MINDSET SCHOLARS NETWORK

Mindset Science: Exploring New Findings and Applications

November 15, 2017

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College Transition Collaborative

Equal Opportunity Schools

Motivate Lab

Perception Institute

PERTS

Sevenzo

Transcend

MEETING AGENDA

Raikes Foundation - 2157 N. Northlake Way, #220, Seattle, WA 98103

9:00 a.m. Introduction: Lessons from mindset science and implications for education

Lisa Quay, Mindset Scholars Network

10:20 a.m. Transition

10:30 a.m. Research translation panels and design workshops: Bridging mindset science and practice in K-12 and postsecondary contexts (pick one)

K-12 Session Panelists:

- Jennifer Charlot, Transcend Education
- Dave Paunesku, PERTS
- Sasha Rabkin, Equal Opportunity Schools
- Maša Užicanin, Sevenzo

Postsecondary Session Panelists:

- Rachel Godsil, Perception Institute and Rutgers School of Law
- Chris Hulleman, Motivate Lab and University of Virginia
- Natasha Krol, College Transition Collaborative
- Rob Urstein, Stanford Graduate School of Business

(Snacks will be available during this session)

1:00 p.m. Lunch

1:30 p.m. Transition

1:45 p.m. National Study of Learning Mindsets: An early look at impact findings and discussion of future directions for the study

- David Yeager, Principal Investigator, University of Texas at Austin
- Robert Crosnoe, University of Texas at Austin
- Paul Hanselman, University of California, Irvine
- Chandra Muller, University of Texas at Austin
- Barbara Schneider, Michigan State University

3:30 p.m. Transition

3:45 p.m. Application exercise: Integrating insights from mindset science into your work as philanthropists

Lisa Quay, Mindset Scholars Network

4:30 p.m. Concluding remarks

Lisa Quay, Mindset Scholars Network
Zoë Stemm-Calderon, Raikes Foundation

5:00 p.m. Break

5:30 – 7:00 p.m. Cocktail hour, hosted by the Bill & Melinda Gates Foundation

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

BY LISA QUAY

Research synthesis | October 2017

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

MINDSET SCHOLARS NETWORK

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.

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.

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.

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]

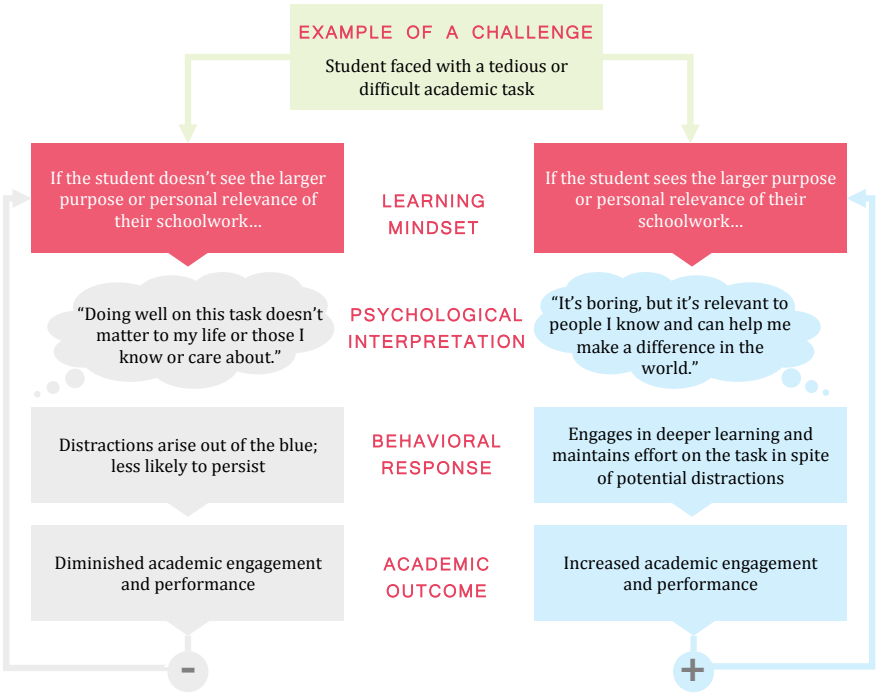
The current structure of the American education system comes from a time when we had less scientific understanding about the factors that shape people's motivation to learn and how motivational processes affect cognition. Focusing on how we can design schools and classrooms that nurture people's natural 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?

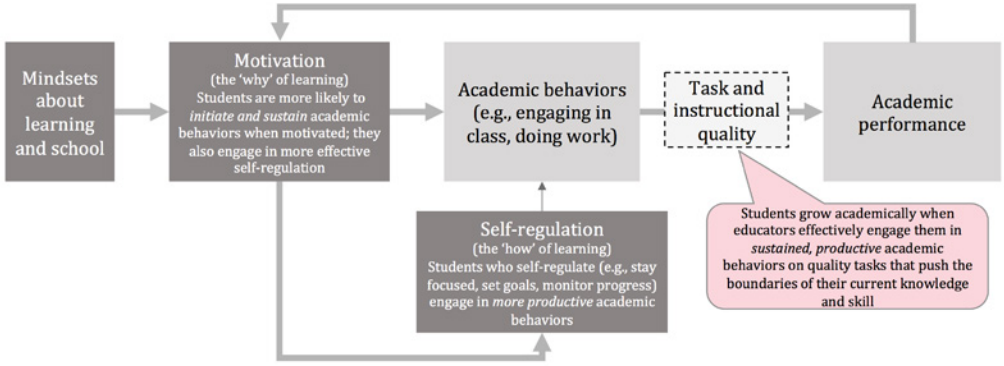
The key mindsets about learning and school relate to beliefs about belonging, intelligence, and the value of schoolwork.

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]

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.

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.

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.

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]

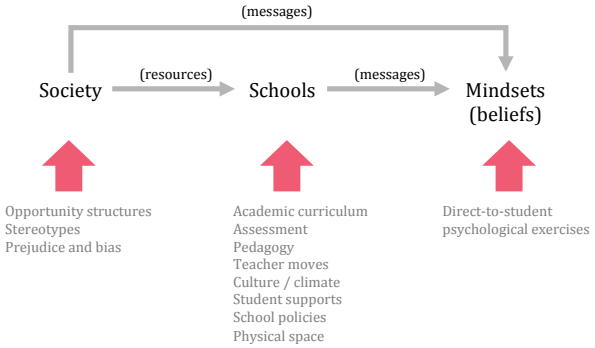
In sum, it is possible to intervene at three points to change the messages students perceive and the mindsets they come

[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.
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[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.
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[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.

MINDSET
SCHOLARS
NETWORK

MINDSET SCHOLARS NETWORK OVERVIEW

Founded in the spring of 2015 at Stanford University's Center for Advanced Study in the Behavioral Sciences, the Mindset Scholars Network is a group of the nation's leading social scientists devoted to improving learning and expanding educational opportunity by advancing an interdisciplinary field of scholarship on learning mindsets.

Mindsets are the lenses through which students interpret their experiences in school. These interpretations, in turn, shape their responses to those experiences, particularly to challenges. Mindsets are thus key determinants of how people respond to the struggles and setbacks that are essential to the learning process. When students hold "learning mindsets," they believe that they can get smarter, that they belong at school, and that their schoolwork is relevant to their lives and a larger purpose. As a result, they are more likely to choose challenging tasks, persist in the face of difficulty, learn more deeply, and achieve at higher levels.

Decades of research has shown that learning environments play a critical role in shaping students' mindsets. Beginning at a young age, children come to develop mindsets about learning and school from countless observations of the world around them: from society, their peers and important adults in their lives, and the policies and practices they see enacted. As natural learners, children constantly read between the lines to understand how the world sees them. Mindsets are reasonable inferences that reflect students' reality.

When students perceive messages from the environment that they can excel, that they belong in school, and that their schoolwork is valuable, they are more likely to develop mindsets that bolster their drive to learn in the face of challenges that have the potential to sap motivation. Everyone needs to receive these positive messages. But some children are more (or less) likely to receive them because of long-standing structural inequalities in our society that privilege certain groups.

The Mindset Scholars Network, which is now an independent project of New Venture Fund, a 501(c)(3) public charity, has four key aims: (1) to advance mindset science in ways that are useful to research, practice, and policy; (2) to refine a new model for interdisciplinary scholarly collaborations in the social sciences that are rigorous, transparent, and practically relevant; (3) to communicate useful scientific knowledge that quickly reaches stakeholders and helps improve the outcomes of today's students; and, (4) to establish mindset science as an important, permanent element of education research and systemic change.

The network accomplishes these aims by:

- **Investing in cross-disciplinary research projects that are timely and relevant:** issuing RFPs that advance the network's research agenda; providing support to launch large-scale studies; and bringing questions from practitioners to the research community.
- **Providing leadership to the scientific community:** making data and other research assets available for broader use; issuing consensus statements; and cultivating the next generation of scholars committed to interdisciplinary scholarship on mindsets.
- **Conducting outreach to education stakeholders:** synthesizing the latest research and its implications for practice and policy, and advising organizations (e.g., sector media, intermediaries, funders) and thought leaders on issues related to mindset science.

The network scholars have stellar individual reputations and strong track records for conducting top research in their respective domains. They are also higher education practitioners and many have taught in K-12 classrooms. They are committed to collaboration across disciplinary boundaries and value research that benefits society. The membership features representatives from 15 universities across the U.S. and includes the world's leading researchers on learning mindsets and academic motivation more broadly.

Andrei Cimpian	Associate Professor of Psychology	New York University
Angela Duckworth	Professor of Psychology	University of Pennsylvania
Barbara Schneider*	John A. Hannah Chair and Distinguished Professor of Education and Sociology	Michigan State University
Ben Castleman	Assistant Professor of Education & Public Policy	University of Virginia
Bridget Terry Long	Academic Dean & Saris Professor of Education and Economics	Harvard University
Camille Farrington	Senior Research Associate & Managing Director	Univ. of Chicago Consortium on School Research
Carissa Romero	Partner	Paradigm, Inc.
Carol Dweck	Lewis and Virginia Eaton Professor of Psychology	Stanford University
Chandra Muller*	Professor of Sociology	University of Texas at Austin
Chris Hulleman	Research Associate Professor of Education	University of Virginia
David Paunesku	Co-Founder & Executive Director	PERTS at Stanford University
David Yeager*	Associate Professor of Psychology	University of Texas at Austin
Elizabeth Tipton	Assistant Professor of Applied Statistics	Columbia University
Eric Bettinger	Associate Professor of Education and Economics	Stanford University
Geoffrey Cohen	Professor of Psychology and the James G. March Professor of Organizational Studies in Education and Business	Stanford University
Gregory Walton	Associate Professor of Psychology	Stanford University
Jo Boaler	Professor of Mathematics Education	Stanford University
Mary Murphy	Associate Professor of Psychology	Indiana University
Matthew Kraft	Assistant Professor of Education and Economics	Brown University
Mesmin Destin*	Associate Professor of Psychology	Northwestern University
Michal Kurlaender	Associate Professor of Education	University of California, Davis
Nicole Stephens	Associate Professor of Management & Organizations	Northwestern University
Robert Crosnoe	Chair and Professor of Sociology and the Elsie and Stanley E. ('Skinny') Adams, Sr. Centennial Professor in Liberal Arts	University of Texas at Austin
Ronald F. Ferguson	Adjunct Lecturer in Public Policy Faculty Director, Achievement Gap Institute	Harvard University
Sidney D'Mello	Associate Professor of Psychology and Computer Science	University of Colorado Boulder
Stephanie Fryberg	Associate Professor of American Indian Studies and Psychology	University of Washington
Thomas Dee*	Professor of Education	Stanford University
Timothy Wilson	Sherrell J. Aston Professor of Psychology	University of Virginia

** Current members of the Mindset Scholars Network's Scientific Steering Committee*

Mindset Scholars Network's Portfolio of Research on Mindsets and the Learning Environment

October 2017

In Fall 2016 the Mindset Scholars Network launched an interdisciplinary initiative to explore how learning environments shape the mindsets students develop about learning and school. The network issued a request for proposals (RFP) to network members and external collaborators for interdisciplinary studies that would utilize recently collected, large-scale datasets. With funding from the Raikes Foundation, Overdeck Family Foundation, Bill & Melinda Gates Foundation, and Joyce Foundation, the initiative's aim is to rapidly generate scientific evidence about how schools and educators at all levels can convey messages to students that they can grow their ability, that they belong and are valued at school, and that what they are doing in school matters. Fourteen projects have been funded through two rounds of the RFP, one in Fall 2016 and a second round in Fall 2017.

PROJECTS FUNDED IN FALL 2016

A big biodata approach to mindsets, learning environments, and college success

Principal Investigator: Sidney D'Mello

Co-PI: Angela Duckworth

Other Team Members: Stephen Hutt, Margo Gardner, Parker Goyer, Donald Kamentz, Chad Spurgeon, Lauri Bonacorsi

Team Disciplines: Computer Science, Developmental Psychology, Education & Human Development

Primary Research Questions:

- Which mindset-related factors gleaned from student biographical data (e.g., extracurriculars, work experience) best predict college success?
- How do students' learning environments in high school influence the mindset-related factors that predict college success?

The effect of school climate on students' sense of belonging

Principal Investigator: Matthew Kraft

Co-PIs: Chris Hulleman, Katie Buckley

Team Disciplines: Economics, Psychology, Education

Primary Research Questions:

- How does school climate affect students' reported levels of belonging?
- What dimensions of school climate are most important for promoting students' sense of belonging?
- To what degree are students holding similar levels of belonging concentrated in the same schools?

The nature and reproducibility of mindset effects across diverse contexts

Principal Investigator: Mesmin Destin

Co-PIs: Elizabeth Tipton, Stephanie Fryberg, David Yeager

Other Team Members: Robert Crosnoe, Chandra Muller, Paul Hanselman

Team Disciplines: Psychology, Statistics, American Indian Studies, Sociology

Primary Research Questions:

- What supports are necessary for learning mindsets to lead to positive outcomes for students in disadvantaged environments?
- What makes a mindset program effective for students attending the poorest schools?

The role of psychologically wise teaching in student achievement

Principal Investigator: Geoffrey Cohen

Co-PI: Tanner LeBaron Wallace

Other Team Members: Ronald Ferguson

Team Disciplines: Psychology, Education, Economics

Primary Research Questions:

- How are teachers creating cultures of growth, belonging, purpose, and affirmation through their daily instructional practices?
- What "psychologically wise" instructional practices distinguish between low and high academic growth classrooms?

MINDSET SCHOLARS NETWORK

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.

MindsetScholarsNetwork.org

Learning mindset development in co-requisite courses across learning contexts

Principal Investigator: Chris Hulleman

Co-PI: Stephanie Wormington

Other Team Members: Elizabeth Tipton, Ron Ferguson, Tim Wilson

Team Disciplines: Psychology, Education, Statistics, Economics

Primary Research Questions:

- How do learning mindsets develop during co-requisite courses (courses in which postsecondary students take a one-credit support course alongside foundational math, English, and writing courses—rather than a non-credit developmental course)?
- What factors affect learning mindset development in co-requisite courses?

How do teachers' behaviors and classroom environments promote identity safety, growth mindset, and performance for underserved students?

Principal Investigator: Stephanie Fryberg

Co-PIs: Zoe Higheagle Strong, Mesmin Destin

Other Team Members: Laura Brady, Bruce Austin, Amy Roth McDuffie, Chandra Muller

Team Disciplines: Psychology, American Indian Studies, Education, Statistics, Sociology

Primary Research Questions:

- Which environmental factors (e.g., teachers' mindsets about intelligence and growth mindset practices) cue identity safety for underserved students?
- How do these identity safety environmental factors facilitate or hinder the effectiveness of growth mindset interventions, particularly for underserved students?
- Are growth mindset interventions more effective in classrooms where environmental factors cue identity safety?

Teachers' mindsets about mathematical ability as a feature of the learning environment

Principal Investigator: Andrei Cimpian

Other Team Members: Joseph Robinson Cimpian, Matthew Kraft, Sophia Yang-Hooper

Team Disciplines: Psychology, Economics, Education

Primary Research Questions:

- Are teachers' mindsets about mathematical ability related to their classroom practices?
- Are teachers' mindsets about mathematical ability directly related to students' learning?
- Are classroom practices related to students' perception that their teacher endorses a growth mindset? If so, which practices are most strongly related to these perceptions?
- Are there differences between stigmatized and non-stigmatized students in terms of how they perceive their teachers' mindsets? Are stigmatized students less likely to perceive that their teachers endorse a growth mindset (e.g., think that anyone can become good at math)?

Developmental, neural and psychosocial correlates of mindset among low-socioeconomic adolescents from two cultural groups

Principal Investigator: Mary Helen Immordino-Yang

Co-PI: Camille Farrington

Other Team Members: Xiaofei Yang, Christina Krone

Team Disciplines: Neuroscience, Education

Primary Research Questions:

- Is it possible to extend mindset programs to target broader psychosocial and neurobiological health outcomes among adolescents?
- How do cultural influences on social brain development explain how exposures to cultural norms and values shape styles of social-emotional and self-processing?
- Are there practices and policies that could more effectively support the development of learning mindsets by strategically leveraging opportunities for downtime and reflection with opportunities for concrete productivity?

PROJECTS FUNDED IN FALL 2017

A neurobehavioral investigation of the relationship between adverse experiences and learning mindsets in children

Principal Investigators: Andrei Cimpian, Nim Tottenham

Other Team Members: Joseph Robinson Cimpian, Kali Trzesniewski

Team Disciplines: Psychology, Economics, Education, Neuroscience

Primary Research Questions:

- Can a growth mindset serve as a protective factor that allows some children to "bounce back" despite facing considerable hardship?
- What experiences of children faced with early adversity might lead them to adopt a growth mindset?
- What are the neurobiological components that explain the link between children's experiences and their mindsets?

The effects of the African American Male Achievement (AAMA Program)

Principal Investigator: Thomas Dee

Co-PI: Emily Penner

Team Disciplines: Economics, Education

Primary Research Questions:

- What were the effects of AAMA participation on measures of academic engagement such as chronic absenteeism and the probability of being suspended or expelled?
- What are the effects of AAMA participation on diverse academic outcomes such as grades in core academic subjects, test performance, school dropout, and college matriculation?
- Do social-psychological mechanisms mediate the effects of AAMA?
- Is there any evidence that the presence of an AAMA program had "spillover" effects for non-participating students in the school?

Social and environmental influences on motivation for learning: The role of childhood adversity in affecting motivation among older children and adolescents

Principal Investigator: Katie McLaughlin

Co-PI: Rob Crosnoe

Team Disciplines: Sociology, Psychology

Primary Research Questions:

- Does exposure to childhood adversity influence mindsets about intelligence, sense of belonging at school, and perceived utility value of school and do these associations vary across distinct types of adversity? (threat (i.e., exposure to violence), deprivation (i.e., an absence of cognitive and social stimulation), and socioeconomic disadvantage)?
- Are mindsets about intelligence, belonging, and perceived utility value mechanisms that link diverse forms of childhood adversity to poor academic performance later in childhood and adolescence?

Developing Spartan persistence: Connecting students to resources in a public university

Principal Investigator: Barbara Schneider

Co-PIs: John T. Yun, Soobin Kim

Team Disciplines: Sociology, Economics, Education

Primary Research Questions:

- Is there value add to assigning students to both a light-touch mindset intervention at orientation and a follow-up mentoring program offered by the university that provides support throughout the first year of college?
- Do any of these effects differ by key subgroups (e.g., race/ethnicity, gender, first generation in college status)?
- Do outcomes differ depending on characteristics of the mentor who works with the student during the first year of college?
- What causal mechanisms might explain how the interventions achieved their effects?

Learning mindsets, teacher practice, and school organizations: Becoming Effective Learners Survey and 5Essentials

Principal Investigator: Camille Farrington

Co-PI: Shanette Porter

Other Team Members: Christopher Young, Sangyoon Park, Faye Kroshinsky

Team Disciplines: Education, Psychology, Psychometrics

Primary Research Questions:

- How is school organization (e.g., effective leaders, collaborative teachers, involved families, supportive environments, ambitious instruction) related to students' learning mindsets and performance?
- How are teachers' mindsets, beliefs about students, and teaching-related beliefs/practices related to students' learning mindsets, learning strategies, and course performance?
- What role do schools and teachers play in disparities in student learning mindsets across students' background characteristics?

Language as thought: Using natural language processing to investigate mindsets, learning environments, and college success

Principal Investigator: Sidney D'Mello

Co-PI: Angela Duckworth

Other Team Members: Stephen Hutt, Margo Gardner, Donald Kamentz, Abigail Quirk, Laura Allen

Team Disciplines: Computer Science, Psychology, Education

Primary Research Questions:

- How do mindsets and motivation, as coded from students' open-ended descriptions of extracurricular activities and work experiences, predict college success and mediate the relationship between extracurricular activities / work experiences and college success?
- Can natural language processing and machine learning techniques be used to automatically measure mindsets and other motivation-related constructs from writing samples at scale?
- How do aspects of students' high school learning environments moderate the relationship between extracurricular activities or work experiences, mindsets, and college success?

Mindsets and the learning environment: A look at the relationships between brain development, mindsets, and cultural context over time

Jess Hennessey, October 2017

Mary Helen Immordino-Yang and Camille Farrington discuss the novel way they're applying neuroscience to the field of mindset science.

In Fall 2016 the Mindset Scholars Network launched an interdisciplinary initiative to explore how learning environments shape the mindsets students develop about learning and school. The network issued a request for proposals (RFP) to network members and external collaborators for interdisciplinary studies that would utilize recently collected, large-scale datasets. With funding from the Raikes Foundation, Overdeck Family Foundation, Bill & Melinda Gates Foundation, and Joyce Foundation, the initiative's aim is to rapidly generate scientific evidence about how schools and educators at all levels can convey messages to students that they can grow their ability, that they belong and are valued at school, and that what they are doing in school matters.

Fourteen projects have been funded through two rounds of the RFP, one in Fall 2016 and a second round in Fall 2017. Seventeen different Network scholars are participating along with over a dozen external collaborators. The projects span a wide range of topics,

from exploring how teacher practices cultivate learning mindsets and identity safety in K-12 classrooms, to the relationships between learning mindsets and neural processes throughout adolescent development.

This is the first in a series of eight posts in which we will hear from the leader of each research project to find out more about the questions they are exploring, what they are learning, and how their work is advancing the field of mindset science.

The first project we're highlighting, *Developmental neural and psychosocial correlates of mindsets among low-socioeconomic adolescents from two cultural groups*, is led by Mary Helen Immordino-Yang and Mindset Scholar Camille Farrington. Mary Helen described the project as an opportunity to add a "broader contextualization of mindsets" and to ground research in the rich, lived social experiences of students.

Who are the members of the research team?

Mary Helen is an associate professor of education, psychology, and neuroscience at the University of Southern California, and Camille is a senior research associate and the managing director of the Consortium on School Research at the University of Chicago. Other teammates include Xiaofei Yang and Christina Krone, from Mary Helen's lab. This interdisciplinary group includes experts in neuroscience, developmental psychology, education, survey design, and data analysis.

Both Mary Helen and Camille have experience as practitioners, having taught in K-12 classrooms. In describing how they began their work together, Camille explains, "I was immediately captivated by [Mary Helen's] research and also really appreciated her practitioner-educator perspective and how she really was thinking about questions that are of important practical significance to teaching and learning and adolescence -- all of the things I care about."

What is the purpose of the project and how will it fit into the field of mindset science?

Relationships between neural development and mindsets

Scientists have long known that significant neurological development occurs during adolescence. But how might those neurological changes be related to the ways adolescents develop learning mindsets? This is one of the key questions this project explores.

An important element of the research is functional magnetic resonance imaging (fMRI) analyses on the default mode network (DMN), a network of interacting brain regions known to have activity highly correlated with each other and distinct from other networks in the brain.

The DMN was chosen for analysis due to its potential relationship with mindsets. Research has shown that this area is activated when individuals call up their own beliefs or reflect on their own (and others') psychological qualities. By exploring DMN activation patterns, and analyzing how they change across adolescence and how those changes correlate with students' reported mindsets and environmental factors, the team is hoping to learn about how neurological development, mindsets, and learning environments are related to one another over time.

The role of environments and culture on the way adolescents' mindsets develop over time

This project builds on a larger study that Mary Helen began for her National Science Foundation Career Grant, which was awarded in 2012. Her research team recruited students from two distinct cultural backgrounds to participate in the study. In addition to collecting fMRI data, they are collecting extensive data on students' social and academic lives, with a focus on their experiences both in and out of school, and their social-emotional functioning. Doing so allows the research team to explore trends in the way social and cultural factors influence the development of neural networks as well as the behavioral changes associated with the neurological shifts, including students' reported mindsets.

About the data

Most mindset research relies on self-report survey measures to explore students' beliefs. In this project the research team is using self-report measures, including the Becoming Effective Learners (BEL) survey, along with longitudinal neuroimaging data and extensive longitudinal data from interviews. Cognitive measures are also collected, including IQ and executive control. By incorporating multiple modes of measurement, the team hopes to gain a deeper understanding of the relationships among underlying neurological processes, students' experiences both inside and out of school, and their reported beliefs. They also hope to learn about how individual differences in the neural and psychological processing of social emotion may relate to the development of mindsets, and to gain insights about how to most accurately measure these relationships over time.

Explaining why the research team decided to use these different datasets in one project, Mary Helen said, "It was the perfect opportunity to start to build liaisons between the kind of work that we do and the standardized measures of psychological constructs that we know are correlated with success in school." Mary Helen and her team had been collecting the fMRI and psychosocial data for several years. By now administering the BEL survey measures Camille developed, the team is able to explore relationships between social-emotional neural processing over time and the survey measures, in order to understand relationships in a more nuanced and practically meaningful way.

53 adolescents from public high schools in Los Angeles participated in the study. All of the students were first-generation U.S. citizens, with parents who emigrated as adults from either Latin America or East Asia. Data were collected from participants at multiple

points in time, first when they were between the ages of 14-16 and again two years later. The study participants underwent fMRI scans each time, and extensive psychosocial interviews, as well as standardized testing. During the scans, participants listened to stories that were designed to elicit strong emotional responses, (e.g., the story of activist Malala Yousafzai) and reported the strength of the emotions they were feeling.

A key component of the project is the use of interviews to better understand how students' cultural contexts and environments influence the development of learning mindsets. The interviews included questions about the quality of participants' family relationships, their cultural identity, whether they had witnessed community violence, and how they viewed their future possible selves. One focus of these interviews in each case was the youths' psychosocial capacities for meaning-making.

The BEL survey was administered to participants after their second visit to the laboratory. The survey measures constructs that have been shown to relate to positive academic outcomes, including students' sense of belonging in school, their mindset about intelligence, and their time management skills.

Initial findings

Initial findings showed that study participants who showed evidence of more complex, empathic emotional responses to the stories they heard during their interviews and later saw again during fMRI scans, showed tighter real-time correlations between their neural activity and reported feelings, and reported higher levels of belonging and greater endorsement of a growth mindset on the BEL survey. These preliminary results suggest that flexible perspective-taking and capacities for abstract thought in the context of emotional responses to social stories may be related to mindset development over time. Interestingly, these findings were independent of IQ, suggesting that they are not related to general intelligence but to social-emotional capacities specifically.

What are the next steps for the project?

The research team is continuing to analyze its data to explore patterns in neural activity and assess how they differ by subgroups and reported experiences. More specifically, the team is continuing to analyze the fMRI data to better understand the longitudinal change in the relationship between real-time brain processes and complex social emotion experiences over time.

Mindsets and the learning environment: Examining how learning mindsets influence higher ed outcomes

Jess Hennessey, October 2017

Chris Hulleman and Stephanie Wormington discuss their project examining how learning mindsets influence college outcomes across the state of Tennessee.

Mindset Scholar Chris Hulleman and his colleague Stephanie Wormington are leading a project entitled, *Learning mindset development in co-requisite courses across learning contexts*. The project uses a large dataset from the Tennessee Board of Regents that features over 6,000 first-year students enrolled in co-requisite courses across 19 institutions of higher education, including both community colleges and four-year colleges and universities.

What is the purpose of this project and how will it advance the field of mindset science?

More and more jobs in the United States require applicants to hold a college degree. Yet many students struggle to graduate from college. Institutions of higher education across the country are working to adopt creative solutions to improve college enrollment, retention, and graduation rates.

In the state of Tennessee, 40 percent of community college students drop out after their first semester. A key goal across Tennessee's higher education system is the Drive to 55, which seeks to ensure 55% of adults statewide hold some sort of post-secondary degree or certification. Achieving success on the Drive to 55 will require the state to significantly increase graduation rates across all of its higher ed institutions. Tennessee's Board of Regents has implemented a number of policy changes to address the issue of graduation rates and dropout, and one of the issues they identified as critical was students holding adaptive learning mindsets when they arrive at college.

Working with students enrolled in co-requisite courses

A new statewide initiative aimed at improving higher ed retention eliminated a traditional developmental model, where students who place below college-level in reading, writing, or math take non-credit courses before placing into courses that count towards a degree. These non-credit courses often serve as significant barriers to graduation, with some students failing the course more than 10 times.

In the new model all students enroll in credit-bearing courses from day one, but these courses are paired with a one-credit, "co-requisite" course that helps students develop core college-level academic skills alongside the regular course work. This approach enables students to earn credits towards their degree while also receiving the academic support they need to succeed. While other states have begun to use the co-requisite model, Tennessee has been at the forefront of adopting this method as a way to improve college graduation rates.

The majority of students participating in this study are enrolled in co-requisite courses.

How can mindset science be used to improve college outcomes?

The project uses data the state collected about the learning mindsets of incoming community college and four-year university students enrolled in co-requisite courses. By considering how learning mindsets relate to important academic outcomes like retention rates over time, while also acknowledging that mindsets won't function in the same way for all students at all institutions, the team hopes to provide a more nuanced perspective about what mindsets are critical for incoming higher education students to be successful, specifically for students who are enrolled in co-requisite courses.

In looking for differences across contexts, the researchers will explore how individual student (e.g., socioeconomic factors), classroom (e.g., average reported growth mindset), and institution-wide factors (e.g., racial/ethnic makeup of student population) affect the relationship between students' learning mindsets and academic performance.
By exploring these relationships, the project will provide insights about which learning mindsets – such as belonging, growth mindset or purpose and relevance – most influence academic performance and retention and under what circumstances. According to Stephanie, "What [the research team] is really interested in is helping an entire state

address a problem that was very real for them by leveraging what we already know about learning mindsets from our own work and others'."

The research team is incredibly interested in applying their research to on-the-ground work happening in higher ed institutions across the country. The team is using findings from this project along with qualitative data collected through focus groups and interviews to design interventions that promote adaptive mindsets across contexts.

Who are the members of the research team?

The team working on this project is multidisciplinary, with scholars from several fields collaborating and sharing their expertise. It includes three psychologists: Chris, Stephanie, and Tim Wilson, all based at the University of Virginia. Other members of the team include statistician Beth Tipton and economist Ron Ferguson. Together, the group shares decades of experience with field interventions, partnering with schools and local governments, and data analysis.

Initial findings

Initial findings suggest a relationship between whether students feel like they belong when they first enter college and retention rates. Students who reported feeling like they belonged at their school in the first few weeks of college were more likely to be enrolled in the spring semester. The same pattern was found for the subsequent three semesters as well, with students' early perceptions of belonging predicting whether they remained enrolled through the first two years of college.

Additionally, students' socioeconomic status predicted whether students were likely to feel they belonged at school. Students identified as low income through both self-reports and Pell grant eligibility were more likely to feel they did not belong. This finding suggests that institutions should pay attention to students' sense of belonging as they transition to college, especially for students from lower socioeconomic levels.

As the research team continues their analysis, they will explore how this relationship and others are influenced by classroom and school-level factors in order to contextualize belonging and other mindsets in postsecondary environments. In future analyses, the research team will also examine intersectional questions by exploring how belonging varies among low-income students from different demographic backgrounds.

What are the next steps for the project?

Chris and Stephanie are continuing their partnership with the state of Tennessee to explore how the relationship between learning mindsets and academic outcomes develops over time. To do so, they will look at additional outcomes including retention beyond the first year of college, grade point average, employment status, and income. They are collecting qualitative and quantitative data with students, faculty, advisors, and administrators across the state and using those insights to co-create interventions in

community college contexts. They are also collecting data from students in technical colleges across the state.

Chris and Stephanie are also beginning a partnership with the state of Georgia to conduct similar research and help improve college outcomes in Georgia. Partnering with statewide groups of colleges and universities allows the researchers to work with data drawn from a large, diverse group of students. As Chris explains, “With the burgeoning research on academic mindsets, there is an increasing appetite among educators to enhance student mindsets through their educational practices. As the evidence supporting the importance of learning mindsets grows, higher education organizations are trying to determine how to support adaptive mindsets for students across their systems. The idea of scaling-up mindset interventions using evidence-demonstrated methods is catching, and our work contextualizing the role of learning mindsets across students and institutions will help provide useful evidence for scaling up our efforts.”

NATIONAL STUDY OF LEARNING MINDSETS

The first flagship study of the Mindset Scholars Network is the National Study of Learning Mindsets, which is led by network co-chair David Yeager.

CONTEXT FOR THE STUDY

The original learning mindset programs were carried out in person, face-to-face. But recently scholars have found that online versions of these programs amazingly still have the desired effect on students. This innovation means that interventions that had previously been delivered by researchers under careful, precise conditions in laboratory-like settings can now be delivered inexpensively in real-world classroom settings with a high degree of fidelity—the make or break factor in scaling effective programs in education.

The National Study of Learning Mindsets was designed to understand which kinds of students, in which kinds of classrooms, and which kinds of schools are most likely to benefit from these online exercises designed to foster learning mindsets. The study accomplishes this by randomly assigning half of the ninth graders in a group of randomly selected schools nationwide to receive an online learning mindset program during the first 10 weeks of high school; the other ninth graders in these high schools received a placebo in the control condition. Since the treatment and control groups are identical in all regards except for the content of the program they receive, this means that any difference observed in outcomes between the groups can be attributed to the program itself.

This study is one of the only studies in the history of the social and behavioral sciences to use the gold standard for testing cause and effect (a randomized experiment) with the gold standard for making claims about a population of schools (a random sample).

INTERVENTION

The learning mindset program used in this study incorporates both 'growth mindset' and 'sense of purpose' mindset messages. Growth mindset messages convey to students that they can grow their intelligence. Sense of purpose messages help students make connections between their schoolwork and a larger, prosocial purpose. The program was developed using a rigorous R&D approach that combined insights from psychological theory with user-centered product design. The researchers drew on early interventions from the scientific literature, combined with input from educators and students.

SAMPLE

The study is an individual-level randomized experiment conducted with ninth grade students in a national probability sample of 76 regular U.S. public high schools.

Survey data collection occurred between August 2015 and March 2016; schools will provide data on students' academic outcomes this winter.

MEASURES

The study will assess the effects of the program on learning mindsets, hypothetical challenge-seeking behavior, and multiple academic outcomes (e.g., grades, test scores, attendance, discipline referrals). The study is also collecting a variety of data on the student, classroom, and school contexts that will enable researchers to create a detailed picture of the mindset climate as reported by adults and experienced by students.

STUDY OUTPUTS

At the end of the study, the team will have developed and tested a learning mindset program that can be delivered in any regular U.S. public high school, and they will know which kinds of schools and which kinds of students will benefit the most. The program will be offered to schools at no cost through scaling partners.

In addition, the research team will have answered several critical questions:

- Will students in the lowest-performing schools benefit from a learning mindset program, or will it only be effective in higher-performing schools?
- What happens when a student comes to develop a growth mindset and sense of purpose from participating in the program, and then enters a classroom where a teacher communicates the opposite messages through his or her instruction?
- What kinds of instructional practices can make a learning mindset program more effective, and what practices weaken is effects?
- Will previously unmotivated students benefit from a learning mindset program, or will the program be unable to overcome a lack of motivation due to other factors?

The researchers have also taken steps to ensure that the full dataset from the study will be made freely available to any scientist who wishes to analyze it; given the study's rare design and comprehensive collection of student-, classroom-, and school-level measures, this dataset will be an invaluable resource that can provide countless insights about learning mindsets and the learning environment for years to come.

PARTICIPATING MINDSET SCHOLARS NETWORK MEMBERS

David Yeager, Principal Investigator
Barbara Schneider
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Ronald F. Ferguson
Timothy Wilson

The College Transition Collaborative
Leveraging Psychology to Create Equitable Learning Environments from Orientation to Graduation

Despite enormous investments by institutions of higher education to provide academic and financial supports for their students, 4 out of 10 new 4-year college students do not graduate within 6 years. Completion rates are even lower for students of color, first-generation college-goers, and students from low income backgrounds. Over a decade of research shows that students' psychological experience of college can critically affect their academic outcomes. By creating learning environments that help students feel competent, valued, and connected to others, colleges and universities can help more students achieve their full potential.

How can we help more students succeed?
The ways people make meaning of themselves and their experiences can shape their beliefs and behaviors. For example, when new students encounter challenges in the transition to college, they are more likely to remain socially and academically engaged if they see these challenges as common and surmountable, rather than implying a lack of ability or potential. (Learn More)

Scientists have demonstrated that well-designed learning environments can have lasting effects on how students make meaning of events and respond to difficulties. When students feel like their school believes in them and provides a clear path to success, they are more likely to participate in class, attend office hours, join student groups, seek mentors, and make use of resources provided by their institution that may otherwise be underutilized. (Learn More)

"This approach requires thinking about students differently it assumes that all students can succeed."
CTC Partner Administrator at a Large Public University

Schools send students countless messages every day, both explicitly in communications and implicitly in the design of policies, programs, and practices. Colleges have a powerful opportunity to support student achievement by ensuring that the messages, policies, programs, and practices students encounter throughout their college journey are informed by an understanding of how students make meaning of their experiences – i.e., students' "psychological experience" of college. Learning environments attuned to students' experiences, beliefs, and concerns can help students make sense of challenges and transitions in ways that bolster academic performance and foster well-being. This is especially critical for students who have been targeted by negative stereotypes throughout their life, and may reasonably experience challenges–such as a low grade on an exam, difficulty registering for courses, difficulty making friends, or being placed on academic probation–as yet another sign that they do not belong or can't succeed.

The student need is urgent. Yet, despite decades of research indicating the importance of students' psychological experience in college, few resources exist to help schools apply findings from existing research or integrate psychologically attuned approaches into broader completion efforts. Simultaneously, many researchers cannot reach enough practitioners to ensure their work is actionable for schools.

What is the role of the College Transition Collaborative (CTC)?
The mission of the College Transition Collaborative (CTC) is to create higher education learning environments that foster equitable student outcomes by bridging psychological research and practice. Our work helps schools better understand how their students experience moments of transition or difficulty and how psychologically-informed practices–messages, policies, behaviors, and programs–can convey to all students they are valued, respected, and can excel.

CTC:

- Works with researchers and practitioners to **identify and map pivotal moments of transition or difficulty throughout college** that may cause students to question their belonging or potential, and where schools can intervene through existing channels (e.g., messages, policies).
- **Builds awareness and understanding** for how students' psychological experiences can impact well-being and achievement throughout their college journey **by illustrating these critical points from orientation to graduation.**
- **Connects practitioners and researchers with each other to develop and test evidence-based, psychologically attuned tools and resources** designed to address these pivotal moments, including diagnostic tools, direct-to-student programs, and administrator toolkits.
- **Partners with key intermediaries to scale these approaches** and ensure adoption with fidelity across contexts.

Programs and practices developed by CTC researchers have been implemented for thousands of students at nearly 60 colleges and universities across the U.S. and have helped support student well-being, engagement, achievement, and completion.

Example opportunities for schools to support students' psychological experience of college:
Quotes in italics represent real quotes from student responses.

Transition into College *"I have become more and more anxious about my arrival on campus. I worry that it may be difficult to find my niche and to find people who I really connect with."*	• Do **welcome messages** communicate to students that diverse kinds of students belong in college, or do they signal that only some kinds of people belong and others don't? (Learn More: Social-Belonging) • Do messages around **placement tests**, especially poor performance on placement tests, lead students to question whether they belong and can succeed in college? • Do restrictions placed on **transfer students** lead students to anticipate that they won't belong or do well in college, or that their prior education is de-valued?
Points of Difficulty *"I felt incredibly alone. No one seems to struggle, at least not to the degree I am."*	• How do large class sizes or explicit attempts to "weed out" students in **gateway courses** for certain majors impact students' feelings of belonging or academic potential? • Do communications about **academic setbacks** communicate that faculty and the college care about their success and believe they can improve? (Learn More: Academic Standing) • Do communications about **remedial coursework** lead students to feel "dumb" and communicate a fixed mindset about intelligence?
Throughout College *"You typically feel uncomfortable and out of place when you are suddenly surrounded by people who don't look like you and who don't come from similar backgrounds."*	• How can schools help foster positive **intergroup relationships**? How can schools foster the development of more diverse social networks? How do schools message valuing of diversity to students, and how does this impact intergroup relations?

Join us in learning more.
Please visit http://collegetransitioncollaborative.org and sign up for our newsletter to access current resources, receive the latest updates on our work, and stay in touch to contribute your perspectives. We look forward to learning together!

The Equal Opportunity Schools (EOS) mission is to ensure students of all backgrounds have equal access to America's most academically intense high school programs—and particularly that low-income students and students of color have opportunities to succeed at the highest levels.

Our work is driven by the principle that "opportunity precedes achievement". For too long, education has adhered to a narrative that achievement drives opportunity. In so doing, and often through a long list of racialized and inequitable experiences, educational systems double down on the idea that students must earn their spot before opportunities are bestowed upon them. This perspective has significantly curtailed access, particularly for historically marginalized communities, to rigorous coursework, and, more insidiously, to expectations of excellence.

For decades, public high schools across the country have systematically under-enrolled students of color and low income students in Advanced Placement, International Baccalaureate, and other rigorous courses. This has led to substantial inequities in college preparation and access between students of color or low income students, and their white, non-low income classmates. These inequities amount to a systemic denial of access to positive long-term life outcomes such as post-secondary success, diverse and viable career pathways, and to agency and self-actualization.

Low-income, Black, and Latino/a students are about as likely as their peers to attend schools that offer AP or IB programs, yet the clear majority of AP/IB programs do not yet provide equal access. This means that missing students – hundreds of thousands per year by our estimates – are stuck literally just across the hall from the education they need and deserve (we call them 'missing students'). And these students are not anywhere close to maxing out their academic potential in non-AP/IB courses. Of low-income students and students of color not in AP or IB, 85% report not yet being "challenged" or "very challenged" in high school.

In our first five years, EOS, in conjunction with partner schools, enrolled ~27,500 "missing" students in Advanced Placement (AP) and International Baccalaureate (IB) classes. We have done so with partnerships in 27 states and over 400 public high schools in rural, urban and suburban districts. This year our active portfolio includes 285 schools in over 50 school districts including New York City, Chicago, San Diego, Montgomery County and Prince George County.

In service of our mission- and, hopefully, of interest to the Mindset Scholars Network- EOS provides partners with actionable data and tools that serve as the enabling conditions for learning mindsets - growth mindset, purpose for learning, and belonging- for both adults and students. For example, we provide our school partners with the following:

1. Lists of assets, mindsets and perceived barriers faced (as identified on our Fall student survey, this year to be taken by nearly 400,000 students nationwide) to provide alternative measures for identification, more holistically understand students, and remove the barriers they face in accessing advanced courses.
2. Student Insight Cards that facilitate personalized understanding of each student's experience including nearly 40 data-points gathered through the student survey.
3. Advocacy and Outreach strategies including conversations with trusted adults, student panels, letters to parents and other opportunities to effectively communicate an unwavering belief in students, help students feel seen, appreciated, and develop trust that adults in the building have their backs to take on new academic challenges.

Though we believe in the centrality of opportunity, we are committed to understanding and improving what happens once students enroll in new, more rigorous courses. Consequently, our Phase 2 (the phase following our initial focus on access, opportunity and enrollment in AP/IB) aims to reduce attrition, support academic success, and provide a positive student experience in AP by helping to develop teacher mindsets and practices to promote a sense of belonging, growth mindset, and purpose for learning- particularly for students of color and low income students.

Phase 2 includes:

- Resources on Teacher mindsets and practices including online staff activities to enhance belonging and growth mindset.
    - We have piloted online staff activities on belonging and growth mindset with over 2000 educators. While these 40-minute activities, based on the latest research and practices, are a work in progress, a large majority (about 75%) rated the materials useful or very useful.
- Teacher workshops in belonging and mindset.
    - EOS has piloted 14 belonging and mindset pilot workshops with partners and continues to improve these resources for educator practice. In our most recent workshop, over 90% of attendees reported they were likely or very likely to implement one of the suggested strategies into their classes.
- Equity Leader Labs that bring a community of practice approach to solving problems of practice around belonging and learning mindsets.
    - This year we are piloting Equity Leader Labs in New York City, Illinois, and Maryland, each with about 30 AP educators from 10 or more schools. Educators will implement evidence-based practices, measure efficacy using Copilot resources from PERTS, and collaboratively reflect and refine their classroom practice.
- Student mindset interventions personalized for students to best benefit from existing research on affirming/supporting student mindsets.
    - Before this year, over 55,000 students participated in growth mindset and belonging interventions.
    - Using randomized control trials, participation has increased course pass-rates by as much as 4% for students with below-median GPAs and has increased access in AP/IB by 3% for students of color and low income students.

Motivate Lab

OUR MISSION

To improve people's lives through rigorous motivation research.

Our focus is to understand the motivation and mindsets that promote individuals' learning, growth, achievement, and wellbeing.

We use those insights to develop evidence-based solutions that can be applied across educational, extracurricular, and work contexts.

LEARNING MINDSETS AND WHY THEY MATTER

Mindsets are our beliefs and perceptions about learning. They shape how we interpret difficulty, and research shows they are critical predictors of academic performance, persistence, and motivation. We are primarily interested in three main learning mindsets.

GROWTH MINDSET:
Belief that intelligence can be developed

PURPOSE AND VALUE:
Belief that schoolwork is valuable because it's personally relevant

SOCIAL BELONGING:
Belief that one is connected to and respected by peers, cared for by teachers and mentors, and fits in with the culture

OUR METHODS

SCIENTIFIC RIGOR + **DESIGN PRINCIPLES** + **STRONG PARTNERSHIPS** = **SOLUTION-FOCUSED, ACTION-ORIENTED RESEARCH**

By combining psychological science with design thinking and leveraging strategic researcher-practitioner partnerships, we seek to instigate positive change in organizations, from the individual to the policy level. We utilize best practices in design-based research, randomized control trials, and mixed-methods research to find optimal solutions to meet our partners' needs.

EMPATHIZE & LEARN
Understand the problem and context

SYNTHESIZE & PLAN
Consolidate learning and develop next steps

PROTOTYPE
Customize interventions informed by data, feedback, and theory

TEST INTERVENTIONS
Start small, fail fast, utilize those learnings to scale up across the system

CONTACT

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Motivate Lab

PROJECTS & PARTNERSHIPS

	THE CHALLENGE	WHAT WE'RE DOING	WHERE WE'RE GOING
TENNESSEE PATHWAYS WITH PURPOSE	Tennessee's goal is for 55% of adults to obtain a post-secondary degree, but less than half of students across the higher education system graduate within six years. The problem is especially severe at community colleges, where 40% of students drop out after only one semester.	We are partnering with the Tennessee Board of Regents to improve students' learning mindsets and academic outcomes. We've collected data from over 12,000 students across 45 higher-education institutions – including community colleges, technical schools, and four-year universities – to understand these contexts and create strategies aimed at improving student retention. Through statewide partnerships, we are also laying the foundations to scale up efforts over the next several years.	We will provide a more nuanced perspective on the link between mindsets and student success and how this link varies across institutions. Because initial findings suggest feelings of belonging predict student retention, we will explore how this varies among low-income students from different backgrounds and institutions. We will also examine additional outcomes, such as GPA, degree attainment, employment status, and income.
INFUSING HIGHER EDUCATION IN GEORGIA WITH LEARNING MINDSETS	Georgia aims for 60% of adults to hold a post-secondary degree by 2025 (up from 38%) and is interested in harnessing research on learning mindsets to achieve this goal.	We are partnering with the University System of Georgia to increase graduation rates. We are currently collecting data from students and faculty at 28 institutions to understand the motivational culture in four- year institutions so we can support students' adaptive learning mindsets through system-wide changes.	Based on insights from data, we will co-create a plan to infuse mindset-supportive practices into Georgia's higher education system at the student, instructional, curricular, and policy levels.
REMOVING BARRIERS TO MOTIVATION IN COMMUNITY COLLEGE MATH	At a large community college system in Florida, 40% of the 20,000 enrolled students who take developmental math each year don't pass. Similar patterns are found at community colleges across the US.	We are partnering with math faculty at Valencia College to test whether brief, in-class interventions targeting growth mindset and utility-value perceptions can boost student motivation and math performance. Over 8,200 students have been part of the study since 2015.	We are adapting and improving our interventions based on insights gained through mixed-methods analyses from this study. We also plan to explore students' longitudinal outcomes, such as GPA, major path, and career trajectories.
SUPPORTING TEACHERS IN HELPING STUDENTS MAKE CONNECTIONS BETWEEN LEARNING AND LIFE	Students often struggle to understand the value of what they are learning. This is especially true for students who are at risk for under-performance.	Prior field experiments show that utility value interventions can boost motivation and performance for students at risk of under-performance. Based on these findings, we are partnering with the Character Lab to develop a teacher-led activity aimed at helping them increase students' perceptions of the value of their coursework.	We will continue to work with practitioners to improve this tool, and plan to make it freely available online for teachers in Spring 2018.

To read more about our research visit motivatelab.org/publications

PERCEPTION INSTITUTE

WHO WE ARE

Perception Institute is a consortium of researchers, advocates, and strategists that uses cutting-edge mind science to help institutions reduce discrimination linked to race, gender, and other identity differences. Working in sectors where bias has the most power to create harm—our schools, workplaces, hospitals, justice system, and the media—we conduct original research, translate findings into empirically-based interventions and workshops, and develop strategies to communicate in ways that bridge differences and disrupt bias. https://perception.org/

WHY THE MIND SCIENCES?

For decades, institutions have struggled with a familiar diversity and inclusion cycle: well-intentioned programs promote identity-related awareness, which in turn triggers the need to manage anxiety and resentment about identity. Core insights about how our brains work help us explain this paradox. Most Americans firmly believe in equality and yet, stereotypes embedded in our brains—shaped over time by history, media, and culture—lead us to view the world through a biased lens and behave contrary to our deeply held values. Left unchecked, routine biased behavior leads to systemic discrimination. And racial and gendered anxiety—the fear that our biases may be revealed, or that we may become the object of bias—can unintentionally lead our brains to shut down, causing us to avoid interactions between identity groups, limiting our ability to reap the innovation benefits of diversity or transform practices that may negatively affect our employees and our consumers.

OUR APPROACH

We focus on conducting applied empirical research and translating research insights into publications accessible to broad audiences. Perception's approach helps institutions center their strategies for diversity, equity, and inclusion on the latest evidence-based research on implicit bias, racial anxiety, and stereotype threat, among other core concepts in the mind sciences that can be applied to everyday individual and institutional interactions. We bring together organizational stakeholders and researchers to test solutions, bring them to scale, and build metrics for institutional accountability to encourage forward momentum. Last, we are driven by a healthy optimism that is undergirded by exciting empirical evidence that suggests we *can override* our biases and navigate differences in ways that create better experiences and opportunities for all.

PARTNERSHIPS

Perception engages with a wide variety of institutions across critical fields such as education, criminal justice, health care, education, and media. We maintain a strong presence with those working in the justice system, conducting workshops with prosecutors, judges, and child welfare advocates in New York, Delaware, and Minnesota. We actively pursue opportunities in education, building new partnerships with public school districts, individual schools, independent schools, and institutions of higher education across the country.

We have engaged in a two-year project with a health care institution and are now embarking on a multi-stakeholder partnership in the criminal justice system. In the context of education, we are beginning an original research project, entitled *Promoting Academic Success and Belonging for All Students Project*, which encompasses two distinct multi-modal studies based in Boston Public Schools (BPS) and Kalamazoo Public Schools (KPS). This project will examine the effects of the

described vulnerabilities on teachers and students, determine ways to remedy them, and assess the efficacy of these intervention strategies. In all phases, the project aims to develop scalable metrics that can be applied within other school districts as well. Partnerships with BPS and KPS have been secured, and we are working toward engaging other interested school districts.

In addition to long-term partnerships, we regularly provide inter-active workshops in which we present the insights from the mind sciences and offer recommendations for further work to integrate the insights into polices and practices within their institutions. A sample of institutions we've worked with include:

- University of Virginia Engineering School (Charlottesville, VA)
- New School for Social Research (New York, NY)
- Brooklyn Law School (New York, NY)
- Cardozo Law School (New York, NY)
- NYU School of Film (New York, NY)
- University of Michigan Law School (Ann Arbor, MI)
- P.S. 10 (New York, NY)
- U.S. Department of Education, Office of Civil Rights (Washington, DC)
- NYC Department of Education ESI Summer Professional Development (New York, NY)
- Columbia University Teachers College Klingenstein Summer Institute (Princeton, NJ)
- The Spence School (New York, NY)
- Chelsea Day School (New York, NY)
- LREI School (New York, NY)
- Georgetown Day School (Washington, DC)
- P.S. 261(New York, NY)
- The Dalton School (New York, NY)
- UCLA School of Law (Los Angeles, CA)
- University of Pennsylvania Law School (Philadelphia, PA)
- University of North Carolina-Chapel Hill School of Government (Chapel Hill, NC)

PERCEPTION PRINCIPALS:

Alexis McGill Johnson, Executive Director and Co-Founder
Alexis is a thought leader and a bridge builder whose work spans politics, academia, social activism, and cultural strategies. She has taught political science at both Yale and Wesleyan Universities. Currently, Alexis is a Board member and the immediate past Chair of the Board of Planned Parenthood Federation of America. Previously, she has served on the boards of New York Civil Liberties Union, Center for Social Inclusion, and Citizen Engagement Lab. She is a founder of the Culture Group as well as a frequent commentator on FOX News, CNN, MSNBC, and in the press. She holds degrees from Princeton and Yale Universities.

Rachel Godsil, Director of Research and Co-Founder
Rachel is the Director of Research and Co-Founder of the Perception Institute. She collaborates with social scientists on empirical research to identify the efficacy of interventions to address implicit bias, racial anxiety, and stereotype threat. Rachel has co-authored a wide variety of articles, book chapters, and reports focusing on implicit bias, racial anxiety, and stereotype threat, and regularly authors amicus briefs on behalf of empirical social psychologists in the Supreme Court. She works with a wide range of private and public institutions seeking to address the role of bias and anxiety associated with race, ethnicity, religion, and gender. Rachel practiced law in New York City as an Assistant United States Attorney for the Southern District of New York and as an Associate Counsel at the NAACP Legal Defense and Educational Fund. She has taught at Seton Hall University School of Law, University of Pennsylvania Law School, and New York University School of Law. Currently, she is a Professor of Law and Chancellor's Scholar at Rutgers Law School.

The Project for Education Research That Scales
perts.net

The Problem: Prevalent practices hinder academic engagement and success

Over 50% of adolescents report being disengaged in school, and 47% of high school dropouts say disinterest in classwork was the main reason they left (Bridgeland et al., 2006; Gallup, 2015). Since students can only learn when they engage (Immordino-Yang, 2016), widespread disengagement wastes resources and denies students the opportunity to learn. It also exacerbates socioeconomic inequality because members of marginalized groups are—for myriad reasons—more likely to become disengaged and less likely to get a second chance if they do (National Research Council & Institute of Medicine, 2004).

However, research shows that educators can cultivate student engagement by systematically establishing learning conditions that foster internalized motivation and resilience. For example, educators can enact a variety of strategies to help students feel like they belong in school, see schoolwork as worthwhile, and view themselves as capable of succeeding academically (Dweck et al., 2014; Farrington et al., 2012; National Research Council & Institute of Medicine, 2004). Despite strong empirical evidence that specific learning conditions foster academic engagement and success, few schools have the capacity to establish those conditions for all students in a systematic and evidence-based way (Marsh et al., 2016).

PERTS Mission & Activities

The Project for Education Research That Scales (PERTS) at Stanford University envisions a world in which all students engage in learning opportunities fully and fearlessly. To advance this vision, PERTS builds educators' capacity to cultivate student engagement in a systematic and evidence-based manner. It does so through three integrated activities:

1. Translating research insights into evidence-based recommendations and tools that can be implemented widely by educational organizations.
2. Enabling improvement at scale by deploying cost-effective measurement systems that help schools identify local barriers to engagement and quickly assess the impact of implemented solutions.
3. Driving the adoption of research-based practices and improvement systems by building intentional partnerships with schools and other organizations that influence students' learning experiences on a large scale.

Selected PERTS Projects

Free, Evidence-based Resources for Teachers, Parents, and Mentors
PERTS has worked with numerous partners, including Khan Academy, Class Dojo, Teaching Channel, Equal Opportunity Schools, MENTOR, and Committee for Children, to co-create and co-distribute evidence-based resources that help teachers, parents, and mentors foster a growth mindset and sense of belonging among students. These resources, including PERTS's own Mindset Kit (www.mindsetkit.org), have reached over a million individuals, and they are used as part of professional development in many school districts across the U.S.

Mindset Programs that Reached 100 Colleges & 50,000 Students in Inaugural Semester
In Fall 2017, PERTS brought two evidence-based mindset programs to over 50,000 students at 100 colleges. The two programs, *Growth Mindset for College Students* and *Social Belonging for College Students*, have each been shown to affect students' perceptions of school and improve performance in prior randomized controlled trials. For example, they increased by 4 percentage points the rate at which students of color and first generation college students were retained semester to semester (Yeager et al., 2016). Participating colleges were encouraged to dig deep around both student engagement and evaluation. They received the data needed to conduct their own evaluation, a report showing the program's local impact on student mindsets, and a summary of students' views of psychologically important campus experiences, accompanied by recommendations.

Copilot: A Feedback System that Helps Educators Create Engaging Environments
Few educators are trained to systematically diagnose or address the numerous distinct causes of student disengagement. Further, when educators experiment with solutions, detecting their impact can be hard because such impact often begins with imperceptible changes in students' subjective experience—it can take time for even effective practices to turn into visibly higher engagement and performance. This lag makes it challenging to take a systematic approach to engaging all students.

To help educators systematically identify and address the causes of student disengagement, PERTS is working with Mindset Scholars, schools, and other organizations to develop Copilot, a new survey and recommendation platform. Copilot will enable educators to rapidly survey students to identify early indicators of disengagement, learn evidence-based strategies for addressing uncovered problems, and track the impact of implemented solutions in order to create a feedback loop that enables educators to be far more systematic in their approach to cultivating student engagement.

Contact

To learn more, contact Dave Paunesku at dave@perts.net.

sevenzo
connecting educators to spread what works

The Problem We're Trying To Solve

A growing evidence base is signaling what works, but we struggle to:

- **Translate what works** into a set of actions educators can take tomorrow.
- **Build educator will and capacity** for action and behavior change.
- **Spread what works** beyond a few pockets of excellence.

Understanding how to translate evidence of what works into widespread behavior change in US public schools is a critical challenge for the future of our education system. For students of all backgrounds to succeed and be competitive in a global marketplace, **practices that work need to spread further and faster.** Importantly, this diffusion needs to happen in a way that honors the educator's role and supports adaptation across local contexts. This is why Sevenzo was founded.

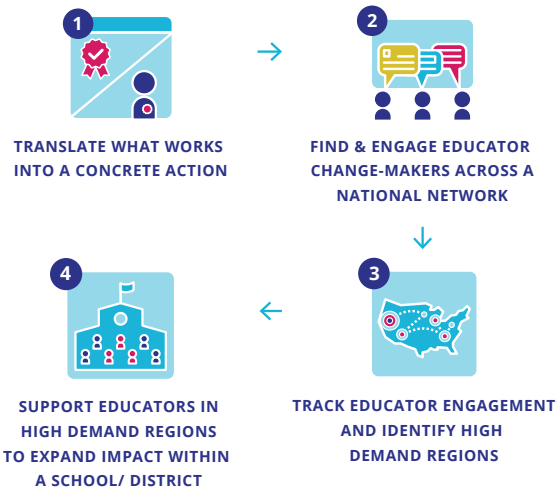
How We're Solving The Problem

Sevenzo combines digital and in-person educator engagement to spread what works.

Guiding Principles

- To spread what works we must meaningfully engage and support change-makers within systems (Rogers, 2010; Valente & Davis, 1999).
- People need to feel connected to others and are more motivated by working together rather than in isolation (Walton & Carr, 2014; Ryan & Deci, 1985, Teachers Know Best PD Report, BMGF).
- Changing behavior can help change beliefs. To change behavior, bite-sized, concrete actions must be accessible (Stangor, 2011; Reay et al., 2006; Sims, 2011).

How We Work

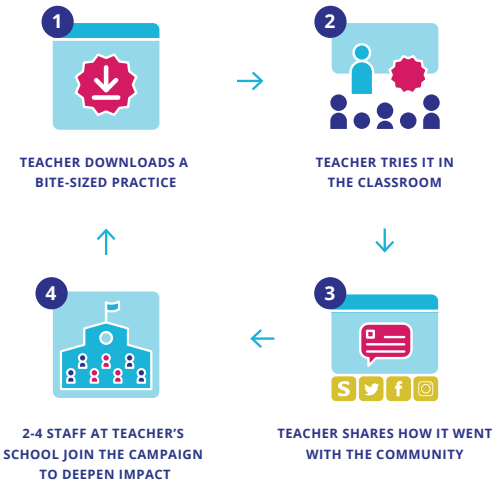


Examples Of Our Work In Action

National Campaigns

#CaringClassroom

https://goo.gl/hyGg6Y



Peer Learning Communities

#SELinAction

https://goo.gl/FNfFrg

Design & provide engaging programming to the #SELinAction Innovation grant recipients to ensure effective SEL practices take hold across schools and districts.

NoVo Foundation
create. change.

educationfirst

What We Need To Do Next

- Identify, promote and diffuse additional evidence based practices *(Partners we're in talks with pictured to the right).*
- Expand our reach through ongoing social media and boots-on-the-ground mobilization.
- Continue to enhance our educator engagement model to ensure the highest quality experience for educators that leads to buy-in and behavior change.
- Streamline the capture and tracking of impact stories and program outcomes (*See sample story on the right).*

Search Institute

FuelEd

Carnegie Foundation for the Advancement of Teaching

STORY BY:
Ciji Thurman
4th Grade Science
Rineyville Elementary
Rineyville, Kentucky
https://goo.gl/EE6GNs

www.sevenzo.org

Transcend

Accelerating innovation in the core design of "school" to far better prepare students for the 21st century

Why We Must Innovate

As we look to the future, this country will be more diverse than ever before. Our students will face global challenges far more complex than we have faced. Many of the jobs they will compete for do not even exist today. We need education to equip our students to navigate—and transform—the 21st century.

And yet, **little has changed in the core design of "school" over the past 100 years**. The traditional design of school is not on a course to meet the demands of our rapidly changing world. *For all children to reach their full potential and thrive in this dynamic world, we must fundamentally reimagine schooling in America.*

The Time Is Now

Today, innovation in school design is more possible than ever before:

Smart application of technology and data tools can pinpoint and more flexibly address student learning needs.

Findings from cognition, motivation, and brain development are deepening our understanding of how to accelerate learning.

In the past 15 years, leading schools have proven that **all students–regardless of their backgrounds–can achieve at high academic levels.** We can now build on their progress.

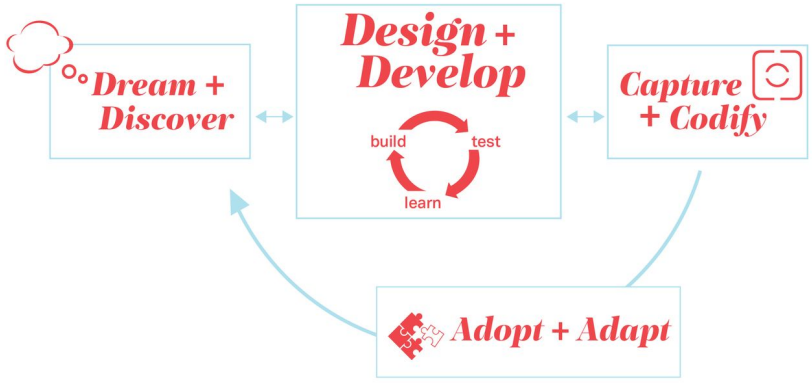
More districts, states, and funders are creating conditions that **enable new school designs to emerge and spread.**

As with successful innovation in any other sector, seizing this opportunity requires significant R&D. Our experience confirms that **visionary school communities want to innovate but lack the capacity to do so**. Transcend (www.transcendeducation.org) fuels that R&D to holistically redesign and spread learning environments that prepare children for the challenges of today and the opportunities of tomorrow.

How We Do It

Our School Partnerships

Since Transcend's founding in 2015, we have partnered with over 25 leading district, charter, and independent school operators around the country. We lead partners through an **innovative R&D journey** with 4 key phases:



Through this journey, **we enable our partners to design, build, codify, and spread innovative models that prepare children to thrive in and transform the 21st century**. We do not promote a single new model, but instead believe that "school" needs to make "8 Great Leaps for Learning" (see http://bit.ly/2ySg94s). Here's one example of what these models might look like from our 2+ year partnership with Achievement First:

- Instead of focusing narrowly on academics, the Achievement First:Greenfield model (www.afgreenfieldschools.org) actively **builds "habits of success"** like drive, empathy, and growth mindset and **helps students discover and pursue their dreams**. What does this look like?
- Greenfield students **devote two 45-minute blocks each day to the core "Enrichment" subjects of their choice** (e.g., martial arts, dance, STEM Inventions), developing deep performance skill through intensive daily practice and a multi-year commitment and experiencing the joy and sense of accomplishment that comes from the pursuit of advanced skills.
- Every 8 weeks, the regular school schedule pauses for **"Expeditions," immersive, authentic 1-2 week learning projects** that culminate in performances, competitions, hackathons, or other celebrations. Example disciplines include theater, photography, mock trial, chess, architecture, and marine biology.
- Each quarter, students meet with a "Dream Team" (https://vimeo.com/217596184) comprising their parents, a teacher, at least one out-of-school mentor, and a classmate to **articulate their dreams, set and be accountable for short- and long-term goals, and reflect on and persist in the journey.**

Our Leadership

Co-founders **Aylon Samouha** and **Jeff Wetzler** have decades of leadership and innovation experience at Achievement First, the National Academy of Advanced Teacher Education, New Classrooms Innovation Partners, Rocketship Education, SCORE! Educational Centers, Teach for America, and Uncommon Schools.

Board Chair **Stacey Childress** is CEO of NewSchools Venture Fund and a leading expert on K-12 innovation. Other Board members include **Trevor Brown**, a partner at New Profit; **Bror Saxberg**, Vice President for Learning Science at the Chan-Zuckerberg Initiative; **Vanessa Rodriguez**, Chief of Talent and Leadership at Citizens of the World Charter Schools; and **Diane Tavenner**, CEO of Summit Public Schools.

To Learn More: please contact Jeff Wetzler, co-founder, at jeff@transcendeducation.org.