

# What We Know About Learning Mindsets from Scientific Research

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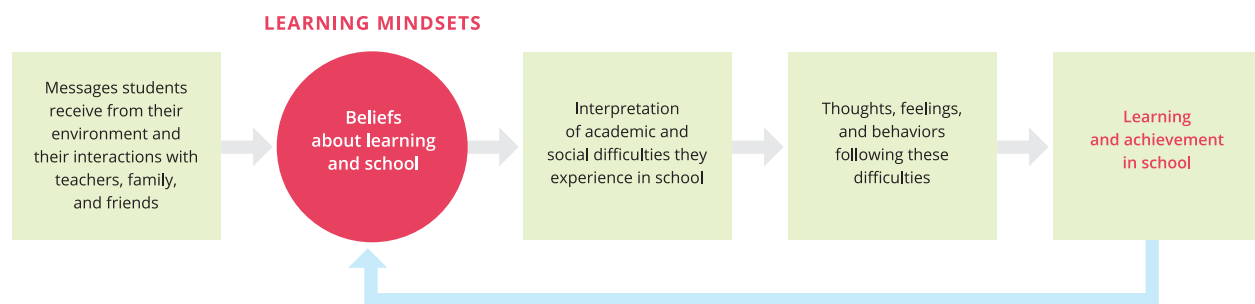
## LEARNING MINDSETS

Mindsets are students' beliefs about learning and school. Students with learning mindsets are more motivated to take on challenging work, persist in the face of setbacks, and achieve at higher levels.

Research shows that the following learning mindsets play a role in students' persistence and achievement in school.

- **Growth Mindset:** The belief that intelligence can be developed
- **Belonging:** The belief that one is respected and valued by teachers and peers, and fits in culturally in one's learning environment
- **Purpose & Relevance:** The belief that one's school work is valuable because it is personally relevant and/or connected to a larger purpose

## The role of learning mindsets in shaping academic outcomes



## CHALLENGES ARE AN IMPORTANT PART OF THE LEARNING PROCESS

Learning mindsets shape the way we respond to challenges—whether we engage with them or retreat. It's important to engage with challenges, because that's when people learn the most.

Many of us have been taught that learning should come easy, getting the right answer the first time is most important, and that failure is bad for children's self-confidence. But research tells us that we maximize our learning—and gain the most satisfaction—when we persist in solving the challenging problem that stumped us initially.<sup>1</sup>

Neuroscientists have shown that our brains operate like a muscle. When we go to the gym, we put in hard work lifting weights that make our muscles struggle—because that's what will make them stronger. The same is true of our brains. Research tells us that our brains strengthen the most not when we get a question correct, but rather when we get a question wrong and work through our mistake. We build stronger connections between the neurons in our brain when we wrestle with a problem, reflect on why we got it wrong, and try different strategies. With the proper support and guidance from others, these so-called failures are often the very opportunities that make us smarter and expand our capabilities. These productive struggles also can yield a greater sense of satisfaction for the learner.

**MINDSET  
SCHOLARS  
NETWORK**

Hosted at the Center for Advanced Study in the Behavioral Sciences at Stanford University, the Mindset Scholars Network is a group of leading social scientists dedicated to improving student outcomes and expanding educational opportunity by advancing our scientific understanding of students' mindsets about learning and school.

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Learning mindsets come into play right at the point at which we begin to struggle or face a challenge. How we interpret this adversity affects our motivation to remain engaged with the task at hand. If we don't remain engaged, we lose out on the cognitive benefits of working through a challenge.

#### **LEARNING MINDSETS AFFECT STUDENTS' INTERPRETATIONS OF CHALLENGES AND ADVERSITY**

Learning mindsets affect whether or not students engage with challenges because they affect the way in which students understand the larger meaning of those challenges. These mindsets can be thought of as lenses through which students interpret their day-to-day experiences in school, particularly experiences of adversity.

For example, two students receiving the same exact low score on an assignment may have very different responses depending on their respective mindsets. If a student believes intelligence is fixed at birth, she may see it as a judgment on her ability in the subject, withdrawing effort and steering clear of future challenges to avoid failure. In contrast, a student who knows that intelligence is malleable may see the test score as an indication that she simply hasn't mastered the material yet, redoubling her efforts, asking for help, and trying different strategies.

#### ***Mindsets about learning and school that are maladaptive set in motion a negative, self-reinforcing cycle***

A student who believes intelligence is a fixed trait sees the poor grade as a judgment on her ability in the subject. Since she believes she is not good at the subject, she writes it off as not worth her time. She studies less hard for the next test and does even worse, confirming her hypothesis that she's not smart at the subject. She is now caught in a negative, self-reinforcing cycle: the worse she does, the more

she withdraws, and the more she confirms her belief that she's not smart.

#### ***Learning mindsets spark a positive, self-reinforcing cycle***

In contrast, a student who believes it's possible to develop one's intelligence merely interprets the poor grade as a sign she didn't work hard enough or used the wrong strategies, and hasn't yet mastered the material. So she puts in more effort before the next test, tries different strategies, or seeks advice from her peers or teacher. She performs better, and this triggers a positive cycle: the better she does, the more evidence she receives that her intelligence can be developed, and the more she is motivated to continue working hard.

#### ***Schools and teachers respond to students' performance—reinforcing positive, or negative, cycles***

Furthermore, the learning environment will also react to these students. While the first student may be treated like a failure, the second student may be elevated: given more attention in class, harder tasks and more challenging course placement, and so on. Because students' mindsets can start recursive cycles that are reinforced by the self and the environment, their impact can compound over time.

#### **STUDENTS' MINDSETS ARE SHAPED BY THEIR DAY-TO-DAY EXPERIENCES, INTERACTIONS, AND OBSERVATIONS**

Mindsets are not fixed traits. They come from messages students learn from society, their interactions with others, and their experiences in school.

Even when students receive the same curriculum and the same instruction from the same teacher, their personal experience of that classroom differs depending on their beliefs about the nature of ability, their belonging in school, and the purpose and relevance of their schoolwork. Above

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all, these beliefs are entirely reasonable from the point of view of the student—and are rational responses to their prior observations and interactions—and they can be self-reinforcing. If you believe people can grow, you may notice yourself growing more.

But certain mindsets can also hamper students' ability to perform. Crucially, even when a student has intellectual ability and access to adequate learning opportunities, she may not perform at her best if her mindsets about learning and school undermine her ability to take advantage of them.

When a student is told, "it's okay, some people just aren't 'math people,'" she can come to believe that math ability is a fixed quantity. She withdraws effort or worries about how to avoid "looking dumb."

Aware of the stereotypes that math professors may have about women, a math major may question whether she is respected and valued, and may be on the alert for cues that others think she doesn't belong.

And when the connection between a student's daily schoolwork and her life and long-term goals isn't clear, she understandably has little incentive to remain engaged when the work is boring, frustrating, or challenging.

#### STUDENTS CAN ADOPT LEARNING MINDSETS WHEN THEY RECEIVE DIFFERENT MESSAGES

The good news is that mindsets can be transformed, sometimes with seemingly small changes. Recent studies have shown that students adopt learning mindsets when they receive certain messages from their learning environments, either through what adults communicate or through targeted programs. Changes in mindsets can alter students' academic behaviors in ways that can lead to sustained improvements in performance.

Similar to removing logs blocking a stream running downhill, when we free students from their concerns, they are better able to take advantage of the learning opportunities available to them, performing better and gaining momentum over time.

#### *Altering the environment in which students learn changes the messages they receive*

Students constantly receive messages from the environment that shape their mindsets—from the way their parents talk to them about homework to their teachers' grading policies and how they are tracked into different course pathways by schools. Recent studies suggest that it is possible to change messages students receive from the environment in ways that encourage learning mindsets.<sup>2</sup>

#### *We can also deliver new messages to students through carefully-targeted programs*

Researchers have shown that you can deliver new messages directly to students through brief online programs.<sup>3</sup> When students receive well-crafted messages that target specific beliefs, they come to adopt learning mindsets and do better in school.

The opportunity now is two-fold: figuring out where mindset programs are most effective and how to optimize them for different students and settings, and how to change the messages students receive on a day-to-day basis from their environment. The Mindset Scholars Network is making inroads in both of these areas.

#### *Fostering learning mindsets can lead to sustained academic growth*

In education, early success begets future success. When we help students develop learning mindsets, this has a direct effect on their motivation. When we can increase students' motivation to study, learn, and build academic skills, they are better prepared to learn and perform in the future. As students feel more comfortable in school, they build stronger relationships with their peers and teachers, which supports greater achievement in the future. As students perform better, they may be placed in more challenging, higher-level courses. Such courses bring with them higher expectations and higher-achieving peers—all of which coalesce to put students on a better academic trajectory.<sup>5</sup>

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<sup>1</sup> Yeager, D.S., Henderson, M., Paunesku, D., Walton, G., Spitzer, B., D'Mello, S., & Duckworth, A.L. (2014). Boring but important: A self-transcendent purpose for learning fosters academic self-regulation. *Journal of Personality and Social Psychology, 107*, 559-580.

<sup>2</sup> Hulleman, C. S., & Harackiewicz, J. M. (2009). Promoting interest and

performance in high school science classes. *Science, 326*(5958), 1410-1412.

<sup>3</sup> Yeager, D.S., Henderson, et al., 2014.

<sup>4</sup> Paunesku, D., Gripshover, S., Romero, C., Beaubien, J., Yeager, D.S., Walton, G.M. & Dweck, C.S. *Manuscript in preparation.*

<sup>5</sup> Yeager, D. S., Paunesku, D., Walton, G., & Dweck, C. S. (2013). How can we instill productive mindsets at scale? A review of the evidence and an initial R&D agenda. White paper prepared for the White House meeting on "Excellence in Education: The Importance of Academic Mindsets."