

UNDERSTANDING STUDENTS THROUGH MATH IDENTITY

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WHAT IS MATH IDENTITY?

Many believe that there are those who are good at math and those who are not, but nobody is *actually* born a “math person.” In fact, these sentiments are not a reflection of one’s potential as a mathematician, but instead a reflection of their math identity.

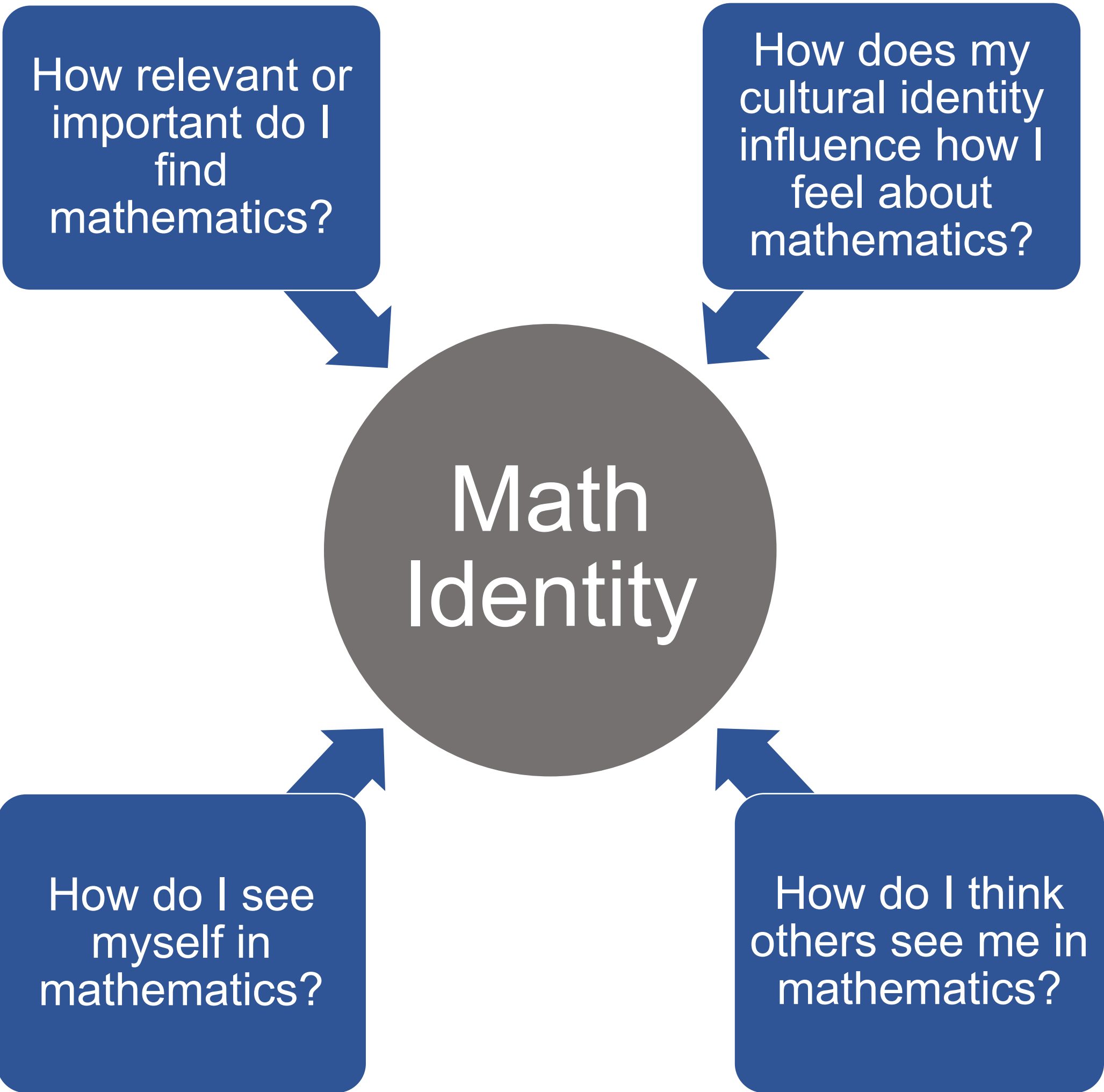
Identity: A mosaic of stories about a person that are generalized, reflective of reality, and significant (Sfard & Prusak, 2005, p. 15-16).

Math identity: “An individual’s concept of who he or she is mathematically” formulated by significant experiences and stories that an individual adopts about their ability in mathematics. (Latterell & Wilson, 2017, p. 46).

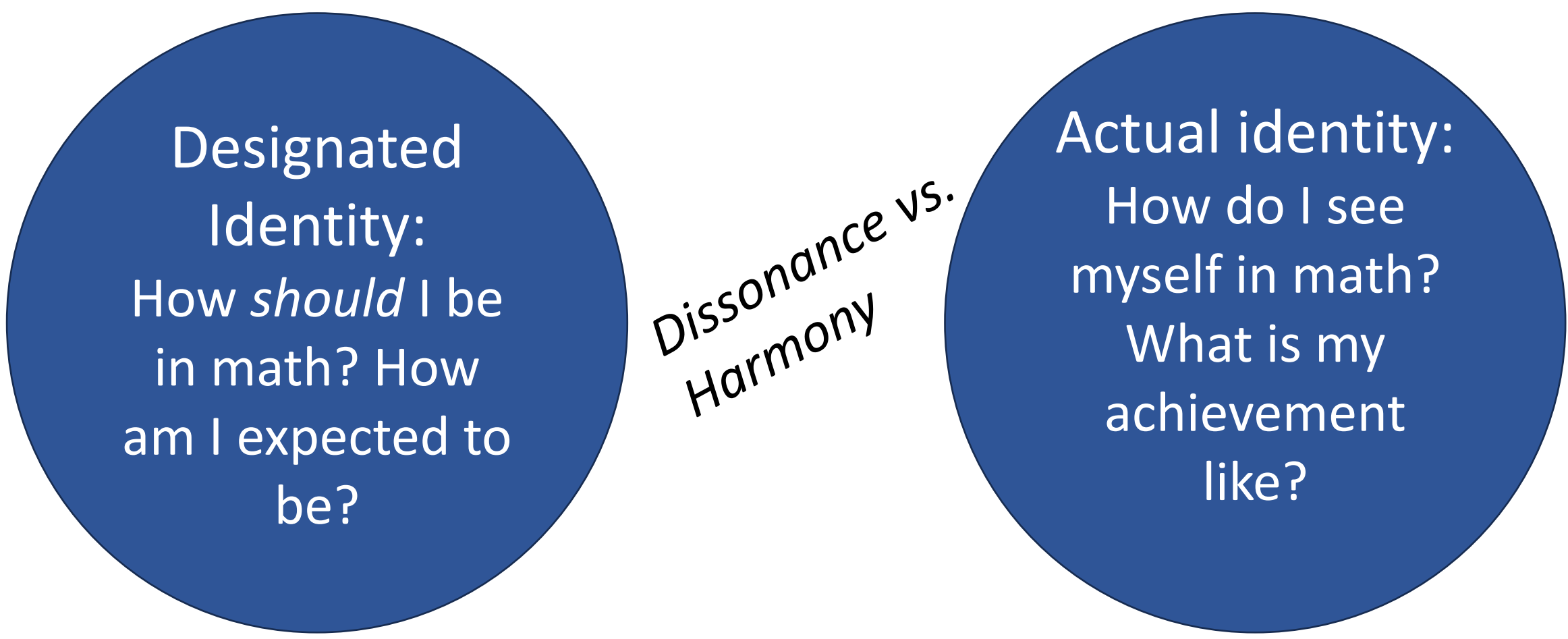
TPEP Alignment: Criterion 5 – Fostering and managing a safe, positive learning environment

INQUIRY QUESTIONS

- What is math identity, and how does it relate to identity in general?
- How do other aspects of identity affect math identity?
- What are the effects of both positive and negative math identities?



Adapted from information found from Latterell & Wilson (2017), Sfard & Prusak (2005), and Martin (2009).



Adapted from information found from Sfard & Prusak (2005).

INTERACTION BETWEEN MATH IDENTITY AND OTHER ASPECTS OF IDENTITY

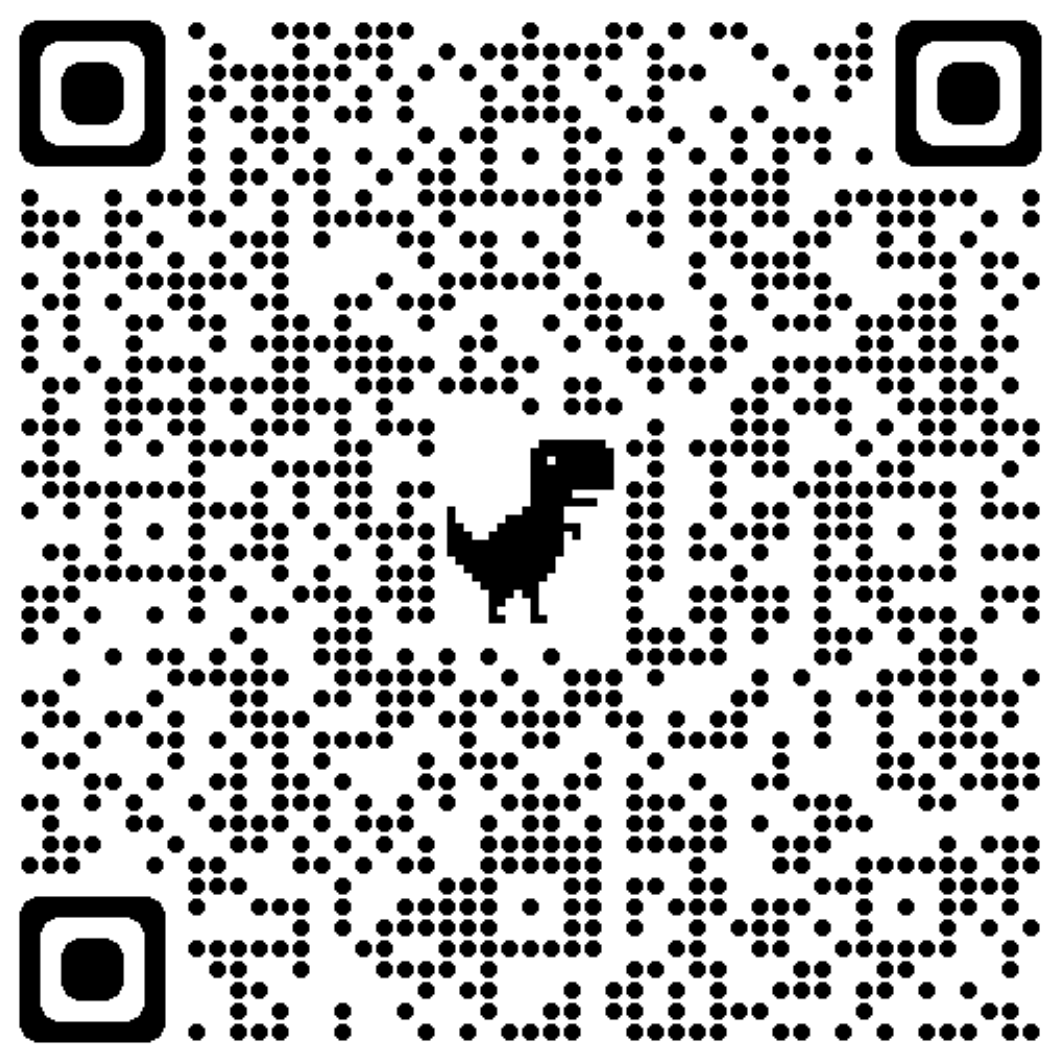
Cultural identity—particularly marginalized identities—can have a significant effect on the formation of math identity due to stereotype threat (Tine & Gottlieb, 2012; Murphy et al., 2007).

Marginalized groups can receive messaging that implies that their group is not competent in math.

- Overrepresentation of Black students in remedial math courses can signal to Black students that they are not seen as competent.¹
- An individual’s income (their class identity) and their racial identity can have negative effects on their performance in math due to stereotype threat.²
- Situational cues can affect an individual’s math identity—or sense of belonging—negatively.³

An individual’s identity is influenced by stories that they believe to be true of others (Sfard & Prusak, 2005, p. 18). Individuals perform better in areas in which they feel competent, which is connected to the idea that people are more motivated to pursue achievement in areas in which they expect to succeed (Leaper et al., 2011, p. 269).

To encourage a strong math identity for all our students, we need to recognize certain implicit biases and respond by showing our students that they belong as math-doers.



Scan me to see the sources used in this project!

For more information on these studies, see:
¹ Nasir & Shah (2011)
² Tine & Gottlieb (2012)
³ Murphy et. al (2007)
⁴ Ashcraft & Moore (2009)
⁵ Gentrup et al. (2020).

EFFECTS OF MATH IDENTITY

Math Anxiety

A “feeling of tension and anxiety that interferes with the manipulation of numbers and the solving of mathematical problems in a wide variety of ordinary life and academic situations” (Richardson & Suinn, 1972, p. 551)

Math anxiety is shown to have a negative effect on performance.⁴ Those who are math anxious are thrown into a cycle where they fear math performance and then subsequently have poor math achievement.

Self-Fulfilling Prophecies

The teacher first forms an inaccurate expectation, treats the student with such expectation, and the student then reflects that expectation (Jussim et al., 2009).

If a student believes that they lack potential, they may not take steps to ensure success.

Students who believe in their success within a domain “are more likely to set goals, select more challenging activities, and engage in more effective learning strategies” (Carroll et al., 2023, p. 20).

High teacher expectations were found to have an increasing effect on student achievement in mathematics due to self-fulfilling prophecies.⁵

HOW TO FOSTER A POSITIVE MATH IDENTITY

- Highlight and value contributions from diverse communities
- Implement lessons that are culturally relevant
- Advertise math as a useful tool
- Promote careers that use math
- Affirm math abilities within students

Mathematics							
Know and believe in your students.		Redefine mathematical success.		Prioritize student voice.		Monitor identity formation.	
Instructional Practice							

Four pillars to support math identity (Allen & Schnell, 2016, p. 400)

IMPLICATIONS FOR EQUITY

Students of color, female students, and students of low SES have historically experienced an opportunity gap and low performance in the mathematics classroom. This starts with math identity. When students do not believe that they can succeed, they are more likely to disengage or avoid partaking in behaviors that ensure academic success. Teacher expectations of students play a significant role in the math identity of certain groups. Using the knowledge gained from this project, we can be more aware of the effects that tracking, remedial courses, and overrepresentation in special education on our student’s success in STEM.

A positive math identity often leads to success and perseverance within mathematics. Fostering such an identity is the key to opening the STEM field to more diverse populations Mathematics is considered a gateway to higher education due to standardized testing and college prerequisites. Using math identity to build a strong foundation for students to lean on in times when they need motivation and grit is the key to giving more students the opportunity to pursue higher education.