Leveraging Mindset Science to Design Educational Environments that Nurture People's Natural Drive to Learn

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Motivation is a key determinant of learning

Human beings are born to be learners and doers. People are naturally curious.[i] Motivation is the psychological process that *propels* learning; its function is to mobilize the brain to engage in learning and development.[ii] When people's basic physiological needs are satisfied, motivation is a critical driver of how much, and how deeply people learn.[iii]

This natural desire to learn is sustained when a few core psychological needs are met. People need to feel competent. They need to feel connected to others. They need to feel capable of expressing their authentic self and taking action.[iv]

Because of these core needs, people feel an emotional pull to participate in tasks at which they feel capable of succeeding, that engage them in a collective endeavor, and that they perceive as valuable (e.g., that are interesting or relevant to realizing meaningful goals or a valued identity). People need to want to do a task, feel safe and connected to others in doing the task, and believe they can do the task with the right support. When these conditions are met, people are more likely to choose challenging tasks, persist in the face of difficulty, learn more deeply, and achieve at higher levels.[v]

Many external factors affect the motivation to learn. Students need a safe, healthy environment and enriching experiences outside of school. They need to be free from the fear of being

HIGHLIGHTS

- People are born to learn and motivation is the fuel that propels learning
- How people make meaning of their experiences in school (their 'mindsets') is one important factor that affects their motivation to learn and their ability to learn effectively
- The mindsets students develop about learning and school are reasonable inferences from their social environment and are shaped by systemic inequities in society
- Students' mindsets are malleable and can change when we change the messages we send them: from society, in school, and through targeted psychological interventions
- Retooling schools and postsecondary institutions to align with insights from mindset science has the potential to nurture the inherent drive to learn with which people are born and enhance learning outcomes and educational equity

student experience RESEARCH NETWORK

harassed or bullied. Additional in-school factors affect the opportunity to learn, from the presence of trained educators to cognitively-rich instruction in learning strategies and content knowledge. An absence of these factors serves as a headwind to motivation and learning.

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Yet even if these foundational elements are in place, students will not be motivated to engage in the learning behaviors that are necessary to master academic content unless they are confident they are cared about, feel connected to teachers and peers with shared intentions for learning, see the value of what they are being asked to learn, and believe they have a real chance to succeed.[vi]

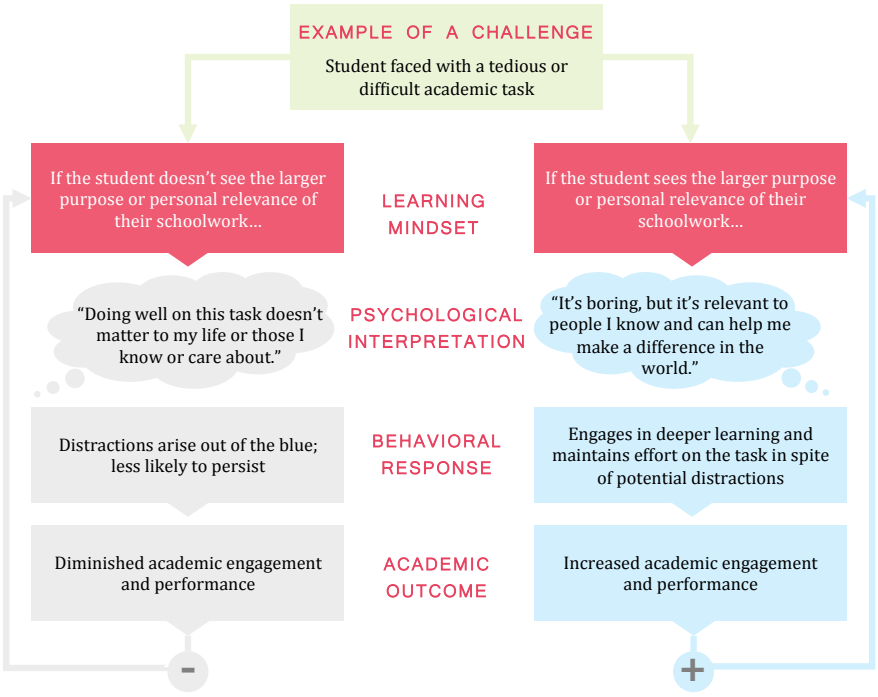
The current structure of the American education system comes from a time when we had less scientific understanding about the factors that shape people's motivation to learn and how motivational processes affect cognition. Focusing on how we can design schools and classrooms that nurture people's natural desire to learn is critical when considering many pressing challenges in education, from implementing more rigorous academic standards and increasing college completion to addressing persistent disparities in school discipline and STEM participation.

How people make meaning of their experiences in school is a key factor that affects their motivation to learn and their ability to learn effectively

Myriad factors shape students' motivation to learn. But one key determinant of motivation is the beliefs that students come to hold about themselves, their relationship to others, and the work they are asked to do in school. These beliefs are shaped by students' observations of the world around them; they are reasonable inferences that reflect students' reality. They represent "working hypotheses" about who students are, the way the world works, and their place in it.[vii] These beliefs (or 'mindsets') are the lenses through which students make meaning of, or *construe* their experiences in school. These interpretations, in turn, shape their responses.

As Walton and Wilson note, "virtually every situation is open to interpretation… and it is the interpretation people draw that guides behavior."[viii] Certain mindsets make it reasonable from students' point of view to disengage

Figure 1. Mindsets shape behavior by affecting how people make meaning of their experiences, particularly challenges (mindset featured in this example: whether or not students believe the work they are asked to do is relevant to their life or connected to a larger purpose)



when they struggle, while other mindsets make it reasonable to seek out and persist in the face of challenges (see Figure 1, previous page). It is logical that students will not be motivated to persist at tasks they find tedious or difficult if they see their schoolwork as lacking in meaning. But if they see what they are learning in school as something that will help them make a difference in the world or connect to a valued identity, they are more likely to be motivated to stick with those tasks. For example, a college student who sees the connection between memorizing legal cases and her goal of going to law school to become a public defender will be more willing to repeatedly revisit such cases, even if it feels laborious or difficult.

In other words, students' mindsets *sustain* or *undermine* their sense of competence, their connection to others, and their perception that what they are doing is valuable when faced with challenges, uncertainty, or tedium.[1] Mindsets are thus key determinants of how people respond to the struggles and setbacks that are essential to the learning process and can be valuable opportunities for growth.

STUDENTS' MINDSETS SUSTAIN OR UNDERMINE THEIR SENSE OF COMPETENCE, THEIR CONNECTION TO OTHERS, AND THEIR PERCEPTION THAT WHAT THEY ARE DOING IS VALUABLE WHEN FACED WITH CHALLENGES, UNCERTAINTY, OR TEDIUM.

Scientists have repeatedly shown that students' mindsets *causally affect* their motivation to engage in sustained learning behaviors, the quality of their learning strategies, and their learning outcomes, including grades, test scores, and persistence to graduation (see Figure 2).[ix]

What are the key mindsets about learning and school?

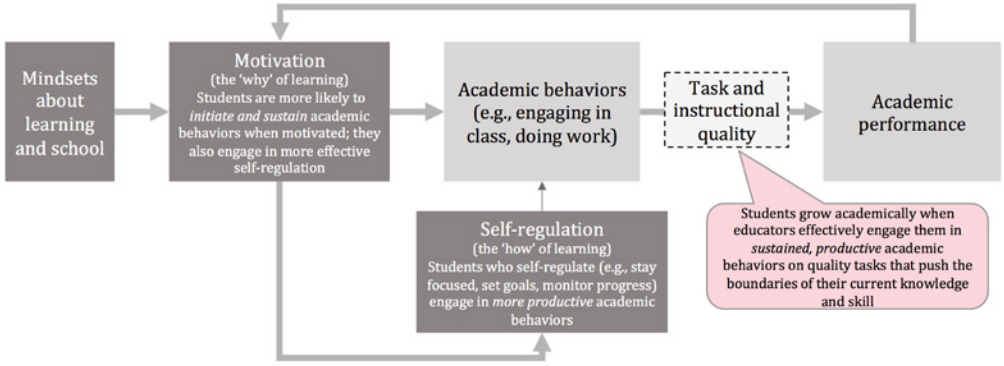
The key mindsets about learning and school relate to beliefs about belonging, intelligence, and the value of schoolwork.

Mindsets that undermine motivation: When students are aware that they may be judged negatively based on who they are, they are more likely to exert mental capacity looking for cues that people don't think they 'belong' in that environment. When students perceive that the people around them believe ability is a fixed trait, like eye color, they are more likely to worry about proving they are 'smart' (or avoiding looking 'dumb'). When the value of their schoolwork isn't clear, students are less likely to engage.

Mindsets that sustain motivation: By contrast, when students feel confident their instructors and peers value and respect them (belonging), they can focus attention on the work at hand.[xi] When students' environment conveys to them that they can improve their ability if they apply effort and effective strategies (a "growth" mindset about intelligence), students are more likely to interpret new challenges as intrinsically rewarding opportunities to grow and experience competency.[xii] When students see the connection between their schoolwork and their lives or a larger purpose (relevance and purpose), they are more likely to perceive tasks that are hard or tedious as worthwhile.[xiii]

These adaptive behavioral responses set in motion positive, recursive processes between the individual and their environment that can lead to productive learning. People invest more in their own efforts when they believe they are capable; similarly, people invest more in others whom they perceive

Figure 2. Mindsets affect students' motivation, which influences the quality and persistence of students' learning behaviors and, in turn, their learning outcomes[x]



Farrington et al., 2012

[1] To be clear, this is not an endorsement of boring schoolwork; however, many foundational skills require sustained, deliberate practice (e.g., becoming a musician requires practicing scales and etudes).

as capable.[xiv] When students appear more engaged, instructors respond to them more positively; when students show greater proficiency over time, they are more likely to receive rigorous work and higher course placements.[2] When students sense they are respected by their peers and instructors, they are more likely to reach out and form relationships, which in turn strengthen their sense of belonging and engagement at school.[xv]

Conversely, beliefs that lead students to disengage from productive learning behaviors spark negative, self-reinforcing cycles that lead to poorer learning and increased disidentification with school over time. When students worry that asking questions in class will make them look 'dumb,' they are less likely to seek help from their instructors or peers, which leads them to do worse and withdraw further; others perceive them as 'unmotivated' or 'not caring about their education' and withhold investment.

Education is one of the ultimate recursive processes. Past experiences shape future outcomes, and the mindsets through which students interpret their daily experiences at school are a powerful mechanism by which this dynamic plays out.[xvi] Similarly, the lenses through which educators interpret students' behavior are an important determinant of how they respond to students, too.[xvii]

KEY MINDSETS

Belonging: Whether you believe you are valued and respected by your peers and instructors

Intelligence: Whether you believe you can grow your intelligence

Relevance and purpose: Whether you believe the work you are asked to do at school is relevant to your life or connected to a larger purpose beyond the self

Mindsets are reasonable inferences from the social environment and are shaped by systemic inequities in society

How do students develop the lenses through which they interpret what happens to them at school? From a young age, children begin to develop mindsets from countless observations of the world around them: from society, their families and other important adults in their lives, their peers, and the policies and practices they see enacted around them.

As natural learners, children are constantly reading between the lines to understand how the world sees them. This affects the identities and goals they come to adopt, and the beliefs they develop. When we send children messages that we believe they belong in school, that they can excel, and that schoolwork is meaningful, they are more likely to develop mindsets about learning and school that sustain the inherent drive to learn with which they were born.

All children need to receive these positive messages. But some children are more likely to receive them because of long-standing inequities in our society that privilege certain groups. Students from wealthier communities, for instance, are more likely to attend well-resourced schools that provide a richer curriculum. White students, particularly white boys and men, are more likely to see people who look like them in instructional materials and positions of power.[xviii]

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Other children perceive a contrasting set of messages because they experience a different social reality as a member of a stigmatized group, or because they lack financial resources. These students are keenly aware of negative stereotypes in society and that they may be judged or evaluated as less capable.[xix] A scarcity of people from their background in certain positions or a lack of economic opportunity convey that they have fewer options for the future.[xx] Teachers may hold lower expectations for them and interact with them differently as a result (e.g., providing less feedback to incorrect responses).[xxi] The curriculum and instruction to which they are exposed are less likely to reflect their community and cultural models, and may be more "rote-oriented" and less demanding.[xxii]

The residue of these messages accrues over time, shaping the mindsets students come to hold, and influencing how they interpret future experiences. Some students have received messages for years that people like them have less intellectual aptitude. They must always contend with the worry that people might judge them negatively because of who they are, or that they don't have what it takes. Other students have the privilege to learn free of this additional weight.[xxiii] These are the respective lenses through which students interpret challenges and setbacks, whether it is critical feedback on an essay or being stopped in the hallway by a teacher. A white student may see these experiences as innocuous, for instance, while

[2] It is important to note that students of color are less likely than white students of similar academic qualifications to be recommended by teachers for 'gifted and talented' placements (e.g., Grissom & Redding, 2016).

an African American student may reasonably worry about whether they are being evaluated differently. These divergent interpretations shape their responses and their experiences of school.

Students' mindsets can change when we change the messages we send them

Research has demonstrated that mindsets are malleable—they are not fixed traits.[xxiv] This is crucial because when people experience challenges and setbacks differently, they respond differently in turn. This can set off a self-reinforcing cycle of adaptive beliefs, behaviors, and outcomes that can put them on a new learning trajectory.

Over the past several years, scientists have shown that it is possible for students to develop different mindsets when they participate in exercises that can be delivered with fidelity to massive numbers of students online.[xxv] These psychological interventions are precisely targeted to spark positive recursive cycles that encourage different mindsets to take hold over time.[3] Studies have shown that carefully-designed mindset interventions can reduce achievement gaps by improving the performance of students who have struggled academically or who face negative stereotypes about their group's intellectual ability.[xxvi] Critically, the academic environment must afford the possibility of improvement: sufficient resources (e.g., quality instruction) must be in place for these intervention effects to bear out over time.[xxvii]

Such interventions are important because many students are faced with learning environments in which the messages they receive may not support adaptive mindsets. The interventions can thus trigger a critical 'buffer' for low-performing students and those who contend with negative stereotypes about their ability. These interventions do not eliminate the need to make changes to learning environments that send harmful messages to students but they are an important resource today for students who must face such environments on a daily basis. Moreover, such interventions can provide insights as to how environments can be changed to greatest effect.

Scientists also hypothesize that interventions that target students' mindsets can make students more attuned to positive messages in the environment where they do exist. For example, if students have been primed through a psychological intervention to understand that one's intellect can grow, they may be more likely to pick up on growth-aligned instructional practices (e.g., encouraging revisions).[xxviii]

But interventions designed by scientists aimed at students' mindsets are just the tip of the iceberg. Everything we do in schools conveys explicit and implicit messages to students that shape the mindsets they hold. The environments educators create in schools in collaboration with families and integrated community partners can be 'motivating' or 'demotivating' in their design. We can sustain people's natural drive to learn—or we can undermine it.

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Students develop more adaptive mindsets when we intentionally craft learning environments that reinforce the messages that students belong, that they can get smarter, and that their schoolwork is personally meaningful. Such messages leave behind layers of positive psychological residue that contribute to the mindsets students develop. Creating such environments is critical for all students, but particularly for those from groups that have been marginalized and negatively stereotyped in academic contexts, including students of color, English language learners, students with learning differences, first-generation college students, and women and girls in STEM.

Such messages are relevant beyond their contribution to the beliefs that students come to acquire over time. These cues can also trigger in students more (or less) adaptive mindsets in a particular school or classroom context. Consider, for example, a woman taking an advanced chemistry course in college. She is likely to be aware of negative stereotypes about women's ability in the physical sciences and will be vigilant for signs that her peers or instructor think she doesn't belong or can't succeed. If her instructor conveys that all students are capable of exceling in the course with the right strategies and support, she will be less likely to question whether she belongs in the course and can master the material. When she comes up against a challenging problem or gets a low exam grade, she will feel capable of bouncing back and be more likely to reach out for help. In contrast, if the instructor begins the semester saying that "half of you will earn Ds or Fs" and imploring students not to ask "dumb questions," this will likely dissuade her from seeking the support she needs to succeed.[xxix]

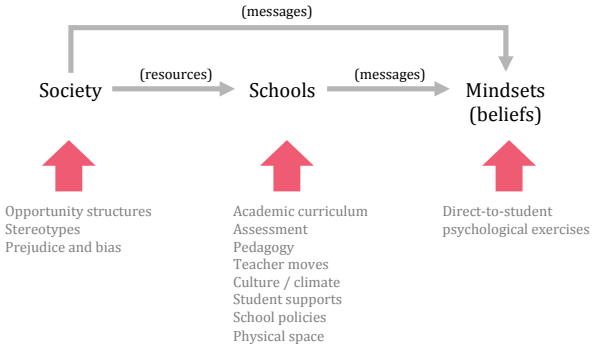
In sum, it is possible to intervene at three points to change the messages students perceive and the mindsets they come

[3] Social psychological interventions target beliefs that shape how people interpret their experiences. This can set off a "snowball" effect: the new interpretation changes their response to subsequent experiences, the outcomes of which then reinforce the new belief; this recursive cycle picks up steam over time (Walton, 2014, p. 79). For example, as students become more confident they belong in school, they build stronger relationships with their peers and instructors, who become ongoing sources of support and bolster students' success over time (Yeager & Walton, 2011). Importantly, this snowball effect depends on the extent to which certain educational resources are present in the environment. While similarly brief in duration, 'nudge' interventions often operate via a somewhat different mechanism: they change the structure of situations (e.g., changing the default option, sending a timely reminder) to make certain behaviors in that specific context more likely. These changes may not generalize to other situations (Walton & Wilson, under review).

to hold (see Figure 3). We can change the opportunity structures, stereotypes, prejudice, and bias students experience in society. We can modify our educational practices and policies to change the messages students receive in school. [4] And we can intervene at the student level with precise interventions designed by scientists to reorient students to more adaptive mindsets. These options are not mutually exclusive but complementary opportunities to help remedy educational and societal inequity.

It is important to emphasize that this is not an 'either/or' choice. It is necessary to make long-term, systemic changes to aspects of schools and society that perpetuate unequal educational outcomes in part by sending disparate messages to students that shape their motivation in school. It is also imperative today to use scientific knowledge about how interventions can change students' mindsets responsibly and reliably to improve the experience of current students who might benefit from such immediate supports. Failing to do so would be akin to denying individuals who face significant adversity access to effective services that could help them lead healthier lives until all sources of adversity are eradicated—the ultimate societal goal.

Figure 3. There are multiple points of intervention to change the messages students receive and the mindsets students hold



Retooling education to align with insights from mindset science has the potential to nurture the inherent drive to learn with which people are born

Motivation is a critical determinant of how much and how deeply people learn.[5] But the typical design of schooling reflects a time when we had less scientific understanding about how motivational processes shape cognition and where the motivation to learn comes from. Some of this knowledge has validated popular notions about motivation (e.g., tasks that are novel and varied spark greater interest), while other insights run counter to widespread beliefs and practices (e.g., rewards, evaluations, and punishments can undermine deeper learning because they imply that people must require bribery or threats to engage in the task, and they focus people on achieving the outcome rather than the process).[xxx]

For example, developmental scientists have observed that as students age, the typical design of schooling becomes increasingly out of sync with our understanding of adolescents' motivational needs.[xxi] Adolescents become more sensitive to social comparison and signals of respect, more capable of taking on abstract, conceptual thinking, and need different kinds of relationships with caring adults.[xxxii] Yet secondary schools increasingly rely on summative evaluation and ranking, apply zero-tolerance policies that undermine respect, assign less challenging work, and become more impersonal as students rotate through multiple teachers each day.[xxxiii] Perhaps unsurprisingly, students report declining levels of intrinsic motivation beginning in middle school and continuing into high school.[xxxiv]

THE TYPICAL DESIGN OF SCHOOLING REFLECTS A TIME WHEN WE HAD LESS SCIENTIFIC UNDERSTANDING ABOUT HOW MOTIVATIONAL PROCESSES SHAPE COGNITION AND WHERE THE MOTIVATION TO LEARN COMES FROM.

Guiding principles gleaned from scientific research on motivation can help practitioners and policymakers adjust educational policies, school designs, instructional practices, and academic tasks to enhance student engagement in learning.[6]

Research suggests that learning environments that are inclusive, growth-oriented, and meaningful are more likely to sustain the inherent curiosity and desire to learn with which we are born. Table 1 summarizes design principles extracted from four decades of behavioral and social science research about the features of such learning environments. These principles speak to what is taught, how it is taught, who teaches it, and the context in which it is taught. Notably, similar principles are also likely to sustain educators' professional motivation to continuously improve their instructional practice and build their collective capacity to create collaborative, purposeful environments for teaching and learning.

[4] In this brief, we are focused primarily on educational institutions but families and other actors in students' lives outside of school are also important sources of these messages (e.g., Haimovitz & Dweck, 2016; Moorman & Pomerantz, 2010; Gunderson et al., 2013).

[5] It is important to note that motivation is critical to becoming an effective, self-directed learner, but it is insufficient on its own. Students can be motivated to learn but not have the knowledge, metacognitive skills, or learning strategies necessary to put that motivation 'to work.'

[6] Leading practitioners and R&D organizations are already engaged in this work in K-12 and higher education. R&D organizations like the Carnegie Foundation for the Advancement of Teaching, College Transition Collaborative, Motivate Lab, Perception Institute, PERTS Lab, University of Chicago Consortium on School Research, and others are working with practitioners to create tools and practices that draw on mindset science to design learning environments that nurture people's motivation to learn.

Table 1. Design characteristics of K-16 learning environments that nurture people's motivation to learn

LEARNING ENVIRONMENTS THAT ARE INCLUSIVE ARE…

Relationship-centered: They adopt routines and practices that foster trust and encourage sustained, developmentally-supportive relationships among students and educators inside and outside the classroom[xxxvi]

Cue-conscious: They ensure visual cues convey to students that people like them belong and are expected to excel:[xxxvii]

- They attend to issues of representation: Students see peers and role models of similar backgrounds and identities in all advanced courses, disciplines, and instructional positions
- They pay attention to the images present in the physical environment: They consider what images (e.g., posters, artwork) in the classroom and school convey about who belongs and is successful
- They are safe and well-resourced: The physical setting conveys to students their education is valued

Transition-supportive: They signal that integrating into a new learning community is a process and that 'difference' is a valued asset that can contribute to students' success (e.g., transition programming foreshadows potential challenges and strengths students bring)[xxxviii]

Pedagogically-inclusive: They ensure curriculum and instruction value students' identities and reflect their cultural models, and include all students in academic work and discourse in meaningful ways[xxxix]

Exclusion-mindful: These environments remedy policies and practices that undermine students' sense of inclusion and situations that create barriers to belonging:[xl]

- They remedy policies and practices that exclude, stigmatize and shame, preserve racial / ethnic and cultural dominance, perpetuate stereotypes, and undermine perceived fairness and due process (e.g., many forms of tracking; discipline policies; messaging surrounding academic probation and remediation)
- They attend to exclusionary language (e.g., language used to describe families, gender identity, sexuality, ability status, race, ethnicity, and immigration status; mispronunciations of students' names)
- They address barriers to participation that could undermine students' sense of belonging in the learning environment (e.g., lack of access to food, shelter, safety, and healthcare; inability to pay for school supplies; financial or academic barriers to participate in extracurricular activities; family time, language barriers, or administrative hassles that make it difficult for families to be involved in school)

LEARNING ENVIRONMENTS THAT ARE GROWTH-ORIENTED ARE…

Conceptually-focused: They focus curriculum and instruction on conceptual understanding and prioritize depth over breadth in coverage[xli]

Challenge-supportive: They create conditions for optimal challenge (difficult but not impossible given the student's skill level) and enable all students to experience meaningful growth in a challenging curriculum:[xlii]

- They hold all students to high standards and design challenging, open-ended tasks that students at different levels of mastery can all access
- They provide differentiated supports that equip students to meet challenges and maintain a sense of efficacy and competence—positioning learning as a collaborative enterprise with collective responsibility among students, their peers, and educators
- They do not give "comfort-oriented feedback" (e.g., consoling students that people may struggle in this domain but can succeed in others or that "not everyone is a math person," or assigning less work)

Mastery-oriented: They normalize mistakes as central to learning, make it safe to take risks, focus on competency over seat-time, encourage feedback and revision, and reframe assessments as resources for improvement and development of mastery[xliii]

Process-focused: They focus feedback (responses, criticism, and praise) and assessment on process over accuracy or speed, and make explicit the connections between students' process and their outcomes[xliv]

Comparison-mindful: They consider the messages that competition, ranking, grouping, grading, or labeling practices and policies could send students about their ability to grow intellectually[xlv]

LEARNING ENVIRONMENTS THAT ARE MEANINGFUL ARE…

Future-oriented: They engage in practices that convey to students that a range of personally motivating future goals and "possible selves" are available and that students will be supported in achieving them[xlvi]

Agency-supportive: They provide students with regular opportunities to have voice and agency (express their authentic self, make choices that are meaningful to them, and be a source of action), collectively or individually[xlvii]

Engagement-driven: They provide schoolwork designed to sustain interest and engagement:[xlviii]

- Tasks and assessments are engaging (authentic, collaborative, problem-oriented, challenging, novel, varied, open-ended, sensory, cooperative, requiring active meaning-making, prosocial, and utilizing resources outside school) and perceived as valuable (relevant to students' interests and goals)
- They consider the potential negative effects of extrinsic motivators (evaluation, reward, punishment) and controlling / autonomy-undermining behaviors (e.g., instructors monopolizing discourse, focusing on commands and compliance, telling students the right answer instead of giving time to discover it) on students' engagement and their desire to learn

Connection-themed: They provide curriculum, tasks, and leadership opportunities that encourage students to connect what they are learning with their lives, identities, communities, and a self-transcendent purpose

Motivation is core to learning—not an add on—and we can create environments that foster it

Rigorous scientific evidence shows that motivation is a vital psychological process that makes possible humans' evolutionary predisposition to learn and develop. It drives people to seek out new knowledge and skills. The environments we create in schools and classrooms can support or weaken this natural desire to learn.

A key insight from the science of motivation is that how students make meaning of their experiences at school can sustain or undermine their sense of competence, their connection to others, and the perceived value of tasks when encountering challenges and setbacks that are inherent to the learning process. These mindsets are thus critical determinants of students' motivation and their ability to successfully master rigorous academic content and become life-long learners. This is especially true for students from underrepresented and marginalized groups who have disproportionately received messages that they are less capable.

A robust and growing body of research provides scientific warrant to a set of principles that can help educators and practitioners design environments that nurture people's natural desire to learn—and it can help the field know what to look for in surfacing promising innovations from practice. Cultivating schools and classrooms aligned with insights from mindset science is essential to realizing an equitable educational system that provides an engaging, enriching experience for all students and educators.

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[i] Silvia, 2008.
[ii] Larson & Rusk, 2011.
[iii] Immordino-Yang, 2016.
[iv] Deci & Ryan, 2000; Furrer, Skinner, & Pitzer, 2014; Baumeister & Leary, 1995.
[v] Wigfield et al., 2015; Carr & Walton, 2014; Master, Cheryan, & Meltzoff, 2017; Butler & Walton, 2013.
[vi] Dittman & Stephens, in press; Yeager & Walton, 2011.
[vii] Walton & Wilson, under review.
[viii] Walton & Wilson, under review.
[ix] Aronson, Fried, & Good, 2002; Blackwell, Trzesniewski, & Dweck, 2007; Good, Aronson, & Inzlicht, 2003; Jamieson et al., 2010; Murphy & Zirkel, 2015; Sherman et al., 2013; Walton & Cohen, 2011; Yeager et al., 2014.
[x] Farrington et al., 2012.
[xi] Walton & Cohen, 2011.
[xii] Blackwell, Trzesniewski, & Dweck, 2007.
[xiii] Hulleman & Harackiewicz, 2009; Yeager et al., 2014.
[xiv] Walton & Wilson, under review.
[xv] Walton & Wilson, under review.
[xvi] Walton, 2014.
[xvii] Okonofua, Paunesku, & Walton, 2016.
[xviii] Banks et al., 2005.
[xix] Steele & Aronson, 1995; Reyna, 2000.
[xx] Zirkel, 2002; Oyserman & Fryberg, 2006.
[xxi] Gershenson, Holt, & Papageorge, 2016; Brophy & Good, 1970; Ferguson, 2003; Tenenbaum & Ruck, 2007.
[xxii] Paris, 2012; Fryberg & Markus, 2007; Banks et al., 2005, p. 239.
[xxiii] Notably, dramatic reductions in achievement gaps have been observed in both K-12 and postsecondary contexts when researchers have alleviated these disparately experienced psychological burdens in randomized controlled trials. See for example, Yeager, Purdie-Vaughns et al., 2014; Walton & Cohen, 2011; Yeager, Walton, et al., 2016; Walton, Logel, et al., 2015.
[xxiv] Walton & Wilson, under review.
[xxv] Paunesku et al., 2015.
[xxvi] Cohen et al., 2009; Paunesku et al., 2015; Stephens et al., 2014; Yeager, Walton, et al., 2016; Walton & Cohen, 2007; Walton & Cohen, 2011.
[xxvii] Walton, 2014.
[xxviii] Yeager et al., in prep.
[xxix] Murphy, 2015.
[xxx] Ames, 1992; Lepper, Corpus, & Iyengar, 2005; Larson & Rusk, 2011; Deci, Koestner, & Ryan, 1999.
[xxxi] Eccles et al., 1993.
[xxxii] Yeager, Dahl, & Dweck, 2017; Eccles et al., 1993.
[xxxiii] Yeager, 2017; Yeager, Dahl, & Dweck, 2017; Eccles et al., 1993.
[xxxiv] Wigfield et al., 2015.
[xxxv] Fullan, 2011; Fullan & Quinn, 2016.
[xxxvi] Goodenow, 1993; Gehlbach et al., 2016; Eccles & Roeser, 2009; Furrer, Skinner, & Pitzer, 2014; Lee, Smith, Perry, & Smylie, 1999; Reeve, 2006.
[xxxvii] Murphy, Steele, & Gross, 2007; Dee, 2004, 2005; Gershenson et al., 2016, 2017; Cheryan et al., 2009.
[xxxviii] Stephens, Hamedani, & Destin, 2014; Walton & Brady, 2017; Walton & Cohen, 2011; Yeager et al., 2016; Walton et al., 2015.
[xxxix] Dee & Penner, 2016; Carr & Walton, 2014; Cohen & Lotan, 2014; Paris, 2012; Boaler & Staples, 2008; Fryberg & Markus, 2007; Stephens et al., 2012.
[xl] Brady, Fotuhi et al., in prep.; Okonofua, Paunesku, & Walton, 2016; Marks, 2000; Newmann, 1992; Kohli & Solórzano, 2012.
[xli] Ames, 1992; Sun, 2015.
[xlii] Ames, 1992; Yeager, Purdie-Vaughns et al., 2014, 2017; Ferguson et al., 2015; Cohen & Lotan, 2014; Boaler & Staples, 2008; Lepper & Woolverton, 2002; Rattan, Good, & Dweck, 2012.
[xliii] Ames, 1992; Smeding et al., 2013; Linnenbrink, 2005; Haimovitz & Dweck, 2016; Sansone & Harackiewicz, 2000; Brophy, 2014.
[xliv] Mueller & Dweck, 1998; Yang-Hooper et al., 2016; Park et al., 2016; Cimpian et al., 2007.
[xlv] Maehr & Midgley, 1996; Sun, 2015; Eccles & Roeser, 2009; Boaler, William, & Brown, 2000; Ames, 1992.
[xlvi] Destin, 2017; Destin & Oyserman, 2009; Oyserman & Fryberg, 2006; Browman, Destin, Carswell, & Svoboda, 2017.
[xlvii] Ryan & Deci, 2000; Ames, 1992. Note: Students who possess more interdependent cultural models of the self may be more motivated when someone important to them makes choices for them, see Iyengar & Lepper, 1999.
[xlviii] Ames, 1992; Larson & Rusk, 2011; Csikszentmihalyi, 1990; Eccles, 2005; Newmann, 1992; Marks, 2000; Hidi & Renninger, 2006; Sansone & Harackiewicz, 2000; Shernoff, Csikszentmihalyi, Schneider, & Shernoff, 2003; Hulleman, Durik, Schwiegert, & Harackiewicz, 2008; Grant, 2007; Grant, 2008; Master, Cheryan, & Meltzoff, 2017; Carr & Walton, 2014; Silvia, 2008; Reeve, 2006; Reeve & Jang, 2006.
[xlix] Dee & Penner, 2016; Diekman et al., 2010, 2011; Hulleman & Harackiewicz, 2009; Yeager et al., 2014; Cohen et al., 2009; Miyake et al., 2010. Note: As explained in Yeager et al., 2014, adults should not *tell* students (particularly adolescents) what their purpose for learning should be. Also, students from cultures that hold interdependent norms have been found to endorse more "interdependent motives" for pursuing education (e.g., giving back to their community, being a role model, helping their family, showing that people with their background can do well), see Stephens et al., 2012.