math learning gets hard, by positively influencing the narrative ecosystem
- To facilitate a more supportive learning math environment and create conditions that enable positive student and adult behavior change



# NARRATIVE ECOSYSTEM

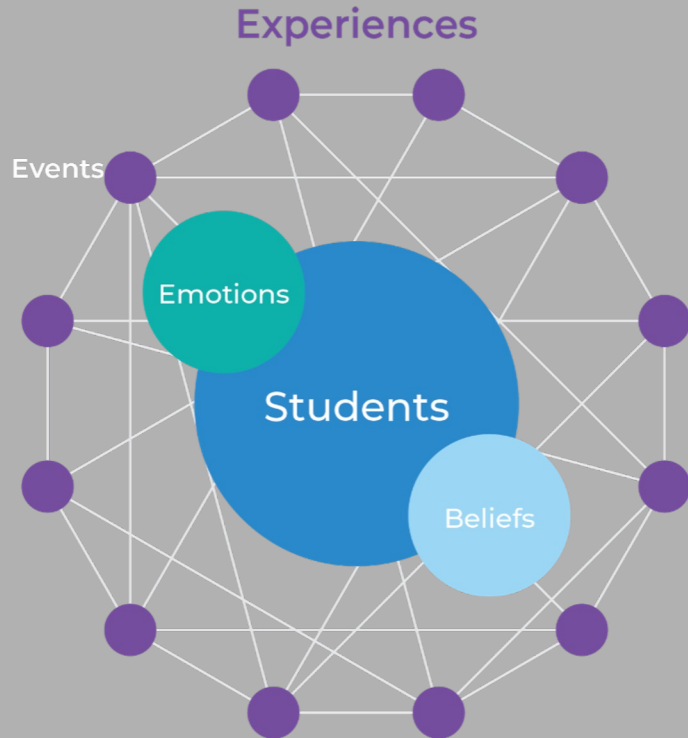
- **Beliefs** and **Emotions** are the **connective tissue** that reinforce or support narratives
- Interventions that **reinforce positive narratives and disrupt negative narratives** in the ecosystem are particularly potent when they **target emotions and beliefs**
- These narrative interventions are felt at a **visceral level, as much as or more than on an intellectual one**

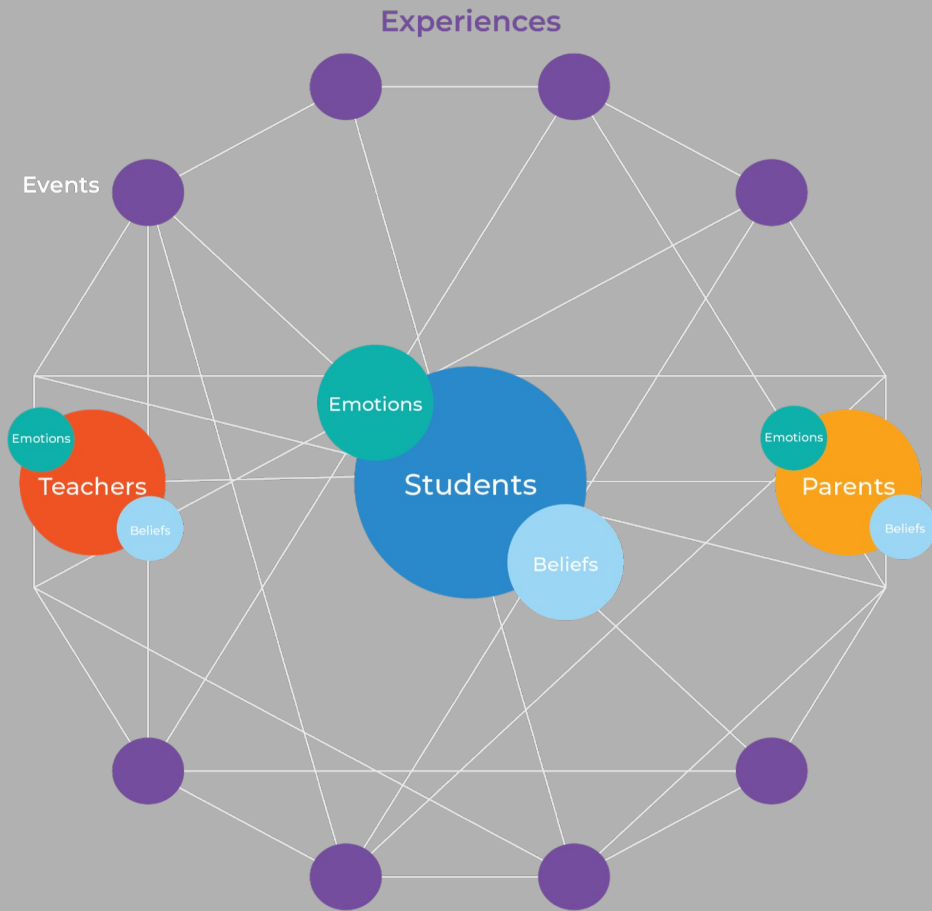


# NARRATIVE ECOSYSTEM

**Students' behaviors are shaped by:**

- The **events** that they experience
- The meaning they make from those events (**beliefs, emotions, narratives**)





# NARRATIVE ECOSYSTEM

Adults also influence the environments in which kids learn math in ways that impact their experiences with math learning:

- **Teachers** at School
- **Parents** at Home



# NARRATIVE INTERVENTIONS CAN...

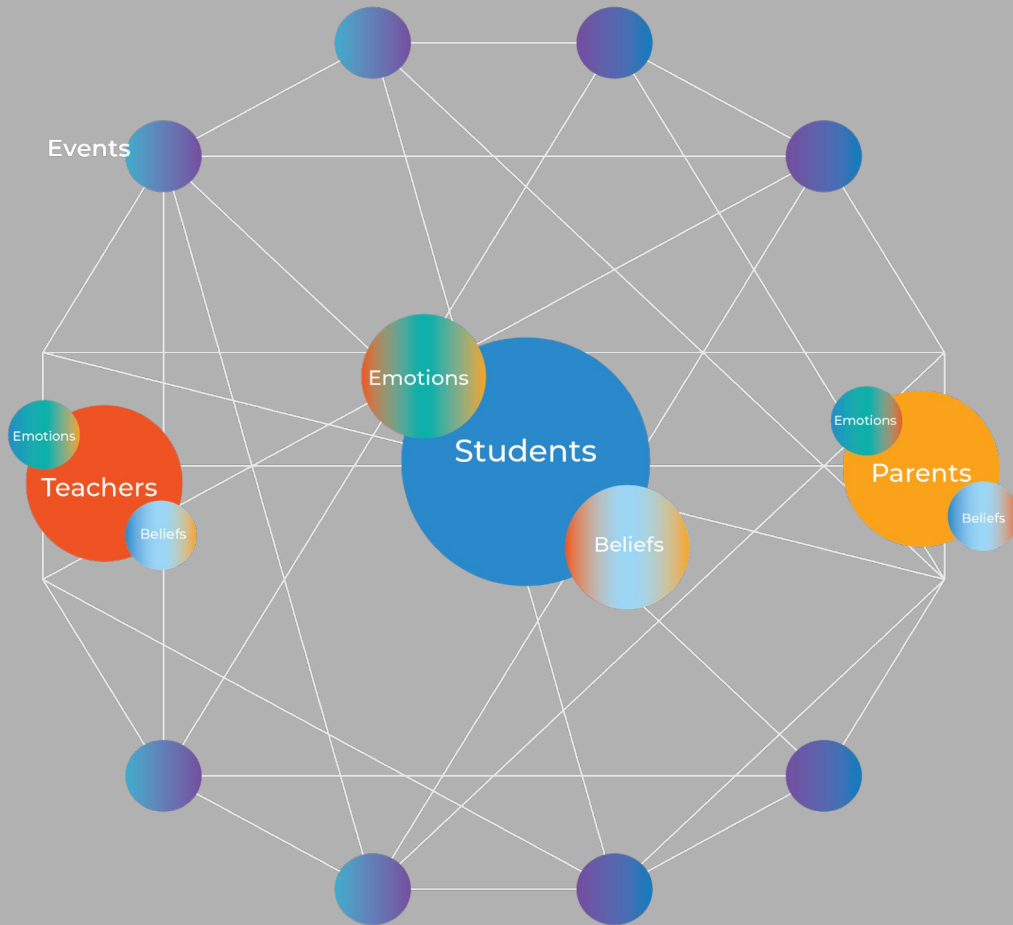
- **Students**

- ...Help to shift beliefs and reinterpret emotions and experiences, enabling students to draw new meaning from their math learning experiences, including interpreting their math learning experiences more positively
- ...Change how students see the relevance of higher-level math in their own lives

- **Adults**

- ...Help adults understand how their actions impact students' beliefs and learning experiences
- ...Help adults feel more motivated to help students persist when learning math gets hard
- ...Help equip adults with positive narratives for themselves and to share with students

## Experiences



# NARRATIVE CHANGE HYPOTHESIS

- When narrative interventions effectively help audiences (youth and adult) shift their beliefs and reinterpret their emotions, it can create the conditions for positive behavior change among students, teachers, and parents
- These behavior changes create the enabling conditions for a more supportive math learning environment



# STUDENTS IN THE NARRATIVE ECOSYSTEM

Students aren't learning math in a vacuum. They're hearing narratives from parents and teachers — and other students — about the relevance of math, their own capability, and the value of mistakes and questions. They are operating with:

- Their own beliefs and emotions about learning math ← We can affect some of this through narrative change
- Their own interpretations of events that happen in math class ← We can affect some of this through narrative change for teachers
- Environments that teachers create in the classroom, and student relationships with those teachers ← We can affect some of this through narrative change to parents
- Expectations and narratives handed down from parents ←



# OVERVIEW: KEY STUDENT FINDINGS





## MESSAGING RECOMMENDATIONS: OVERVIEW (1 OF 2)



**Elevate student agency:** Messaging should elevate student agency and center students' emotions and experiences which are critical to their learning of math



**Acknowledge real-world context:** Empathize with students by acknowledging and naming the real-world challenges they face in learning math



**Acknowledge emotions in math learning:** Normalize the emotional nature of learning math, and provide examples of how students' negative emotions can be reinterpreted or managed



**Make math relevant:** Deliver credible and motivational messaging on the relevance, value, and utility of higher-level math (algebra and above) for students' lives, desired careers, and futures





## MESSAGING RECOMMENDATIONS: OVERVIEW (2 OF 2)



**Affirm the value of mistakes:** Normalize making mistakes as an important and valuable part of learning, including learning math



**Encourage help-seeking:** Build students' confidence to seek the help they need to learn math while informing them of the types of help that may be available



**Reframe struggle and capability:** Reframe struggle from a sign of lacking capability to a sign of needing support



## RESEARCH INSIGHTS: OVERVIEW (1 OF 3)

- **Math learning is emotional:** Learning math is a deeply emotional experience for students, and student survey respondents report a mix of both positive and negative emotions. When students have negative experiences and emotions around learning math, it reduces their willingness to persist when learning math gets difficult. When negative emotions are particularly strong, students are more likely to disengage completely.

Applies to every recommendation

- **Students face barriers to math learning:** Students' experiences of learning math are shaped in part by the context in which they live and learn, including, for instance, learning interruptions from COVID-19, home life, or the lack of availability of outside help for math learning. Students don't have much control over many of these circumstances and can experience school and learning as a place where they are acted upon and don't have much agency.



- **Math learning is different:** Many students report math learning as being different from other subjects in a variety of ways that can make it more difficult, including feeling less related to the real world, more conceptual and abstract, and parents being less able to help.




- **Students see the relevance for basic math — not higher-level math:** Many students experience frustration as math gets more difficult, and they have genuine questions about why they need to learn higher-level math that they often feel aren't adequately answered by teachers or parents. Some even hear from adults that higher-level math is not relevant. A lack of credible reasons to learn higher-level math leaves them less motivated to keep trying in math when it gets difficult.







## RESEARCH INSIGHTS: OVERVIEW (2 OF 3)

- **Questions can be embarrassing:** Students worry that their questions will be perceived as “dumb” or that they will be accused of not paying attention by teachers. This leaves them less able to get the help they need when they get stuck. 


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- **Mistakes are discouraging:** Many students believe that making mistakes or not “getting” new math concepts quickly means they are not good at math. 

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- **Struggling is often seen as a sign to give up:** For many students, struggling while learning math is perceived as negative and often interpreted as an indication of one’s limited capability to do math. 

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- **Math identity is fluid:** Being good at math is not enough for students to feel that they like math. Both their perceived capability and enjoyment of math can change year to year and even day to day based on their external environment including who their teacher is, the math topic they’re learning about currently, or just what happened in the classroom that day. 

This combination of problematic beliefs about questions, mistakes, and struggling can lead students to feel that they are not good at math — and that it isn’t worth putting in the effort to try to get better.



## RESEARCH INSIGHTS: OVERVIEW (3 OF 3)

- **Teachers impact student emotions and experiences:** Classroom experiences and interactions with teachers have a profound impact on emotions about learning math. Students often talk about when they like or dislike math in the context of their relationship with their math teacher. Math teachers are powerful messengers for students when it comes to reinterpreting negative emotions, reframing mistakes, encouraging help-seeking, and reframing struggle and capability.
- **Students' developmental stage shapes their experiences and beliefs:** Peer dynamics are an important factor in all students' learning experiences, but especially for adolescents and pre-adolescents. Students of this age have a heightened sensitivity to how their peers view them, which can make the experience of making mistakes or asking questions particularly embarrassing. This fear of embarrassment can lead students to disengage and avoid persisting in learning higher-level math when it gets difficult.





## KEY DIMENSIONS TO KEEP IN MIND

- The findings in this report apply to 6th-10th grade public school students in the four states, and the messaging recommendations are generally effective across demographics
- However, there are a few important dimensions of students' demographics and experiences to keep in mind when deploying the recommendations



# KEY DIMENSIONS TO KEEP IN MIND: PARENT'S REPORTED INCOME LEVEL

- Students from lower-income level\* households are more likely than students from higher-income level households to report:
  - Negative emotions about learning math
  - Being embarrassed about mistakes
  - Less confidence in their ability to learn and get better at math
  - Less confidence they can get the help and support they need
- The tested messaging works across demographics, but it is especially effective with students from lower-income level households
  - In the survey, parent reporting of income level (i.e., lower, middle, higher) is a better predictor of how students respond to messaging than is parent-reported absolute household income (i.e., the dollar amount of annual household income), likely because the same income can mean a very different life experience depending on the cost of living in the area and the number of people in the household that that income is supporting

\*In most cases in this report, differences are noted by income level rather than absolute income. *Income level* refers to respondents' parents' answer to the survey question below.

Question text: Thinking now about your current household — including all the people who live in your home — how would you describe your household's income level?

Lower income level households respond *very low income* or *low income*

Middle income level households respond *middle income*

Higher income level households respond *high income* or *very high income*



## KEY DIMENSIONS TO KEEP IN MIND: GENDER

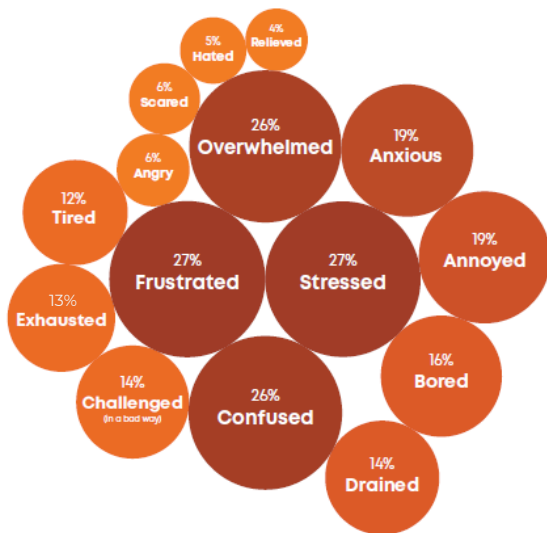
- Female students are somewhat more likely than male students to report:
  - Negative emotions about learning math
  - Being embarrassed about mistakes
  - Less confidence in their ability to learn and get better at math
  - Less confidence they can get the help and support they need



# STUDENTS FEEL A RANGE OF EMOTIONS ABOUT MATH – AND MANY ARE NEGATIVE

Here is a list of feelings. Please select the ones that you feel when you are learning math.

## NEGATIVE



## POSITIVE







# MATH EMOTIONS VARY BY RACE AND GENDER

Here is a list of feelings. Please select the ones that you feel when you are learning math.



\*Note that AAP1 is a small sample size – n 84 – however this group is included here because it may be comparatively informative  
Source: MNP Student Survey Data, n1091 respondents



# STUDENTS FROM LOWER-INCOME HOUSEHOLDS FEEL MORE NEGATIVE EMOTIONS ABOUT MATH

Here is a list of feelings. Please select the ones that you feel when you are learning math.



Family income refers to reported annual household income and is based on participants' parents' response to: What is your total annual household income before taxes (in other words, the total combined income for everyone who is currently contributing to your total household income)?

Source: MNP Student Survey Data, n1091 respondents



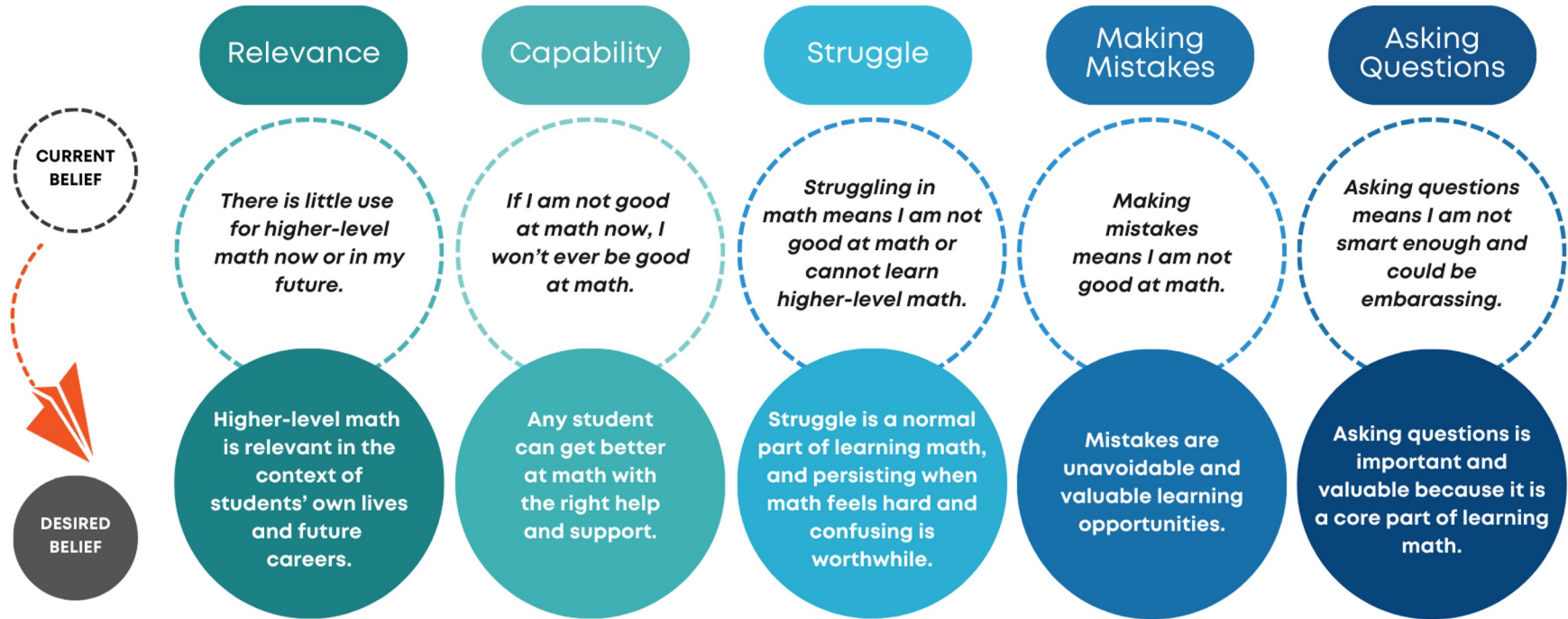
# HELPING STUDENTS SHIFT THEIR BELIEFS THROUGH NARRATIVE INTERVENTIONS

Overall, effective narrative interventions:

- Impact and shift the ways in which students interpret their emotions, in part by disrupting problematic narratives and replacing them with more positive ones
- Can support students to shift their beliefs from those that are barriers to math learning, to those that are more conducive to learning math

On the next slide, you'll see the 'Student Belief Pathway.' This belief pathway depicts existing beliefs that are tied to problematic narratives about math, as well as desired beliefs that will support students' math learning.

# Belief Pathway: Student



## Student Emotions



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



# IMPACT OF NARRATIVE INTERVENTIONS IN THE RESEARCH:

## STUDENT JOURNEY IN A FOCUS GROUP *Hispanic Male Student, FL*

### Pre-Messaging

- Rarely asks the teacher for help
- Relies on examples from the textbook and tries to figure things out on his own
- Reveals he is uncomfortable asking questions in class

**“My teacher only helps out the students that raise their hand for help. When I need help, I just look at the examples...I never really ask for help from my teacher in math.”**

**[Moderator] “Is that because you don’t need the help or because you don’t feel comfortable asking?”**

**“A little bit of both.”**

### Post-Messaging

- Expresses more comfort asking questions
- Now believes asking questions may benefit not only him but also other students in the class

**“I think after this conversation I would raise my hand up and ask questions more just by seeing how it benefited the students, especially the videos we saw. They said they asked for help and seeing how they benefited from it, that might help me and a lot of students.”**



## IMPACT OF NARRATIVE INTERVENTIONS IN THE RESEARCH: OPEN END RESPONSES AT THE END OF THE SURVEY

*At the end of the survey after having viewed messaging, respondents are asked to write down anything they are thinking about differently.*

**“ I now feel like with lots of hard work, practice, encouragement, and support that I can get a lot better at math and learn how to do it a lot better.”**

**–AAPI Female Student, CA**

**“ After [this] I feel as though I can learn and get better at high level math now. I am feeling more confident!”**

**–Hispanic Male Student, TX**

**“ I never ask for help because I am shy and don't want to be wrong. Watching the video showed me in order to get better I need to ask for help to be successful.”**

**–Black Male Student, NY**



# DETAILED INSIGHTS



# MATH LEARNING IS EMOTIONAL

- Learning math is a deeply emotional experience for students, and student respondents report a mix of both positive and negative emotions. When students have negative experiences and emotions around learning math, it reduces their willingness to persist when learning math gets difficult. When negative emotions are particularly strong, students are more likely to disengage completely.
- Emotions felt while learning math do not align neatly with whether students like math. Students who say they don't like math sometimes have positive emotions (even if it's just reprieve from the negative, like "relief") and students who say they love math sometimes have negative emotions.
- *Note:* The recommendations later in this Comprehensive Findings report are particularly effective in changing beliefs and increasing motivation for students with negative emotions about math.





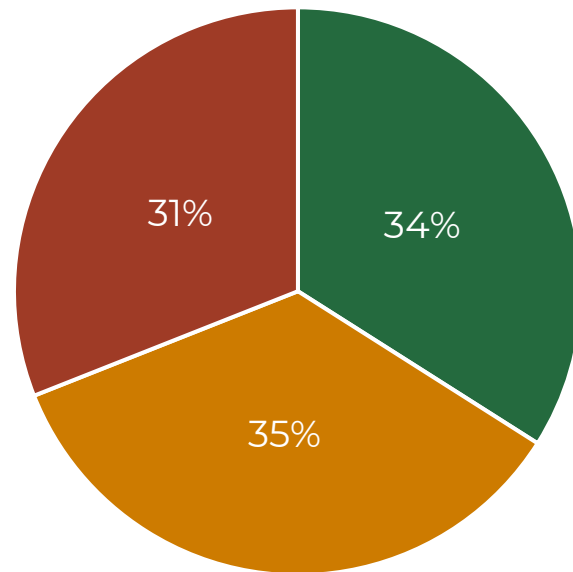
# STUDENTS EXPRESS A RANGE OF POSITIVE AND NEGATIVE EMOTIONS

“ [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

Here is a list of feelings. Please select the ones that you feel when you are learning math.

- Positive emotions only
- Mixed emotions
- Negative emotions only



Source: MNP Student Qualitative Research. See Detailed Methodology in the Appendix for more information on the research methodology.

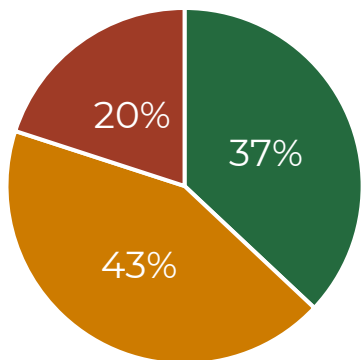
Source: MNP Student Survey Data, n1091 respondents 41



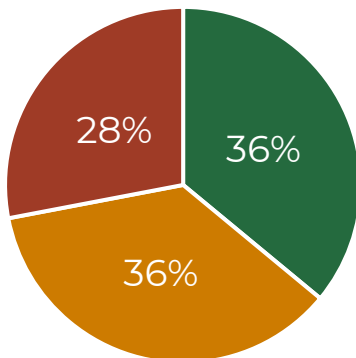
# API STUDENTS LEAST LIKELY TO HAVE ONLY NEGATIVE EMOTIONS ABOUT MATH

Here is a list of feelings. Please select the ones that you feel when you are learning math.

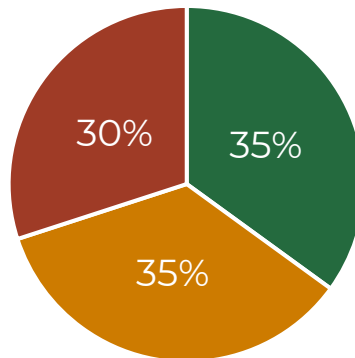
■ Positive emotions only ■ Mixed emotions ■ Negative emotions only



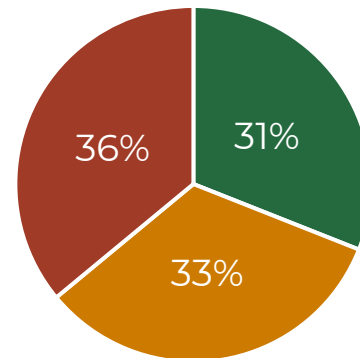
AAPI\*



Black



Hispanic



White

\*Note that AAPI is a small sample size – n84 – however this group is included here because it may be comparatively informative

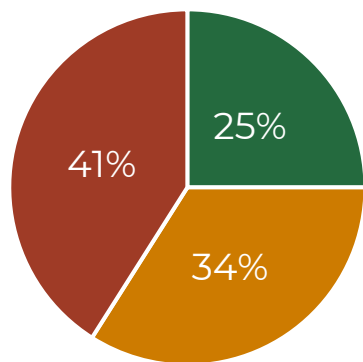
Source: MNP Student Survey Data, n1091 respondents



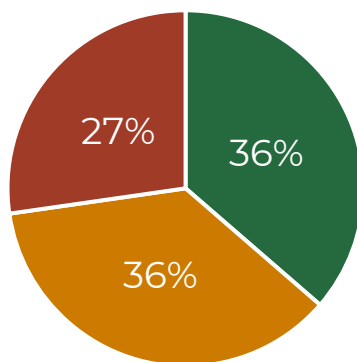
# STUDENTS FROM HIGHER-INCOME LEVEL HOUSEHOLDS MOST LIKELY TO HAVE POSITIVE EMOTIONS ABOUT MATH

Here is a list of feelings. Please select the ones that you feel when you are learning math.

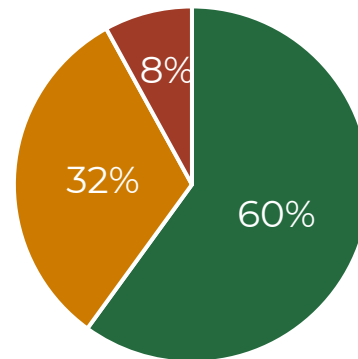
■ Positive emotions only ■ Mixed emotions ■ Negative emotions only



Lower-income level



Middle-income level



Higher-income level\*

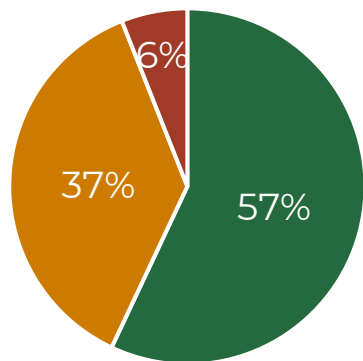
*\*Note that higher-income level is a small sample size – n99 – however this group is included here because it may be comparatively informative  
Source: MNP Student Survey Data, n1091 respondents*



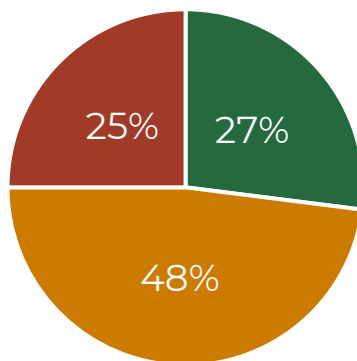
# STUDENTS WITH LOWER SELF-REPORTED MATH CAPABILITY HAVE MUCH MORE NEGATIVE EMOTIONS ABOUT MATH

Here is a list of feelings. Please select the ones that you feel when you are learning math.

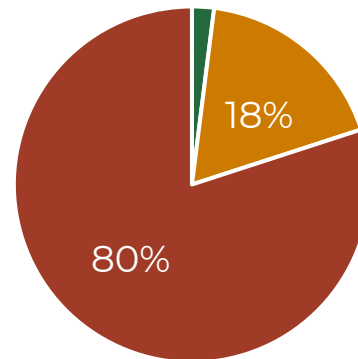
■ Positive emotions only ■ Mixed emotions ■ Negative emotions only



Self-report as *excellent* or *very good* at math



Self-report as *good* at math

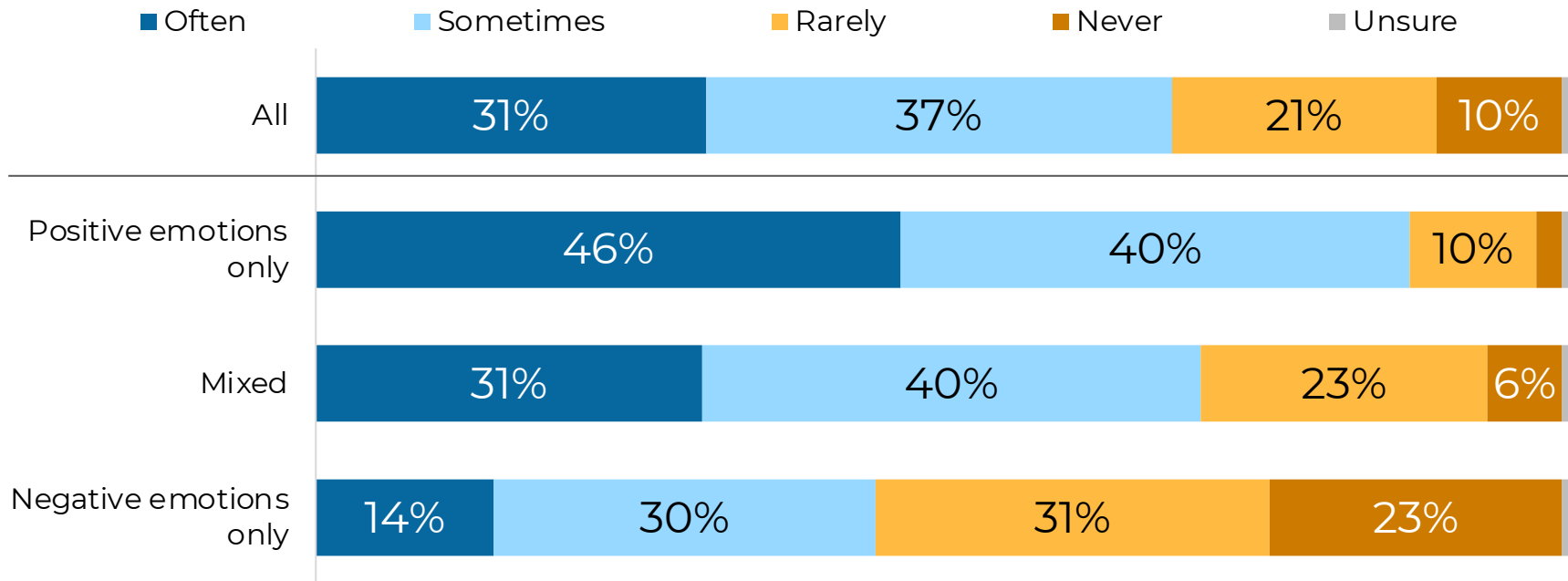


Self-report as *just ok* or *not very good* at math



# EMOTIONS HAVE POWERFUL EFFECT ON HOW STUDENTS ENGAGE IN THE MATH CLASSROOM

*Thinking about your math class this year, how often do each of the following happen?  
I raise my hand to ask questions in math class*





# MATH LEARNING FEELS DIFFERENT THAN OTHER SUBJECTS

- Many students report math learning as being different from other subjects in a variety of ways that can make it more difficult, including feeling less related to the real world and parents being less able to help
- Student participants in the research report that:
  - Math is more conceptual and abstract and harder to relate to uses in the real world
  - Higher-level math topics build on basic math topics in a way that makes it difficult to catch up if you miss a lesson or struggled with a topic in a previous year
  - Math feels “black and white” — there’s only one right answer, and a small mistake in working out a problem can make the whole answer incorrect
  - Parents are often not able to help — because they don’t remember the math from their youth, or feel they were never good at math, or feel Common Core has changed math so much from the way they learned it that they cannot help

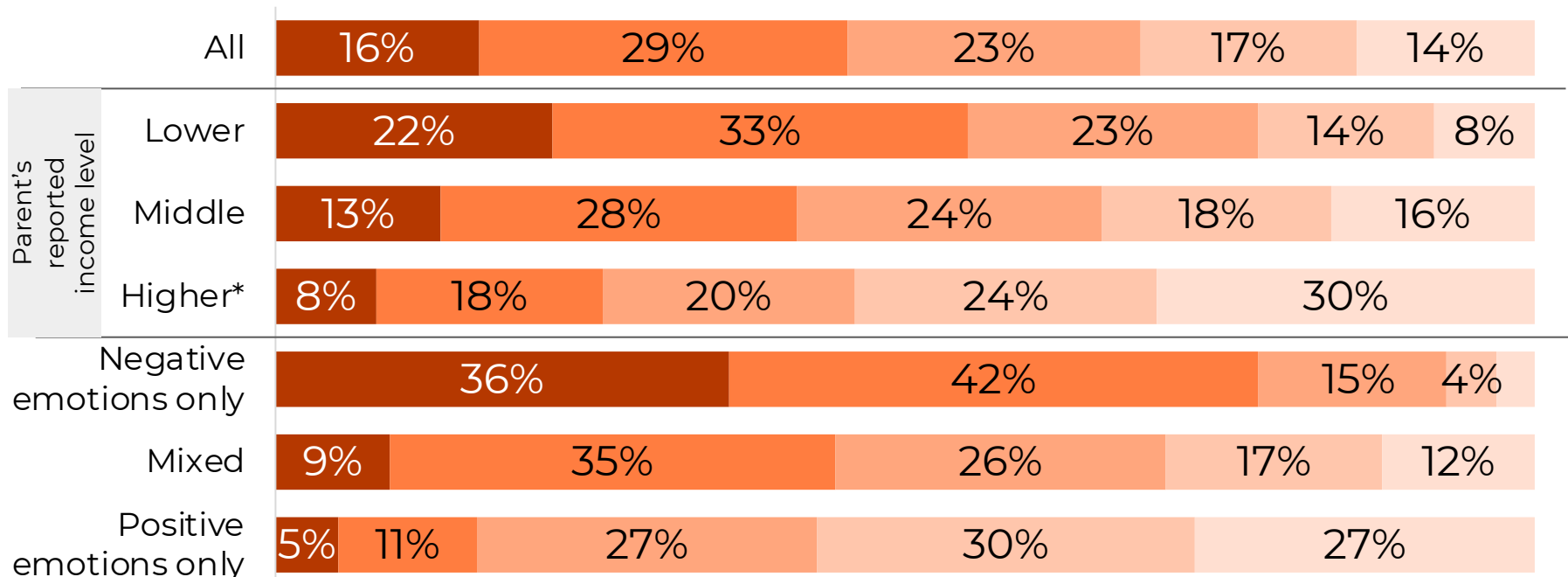




# STUDENTS FROM LOWER-INCOME LEVEL HOUSEHOLDS OR WITH NEGATIVE EMOTIONS REPORT MATH AS HARDER THAN OTHER SUBJECTS

Would you say that for you personally, learning math is...than learning other subjects?

■ Much harder   
 ■ Somewhat harder   
 ■ About the same   
 ■ Somewhat easier   
 ■ Much easier



\*Note that higher-income level is a small sample size – n99 – however this group is included here because it may be comparatively informative

Source: MNP Student Survey Data, n1091 respondents



# MANY STUDENTS DO NOT SEE THE RELEVANCE OF HIGHER-LEVEL MATH

- As math becomes more difficult, many students have to put in more time and effort to “get it,” and they experience more frustration. This usually starts around the time they begin algebra, and the introduction of variables is a major source of confusion across demographics.
- As their difficulty with learning math increases, many students begin to regularly ask, “Why do I need to learn this? When am I ever going to use this?”
- These are genuine questions, and they want to know in what ways the struggles and frustration they are enduring will pay off or help them later in life — and they report not receiving compelling or credible responses from adults.
- Many students who are helped to see the relevance of higher-level math are more likely to persist when they encounter difficulties.

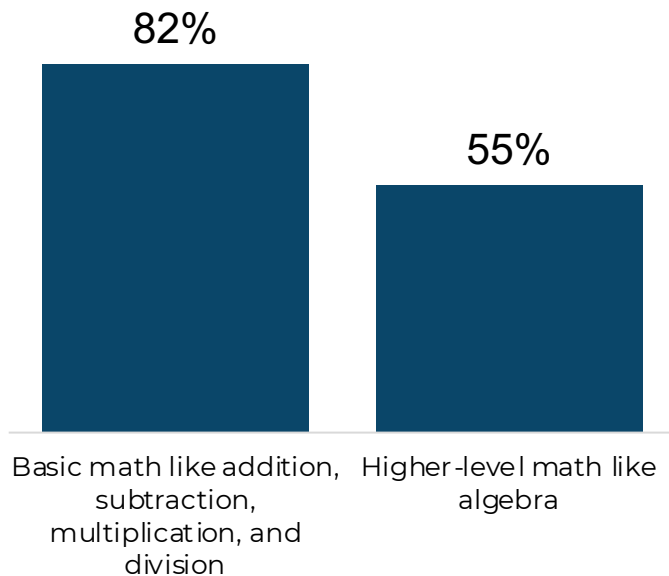




# STUDENTS DIFFERENTIATE BETWEEN BASIC MATH AND HIGHER-LEVEL MATH LIKE ALGEBRA

*Thinking about...how useful and helpful do you feel it will be in your future as an adult for you to have learned how to do that kind of math?*

**Showing % that say very or somewhat useful and helpful**





## STUDENTS REPORT ASKING QUESTIONS CAN BE EMBARRASSING

- Students worry that their questions will be perceived as “dumb” or that they will be accused of not paying attention by teachers. This leaves them less able to get the help they need when they get stuck.
- Many student participants report that asking questions in class can be embarrassing. Students report this fear is exacerbated by incidents of peers making fun of them for asking a question, or teachers reacting in a way that made them seem annoyed at the question.
- These embarrassing experiences often stick with students more than positive classroom experiences. Parent research participants also report clearly remembering negative classroom experiences over asking questions, making mistakes, or struggling in math class from when they were in school.



# EMBARRASSMENT ABOUT QUESTIONS LEAVES SOME STUDENTS WITHOUT THE HELP THEY NEED



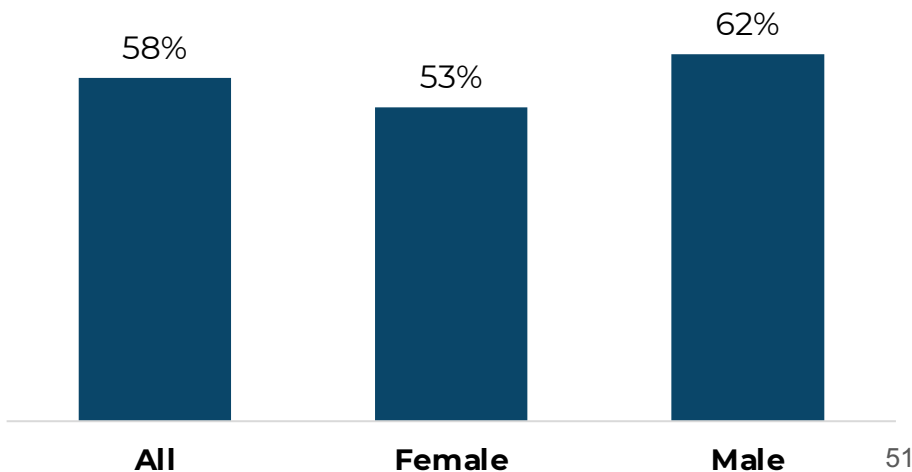
**I don't ask for help because it's embarrassing to go up to a teacher, because it's usually quiet in the classrooms. When you walk up to them and say, 'I don't know how this works,' and then you just see everybody look at you."**

—Hispanic Female Student, FL

Source: MNP Student Qualitative Research

Please tell us how much you personally agree or disagree with each of the following statements on a scale of 1 to 7, with 1 meaning you strongly **disagree**, and 7 meaning you strongly **agree**. You can use the slider below to choose any number from 1 to 7 to say how strongly you feel.

**I feel that I can get help and support to learn higher-level math when I need it**  
**Showing strongly agree (6 or 7)**



Source: MNP Student Survey Data, n1091 respondents

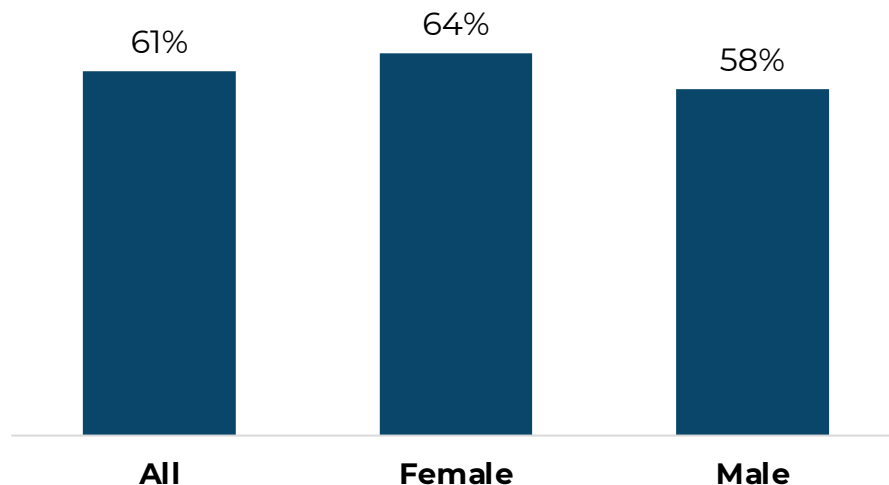


# STUDENTS REPORT MISTAKES ARE DISCOURAGING

- Some students may believe mistakes are a part of learning, but anxiety can be heightened when the mistake is made in front of peers
- Students also report finding mistakes particularly embarrassing when their teacher moves on and doesn't help them understand where the mistake happened
- A fear of mistakes can lead students to disengage and stop trying in math class

*Still thinking about your current math class, please tell us how much you agree or disagree with each of the following statements.*

**I feel embarrassed when I make mistakes in math class in front of others**  
**Showing strongly or somewhat agree**





## STRUGGLING AS A SIGN TO GIVE UP (1 OF 2)

- Most report not believing (or even knowing about) race and gender stereotypes in math capability, and most also report not having a negative stereotype of a math “nerd” that might drive them away from trying hard
- In general, many students report believing that they and others can make improvements in learning math with practice
- However, students may lack the motivation to put in the effort to improve because they don’t see the relevance, or don’t have the tools to get the support they need, when they get stuck
- Many students also express a belief that struggling to learn new concepts is a sign that they are not good at math — or believe that struggling with higher-level math means the subject is just too hard for them
- These students see struggling as a signal to give up on a concept because they believe they won’t ever get it





**I feel like a certain set amount of time you put into it and [if] you still don't understand it, it's time to give up after that.**

**–AAPI Male Student, CA**



## MATH IDENTITY IS FLUID

Many student participants report feeling good about math when they are “getting it,” but also report feelings of frustration or being overwhelmed at other times, or painful memories around learning math, like being embarrassed or chastised by teachers in front of other students.

**“ Sometimes, it is frustrating, because I'm mainly confident in math, but then there's always going to be certain subjects that I'm not too confident. Right now, we're doing proofs, and that's a lot of memorization of theorems and things like that. So, I'm not super confident on my ability, and sometimes I make mistakes, or I have a hard time figuring out how to solve a certain problem, so that does tend to get frustrating.”**

**–AAPI Female Student, CA**



# ABOUT HALF OF STUDENT RESPONDENTS SAY THEY LOVE OR LIKE MATH, OR THAT THEY ARE EXCELLENT OR VERY GOOD AT MATH

*Which of the following best describes how you feel about learning math?*

■ Love it ■ Like it ■ Think it is just ok ■ Don't like it very much ■ Pretty much hate it ■ Unsure



*How good would you say you are at math?*

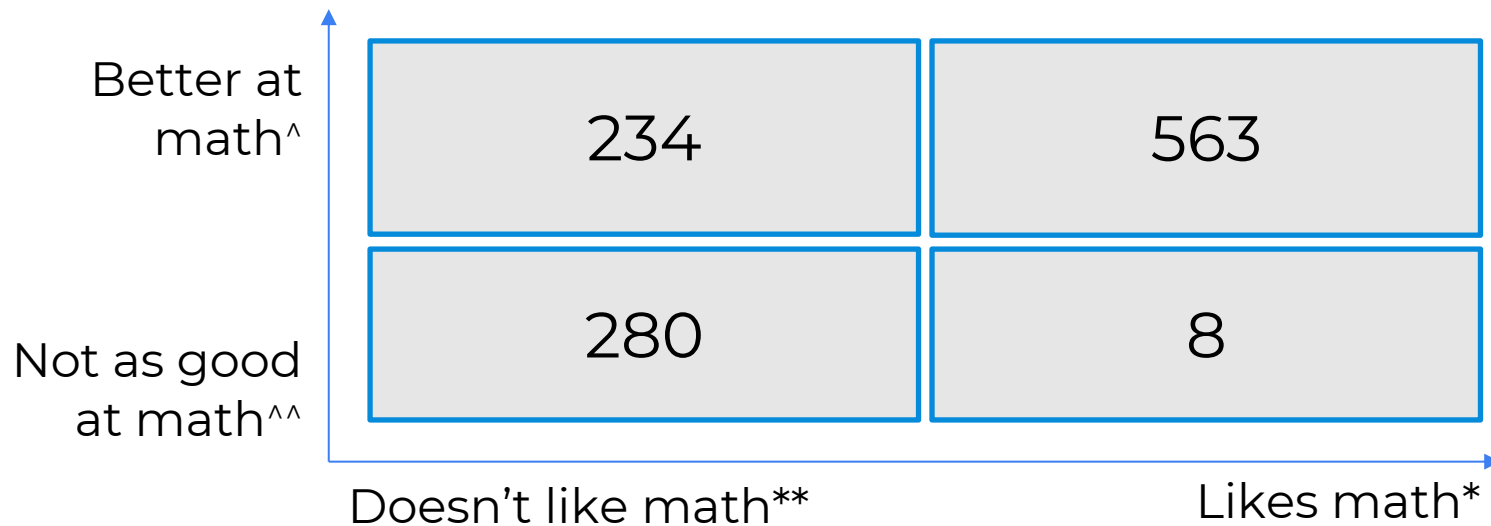
■ Excellent ■ Very good ■ Good ■ Jusk ok ■ Not that good ■ Unsure







# FEELING LIKE THEY ARE GOOD AT MATH IS NOT ENOUGH FOR ENJOYMENT FOR MOST STUDENTS



^ Respondents who report being *excellent*, *very good*, or *good* when asked, *How good would you say you are at math?*

^^ Respondents who report being *just ok* or *not that good* when asked, *How good would you say you are at math?*

\* Respondents who report they *love* or *like* learning math when asked, *Which of the following best describes how you feel about learning math?*

\*\* Respondents who report they think learning math is *just ok*, *don't like*, or *pretty much hate* learning math when asked, *Which of the following best describes how you feel about learning math?*



## STUDENTS REPORT THAT FEELING LIKE THEY ARE NOT GOOD AT MATH IS DEMOTIVATING

- Perceived capability is often disconnected from objective measures like grades.
  - Some student participants report feeling that they are just ok or bad at math even when getting As and Bs because there is a specific concept or topic that they are struggling to understand, or because they have to try hard and believe that being good at math means getting new concepts quickly. Others may feel they're good at math with lower grades because they have been showing improvement over time.
- Many students believe that if you are not good at math, you won't ever get better — or that when they struggle with math, it means they probably won't ever “get” the concept they're struggling with.



# CLASSROOM EXPERIENCES AND RELATIONSHIPS WITH TEACHERS HAVE A BIG IMPACT ON STUDENTS

- Classroom experiences and interactions with teachers have a profound impact on emotions about learning math. Students often talk about when they liked or disliked math in the context of their relationship with the teacher.
- Teachers can help some students be motivated by fostering a sense of connection, belonging, and mattering with their students and showing that they care about their students as individuals.
  - Teacher intent is important — students can tell when the teacher really cares or doesn't — and this has an impact on whether they're willing to try in class.
- Some student participants note the importance of having a good math teacher in helping them build confidence and creating a good environment in class to reduce the stress that comes along with learning math.
- Many students find teachers who discuss their own math journey stories and experiences struggling with, or not liking, math to be relatable and credible. Students are encouraged that they too can get better at math.
- Students also report feeling more comfortable learning math when they feel their teacher empathizes with the struggles they are experiencing.



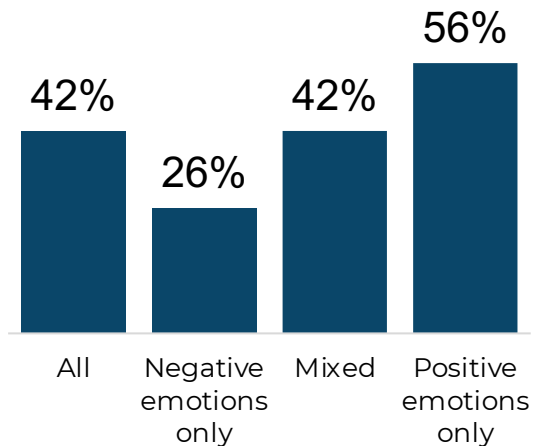


# WHEN MATH TEACHERS PROMOTE BELONGING IN THE CLASSROOM, IT CAN PROMOTE POSITIVE EMOTIONS FOR STUDENTS

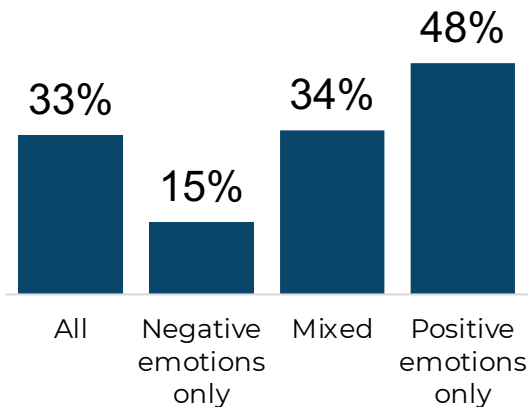
Thinking about your math class this year, how often do each of the following happen?

**Showing % that say often**

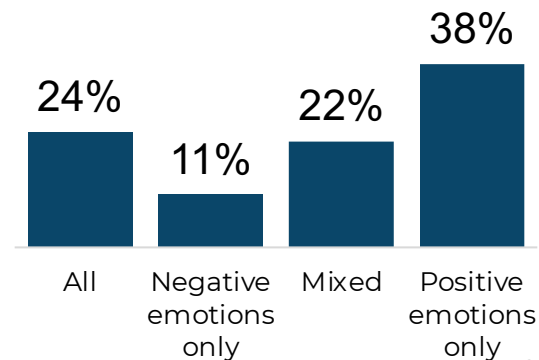
My math teacher lets me know they believe I can learn and get better at math



My math teacher uses word problems and examples that I can relate to



My math teacher gets input from the class on what topics we want to learn about, or what examples we would find interesting





# STUDENT DEVELOPMENT AND PEER DYNAMICS IMPACT MATH LEARNING

- These are formative years for students' psychological development, and experiences with their peers can have a disproportionate impact on their emotional experiences.
- In the learning environment, students often feel vulnerable around their peers and are reluctant to do things that, in their mind, will cause their peers to judge or assess them negatively.
- For example, students may not ask a question in class, even though they do not understand a concept, because they do not want to appear “dumb” or are afraid of being teased. Some students report experiences of being teased in class, or seeing others teased in class, with no consequences. A few male students even say that they don't like asking their parents for help because it hurts their “ego.”
- This same dynamic also makes students wary of trying to answer questions in class because they may make a mistake.

The background is a solid yellow color. There are several decorative elements: a dashed blue line that curves from the top left towards the center, another dashed blue line that curves from the top right towards the center, and a white paper airplane icon with a blue outline pointing towards the right. The text is centered in the middle of the page.

# **DETAILED MESSAGING RECOMMENDATIONS**



## ELEVATE STUDENT AGENCY: WHY THIS RECOMMENDATION IS IMPORTANT

- Students are less motivated to persist in learning math when teachers and parents ignore students' personal agency in learning.
- The research team tested some messaging early in the project that focused on the importance of just getting through higher-level math in order to graduate high school. Student participants in the research were often deflated and demotivated by that messaging because it treated students as objects moving through the education system rather than centering their agency to make choices and impact their own math learning.



**My geometry teacher, I really like her. She makes sure to explain everything, so she makes sure that everyone is comfortable to ask questions. She says, you could even ask me privately for the people that are shy to talk in front of the class, and I like that. The teachers who just give you answers, those teachers really bother me. I'm asking you for help. Not the answer. If I needed the answer, I could use a calculator or something, but sometimes knowing how to solve it, the process of it needs to be broken down a lot deeper than it was taught in class."**

**–AAPI Female Student, TX**





# ELEVATE STUDENT AGENCY:

## HOW TO IMPLEMENT THIS RECOMMENDATION WITH STUDENTS

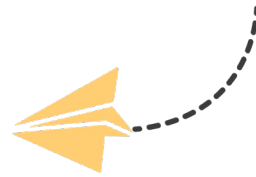
- Position students as active participants in their math learning. This does not mean that messaging needs to describe how students are active participants in their own learning, but student agency must be considered as a factor when creating and delivering messaging. You can do this by:
  - Featuring messengers who are peer and ‘near-peer’ (youth who are somewhat older than the target audience of 6<sup>th</sup> to 10<sup>th</sup> graders, such as older high school or college students), who describe their own experiences learning math, and how their actions and choices have enabled them to be persistent when math gets difficult.
  - *Elevating near-peer student messengers* with a diversity of experiences and feelings about math to help students relate more positively and quickly to the message. (Note: Students often respond well to messengers regardless of whether they match their own racial and gender identity; messengers with similarities in lived experience and context are typically effective regardless of race or gender.)
- 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).





*“What motivated me to ask for help was because I knew nobody else was going to help me...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.”*

## **ELEVATE STUDENT AGENCY: EXCERPT FROM SAMPLE VIDEO MESSAGE OF BLACK FEMALE NEAR-PEER TESTED WITH STUDENT AUDIENCE**



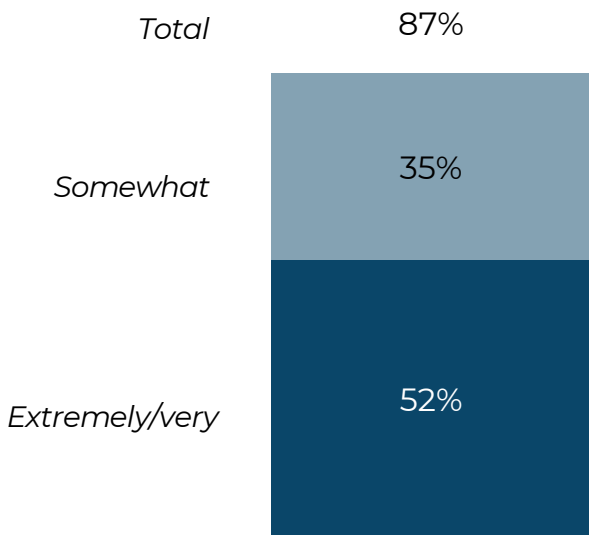
- The messenger begins by talking about how she chose to ask for help, thereby lifting up her own agency and modeling taking action in her math learning
- She shows that while confusion is a common feeling young people have while learning math, she also describes how students have a choice over what actions to take when they feel that confusion



# ELEVATE STUDENT AGENCY: IMPACT OF THIS RECOMMENDATION IN THE RESEARCH (1 OF 2)

Many student survey respondents report that the near-peer messenger video from the previous slide was ‘interesting or helpful’ — and it made many of them feel hopeful.

*Overall, how interesting or helpful was this video for you personally?*



# 73%

Of student survey respondents say they felt ‘hopeful’ (5, 6, or 7 on a scale of 1 to 7) while watching the near-peer video on the previous slide



Source: MNP Student Survey Data, n1091 respondents



## ELEVATE STUDENT AGENCY: IMPACT OF THIS RECOMMENDATION IN THE RESEARCH (2 OF 2)

“ [What stands out to me is] you have to be self reliant and to strive to do better for yourself, be resourceful.”

–Hispanic Female Student, CA

*Source: MNP Student Qualitative Research*

“ Listening to the other students talk about how we should ask for help and that's why teachers are there just gave me that much more confidence.”

–White Male Student, CA

“ After watching the videos, it gave me more confidence.”

–Hispanic Male Student, TX

*Source: MNP Student Survey Data, n1091 respondents*





## ACKNOWLEDGE REAL-WORLD CONTEXT: WHY THIS RECOMMENDATION IS IMPORTANT

- Students' experience learning math is impacted by what happens both inside and outside of the classroom — and there are often barriers to students' math learning that are out of their control
- Lifting up students' agency in messaging without also acknowledging the real-world context they are in can make messages feel disingenuous and less credible



**We just don't have a teacher and we just keep having subs. We literally teach ourselves. We have to teach ourselves in a certain period, like in a certain time before it gets off to the next thing. That's just the time."**

**—Hispanic Female Student, CA**

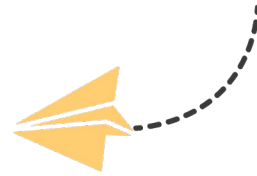


# ACKNOWLEDGE REAL-WORLD CONTEXT: HOW TO IMPLEMENT THIS RECOMMENDATION WITH STUDENTS

- Messages and messengers feel more relatable and credible when messengers acknowledge and name specific circumstances impacting students' learning. Some of these circumstances may include:
  - Help is sometimes unavailable when students seek it
  - Having a bad math teacher for one or more classes interferes with math learning that year and often in subsequent years too
  - In the classroom, teachers' increasing reliance on online learning tools has made it more difficult for some students to learn and get timely help when they need it
  - COVID learning interruptions have impacted foundational aspects of student math learning, producing gaps in knowledge for some students
  - Issues students are experiencing outside of the classroom can interfere with being able to focus at school
  - Heightened concerns during early adolescence about how you are perceived by your peers
  - Large class sizes/high student-to-teacher ratios
  - Pacing of teaching and emphasis on testing and standardized testing outcomes

*“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 with my siblings.”*

## ACKNOWLEDGE CONTEXT: EXCERPT FROM SAMPLE VIDEO MESSAGE OF HISPANIC FEMALE TEACHER TESTED WITH STUDENT AUDIENCE



- A messenger sharing some of the negative learning experiences she had — and which she had no control over — shows students that this message is meant for them even though there are things beyond their control impacting their learning
- Pivoting to how she was able to find help despite these circumstances can help students feel hopeful they too can find help in less than ideal situations



## ACKNOWLEDGE REAL-WORLD CONTEXT: IMPACT OF THIS RECOMMENDATION IN THE RESEARCH (1 OF 2)

Many student survey respondents find the near-peer messenger on the previous slide relatable when she shares the circumstances that made it difficult for her to keep up in math class. Many also report feeling hopeful after she describes how she was able to find help from different sources and improve in math.

70%

Of student survey respondents say they 'could relate to the person in the video' (5, 6, or 7 on a scale of 1 to 7)

68%

Of student survey respondents say they felt 'hopeful' (5, 6, or 7 on a scale of 1 to 7) while watching the near-peer video on the previous slide



## ACKNOWLEDGE REAL-WORLD CONTEXT: IMPACT OF THIS RECOMMENDATION IN THE RESEARCH (2 OF 2)



**I relate because I had to learn myself when things got hard.”**

–Black Female Student,  
FL

*Source: MNP Student Qualitative Research*



**I felt like I could relate to her, especially on the aspect of having so many substitutes.”**

–Hispanic Male Student, NY



**To know that I’m not the only one with the same issues helps me a lot.”**

– White Female Student, FL

*Source: MNP Student Survey Data, n1091 respondents*







## ACKNOWLEDGE EMOTIONS IN MATH LEARNING: WHY THIS RECOMMENDATION IS IMPORTANT

Students' negative emotions around learning math can reduce their willingness to persist when learning math gets difficult. When negative emotions such as frustration, stress, or feeling overwhelmed, are particularly strong or are much more prominent than neutral or positive emotions, students are more likely to disengage completely.

# 66%

Of student respondents chose at least some negative emotions when asked what they feel when learning math. **31%** ONLY chose negative emotions and no positive emotions.

Even among student survey respondents who say they are 'good' to 'excellent' at math, a majority (**54%**) listed at least some negative emotions like 'anxious' or 'overwhelmed.'

“**My previous teachers, they weren't exactly nice about the fact that I really, really struggle with math, and that made me struggle more at it, because I felt like if I messed up, then I would get scolded. Then that just made me more and more anxious. I messed up more.**”

–White Female Student, CA





# ACKNOWLEDGE EMOTIONS IN MATH LEARNING: HOW TO IMPLEMENT THIS RECOMMENDATION WITH STUDENTS

- Acknowledge mixed or negative emotions around learning math are normal and shared by others
  - Share near-peer stories in which students describe the emotions they experience learning math
  - Affirm students' perception that math can feel hard, and sometimes feels harder than other subjects
- Reframe negative emotions as an indication of a need to seek help and not as an indication of an inability to learn higher-level math
  - Show how peers and near-peers who have had negative experiences learning math now understand these experiences differently and how they persisted at math learning and in seeking help despite them



*“When I think about math, I feel anxious, nervous, and honestly, I don't really like it, and I think this is because it's just always in the math classroom from a young age, I just felt dumb or just super slow compared to the rest of my classmates...But when I finally get a math problem that I've been struggling with correct, I feel like I've conquered the world.”*

## **ACKNOWLEDGE EMOTIONS: EXCERPT FROM VIDEO MESSAGE OF HISPANIC FEMALE NEAR-PEER TESTED WITH STUDENT AUDIENCE**



- Here, the messenger talks about common negative feelings many young people have while learning math, helping them to recognize they are not alone and these emotions are normal
- Hearing from near-peers who have felt — and have been able to persist despite — negative emotions while learning math can help students feel hopeful about their own future math learning
- This shows students that negative emotions are not necessarily permanent, and just a sign that you might need help in that moment



## ACKNOWLEDGE EMOTIONS IN MATH LEARNING: IMPACT OF THIS RECOMMENDATION IN THE RESEARCH (1 OF 2)

Many student survey respondents report feeling relieved while watching the near-peer video quoted on the previous slide as she talked about being able to persist through her negative emotions by getting help. Many student survey respondents also say they are thinking about learning math differently after watching the video.

60%

Of student survey respondents say they felt 'relieved' (5, 6, or 7 on a scale of 1 to 7) while watching the near-peer video on the previous slide

63%

Of student survey respondents say they 'feel more comfortable asking for help with math after watching this video' (5, 6, or 7 on a scale of 1 to 7)





## ACKNOWLEDGE EMOTIONS IN MATH LEARNING: IMPACT OF THIS RECOMMENDATION IN THE RESEARCH (2 OF 2)

“It totally fits the way I feel most of the time and gave me some good advice.”

–Hispanic female student, TX

“I think something that was useful or helpful was when she said how she felt about math right in the beginning of the video and her experiences of being in math classes.”

–Black female student, CA





## MAKE MATH RELEVANT: WHY THIS RECOMMENDATION IS IMPORTANT

- Students often don't believe higher-level math like algebra is relevant to their lives and therefore don't feel motivated to persist when learning higher-level math gets hard
- Some students report hearing from their parents that higher-level math won't be useful to them in the future
- Many students report that when they ask teachers why they have to learn higher-level math, their teachers either don't give them an answer, or they give an answer that is not credible

“

**It's good to know subtraction, addition, multiplication, but everything else just doesn't seem like it matters.”**

**–Black Female Student, NY**

“

**My mom has said she doesn't use the stuff she learned in math.”**

**–Black Female Student, FL**

*Source: MNP Student Qualitative Research*





## MAKE MATH RELEVANT:

### HOW TO IMPLEMENT THIS RECOMMENDATION WITH STUDENTS (1 OF 3)

Deliver credible messaging on the relevance, value, and utility of higher-level math for students' lives and futures.

- Include examples of relevance that connect to contexts 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.
  - Different examples resonate to different degrees with individual young people. For this reason, share a mix of examples. To illustrate, some students find it exciting to think ahead to the future when they might need to take out a loan to buy a car or house, while others feel that is too far away from their present lives to be motivating. Also, a financial decisions example mentioning video games did better among males than females.
  - Examples should also connect the dots and show how math is used in that specific instance. For example, it's not enough to say 'you need higher-level math to understand loans and interest rates' — you have to explain how it will help.
  - Examples should include a mix of concepts and applications, so that students at different points in their math education can relate. For example, talking about how linear equations can help you figure out which loan option is best for you is interesting and helpful to students who have been introduced to that concept in algebra class — but confusing to student participants who have not yet taken algebra.





# MAKE MATH RELEVANT:

## HOW TO IMPLEMENT THIS RECOMMENDATION WITH STUDENTS (2 OF 3)

- Employ varied messengers including near-peers, teachers, and parents or other trusted adults
- The following categories of relevance examples are credible to student participants in the research. Learning higher-level math can help you...
  - Keep your future career options open (e.g., it can be important to be able to change jobs or careers if you need to, and as you get older. Math helps you have more choices when and if you ever need to make that pivot)
  - Understand and choose between loans (e.g., you may need to take out a student loan, car, or house loan) and interest rates
  - Prevent yourself or your family from getting scammed or cheated (e.g., high-interest loans that unfairly target Black, Hispanic, and lower-income communities) – (see *slide 82*)
- Some student participants in the research report hearing examples from their teachers that they did NOT find credible, including:
  - You need math for taxes or other adult responsibilities (without giving specific examples)
  - Math is a “universal language”
  - Math builds critical thinking skills

All of these categories of examples are credible and motivating to student survey respondents across subgroups, however...

This is more effective for respondents from higher-income level households

This is especially effective for Black and Hispanic students from lower-income households







## MAKE MATH RELEVANT:

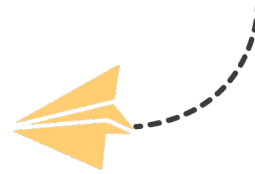
### HOW TO IMPLEMENT THIS RECOMMENDATION WITH STUDENTS (3 OF 3)

- To avoid exacerbating stress around learning math, pair relevance messaging with messages that:
  - Boost students' sense of capability and improvement
  - Show students where and how to get the help they need, when they need it



*Knowledge is power, and knowing higher-level math like algebra can help you protect yourself and your family from being scammed, more than just common sense alone. Some companies target Black or Hispanic communities, or communities without a lot of money, and try to charge really high-interest rates (like with payday loans). But if you understand higher-level math, you can make sure you and your family are not getting cheated or taken advantage of.*

## MAKE MATH RELEVANT: SAMPLE MESSAGE STATEMENT TESTED WITH STUDENT AUDIENCE



- Eighty-five percent (**85%**) of students in the survey report this is an excellent (40%) or good (46%) reason to keep trying to learn math, even if it gets hard
- This message elevates the value of family, and shows students that they have power and agency, especially with the help of higher-level math
- While this message is especially compelling for Black and Hispanic students in lower-income households, it is still very effective for students across race, gender, and income subgroups





# MAKE MATH RELEVANT: IMPACT OF DIFFERENT TYPES OF RELEVANCE MESSAGES

Knowledge is power (message on previous slide)



**I underlined, ‘but if you understand higher level math, you can make sure that you and your family aren't taken advantage of...’ Personally, I just want to make sure that my family doesn't have that happen to them because I do care about my family, and higher-level math can help protect them.”**

–Hispanic Female Student, NY

Loans and financial decisions



**Before this discussion, I guess, I didn't think any part of algebra would [be useful in real life], but then when I read that linear functions describe how two different things are related, that really sparked a little bit of interest.”**

–AAPI Male Student, CA

Keeping career options open



**I find it relatable. I mean that one sentence where it's like, ‘But having as many skills as possible makes it easier.’ I can see that...When you have an interview with a job, you want to tell them how many skills that you have and how many things that you can do so you can get that job.”**

–White Female Student, CA

Source: MNP Student Qualitative Research

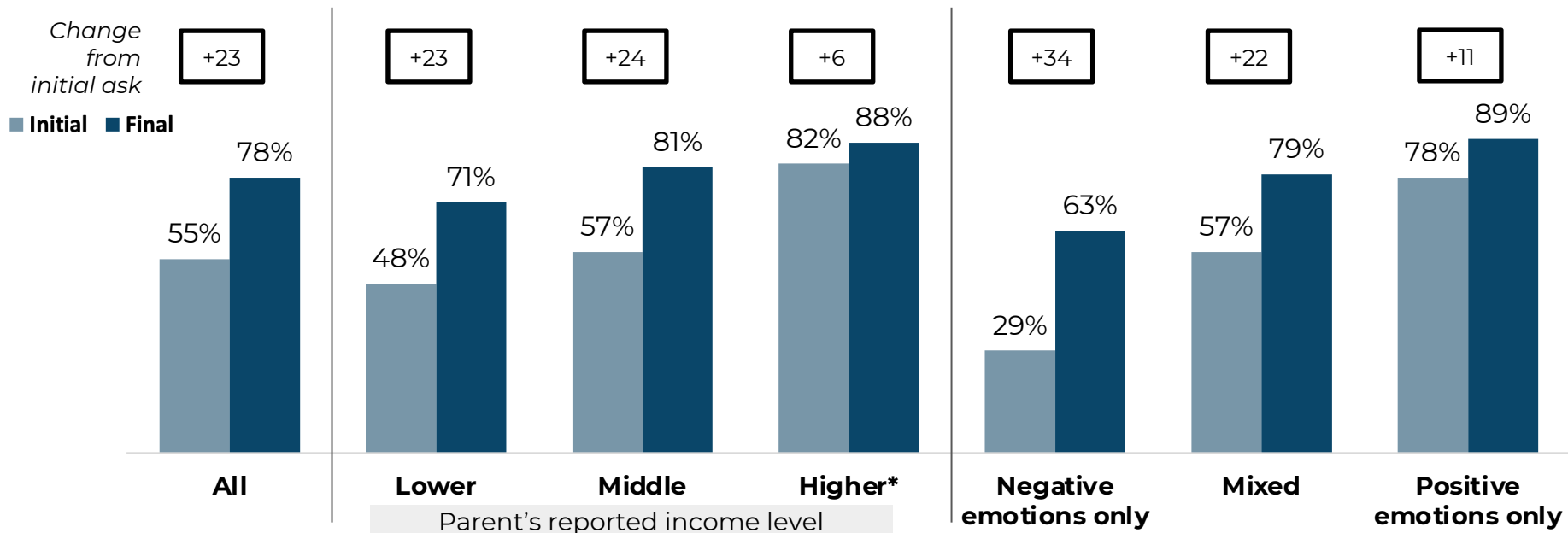




# MAKE MATH RELEVANT: IMPACT OF THIS RECOMMENDATION IN THE RESEARCH (1 OF 2)

Thinking about **higher-level math like algebra** – how useful and helpful do you feel it will be in your future as an adult for you to have learned how to do that kind of math?

**Showing very + somewhat useful before and after messaging**



\*Note that higher-income level is a small sample size – n99 – however this group is included here because it may be comparatively informative

Source: MNP Student Survey Data, n1091 respondents



## MAKE MATH RELEVANT:

### IMPACT OF THIS RECOMMENDATION IN THE RESEARCH (2 OF 2)

“ In my opinion, from my experience, a lot of times when I'm in class and I'm just there, I think...when am I ever going to use this? But then after reading [this], you can tell that math is useful outside of school and use it in the real world.”

–Hispanic Female Student, FL

“ It made me realize math is more useful than I thought...I think this discussion made me realize that math is 100% going to go towards places I don't realize it's going to go towards. I'm not aware where it's going to go, but it's definitely going to go beyond what I'm thinking.”

–AAPI Female Student, CA

“ You never know when something may arise when you will need to use your math skills in your career.”

–Black Male Student, CA

“ I guess I didn't realize how many different things tougher math could apply to, and now I do understand, so it has gave me a change of heart.”

–White Male Student, FL

Source: MNP Student Qualitative Research





## AFFIRM VALUE OF MISTAKES: WHY THIS RECOMMENDATION IS IMPORTANT

- Students often experience negative emotions like frustration, embarrassment, and shame when making mistakes in the context of learning math, which can cause them to disengage or doubt their capability



**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*





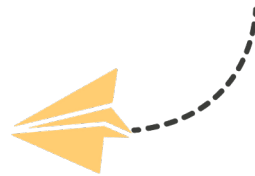
# AFFIRM VALUE OF MISTAKES: HOW TO IMPLEMENT THIS RECOMMENDATION WITH STUDENTS

- 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
  - *Note: Be honest that mistakes are learning opportunities 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*
- Messages from both teachers and near-peers can help ease students' negative feelings about making mistakes
  - When teachers validate mistakes as an important part of learning — coupled with resources and support that focus on individual steps to solving a math problem — they can decrease students' anxiety about making mistakes
  - Stories from other students can demonstrate how to reframe the value of mistakes and build confidence in asking for help
- Affirm that making mistakes is not a reflection on a student's overall capability or potential, but rather an indication that you need more help or support on a specific topic
  - Include messaging that encourages asking questions and seeking support, which helps students feel greater agency around their learning



*“I remember math getting hard in middle school and then even harder in high school. But I knew I needed to pass math to graduate. I played basketball and asked my coach how to improve my jump shots. He told me, ‘You learn more from your missed shots than the shots you make.’ We figured out I needed to work on my release. And it was like a lightbulb went off: maybe my math teacher was like my basketball coach. If I asked her questions, she could give me tips on how to use my mistakes to learn how I could get better at math.”*

## **AFFIRM VALUE OF MISTAKES: EXCERPT FROM SAMPLE MESSAGE STATEMENT FROM STUDENT TESTED WITH STUDENT AUDIENCE**



- This messenger shares common experiences many youth have — feeling math gets harder and also feeling the pressure of needing to pass to graduate — which can help establish an emotional connection and credibility with youth audiences
- The messenger then shows how mistakes in another area of life (basketball) are learning opportunities and reframes mistakes in math as being a similar opportunity

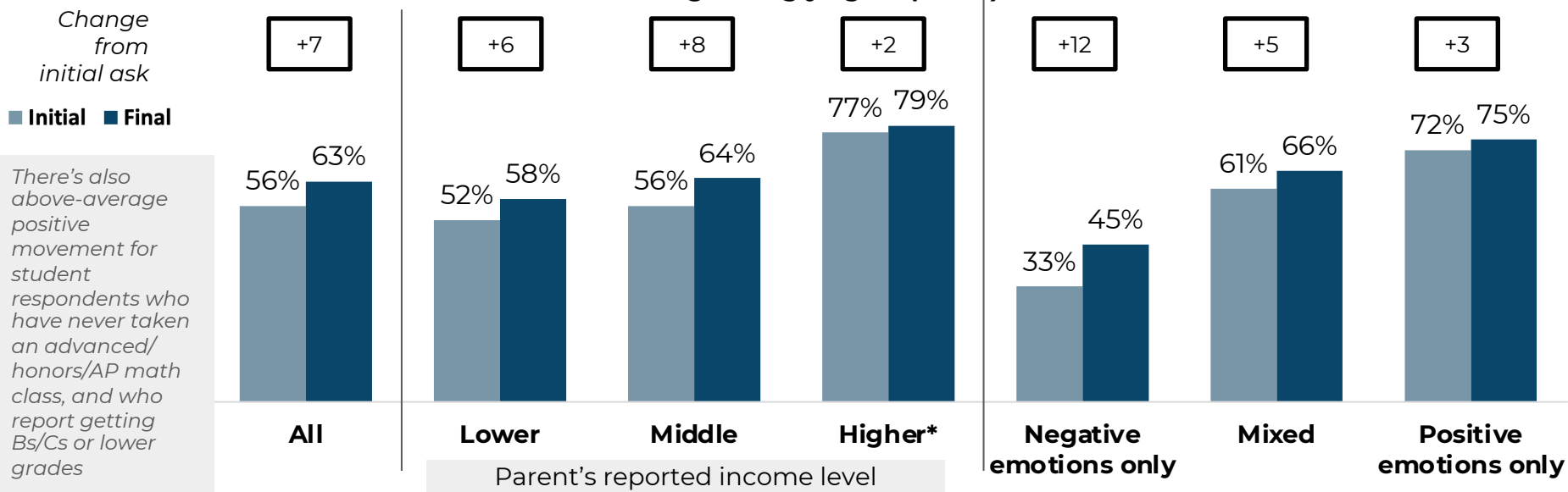




# AFFIRM VALUE OF MISTAKES: IMPACT OF THIS RECOMMENDATION IN THE RESEARCH (1 OF 2)

Please tell us how much you personally agree or disagree with each of the following statements on a scale of 1 to 7, with 1 meaning you strongly **disagree**, and 7 meaning you strongly **agree**. You can use the slider below to choose any number from 1 to 7 to say how strongly you feel.

**Making mistakes on homework or in group work helps me figure out where I need more help with learning math**  
Showing strongly agree (6 or 7)



\*Note that higher-income level is a small sample size – n99 – however this group is included here because it may be comparatively informative  
Source: MNP Student Survey Data, n1091 respondents



## AFFIRM VALUE OF MISTAKES:

### IMPACT OF THIS RECOMMENDATION IN THE RESEARCH (2 OF 2)

“ You gave me more confidence to be able to accept being wrong, and the actuality of this is [that it’s] a learning experience and that’s what I’m here for: to learn, not know everything already.”

–Black Female Student, TX

“ I feel better now knowing that making a mistake is not the end of the world but makes me better.”

–Hispanic Male Student, CA



## ENCOURAGE HELP-SEEKING: WHY THIS RECOMMENDATION IS IMPORTANT

Students often feel that asking questions or asking for help is embarrassing and means they are worse than their peers at learning math or that they are not good at math.



**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*



**I also, I don't know if you guys get this, but if I'm getting help from my parents, I feel like it doesn't feel right. It kind of hurts my ego or something."**

**–AAPI Male Student, CA**

*Source: MNP Student Qualitative Research*





## ENCOURAGE HELP-SEEKING:

### HOW TO IMPLEMENT THIS RECOMMENDATION WITH STUDENTS (1 OF 2)

- Encourage students to recognize asking questions as a valuable part of the learning process. One way to do this is to share stories of students who demonstrate confidence and agency in their learning by asking questions inside and/or outside of the classroom.
- Destigmatize students asking questions with math learning.
  - Convey that people need to ask questions when they are learning new things, with messages such as ‘kids need help to learn math’ and ‘questions are part of understanding new ideas.’
  - Utilize teacher messengers who model supportive responses to students’ questions and reinforce the importance of students asking questions as part of their learning.
  - Utilize near-peer messengers who can share stories in which they felt embarrassed about asking questions at first, but they had the experience of getting their questions answered in useful and respectful ways, which lead them to later recognize the value of asking questions and to feel more equipped to learn as a result.





## ENCOURAGE HELP-SEEKING:

### HOW TO IMPLEMENT THIS RECOMMENDATION WITH STUDENTS (2 OF 2)

- Acknowledge that fear of embarrassment and social anxieties are a normal part of adolescence and may be present for many students. Messaging should describe instances in which students were worried about being embarrassed if they asked a question, but either asked anyway and had a good experience, found ways to ask a teacher for help privately, or asked peers or friends rather than needing to ask a teacher.
- Expand students' perceptions of the places and people who can be of assistance with math learning.
  - Include stories and examples where students ask peers for help in class or after class and ask teachers for help during or after class or privately rather than in front of the whole class.
  - Provide students with access to a variety of tangible, realistic, free, and low-cost resources to support math learning, including online resources, help from adults who are not teachers, or help via other school supports such as tutors.



*“I was kind of nervous to ask my teacher for help, mainly because other students in my class were at a higher level than me and I felt like I didn't have the skills that they had in this math course, and it really was something that I was embarrassed about to ask questions. I feel like, why do I have these questions? Why am I continuously not getting the right answer? And it also feels like I'm disappointed in myself a little bit. I had to make the decision between being frustrated and actually doing something about it, so I decided to ask my teacher for help. My teacher was able to give me resources, such as tutoring and note taking, and also was able to give me a plan so that I would be able to pass the class.”*

## ENCOURAGE HELP-SEEKING: EXCERPT FROM SAMPLE VIDEO MESSAGE OF BLACK FEMALE NEAR-PEER TESTED WITH STUDENT AUDIENCE



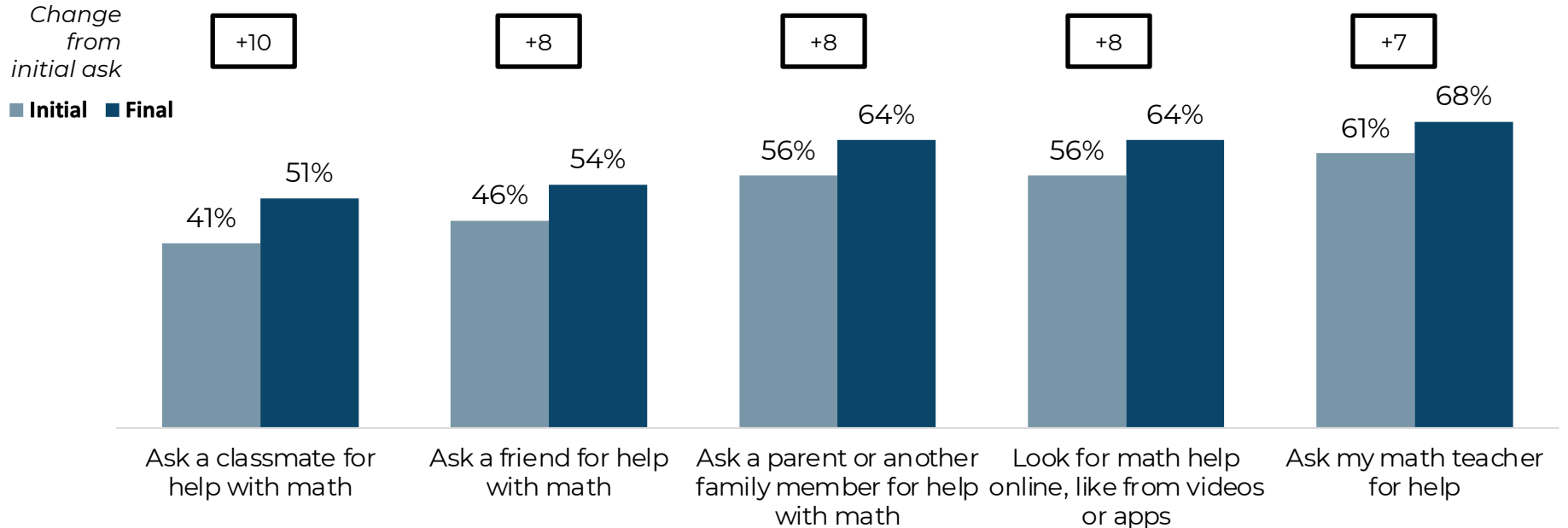
- The near-peer begins by normalizing the need to ask for help, and also names the embarrassment that many students feel when they have questions and the nervousness they can feel asking teachers for help
- Sharing the positive outcome of what happened after she asked for help can help to instill a sense of hope in other students — that if they ask, they also might be able to get help that works for them



# ENCOURAGE HELP-SEEKING: IMPACT OF THIS RECOMMENDATION IN THE RESEARCH (1 OF 4)

Many students sometimes need help learning math. Using a scale of 1 to 7, with 1 meaning you are very UNLIKELY to do it, and 7 meaning you are very LIKELY to do it, please use the slider below to tell us how likely you are to do each of the following things the next time you personally feel like you need help learning math.

**Showing very likely (6 or 7) before and after messaging**



Source: MNP Student Survey Data, n1091 respondents

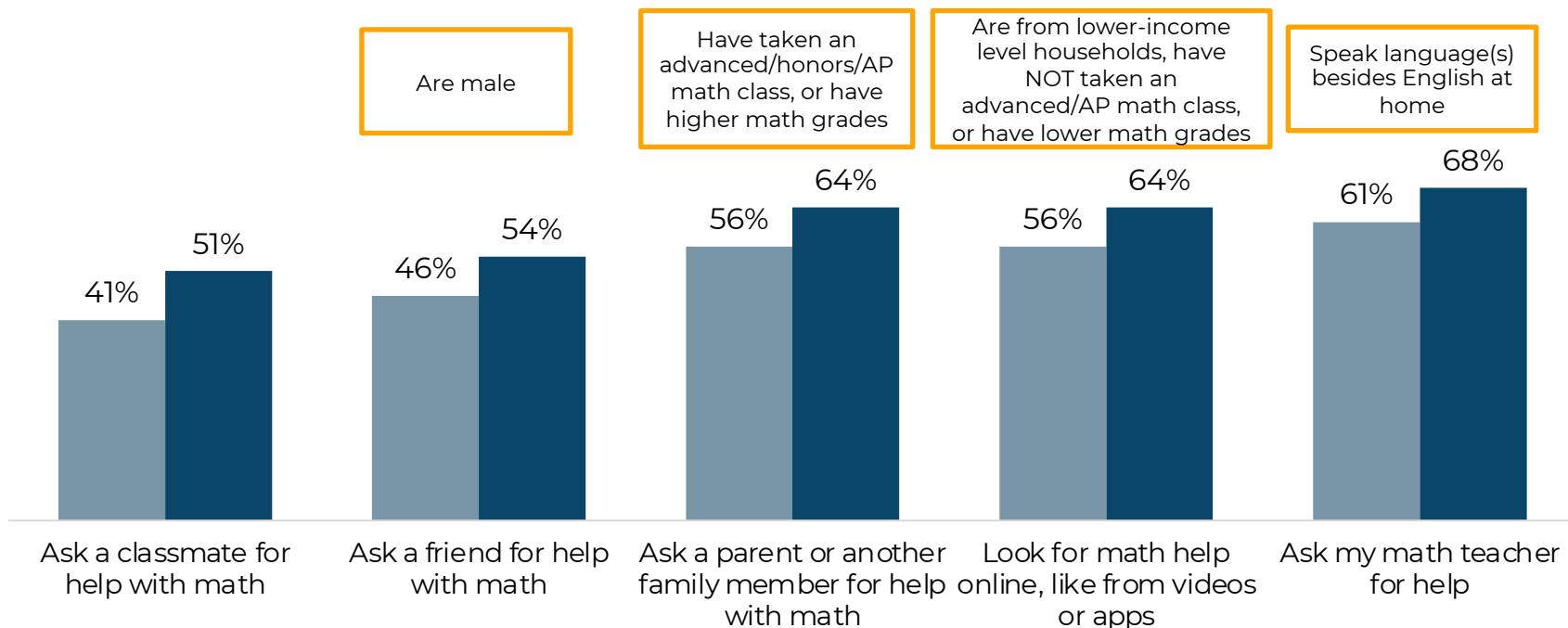




# ENCOURAGE HELP-SEEKING: IMPACT OF THIS RECOMMENDATION IN THE RESEARCH (2 OF 4)

Many students sometimes need help learning math. Using a scale of 1 to 7, with 1 meaning you are very UNLIKELY to do it, and 7 meaning you are very LIKELY to do it, please use the slider below to tell us how likely you are to do each of the following things the next time you personally feel like you need help learning math.

**Difference by subgroups: More positive movement among respondents who...**



Source: MNP Student Survey Data, n1091 respondents







## ENCOURAGE HELP-SEEKING: IMPACT OF THIS RECOMMENDATION IN THE RESEARCH (3 OF 4)

“ Watching the videos made me think about the times I didn't ask for help. And the reason why I didn't want to. I felt like I was going to look dumb. And the videos were helpful with it's ok to be wrong, just takes practice.”  
–Hispanic Male Student, TX

“ I never ask for help because I am shy and don't want to be wrong. Watching the video showed me in order to get better, I need to ask for help to be successful.”  
–Black Male Student, NY

“ This was a great video. I was able to relate, and now I know I shouldn't be embarrassed to ask for help.”  
–White Female Student, TX

*Source: MNP Student Survey Data, n1091 respondents*



## ENCOURAGE HELP-SEEKING:

### IMPACT OF THIS RECOMMENDATION IN THE RESEARCH (4 OF 4)



I think if I was asked this question before I came here and watched the videos and got everyone's perspective, I wouldn't have said to try and ask too many questions because it's kind of embarrassing...But now that I watched some of the videos and I've heard from you guys, and especially that person that said teachers actually like it when you ask questions, that video. I think now that one advice [for other students] would be to ask more questions. And even me, I'll try to ask more questions in my class."

–AAPI Male Student, CA

Source: MNP Student Qualitative Research



I felt relieved that it's not just me, there's other people who have gone through the same thing and they're struggling too. And it's okay to not be scared to ask in front of people or you shouldn't even be scared. You shouldn't even have fear to ask your own teacher about questions that you don't understand."

–Hispanic Female Student, FL





## REFRAME STRUGGLE AND CAPABILITY: WHY THIS RECOMMENDATION IS IMPORTANT

- Students who struggle when learning math often interpret it as a sign of their innate capability, and it discourages them from persisting in higher-level math
- When students report that they struggle with math and therefore aren't good at it, they often also report thinking that this means they won't ever get better at it

“ **Some people just aren't math people, so even how hard they try, they won't get it.**”  
–Hispanic Female Student, FL



# REFRAME STRUGGLE AND CAPABILITY:

## HOW TO IMPLEMENT THIS RECOMMENDATION WITH STUDENTS (1 OF 2)

- Normalize the experience of struggle while learning math by acknowledging that struggle when learning something is a common experience and not inherently a sign that you're bad at something. Everyone is likely to struggle at some point in learning math.
- 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.
  - Use 'asset framing' (which builds on the assets you have, rather than any deficits) to help students recall other places in their lives in which they feel capable and successful.
    - Use asset framing that shows students as capable of overcoming struggle. For example, ask students to recall and think about other areas of their lives — like sports, gaming, music, dance, etc. — that they enjoy and where they have already demonstrated that they can engage with struggle in positive ways.
    - Remind students of what they already know about themselves in other spaces — that hard work and practice lead to improvement and that struggle is normal when learning something new or challenging.





## REFRAME STRUGGLE AND CAPABILITY:

### HOW TO IMPLEMENT THIS RECOMMENDATION WITH STUDENTS (2 OF 2)

- Messengers, including adults and near-peers, who share their own experience of struggle and describe how they overcame this and what resources helped them, can both validate students' experiences of struggle and model how to reframe struggle
  - These personal examples and stories are most powerful when they are paired with specific resources that are actually available (e.g., help from a teacher or someone else, and online tools for students)



*You may get frustrated with math if you don't get the right answer right away. But you can't get better if you don't make mistakes. It's like exercise — if you get sore muscles or get out of breath, it just means you're doing something more challenging than what your body is used to. And you can't get stronger without trying something more challenging.*

## REFRAME STRUGGLE AND CAPABILITY: SAMPLE MESSAGE STATEMENT TESTED WITH STUDENT AUDIENCE



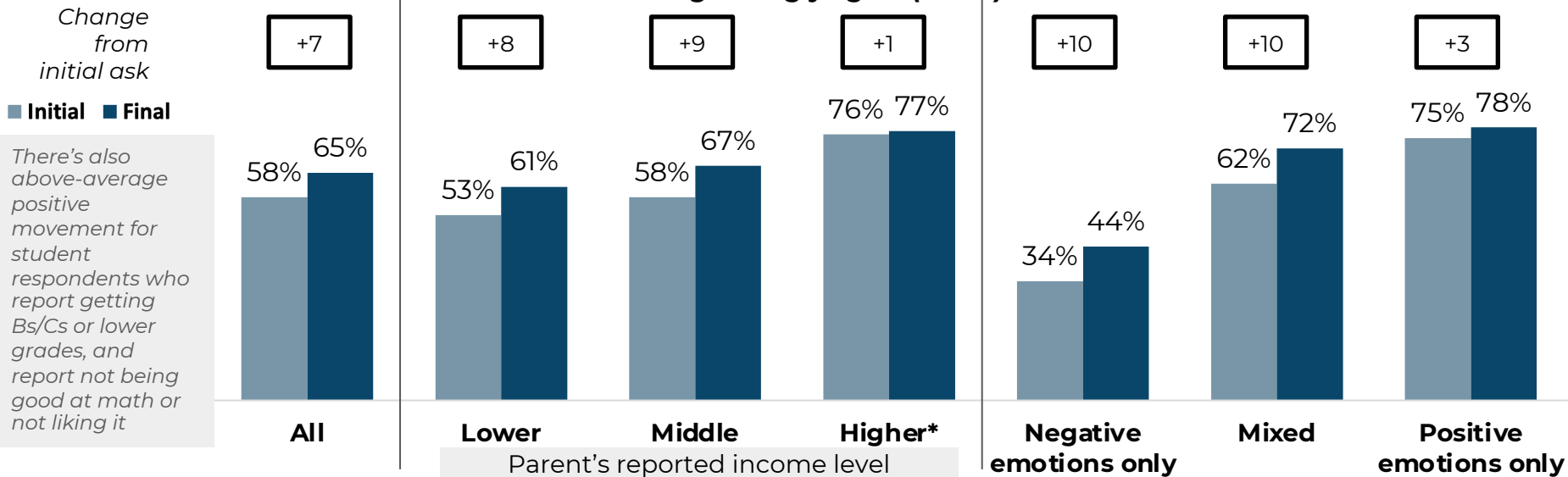
- This message normalizes feeling frustrated when struggling to learn new concepts and making mistakes
- It also has a metaphor between learning math and another challenging activity — which helps to remind students what they already know about the importance of practice and persistence, and that it's normal for something to be difficult at first
- Then it reframes struggle and difficulty as something valuable by comparing it to the process of becoming physically stronger, thereby conveying the idea that struggle can make you stronger in the long run



# REFRAME STRUGGLE AND CAPABILITY: IMPACT OF THIS RECOMMENDATION IN THE RESEARCH (1 OF 2)

Please tell us how much you personally agree or disagree with each of the following statements on a scale of 1 to 7, with 1 meaning you strongly **disagree**, and 7 meaning you strongly **agree**. You can use the slider below to choose any number from 1 to 7 to say how strongly you feel.

**It's important to keep trying in higher-level math when it gets hard because it's normal to have to work at it when you are learning new kinds of math**  
**Showing strongly agree (6 or 7)**



There's also above-average positive movement for student respondents who report getting Bs/Cs or lower grades, and report not being good at math or not liking it

\*Note that higher-income level is a small sample size – n99 – however this group is included here because it may be comparatively informative  
Source: MNP Student Survey Data, n1091 respondents



## REFRAME STRUGGLE AND CAPABILITY: IMPACT OF THIS RECOMMENDATION IN THE RESEARCH (2 OF 2)



I think when teachers share their struggles, like when they struggle, it makes you feel like it's OK to struggle because when you first enter the class, you think they're really good, like they're superior, but they struggle too, just like you."

–AAPI Female Student, TX



It was relatable in many ways to me, and it was good to hear another perspective. It goes to show how just because you are not good at something right now, does not mean you can't get better, you just need the right assistance."

–White Female Student, NY



Now, I think differently because I feel encouraged to give it a try and give it my best even if its hard."

–Hispanic Male Student, CA







# APPENDIX: DETAILED METHODOLOGY



## METHODOLOGY: STUDENT AUDIENCE

- Research participants are public school students in 6<sup>th</sup>, 7<sup>th</sup>, 8<sup>th</sup>, 9<sup>th</sup>, or 10<sup>th</sup> grade living in California, Florida, New York, or Texas.
- Research participants for qualitative research self-identify as Asian American Pacific Islander (AAPI), Black, Hispanic\*, or white, or identified as mixed race and also identified as AAPI, Black, Hispanic, or white to participate. Research participants for the survey were included regardless of race.
- For the qualitative research, Black and Hispanic students could be of any income level; AAPI and white students and parents/guardians were from lower-income households
- Parents/Guardians gave consent for their child to participate in the research

\*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.



## METHODOLOGY: STUDENT QUALITATIVE RESEARCH

- Participants in a research discussion are of the same race and gender as one another
- Interviews and discussions are facilitated by an experienced, professional moderator of the same race or ethnicity as the participant(s)
  - Moderators use a guide with questions carefully designed to provide a particular order and flow of discussion; the content of each moderator's guide is informed by prior phases of research
- Focus group participants do not know each other and are from different schools





## METHODOLOGY: STUDENT MINDSET RESEARCH

- Mindset research was focused on better understanding:
  - Young people's lived experiences of learning math
  - How they feel and talk about learning math
  - How the adults in their lives talk about math
  - How they relate learning math to their education and life
- Tested messaging interventions were informed by the Landscape research and further iterated throughout the Mindset research based on cumulative learnings





## METHODOLOGY: STUDENT MINDSET IN-DEPTH INTERVIEWS

- Sixteen (16) individual in-depth interviews were conducted online with young people in 6th to 9th grade in October and November 2022, among the following audiences:
  - AAPI youth: four interviews, two each among AAPI females and AAPI males
  - Black youth: four interviews, two each among Black females and Black males
  - Hispanic youth: four interviews, two each among Hispanic females and Hispanic males
  - White youth: four interviews, two each among white females and white males





## METHODOLOGY: STUDENT MINDSET IN-PERSON FOCUS GROUPS

- We conducted 12 in-person focus groups in February and March 2023 among 73 participants in 8th and 9th grade, including:
  - 5 AAPI females in California
  - 6 AAPI males in California
  - 6 Black females in Florida
  - 6 Black males in Florida
  - 6 Black females in New York
  - 6 Black males in New York
  - 6 Hispanic females in California
  - 6 Hispanic males in California
  - 6 Hispanic females in Texas
  - 8 Hispanic males in Texas
  - 6 white females in California
  - 6 white males in California





## METHODOLOGY: STUDENT PERSUASION RESEARCH

- Persuasion research was focused on further exploring learnings about math perceptions, and gauging reactions to messaging interventions and messengers intended to encourage students to persist when math gets difficult
- Tested messaging interventions were informed by the cumulative learnings to that point, including from the Mindset research, and were further iterated over the course of the Persuasion research



## METHODOLOGY: STUDENT PERSUASION FRIENDSHIP DYADS

- These dyads took place in person and were conducted among pairs of friends who could — but did not have to be — in the same school
- We conducted a total of eight in-person friendship dyads in August 2023 with students who were going into 7th, 8th, 9th, or 10<sup>th</sup> grade, one dyad each among the following audiences and in the following states:
  - AAPI females (Texas)
  - AAPI males (Texas)
  - Black females (New York)
  - Black males (New York)
  - Hispanic females (California)
  - Hispanic males (California)
  - White females (California)
  - White males (New York)







## METHODOLOGY: STUDENT PERSUASION IN-PERSON FOCUS GROUPS

- We conducted 12 in-person focus groups in September 2023 among 68 participants in 8th and 9th grade, including:
  - 6 AAPI females in California
  - 5 AAPI males in California
  - 6 Black females in California
  - 6 Black males in California
  - 6 Black females in Texas
  - 6 Black males in Texas
  - 6 Hispanic females in Florida
  - 6 Hispanic males in Florida
  - 4 Hispanic females in New York
  - 6 Hispanic males in New York
  - 5 white females in Florida
  - 6 white males in Florida





## METHODOLOGY: STUDENT QUANTITATIVE RESEARCH

- The survey was designed to test the effectiveness of various messaging interventions developed based on the prior phases of research and includes both video and print messaging interventions
- This helped to quantify the qualitative results and allowed us to further analyze results by subgroups, including race, gender, state, and income
- The survey was conducted using an online convenience sample panel
  - Parents/Guardians gave consent for their child to take the survey





## METHODOLOGY: STUDENT PERSUASION ONLINE SURVEY

- The survey was conducted in January 2024 among 1091 public school 7<sup>th</sup>-10<sup>th</sup> graders in California, Florida, New York, and Texas, including:
  - 84 AAPI students
  - 295 Black students
  - 307 Hispanic students
  - 384 white students
  - 21 students of mixed or other races who did not also identify as AAPI, Black, Hispanic, or white
  - 522 female students
  - 569 male students
  - 294 California students
  - 259 Florida students
  - 213 New York students
  - 325 Texas students