

# SPOTLIGHT



Justin Franz for Education Week

Madison Reid, a student in a combined 2nd and 3rd grade classroom, leads a discussion on good listening with her classmates during a morning session at Cleveland's Wade Park Elementary School. Such classroom exercises are part of Cleveland's districtwide social-emotional learning plan.

## GROWTH MINDSET

### EDITOR'S NOTE

An emphasis on non-cognitive skills in schools has spurred efforts to instill growth mindsets in the classroom. In this Spotlight, read how schools are embracing social-emotional learning, nurturing growth mindsets, and creating classroom opportunities for meaningful struggle.

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# Tracking Students' Emotions and Mindsets

By Benjamin Herold

**T**he race is on to provide students with personalized learning experiences based on their individual emotions, cognitive processes, “mindsets,” and character and personality traits.

Academic researchers, for example, are busy developing computerized tutoring systems that gather information on students' facial expressions, heart rate, posture, pupil dilation, and more. Those data are then analyzed for signs of student engagement, boredom, or confusion, leading a computer avatar to respond with encouragement, empathy, or maybe a helpful hint.

“The idea is that emotions have a powerful influence on cognition,” said Sidney D’Mello, an assistant professor of computer science and psychology at the University of Notre Dame, in Indiana. The increasing power and affordability of eye-tracking, speech-recognition, and other technologies have made it possible for researchers to investigate those connections more widely and deeply, he said.

“Ten years ago, there were things you could do in a lab that you couldn’t do in the messiness of the real world,” D’Mello said. “Now, you can get a reasonable proxy of a student’s heart rate from a webcam.”

Still, widely available classroom applications of such work might be a decade or more away.

More prevalent now are digital resources that seek to measure and support the development and self-identification of such “noncognitive competencies” as self-management, perseverance, and a “growth mindset” that recognizes skills can improve with effort. The U.S. Department of Education’s new National Education Technology Plan, for example, officially calls for more work to develop such tools.

Organizations such as the MIND Research Institute are at the forefront of those initiatives. The group’s widely used educational math software, called ST Math, provides students with learning exercises that aim to build not only math



skills, but also curiosity, perseverance, and a mindset that mistakes are powerful learning opportunities.

Ideally, the software would be able to recognize each student’s strengths and weaknesses across each of those domains, then provide a steady stream of customized problems based in part on such factors as a student’s capacity to keep trying to solve new challenges, said Matthew Peterson, the group’s co-founder and CEO.

For now, though, the MIND Research Institute gauges mindset and character traits primarily at the aggregate level, based on laboratory research and analysis of user data about the “typical” 2nd grader.

Other vendors, meanwhile, are wrestling with the opposite challenge. Princeton, N.J.-based startup Mindprint Learning, for example, uses a battery of online cognitive assessments to provide highly customized profiles of how individual students learn, including everything from verbal reasoning to spatial perception. But the company, like others in the field, is still trying to find user-friendly ways for schools and parents to turn the resulting information into compelling learning

experiences that are customized for each individual student’s cognitive strengths and weaknesses.

Privacy concerns and continuing debate about the appropriate use of such technologies for schools in addressing character, mindset, and affect will help shape what happens next.

But district leaders such as Brien Hodges, the executive director of K-12 schools for the 28,000-student Colorado Springs School District 11 are eager for new resources to help personalize student learning, based on more than just academic ability.

“A digital tool that understands what it is the teacher wants all students to know, and knows how each student thinks and learns, and gives the teacher ideas on how to present the material differently would be gigantic,” Hodges said. ■

*Coverage of the implementation of college- and career-ready standards and the use of personalized learning is supported in part by a grant from the Bill & Melinda Gates Foundation. Education Week retains sole editorial control over the content of this coverage.*

## Transform Your Understanding of Student Data



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-Alice Keeler (Teacher & Technology Coach, Clovis High School)



Published December 9, 2015, in *Education Week*

# In Math, Positive Mindset May Prime Students' Brains

Scans provide support for theory

By Sarah D. Sparks

**H**aving a positive mindset in math may do more than just help students feel more confident about their skills and more willing to keep trying when they fail; it may prime their brains to think better.

In an ongoing series of experiments at Stanford University, neuroscientists have found more efficient brain activity during math thinking in students with a positive mindset about math.

It's part of a growing effort to map the biological underpinnings of what educators call a positive or growth mindset, in which a student believes intelligence or other skills can be improved with training and practice, rather than being fixed and inherent traits.

"Our findings provide strong evidence that a positive mindset contributes to children's math competence," said Lang Chen, a Stanford University postdoctoral fellow in cognitive psychology and neuroscience. "Beyond the emotional or even motivational story of 'positive mindset,' there may be cognitive functions supporting the story."

## Seeing a Mind in the Brain

In a forthcoming study previewed at the Society for Neuroscience's annual meeting in Chicago in October, Chen and colleagues tested 243 children ages 7 to 9 for intelligence, numerical problem-solving and math reasoning in word problems, reading ability, working memory, and math-anxiety levels. Chen also gave the students a survey designed to identify positive-mindset levels in math, such as questions about how much they enjoyed solving challenging problems and how competent they felt in learning math.

The researchers focused on math because other studies have found that a student's mindset can be different for different domains—he or she could believe that reading ability can be improved but that

skill at soccer is innate, for example—and math is a subject often associated with a fixed mindset.

Of the children in the study, 47 were asked to either stare at a fixed point or identify whether a series of addition problems were correct while being scanned using functional magnetic resonance imaging, or fMRI, a noninvasive method of identifying brain activity by measuring changes in blood flow in the brain.

Chen and his colleagues found that students with higher positive-mindset levels in math were more accurate at identifying correct and incorrect math problems, even after controlling for differences in IQ, age, working memory, reading ability, and math anxiety.

A lower positive-mindset level was likewise associated with lower math performance.

"This is very, very exciting," said Carol Dweck, the Stanford psychologist who first coined the terms "growth" and "fixed" mindsets, but who was not involved with Chen's study. "We've typically asked how does [mindset] affect students' willingness to take on challenges and their ability to stick to that challenge when they hit setbacks. This opens up a whole new area, which is getting ready to solve a problem.

"My hunch is that often in the fixed mindset, your mind is preoccupied with 'Is this hard?' 'Will I look smart?' 'What will happen if I don't do this?' 'I'm not good at math,' instead of getting that brain ready to do it," Dweck said.

## Mapping the Links

Students with high positive-mindset levels had generally greater brain activity in a number of areas of the brain associated with math problem-solving: the hippocampus, the left dorsomedial prefrontal cortex, the left supplementary motor area, the right lingual gyrus, and the dorsal cerebellum. In particular, the researchers found faster, smoother connections, called "upregulation" between the hippocam-

pus—an area often associated with the ability to quickly remember math facts and processes—and the other brain areas associated with math problem-solving.

Imagine starting your car on a frosty morning. If you warm up the engine a bit before starting out, the car is primed to work better. And if you've just tuned up your engine, it is able to run more efficiently.

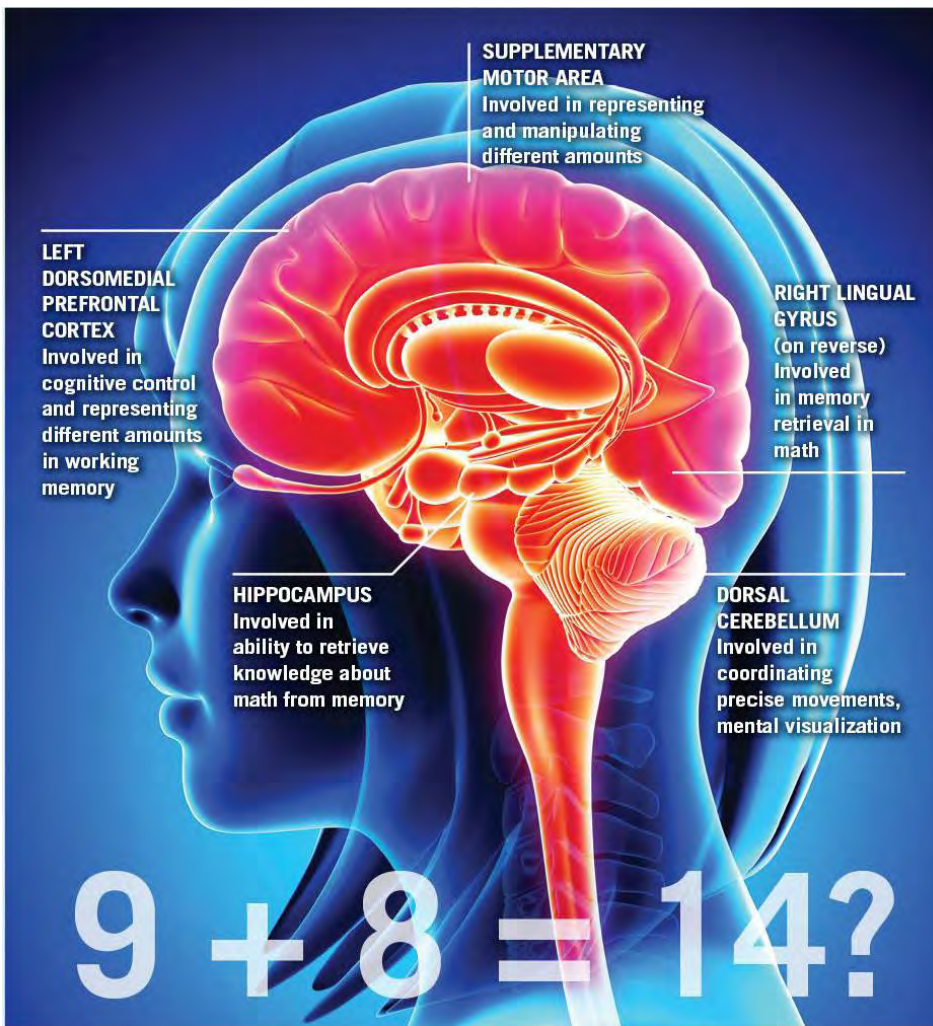
Chen's findings suggest a positive mindset could be giving the brain a similar double boost: "Overall, there is an upregulation of the general cognitive network involving memory, spatial processing, and cognitive control supporting math cognition," he said. "Then, specifically, one of the interesting components is the hippocampal region, which shows a very specific effect for memory retrieval for problem-solving. If we want to solve  $3+4=7$ , there are several different ways to solve it, but the hippocampus plays a role in retrieval rate in solving arithmetic problems. It's one of the cognitive-core hallmarks for efficient problem-solving for math in children." The more positive the mindset, the higher the activation and upregulation researchers saw in those areas and the better students performed on the math problems.

## Echoes of Other Studies

Dweck said that pattern aligns with separate findings by Bruce McCandliss, a Stanford education professor not associated with Chen's study, who found differences in the brains of people who perform better at solving math problems, but had not looked at whether those differences were related to mindset.

"For certain people when they get ready to solve a problem, their brains are in a ready, prepared state," Dweck said. "It's as though they've prepared what they are going to need and gotten it all online."

Chen's study is one of the first to look at the potential benefits of positive-mindset levels on cognitive processing generally,



## Where Mindset Makes a Difference

New research suggests students with a more positive "growth mindset" in math have brains that may be more primed for solving math problems. In a Stanford University study, students who scored higher on an assessment of positive mindset have more brain activity throughout several areas associated with math problem-solving, as well as more efficient connections with the hippocampus, an area associated with memory recall in math.

but there is already mounting evidence that a growth mindset can improve the emotional and motivational supports for learning.

For example, studies have found that students with high growth-mindset levels are less likely to suffer from performance anxiety or stereotype threats, and more likely to learn from—but not obsess over—their mistakes. A 2011 study by Jason Moser, a neuropsychologist at Michigan State University, found people with a high growth mindset were more likely to show conscious attention to mistakes and learn from them more quickly.

"A lot of researchers, cognitive scientists, have traditionally thought of motivation as something very separate from intellectual performance or ability," Dweck said, but as a broader group of researchers from neuroscience, education, and psychology have started working together, "we are finding the brain doesn't separate these things. The way

we have modularized the human mind will not hold up."

## Thinking and Emotion

Mary Helen Immordino-Yang, an associate professor of education, psychology, and neuroscience at the University of Southern California, who studies how emotions contribute to learning, agreed.

"The emotion and thought structures in the brain are totally entwined, totally docked in the brain," she said. She has found the cognitive habits often associated with a fixed mindset—like focusing on grades or considering errors a threat to your identity—can make the brain react emotionally to the wrong things during learning.

"If you are trying to do math and worrying about whether you are going to fail or not, rather than the process of doing math, ... that is not deep learning," she said.

Chen and his colleagues are in the mid-

dle of a larger, longitudinal study tracking how 60 students' attitudes and underlying brain activity change as they grow from age 7 to 12. The researchers are trying to identify differences in students' mindsets and performance if they started out performing generally well or poorly in math.

Separately, the researchers are also working with Jo Boaler, a Stanford math education professor and a co-founder of Youcubed, an intervention to improve growth-mindset levels in math.

"Mindset can change quite a lot across age and grade level, so we really want to see how that change can relate to different brain functions and different math achievement," Chen said. "We want to look at the unique contributions of positive mindset to math achievement and development." ■

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# Nurturing Growth Mindsets: Six Tips From Carol Dweck

By Evie Blad

WASHINGTON

**S**tanford researcher Carol Dweck clearly tapped into a powerful and compelling idea when she linked the concept of growth mindsets to academic success.

As fans of Dweck's research can quickly explain, people with fixed mindsets see strengths and skills as innate traits, like eye color. You're either born with them, or you're not. But people with growth mindsets recognize that the brain can grow and change through effort, and they embrace failures as opportunities for developing new strategies and approaches to learning content and concepts they find challenging.

Enthusiasm for Dweck's work has spread rapidly, and her name is a buzzword in many schools as teachers buy into the idea that helping students shift their mindsets can lead to academic gains.

But, in recent years, Dweck has worked to balance that enthusiasm by busting some misconceptions about her research and its applications in schools. That includes a wildly popular *Education Week* commentary and a keynote address at EdWeek's Leaders to Learn From event in Washington.

"I fear that my work, which grew up to counter the failed self-esteem movement, will be used for the same purpose, trying to make kids feel good but not actually changing the process of learning," Dweck said, explaining her concerns.

As people have embraced the growth mindset idea, they haven't always fully understood every dimension of the research. Among the biggest misconceptions? That boosting students' mindsets is simply a matter of praising effort rather than results or helping students develop new strategies for approaching content they struggle with, Dweck said.

"Sheer effort is highly important, but it is not the ultimate value; learning

and improvement are," Dweck said. "Effort is one route to learning and improvement."

Here are six tips pulled from Dweck's talk:

## 1. Acknowledge the nuance in the research.

Growth mindsets are not a magic trick that will solve every challenge in the classroom, Dweck said. The enthusiasm for the research sometimes leads to an expectation of unrealistic results, researchers have said. And that same enthusiasm can lead skeptics to dismiss them all together. Fellow mindset researcher David Yeager has even published a paper called "Social-Psychological Interventions in Education: They're Not Magic," which he just calls "The Magic Paper."

"A growth mindset is not a panacea, but it does empower [students] and help them learn," she said.

## 2. Everyone has a fixed mindset sometimes.

There's a misconception that every student and teacher can be put into one of two categories: those with growth mindsets and those with fixed mindsets, Dweck said, but in reality, everyone "has a little bit of both." The either/or mentality causes some people to ignore chances they have to address the fixed mindsets they do have about some areas.

"Let's legitimize that fixed mindset, because we all have it somewhere; we are all a mixture," Dweck said. "And watch for those fixed-mindset triggers."

What sparks students' fixed mindsets? It's whatever makes them retreat to that place where avoiding "looking



dumb" is more important than being vulnerable and learning a new idea, she said. Those triggers are different for different people. They could be struggles, setbacks, criticism from mothers, or even meeting someone who is smarter or more talented, Dweck said.

"Do you hate them just a little bit? Or do you say, 'wow how did they develop those skills?' Maybe I can learn from them."

## 3. Name your fixed mindset.

Dweck told of a consultant in Australia who encouraged business executives to name their "fixed-mindset persona" so they could have a fun, comfortable way of discussing it with peers.

In schools, the name gives a quick identifier to the triggers students and teachers identify, and it helps them recognize their responses that might not be productive, she said.

"Name it, claim it, and talk about it," she said. "And over time, recruit it to work with you on your growth mindset goals."

For students, that might mean calling their mindset by their middle name or a goofy nickname.

“When we’re in a crunch, when we’re on deadline and I’m not sure we’re gonna make it, Duane shows up,” one Australian man told his coworkers, according to Dweck. His organization’s morale and productivity shot up as they adopted those strategies, she said.

#### 4. Move beyond effort.

If teachers and parents want to nurture growth mindset in children, they should move beyond just pushing them toward effort. They should also help them identify new strategies and approaches so that effort can be productive, Dweck said. I discuss that a bit in this story about how math teachers can strengthen growth mindsets by changing their approach to the content.

Children can then move beyond just

asking for answers when they don’t understand and instead ask “What can I do to help myself?” she said.

#### 5. Put mindsets into a greater school-culture context.

The larger culture of a school can influence their mindset formation, Dweck said. Students are less likely to avoid “looking dumb” and more likely to try new approaches if they believe that their school is interested in their success, she said. Similarly, in workplaces, employees are more likely to display growth mindsets when they believe that the organization believes in developing abilities.

Social-emotional learning efforts and school climate initiatives that encourage students to build supportive relation-

ships may help build this attitude in a school, Dweck said.

“What is the larger culture that allows teachers and students to feel safe? That we’re out for your development? We’re not here to sort you into who can succeed and who can’t.”

#### 6. Don’t use mindsets to label students (or yourself).

Dweck said she’s been disappointed to hear that some teachers have used a student’s mindset as an excuse, saying things like “that child can’t learn; he has a fixed mindset.”

“We used to say kids don’t have the ability. Now we’re saying they don’t have the mindset? I think it’s protective. It’s our way of saying ‘It’s not my fault that child isn’t learning.’” ■

[Click here to watch the video](#) EDUCATION WEEK

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# Caution Urged on Measuring Social-Emotional Skills

Scholars note flaws in current methods

By Sarah D. Sparks

WASHINGTON

**T**raditional methods of studying social-emotional skills will have to evolve in more reliable, less subjective ways if educators and policymakers expect to incorporate them validly into accountability systems and school improvement plans, education researchers meeting here last week cautioned.

The federal Every Student Succeeds Act broadens the definition of school success, requiring states and districts to include nonacademic factors in their accountability systems. Concepts like growth mindset—the belief that intelligence and other skills are not fixed, but can be improved through effort—and grit—the ability to sustain interest over a long period and persist in a task in the face of boredom or chal-

lenges—have garnered great interest as potential levers to lift student academic achievement through non-academic skills.

“It’s only in the last five years that mindset has moved from an influential academic theory to an educational phenomenon,” David Miele, an education professor at Boston University, said during a symposium on the research at the American Educational Research Association’s annual conference. The gathering drew more than 16,500 researchers from around the world.

But the research studying the skills hasn’t quite caught up with their rising popularity, some scholars said.

In an analysis of 167 National Science Foundation-funded studies of those skills—including 88 interven-

tions designed to improve such qualities as motivation, self-efficacy, and persistence—Jolene Jesse, a program director in the National Science Foundation’s education and human resources directorate, said the instruments being developed are largely self-reports.

For example, to identify changes in a student’s “grittiness,” a researcher might ask students to rate, on a scale of 1 to 5, how much they agree with such statements as “Setbacks don’t discourage me” or “I finish whatever I begin.”

#### Beliefs vs. Actions

Such methods are long-established, but in the symposium and several other discussions at the AERA meeting, research-

ers warned that surveys like these can be muddier and vulnerable to biases.

“Let’s say we were studying students’ math ability,” said Evan Heit, the director of the NSF’s division of research on learning. “How satisfied would we all be if we did that by simply asking students, ‘OK, how good are you in math?’ We probably would not be very satisfied. So should we be using self-reports for [social-emotional learning]?”

For example, Lee Shumow, an educational psychology professor at Northern Illinois University, evaluated how an intervention affected teachers’ and students’ growth mindsets. After conducting teacher training and a six-week curriculum designed to boost growth mindsets among teachers and students, Shumow used self-reported surveys but also observed 10 7th grade and 15 high school science classes.

She measured how often teachers used feedback to students that supported growth mindset—for example, “You did well on this test; see how your studying is paying off?”—and how often they made comments that would undermine a growth mindset, such as comparing students’ test scores or saying, “You aced this test; see how smart you are?”

Students whose teachers provided more growth-oriented feedback had better performance and higher levels of growth mindset.

During teacher training, the middle and high school teachers participating in the growth-mindset intervention answered survey questions in ways that suggested each had a strong growth mindset.

“We did measure teachers’ mindsets using a standard survey to measure mindset,” Shumow explained, “but teachers are pretty savvy. ... They knew exactly how they were supposed to respond, and they answered [the questions] accordingly.”

And sure enough, during classroom observations, the teachers who were part of the intervention made more comments supporting growth mindset than did teachers who had not taken part in the intervention—but the intervention teachers also made more undermining comments than the teachers in the control group.

“We think the statements the teachers made and the behavior they displayed in the classroom” reflect a con-

flict between the explicit beliefs they are learning and implicit beliefs that may be more fixed, Shumow said. “We think the implicit beliefs are where it’s at.”

Heit, of the NSF, pointed to a recent Brookings Institution report calling for researchers studying social skills to distinguish better between character traits and the related behaviors that can be trained. Heit and his colleague Jesse called for more observational protocols that would help teachers and researchers understand what grit or a growth mindset looks like in day-to-day practice.



### True Grit? It Depends

Even when students or teachers answer surveys frankly, they may be influenced by comparing their own behavior with that of their peers—what researchers call reference bias.

That’s why prior studies have found very high-performing students in competitive schools often report being less hardworking than they actually are.

It can also be why between-school comparisons of grit don’t always work well, according to another study presented at the meeting by University of Pennsylvania psychology professor Angela Duckworth, who coined the term “grit”; mindset researcher David Yaeger at the University of Texas at Austin; and colleagues at Stanford University and the University of Notre Dame.

The researchers compared two types

of student surveys of academic persistence with a behavioral test measuring how long high school students would continue to perform a difficult but mundane task while being distracted.

Students’ own reported perseverance predicted how likely they were to complete their first year of college in comparison with others at their own school. But the student reports were not accurate for comparing the college-persistence rates between one high school and another.

By contrast, performance on the behavior task did accurately predict differences in college persistence both within the high schools and between them.

As children grow to adolescence, Duckworth said, they may compare themselves more to their peers, which may also affect how accurately they report their own persistence, self-efficacy, or self-control.

One of the limitations of using student self-reports to measure grit, Duckworth said, is they are “a judgment based on a mental model that’s influenced by many things other than the objective behavior.”

In fact, in a separate study, Duckworth and postdoctoral researcher Lauren Eskreis-Winkler flipped the grit research structure on its head: They used a survey designed to get students thinking about other, younger students as the intervention to increase students’ own gritty behavior.

In a randomized controlled experiment, the researchers gave 550 middle school students basic information on grit and randomly assigned some to fill out a survey giving “tips” to 4th graders on how to be more persistent and gritty. Then the researchers asked all the students to complete challenging math problems in an online program, but added that they could “take a break” and play simple entertainment games whenever they wanted.

In both cases, students who had acted as “mentors” to other students via the surveys persisted in the math task longer and with fewer breaks than those who had not been mentors. The effect was strongest for students who were initially deemed low-performing in math.

The results have also been repeated with three groups of adults: at-risk community college students, unemployed workers trying to find a new job, and smokers seeking to quit. ■



## ILLUMINATE EDUCATION

# The Importance of a Growth Mindset in Turnaround Teachers

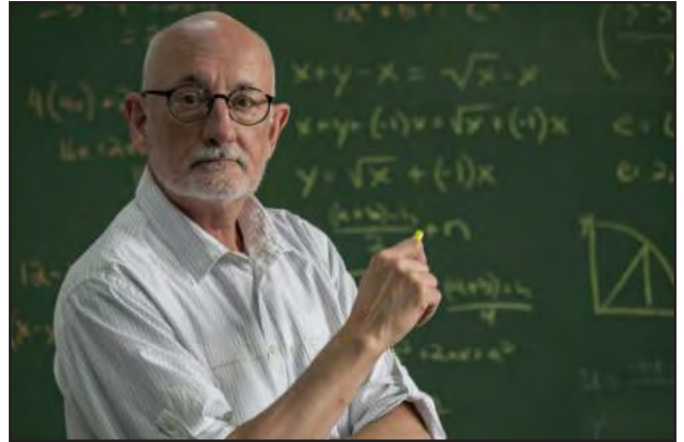
The pattern proves true time and time again. Often, behind people who've overcome underprivileged backgrounds to achieve distinction with one or more facets of adult life is found an educator (or several) who left an indelible mark of inspiration on an otherwise-threatened upbringing. More often than not, turnaround teachers nurtured potential, instilled resiliency and encouraged a desire to pursue personal goals.

When these accomplished individuals give award acceptance speeches and reflect upon their perseverance through adversity, they're often quick to acknowledge the turnaround teachers who touched their lives. They gratefully recognize Mrs. Johnson from fifth grade social studies and Mr. Smith from ninth grade English for helping to mold them into the people they've become today. But what exactly sets turnaround teachers apart, enabling them to succeed with helping close the achievement gap that separates high-poverty schools from more affluent districts? The answer often lies in their mindsets.

## The Power of Growth Mindset

Growth mindset – the belief that qualities like intelligence and talents aren't inherent but rather are cultivated over time through hard work and dedication – typically gets linked to students, yet the concept applies to teachers as well.

Development of the right mindset often proves necessary in order to serve as a successful turnaround teacher.



Effective teachers represent perhaps the most important factor in boosting student achievement. When they exhibit a growth mindset, they're more likely to establish high expectations for students, make instruction engaging and offer extra help when necessary. Unlike individuals who convey fixed mindsets, teachers with growth mindsets genuinely believe each of their students is capable of learning the covered material and they use strategies to unlock hidden potential.

In the case of high-poverty schools, significant gains can be made in math and reading proficiency when educators with growth mindsets are in place. In addition to attacking the challenges facing underprivileged students head-on, these teachers are willing to take a look in the mirror and strive for personal betterment with regards to their instruction skills.

(cont. page no. 2)

# “The notion of treating both teaching and learning as a ‘privilege’ truly embodies what it means to have a growth mindset.”

## Mindset Characteristics in Effective Turnaround Teachers

Gail L. Thompson – the Wells Fargo Endowed Professor of Education at Fayetteville State University – co-authored an article for ASCD that concludes by stating, “Regardless of where they work or the type of principal they have, effective teachers remain true to their overall goal: to offer an outstanding education to all students whom they have the privilege of teaching.” The notion of treating both teaching and learning as a “privilege” truly embodies what it means to have a growth mindset.

While there are many qualities turnaround teachers personify in helping transform low-performing schools by improving at-risk student learning outcomes, some characteristics emerge as trends.

Here are five traits related to having a growth mindset that turnaround teachers often demonstrate:

- **Strong Determination:** Turnaround teachers have an exceptional desire and persistence to drive student learning success.
- **Lofty Expectations:** Turnaround teachers don’t settle for anything less than the best effort each student has to offer.

- **Respected Leadership:** Turnaround teachers develop relationships built on mutual respect, serving as positive role models for their students.
- **Collaborative Approach:** Turnaround teachers foster student participation and create classroom environments that empower students to take control of learning.
- **Genuine Care:** Turnaround teachers demonstrate concern for both their students’ academic and personal well-beings, displaying kindness and compassion.

Ultimately, adoption of a growth mindset benefits students and teachers alike. Yet many impressionable students from underprivileged backgrounds need the guidance of a turnaround teacher to discover their true learning potential. When such teachers effectively impart the virtues of resiliency and personal empowerment to foster learning achievement, then the seeds have been planted for a future success story in the making.

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## COMMENTARY

Published September 23, 2015, in *Education Week*

# Growth Mindset, Revisited

By Carol Dweck

**F**or many years, I secretly worked on my research. I say “secretly” because, once upon a time, researchers simply published their research in professional journals—and there it stayed.

However, my colleagues and I learned things we thought people needed to know. We found that students’ mindsets—how they perceive their abilities—played a key role in their motivation and achievement, and we found that if we changed students’ mindsets, we could boost their achievement. More precisely, students who believed their intelligence could be developed (a growth mindset) outperformed those who believed their intelligence was fixed (a fixed mindset). And when students learned through a structured program that they could “grow their brains” and increase their intellectual abilities, they did better. Finally, we found that having children focus on the process that leads to learning (like hard work or trying new strategies) could foster a growth mindset and its benefits.

So a few years back, I published my book *Mindset: The New Psychology of Success* to share these discoveries with educators. And many educators have applied the mindset principles in spectacular ways with tremendously gratifying results.

This is wonderful, and the good word continues to spread. But as we’ve watched the growth mindset become more popular, we’ve become much wiser about how to implement it. This learning—the common pitfalls, the misunderstandings, and what to do about them—is what I’d like to share with you, so that we can maximize the benefits for our students.

*A growth mindset isn’t just about effort.* Perhaps the most common misconception is simply equating the growth mindset with effort. Certainly, effort is key for students’ achievement, but it’s not the only thing. Students need to try new strategies and seek input from others when they’re stuck. They need this repertoire of approaches—not just sheer effort—to learn and improve.

We also need to remember that effort is a means to an end to the goal of

learning and improving. Too often nowadays, praise is given to students who are putting forth effort, but *not learning*, in order to make them feel good in the moment: “Great effort! You tried your best!” It’s good that the students tried, but it’s not good that they’re not learning. The growth-mindset approach helps children feel good in the short *and* long terms, by helping them thrive on challenges and setbacks on their way to learning. When they’re stuck, teachers can appreciate their work so far, but add: “Let’s talk about what you’ve tried, and what you can try next.”

Recently, someone asked what keeps me up at night. It’s the fear that the mindset concepts, which grew up to *counter* the failed self-esteem movement, will be used to *perpetuate* that movement. In other words, if you want to make students feel good, even if they’re not learning, just praise their effort! Want to hide learning gaps from them? Just tell them, “Everyone is smart!” The growth mindset was intended to help close achievement gaps, not hide them. It is about telling the truth about a student’s current achievement and then, together, doing something about it, helping him or her become smarter.

I also fear that the mindset work is sometimes used to justify why some students aren’t learning: “Oh, he has a *fixed* mindset.” We used to blame the child’s environment or ability.

Must it always come back to finding a reason why some children just can’t learn, as opposed to finding a way to help them learn? Teachers who understand the growth mindset do everything in their power to unlock that learning.

A few years ago, my colleague in Aus-

tralia, Susan Mackie, detected an outbreak of what she called “false growth mindset.” She was seeing educators who claimed to have a growth mindset, but whose words and actions didn’t reflect it. At first, I was skeptical. But before long, I saw it, too, and I understood why.

In many quarters, a growth mindset had become the right thing to have, the right way to think. It was as though educators were faced with a choice: Are you an enlightened person who fosters students’ well-being? Or are you an unenlightened person, with a fixed mindset, who undermines them? So, of course, many claimed the growth-mindset identity. But the path to a growth mindset is a journey, not a proclamation.

Let’s look at what happens when teachers, or parents, claim a growth mindset, but don’t follow through. In recent research, Kathy Liu Sun found that there were many math teachers who endorsed a growth mindset and even said the words “growth mindset” in their middle school math classes, but did not follow through in their classroom practices. In these cases, their students tended to endorse more of a fixed mindset about their math ability. My advisee and research collaborator Kyla Haimov-



itz and I are finding many parents who endorse a growth mindset, but react to their children's mistakes as though they are problematic or harmful, rather than helpful. In these cases, their children develop more of a fixed mindset about their intelligence.

*How can we help educators adopt a deeper, true growth mindset, one that will show in their classroom practices?* You may be surprised by my answer: Let's legitimize the fixed mindset. Let's acknowledge that (1) we're all a mixture of fixed and growth mindsets, (2) we will probably always be, and (3) if we want to move closer to a growth mindset in our thoughts and practices, we need to stay in touch with our fixed-mindset thoughts and deeds.

If we "ban" the fixed mindset, we will surely create false growth-mindsets. (By the way, I also fear that if we use mindset measures for accountability, we will create false growth mindsets on an unprecedented scale.) But if we watch carefully for our fixed-mindset triggers, we can begin the true journey to a growth mindset.

*What are your triggers?*

Watch for a fixed-mindset reaction when you face challenges. Do you feel overly anxious, or does a voice in your head warn you away? Watch for it when you face a setback in your teaching, or when students aren't listening or learning. Do you feel incompetent or defeated? Do you look for an excuse? Watch to see whether criticism brings out your fixed mindset. Do you become defensive, angry, or crushed instead of interested in learning from the feedback? Watch what happens when you see an educator who's better than you at something you value. Do you feel envious and threatened, or do you feel eager to learn? Accept those thoughts and feelings and work with and through them. And keep working with and through them.

My colleagues and I are taking a growth-mindset stance toward our message to educators. Maybe we originally put too much emphasis on sheer effort. Maybe we made the development of a growth mindset sound too easy. Maybe we talked too much about people having one mindset or the other, rather than portraying people as mixtures. We are on a growth-mindset journey, too. ■

*Carol Dweck is the Lewis and Virginia Eaton professor of psychology at Stanford University and the author of *Mindset: The New Psychology of Success* (Ballantine Books).*

## HOW TO ENCOURAGE STUDENTS

### Growth Mindset

What to say:

"When you learn how to do a new kind of problem, it grows your math brain!"

"If you catch yourself saying, 'I'm not a math person,' just add the word 'yet' to the end of the sentence."

"That feeling of math being hard is the feeling of your brain growing."

"The point isn't to get it all right away. The point is to grow your understanding step by step. What can you try next?"



### Fixed Mindset

What not to say:

"Not everybody is good at math. Just do your best."

"That's OK, maybe math is not one of your strengths."

"Don't worry, you'll get it if you keep trying."\*

\*If students are using the wrong strategies, their efforts might not work. Plus they may feel particularly inept if their efforts are fruitless.

"Great effort! You tried your best."\*

\*Don't accept less than optimal performance from your students.



SOURCE: Carol Dweck

## COMMENTARY

Published December 7, 2015, in *Education Week Teacher*

# Beyond Growth Mindset: Creating Classroom Opportunities for Meaningful Struggle

By Brad Ermeling, James Hiebert, and Ron Gallimore

**G**rowing interest in teaching “grit” or “growth mindset” is a hopeful sign. It reflects an increasing awareness that richer, deeper learning can flow from having students struggle with a challenging task and persisting until completion.

But with this hopeful sign comes the risk of an ends-means reversal, a common misapplication of many good ideas. Consider cooperative learning, for example. Cooperative learning was intended, as growth mindset is now, to be a means to deeper, richer learning. But too often it became the end itself. In many classrooms, students have learned to be better “cooperators” but often without any distinct benefit for deeper learning. To avoid a similar fate with growth mindset, the instructional goals must be richer-learning, not just struggle.

Seventy-five years of research documents that learning is enhanced when students persist until successful—through perplexity, dilemma, and struggle. This “struggle effect” appears even in studies of conceptual teaching and learning when investigators were not looking for it.

This result wouldn't surprise the philosopher and education reformer John Dewey. In 1910, Dewey described learning as beginning with a dilemma—an uncertainty about how to proceed. Struggling to work through uncertainty and ambiguity to discover a solution was, for Dewey, essential to meaningful learning.

Struggling and persisting in the face of uncertainty is finding its way back into prescriptions for good classroom practice. Advocates for meaningful struggle recommend that teachers avoid telling students how to solve problems. Instead, teachers are urged to allow students to wrestle with a problem and try to solve it themselves.

## Capturing Key Ideas

Evidence suggests that significant learning benefits result when students are allowed to do some of this hard work on their own and struggle with ideas they do not quite yet understand. Benefits are gleaned when the lesson goal is helping students deepen understanding and learning of important concepts or problems. Struggle is most useful when it helps students grasp and retain key lesson ideas, the ones with the most payoff in comprehension and understanding.

For example, suppose the goal of a 4th grade lesson is introducing the concept of adding fractions with unlike denominators. Students already know how to add fractions with common denominators, such as  $2/5 + 1/5$ . One question teachers might typically pose in the new lesson is, “Can you find a common denominator for the problem  $1/2 + 1/3 = ?$ ”

But this question does not get at the key idea for the lesson—recognizing that units or wholes must be broken into same-size parts to calculate an exact answer to the problem. Finding common denominators can eventually be part of a procedure for finding the size of these parts, but finding common denominators at this point does not call students' attention to the key idea.

A better question to start the lesson is this: “Can you find how much juice we would have if we added  $1/2$  cup of juice and  $1/3$  cup of juice? Show how you found the answer by drawing a picture or writing how you thought about the problem.” This question provides students with an opportunity to struggle with the key idea they need to understand—how to divide a cup of juice into smaller, equal amounts, so you can find an exact total amount for  $1/2 + 1/3$ .

Asking students to persist or struggle with classroom tasks can yield big ben-

efits for deeper learning. But struggle is only productive when students engage with a task that captures the central idea of a lesson.

## Struggle vs. Frustration

Engaging students in productive struggle is a challenge for teachers as well as the students. It takes time, persistence, and some experimenting to plan rich learning opportunities that challenge but don't frustrate students. Activities need to stretch students' thinking and performance just beyond the level they can do on their own—the zone of proximal development, or ZPDs, some call it.

Struggle works and does not frustrate when students have the knowledge and tools to tackle novel problems—ones they've not seen before, and are just beyond what they've already learned and mastered. In mathematics, that might mean a problem that can be solved by applying concepts learned in previous weeks—for example, the principle described earlier that finding exact answers when adding (or subtracting) fractions requires amounts to be divided into same-size parts. Designing challenging tasks that do not frustrate students but require just enough stretch takes refined and continuing teacher assessment and judgment.

Another crucial teaching role in productive struggle lessons is providing timely assistance. When a challenging task opens a productive-struggle zone, the teacher's judgment is again critical. Success depends on teachers recognizing when a little timely assistance sustains student persistence but does not prematurely terminate productive struggle and learning.

Getting the right balance can be difficult. For teachers accustomed to avoiding student struggles, there is tempta-

tion to intervene and help students get the right answers. To do so runs the risk of turning the activity into the classic recitation-style lesson—turning students into passive receivers of knowledge and teachers into “tellers.”

For teachers who are adopting a new emphasis on grit and growth mindset, the other extreme can be equally problematic—urging students to persist with a task that is well beyond their ZPD, without necessary tools to meaningfully tackle the challenge.

### Ear Training

John Dewey was asked what he meant when he advocated that teachers should not “tell students what to do.” Puzzled that he had been interpreted this way, he said teachers could tell students all they wanted to tell—but they should be aware students would only hear what they have been prepared to hear. Struggling, or persistence, for Dewey, was (among other things) a way of preparing children to hear. Educators would do well to adopt this rule of thumb for how and when to engage students in struggle—that is, when you’re preparing them to hear something really important. This places meaningful parameters on what students should struggle with and when teachers should encourage it.

Creating opportunities for meaningful struggle in the classroom that truly enrich student learning involves several key elements:

- Determine timing and placement for productive struggle within the unit or curriculum—lessons that are “preparing students to hear something really important.”
- Align struggle activities with clear, specific learning goals.
- Design struggle tasks based on assessment of students’ prior knowledge and skills.
- Foster a safe environment that encourages student inquiry and exploration of important ideas.
- Use probing questions to solicit student thinking and provide strategic assistance to nudge students through their ZPDs.
- Follow-up each struggle episode with carefully structured lessons that build on students’ ideas, address misconceptions, and help students forge new understandings.
- Assist students to reflect and articulate what they learned as a result of *productive* persistence.



Valuable student growth and learning won’t come from struggle alone. There is little purpose in persistence that yields no tangible benefits in increased knowledge, understanding, or skill. But giving students an opportunity to struggle through a difficult problem with a clear learning goal in mind, combined with just enough stretch and strategic assistance, students can develop lasting connections about important ideas, increased capacity for productive struggle, and durable skills for solving novel problems in life. ■

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*Learning Forward and the 2014 Outstanding Paper Award from Emerald Publishing.*

*Dr. James Hiebert is co-author of The Teaching Gap: Best Ideas from the World’s Teachers for Improving Education in the Classroom, and Making Sense: Teaching and Learning Mathematics with Understanding. He has directed multiple federal grants on the teaching and learning of mathematics in schools and on the preparation of mathematics teachers.*

*Dr. Ron Gallimore (@RonaldGallimore) is the co-author, with Roland Tharp, of Rousing Minds to Life: Teaching, Learning, & Schooling in Social Context. Since 1983, he has conducted instructional improvement studies and is currently involved in researching the improvement of teaching at UCLA’s LessonLab Research Institute. Dr. Gallimore has received the Grawemeyer Award in Education, the IRA Albert J. Harris Award, and a University of California Presidential Award.*

## COMMENTARY

Published July 17, 2015, in Education Week's Finding Common Ground Blog

# Why a 'Growth Mindset' Won't Work

By Peter DeWitt

**S**tanford professor Carol Dweck's work is being used all over the world. When we look at what school should epitomize...the growth mindset should be at the center. Many adults who work in schools say we need to get away from a fixed mindset, because a student's intelligence and future are not set. There is always room for growth.

But what if our actions in school contribute to the reason why a growth mindset has a low effect size?

Recently, John Hattie gave a keynote at the Annual Visible Learning Conference in San Antonio, Texas. Over 1,000 attendees from all over the world sat in the audience when Hattie gave a keynote focusing on *The Science of How We Learn*, which is the title of his book that was published 2 years ago.

As Hattie was going through the *Skill, the Will and the Thrill* of learning, he put up a slide that said, "Growth vs. Fixed mindset - .19." For those of you who don't know, and for full disclosure, I work with John as a Visible Learning Trainer. I gave up being a school principal in a community I loved to work with him. I write about his work from time to time because it provokes some of my best thinking. And because I'm such a huge fan of the growth mindset (I barely graduated from high school and was retained in elementary school), this slide poked my own hornet's nest.

We usually look for effect sizes that are .40 or above, which is what Hattie refers to as the Hinge Point. The Hinge Point provides a year's worth of growth for a year's input. A .19 is concerning because it is so much lower than the Hinge Point. The beauty of Hattie's work is that an influence with a low effect size (ex. Growth vs. Fixed Mindset) doesn't mean we shouldn't do it. The low effect size may be due to how the adults in the classroom or school building ap-

proach the influence, and we may have to change how we approach it.

As Hattie continued to speak, he said the reason why growth vs. fixed mindset has a low effect size is due to the fact that adults have a fixed mindset and keep treating students accordingly, so right now the effect size is low, and will continue to stay low unless we change our practices in the classroom. We put students in ability groups, they get scores on high stakes tests that help label them, and then we place them in Academic Intervention Services (AIS) which adds to their fixed mindset. Once students enter into AIS or Special Education, very few leave.

Students are conditioned to have a fixed mindset, and it's due to us.

## What can we do differently?

First and foremost, we have to get away from having a fixed mindset because it has terrible implications for how we treat students. We do not have a crystal ball, and we shouldn't treat students who struggle like they will struggle for the rest of their lives. It's like a self-fulfilling prophecy. If we treat students like they will always struggle...they may always struggle.

Besides...

If students aren't doing well in our classrooms it may not be due to them and may require that we change the way we teach. "Change the environment and not the child." When we use ability groups, categorize students by test scores, and do not instruct in a variety of ways, we will continue to treat students with a fixed mindset. Our fixed mindset puts them at a greater risk of having a fixed mindset. We need to try to do the following:

- Less Testing - Yes, I know. We don't feel like we have control over this but we do have control over parts of it. We can

continue to speak up about the harmful way that high stakes testing is being used, but we can also change the way we use the tests we create and use in our classrooms. First of all, use less summative testing. Formative assessment is the sweet spot. Be less concerned about grades and more concerned about formative assessment.

- More feedback - If we want things like class size to matter more, than we need to change the way we provide feedback. Reflect on the feedback you provide to students. Does the feedback go deeper as the students gain more expertise in the topic? Or do we just slap a grade or a sticker on a paper and say "Great job!" Praise, although great to hear, does not move learning forward.
- Flexible Grouping - When we put students in ability groups like Lions, Tigers and Bears, something I was guilty of, they know which group has the high achieving students and others who are not as gifted in the curricular area. Students, no matter their academic level, can provide effective feedback to each other if it has been modeled correctly.
- Different Questioning - 95% of questions stay in the surface level. According to Hattie's research, Experienced teachers ask 75% surface and 25% deep. Expert teachers ask 75% that are deep and 25% that are surface.
- Stop talking so much - "Teachers ask more than 200 questions per hour," which means wait time is low and students are not getting the opportunity to talk with one another. Try to do a Think, Pair, Share or cooperative conversations.

## In the End

We talk a lot about the growth mindset but our actions may be counter-productive to putting it into action. A growth mindset is so vitally important for adults and students. Adults need to have that mindset for their own growth but more importantly for the growth of their students.

Talking about the growth mindset is not good enough. Our actions are where the rubber hits the road. If we believe the growth mindset is important, and believe that it should have a higher effect size, then we need to follow up with the actions to make it happen. ■

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