

Dana Center
Mathematics
PATHWAYS

What's All This Fuss About Growth Mindset and Other Psychological Factors?

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 The University of Texas at Austin
Charles A. Dana Center

www.dcmathpathways.org

Good afternoon. My name is Paula Talley, and I am the manager of professional learning for the higher education team at the Dana Center. I am privileged to have Joan Zoellner on this webinar who is a course program specialist which is part of the curriculum team at the Dana Center. She has been working on our co-requisite materials for the past several months.

This is an interactive webinar. There will be several times where you are sent to break-out rooms to talk with your colleagues around the system. You are not here to just listen to me talk. You are here to share ideas and learn from each other.

Session Outcomes

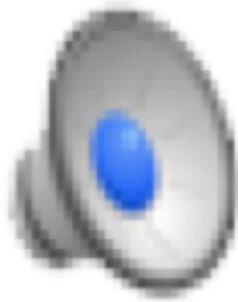
Participants will:

- Explore different categories of non-cognitive, or psychosocial, factors.
- Discuss the impacts of psychosocial factors on student success and retention.
- Discuss a variety of interventions related to helping students develop specific non-cognitive attributes.

There is a lot of research on these topics. It is important for us to understand what these psychosocial factors are to find ways to help students be successful in college.

In this webinar, we will highlight key motivational constructs and share strategies with each other. Honestly, we will just be touching the surface. We could spend several webinars digging into this work.

Our Culture & Mathematics

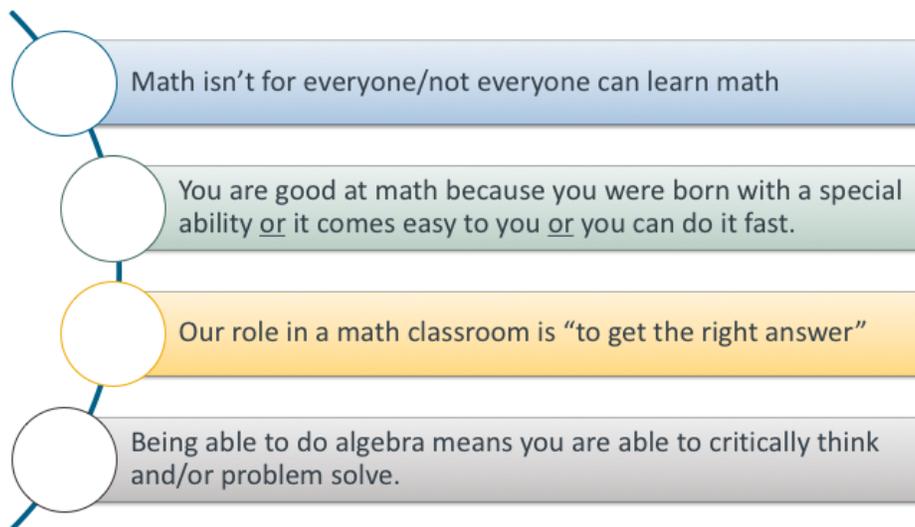


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Key points:

Listen for aspects of 'the culture of mathematics'

Our Mental Model of Mathematics



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- ◆ "She's bad at math, she's good at other things so don't worry."
 - ◆ "I thought of myself as not good at math."
 - ◆ "You are good at math because you were born with a special ability."
 - ◆ Being good at math means that it comes easy to you and you can do math "fast"
 - ◆ "Not everyone can learn math."
 - ◆ Math is a performance subject ("what is the right answer?")
 - ◆ Math anxiety is normal and acceptable
 - ◆ Algebraic thinking is a proxy for critical thinking and problem solving
- Math is a Performance subject:
- Ask students what they think their role in a math classroom is, they answer "to get the right answer".
 - Not getting TO A correct answer
 - "Math Facts" memorization = indicates that being successful in math is about recalling facts at speed

How can we address these misconceptions?



KEY: MENTAL MODEL OF BREAKING 4 MINUTE MILE ...
Sports Illustrated Sportsman of the Year in 1954
Initiated the first testing for use of [anabolic steroids](#) in sport.

His major contribution to academic medicine was in the field of [autonomic](#) failure, an area of neurology focusing on illnesses characterised by the loss of certain automatic responses of the nervous system (for example, elevated heart rate when standing up). He ultimately published more than eighty papers, mostly concerned with the [autonomic nervous system](#), [cardiovascular physiology](#), and [multiple system atrophy](#).^[28] He edited *Autonomic Failure: A Textbook of Clinical Disorders of the Autonomic Nervous System* with C.J. Mathias, a colleague at St Mary's, as well as five editions of *Brain and Bannister's Clinical Neurology*.^[28]

Bannister always said he was more proud of his contribution to medicine than his running career.^[29] In 2014, Bannister said in an interview: "I'd rather be remembered for my work in neurology than my running. If you offered me the chance to make a great breakthrough in the study of the automatic nerve system, I'd take that over the four minute mile right away. I worked in medicine for sixty years. I ran for about eight."^[30]



We should help students understand that success is messy.

How can we help student develop the skills necessary to navigate to success?

Primary Psychosocial Factors

- Self-perception
- Motivation
- Attributions
- Self-regulated learning
- Anxiety

Fong, C. J., Davis, C. W., Kim, Y., Kim, Y. W., Marriott, L., & Kim, S. (2017). *Review of Educational Research*, 87(2), 388–424.

- We can start by looking at the 5 categories of psychosocial factors.
- Note: some of the attributes straddle these categories – these are not necessarily distinct, but are rather ways to think about student attributes
- Researchers from the University of Texas at Austin examined the relationship between these 5 psychosocial factors and the student success outcomes of college persistence and achievement.
- By identifying these noncognitive factors that can be enhanced through educational interventions, such as students' self-regulated learning, educators and practitioners can design and implement interventions to help students improve in these areas.

Self-Perception

Self-efficacy

- “How well one can execute courses of action required to deal with prospective situations”- Bandura

Self-concept

- Someone’s personal beliefs about their academic abilities or skills.

Bandura, Albert (1982). "Self-efficacy mechanism in human agency". *American Psychologist*. **37** (2): 122–147

Research shows that a student’s self perception has a strong reciprocal relationship with student success.

Bandura, Albert (1982). "Self-efficacy mechanism in human agency". *American Psychologist*. **37** (2): 122–147.

- In practice, self-efficacy is related to a student’s belief on ability to perform the necessary actions to succeed in a course, or in college.

Trautwein, Ulrich; Lüdtke, Oliver; Marsh, Herbert W.; Nagy, Gabriel (2009). "Within-school social comparison: How students perceive the standing of their class predicts academic self-concept". *Journal of Educational Psychology*. **101** (4): 853–866.

- In practice, self-concept is strongly related to whether a student believes that they belong in college. Do they identify as “college material”? Do they feel that they belong in college?
- This attribute can be fostered by helping students develop a sense of community in their classes and at the school.
- Having students enter directly into college-level classes (using co-reqs) can help promote this sense of belonging.

Motivation

Intrinsic vs. Extrinsic Motivation

- Is the student interested in learning the material for its own sake, or are they motivated by external pressures or influences?

Mastery vs. Performance goal orientation

- Is the student's goal to develop competence and understanding, or do they have performance related goals such as "get an A in the course"?

Intrinsic motivation is doing something because you want to versus extrinsic is you are doing it because of external pressures. Both are critical, but too often we see faculty rely heavily on extrinsic motivation as an essential strategy in teaching.

It can be very difficult to change students' motivation source, but if they are in a class or program related to their actual interests, vs. a class or program that is non obviously tied to their interests, they are more likely to demonstrate intrinsic motivation. They want to be there

The student in the video was interested in math, but her self-concept was she was not good at it – which affected her motivation. Changing to a new school and creating a new identity helped her build on her intrinsic motivation to do challenging math again.

Goals are also tied to motivation. Does a student truly want to understand something or just get the grade?

Mastery goals tend to lead to greater persistence and student success. The student wanted to understand the math.

Attributions

Locus of causality

- The degree to which people believe that they have control over the outcome of events in their lives, as opposed to external forces beyond their control.

Mindset

- “In a **fixed mindset** students believe their basic abilities, their intelligence, their talents, are just fixed traits...In a **growth mindset** students understand that their talents and abilities can be developed through effort, good teaching and persistence.” - Dweck

Weiner, B. (1972). Attribution theory, achievement motivation, and the educational process. *Review of educational research*, 42(2), 203-215.

Locus of causality or perception of causality refers to a student's belief they can control what happens in their lives or is out of their control – pure luck or fate. Do students feel they control their own destiny?

This can be very hard to change, but by having students consider their actions (did you study enough? Were you tired before the exam?) it is sometimes possible to help them get away from an external locus of causality (the teacher just didn't like me)

["Stanford University's Carol Dweck on the Growth Mindset and Education"](#).
OneDublin.org. 2012-06-19.

- A fixed mindset believes that you have all of the intelligence or talent they are going to get. You were either born with it or you were not.
- With growth mindset your brain grows and gets stronger when you challenge and use it. Talents and abilities can be developed through grit, good teaching, and persistence. It is like lifting weights, you start off lifting very little at the beginning and slowly you add more weight and muscle. And! When you stop exercising, your muscles shrink!

We will talk more about strategies later in this webinar.

Self-Regulated Learning

Students who exhibit self-regulated learning engage in a metacognitive learning process involving planning their learning (studying, seeking help, etc.), carrying out their plan, and evaluating the efficacy of their plan (often through their performance on an assessment), and then revise their learning process as a result.

Panadero, E. (2017) A Review of Self-regulated Learning: Six Models and Four Directions for Research. *Frontiers in Psychology*, 8, 422

After students employ the motivational strategy of setting goals, self-regulated learning strategies are required to help students monitor their progress toward a particular goal. Self-regulated learning involves either modifying that goal or creating a new action plan to attain that goal

This involves regulating their study habits, skill development and even anxiety during exams.

Anxiety

- **Academic stress as a threat appraisal**
 - Can lead to avoidance strategies, procrastination; negative effect on achievement.
- **Academic stress as a challenge appraisal**
 - Rise to the challenge with more, and more effective, preparation; positive effect on achievement.

Anxiety is highly prevalent in today's college campus culture and student population. We know some stress is healthy and a response to appropriate task difficulty, many students experience too much stress which impacts their performance. Anxiety may be even more impactful for high-risk students, who may already be primed for the fear of failure.

Breakout #1: Primary Psychosocial Factors

Choose a reporter and a timekeeper.

In your breakout, take turns discussing psychosocial factors we've outlined so far:

- *Which of the factors do you think are most important for student success and retention?*
- *Which of the factors do you think are generally stable vs. which ones can be modified with appropriate interventions?*



Share-out #1: Primary Psychosocial Factors

Reporter:

- *Which of the factors do you think are most important for student success and retention?*
- *Which of the factors do you think are generally stable vs. which ones can be modified with appropriate interventions?*

Other participants:

If there is anything else you want to share that has not been shared, please share in the chat box.



A Look at Research

“Of the five categories of psychosocial factors, it appears that **motivation** and **self-perceptions** were the most influential predictors for both achievement and persistence outcomes.”

- Fong, C. J., Davis, C. W., Kim, Y., Kim, Y. W., Marriott, L., & Kim, S. (2017). Psychosocial Factors and Community College Student Success: A Meta-Analytic Investigation. *Review of Educational Research*, 87(2), 388–424.

While extensive research into the impacts of non-cognitive attributes in higher education is still emerging, some promising evidence has been gathered that shows motivation and self-perceptions as the most influential predictors for both achievement and persistence outcomes.

A Look at Research

“Importantly, noncognitive attributes have a positive overall association with retention to the second year, which is driven by a sizable indirect effect.”

- Bowman, N., Miller, A., Woosley, S., P. Maxwell, N., Jo Kolze, M. (2018). Understanding the Link Between Noncognitive Attributes and College Retention. *Research in Higher Education*.

We should start on day 1 with establishing classroom culture. This activity will be shared after the webinar.

Classroom Culture

Norms for the classroom	I can expect my instructor to:	I can expect other students to:	What can I do to meet this norm?
<i>We will all encourage one another</i>	<i>Create interesting activities so that I am excited to come to class.</i>	<i>Help me figure things out that I don't understand, both in and outside of class.</i>	<i>I can ask a question when I'm confused so others will feel comfortable asking questions too.</i>

We have norms for the classroom such as we will all encourage one another, norms for the instructor, expectations of other students and of one's self.

In this activity, the class as a whole come up with these norms. They are taking ownership of the culture that will be established in the classroom.

Primary Psychosocial Factors

- **Self-perception**
 - **Self-concept**
- **Motivation**
- **Attributions**
- **Self-regulated learning**
- **Anxiety**

How do we help students address these factors?

- Now let's share strategies for addressing these factors. Let's start with self-perception, specifically looking at self-concept.

Breakout #2: Self-Concept

Choose a reporter and a timekeeper.

In your breakout, consider self-concept and discuss:

What are some strategies for helping students develop a positive self-concept related to college?



Share-out #2: Self-Concept

Reporters:

What are some strategies for helping students develop a positive self-concept related to college?

Other participants:

If there are other strategies that have not been shared, please share them in the chat box.



Self-Concept

- Ice-breaker activities
- Collaborative learning
- Activities specifically designed to build learning communities, and guide students in how to seek help

- Here are some other strategies to help build a student's self-concept.

Self-Concept

The image shows two overlapping worksheets from the Dana Center Mathematics Pathways. The top worksheet is titled "Sample In-Class Activity" and "Successful students: The difference that makes the difference". It includes a "Seeking help" section with two statements for discussion, a "Objectives for the lesson" section with checkboxes, and a "Reflection" section with numbered questions. The bottom worksheet is also titled "Sample In-Class Activity" and "Successful students: The difference that makes the difference". It features a "Reflection" section with bullet points, an "Attitudes and emotions (What's about)" section with bullet points, and a "Reflection" section with numbered questions. Both worksheets include a small photograph of students in a classroom setting. The Dana Center Mathematics Pathways logo is visible in the bottom left corner, and the page number 23 is in the bottom right corner.

Here is another activity you can use in your classroom.

Self-Concept

Beliefs (opinions/confidence/trust in)

- During my journey through college, it is not what happens to me that matters, but how I react to the challenges along the way.

Attitudes and emotions (feelings about)

- I want more than just a grade – I get a bigger sense of accomplishment when I understand and can apply what I learn in college.

Thoughts (consideration/reflection)

- I know that feedback from my instructors is an opportunity for learning and improving.

Behaviors (actions/reactions)

- I speak up in class and show myself to be an active, engaged member of that community.

Specifically, it is having students reflect on their beliefs, attitudes and emotions, thoughts, and behaviors.

Primary Psychosocial Factors

- Self-perception
- **Motivation**
- Attributions
- Self-regulated learning
- Anxiety

How do we help students develop motivation?

- Now lets briefly look at motivation.

Strategies for Motivation

- **Become a role model for student interest.**
- **Get to know your students.**
- **Use examples freely.**
- **Use a variety of student-active teaching activities.**
- **Set realistic performance goals.**
- **Place appropriate emphasis on testing and grading.**
- **Be free with praise and constructive in criticism.**
- **Give students as much control over their own education as possible.**

<https://cft.vanderbilt.edu/guides-sub-pages/motivating-students/#strategies>

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Following are some research-based strategies for motivating students to learn.

Become a role model for student interest. Deliver your presentations with energy and enthusiasm. As a display of your motivation, your passion motivates your students. Make the course personal, showing why you are interested in the material.

Get to know your students. You will be able to better tailor your instruction to the students' concerns and backgrounds, and your personal interest in them will inspire their personal loyalty to you. Display a strong interest in students' learning and a faith in their abilities.

Use examples freely. Many students want to be shown why a concept or technique is useful before they want to study it further. Inform students about how your course prepares students for future opportunities.

Use a variety of student-active teaching activities. These activities directly engage students in the material and give them opportunities to achieve a level of mastery.

Teach by discovery. Students find as satisfying as reasoning through a problem and discovering the underlying principle on their own.

Cooperative learning activities are particularly effective as they also provide positive social pressure.

Set realistic performance goals and help students achieve them by encouraging them to set their own reasonable goals. Design assignments that are appropriately challenging in view of the experience and aptitude of the class.

Place appropriate emphasis on testing and grading. Tests should be a means of showing what students have mastered, not what they have not. Avoid grading on the

curve and give everyone the opportunity to achieve the highest standard and grades.

Be free with praise and constructive in criticism. Negative comments should pertain to particular performances, not the performer. Offer nonjudgmental feedback on students' work, stress opportunities to improve, and look for ways to stimulate advancement, (and avoid dividing students into sheep and goats.)

Give students as much control over their own education as possible. Let students choose project topics that interest them. Assess them in a variety of ways (tests, papers, projects, presentations, etc.) to give students more control over how they show their understanding to you. Give students options for how these assignments are weighted.

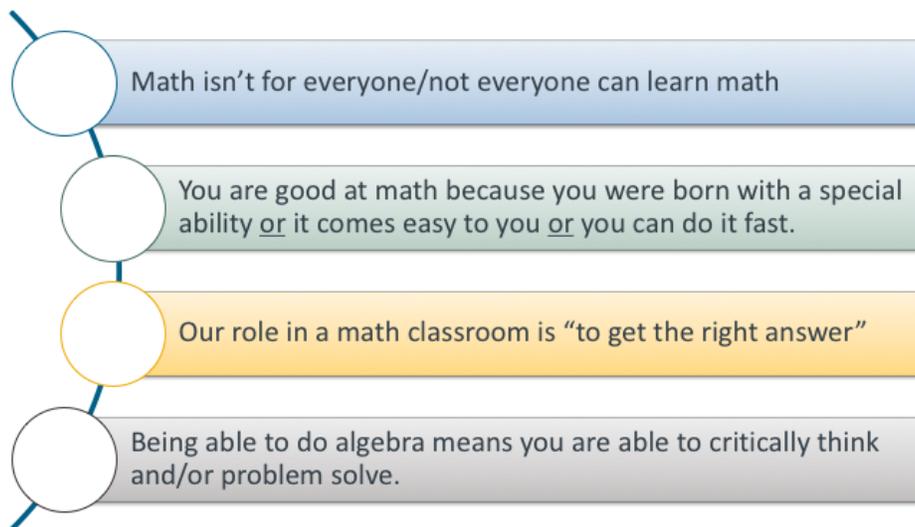
Primary Psychosocial Factors

- Self-perception
- Motivation
- Attributions
 - **Mindset**
- Self-regulated learning
- Anxiety

How do we help students develop a growth mindset?

- Now lets look at mindset

Our Mental Model of Mathematics



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- ◆ Think back to the student at the beginning of this webinar. How do we overcome this fixed mindset?

- ◆ "She's bad at math, she's good at other things so don't worry."
- ◆ "I thought of myself as not good at math."
- ◆ "You are good at math because you were born with a special ability."
- ◆ Being good at math means that it comes easy to you and you can do math "fast"

- ◆ "Not everyone can learn math."
- ◆ Math is a performance subject ("what is the right answer?")
- ◆ Math anxiety is normal and acceptable
- ◆ Algebraic thinking is a proxy for critical thinking and problem solving

Key points:

- Performance subject:
 - Ask students what they think their role in a math classroom is, they answer "to get the right answer".
 - Not getting TO A correct answer
 - "Math Facts" memorization = indicates that being successful in math is about recalling facts at speed

But research tells us ...

“Brain differences children are born with are nowhere near as important as the brain growth experiences they have throughout life.” - Jo Boaler

- Our level of intelligence is not fixed at birth; our brains are constantly changing in reaction to our environments and experiences
- **When we make mistakes, electrical activity in our brain increases in two ways:**
 - Conscious attention paid to the error
 - Due to conflict between the correct response and error

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Key points:

- What we are born with is not as important as growing our brain through life experiences
- We will make mistakes.
- The electrical activity increases when there is conflict – EVEN IF WE AREN'T AWARE OF IT.
- Further (per Moser 2011): overall there is greater electrical activity when mistakes are made than when we get answers correct.
- Best thinking is that this is a time of struggle, so your brain is trying to process that struggle.

Don's say

Quote attribution:

“Math people are those who effortlessly achieve in math because they were born with something different.” – Boaler, p. 95

How the brain works – psychologically speaking

<p>Growth Mindset</p> <p>Incremental theory of intelligence</p> <p>The belief that academic capabilities can change with effort</p>	<p>Fixed Mindset</p> <p>Entity theory of intelligence</p> <p>The belief that academic capabilities are a function of innate ability</p>
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Positive academic behaviors:

- Attending class
- Asking for help
- Enjoying the academic process
- Choosing to tackle challenging tasks

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In Carol Dweck’s work, she explains it’s not just personality, intelligence, or talent that influences success or failure; it’s also the way people view themselves and their abilities. In the fixed mindset, people experience limited success because they make little effort to develop what they believe are fixed abilities. People with a growth mindset are seeking to learn from their mistakes and seek opportunities to learn and grow.

Often times, students have flown through high school with little or no effort and come to college and come up against a wall. Things that were easy before are not so easy anymore. Students with a fixed mindset often expect defeat, change majors, or even drop out of class or even school because they feel they do not have the ability to be successful.

- Avoid challenges and seek easy successes—pass up valuable learning opportunities
- Desire to look smart at all costs
- Worry about failure and question their ability

Even some educators have fixed mindsets about their students. If we think our students cannot learn, we give up on them too quickly.

With growth mindset, we can increase our abilities. Positive academic behaviors associated with growth mindset are

- attending class
- asking for help
- enjoying the learning process
- choosing to tackle challenging tasks

How the brain works – psychologically speaking

Growth Mindset

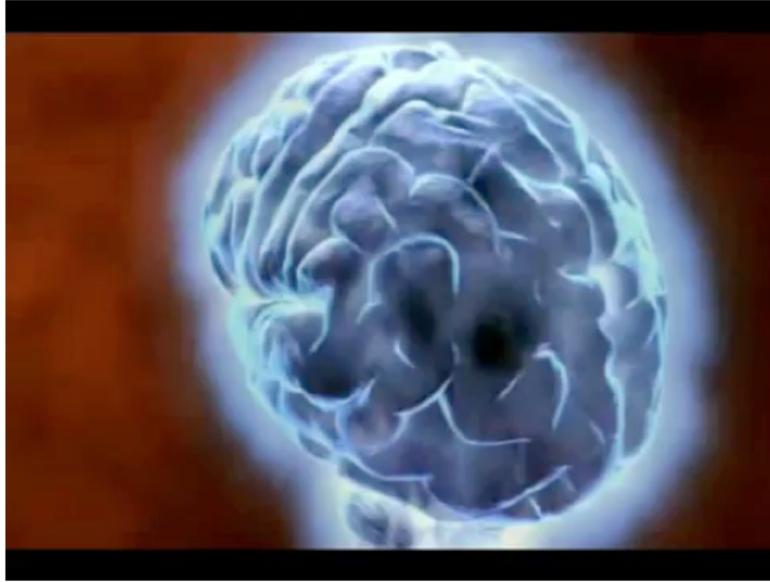
Incremental theory of intelligence

The belief that academic capabilities can change with **effective effort**

**How do we help students shift from a fixed mindset
to a growth mindset in mathematics?**

Can students who lack certain characteristics and skills be successful? if we teach them how their brain works!

A closer look at learning



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We are not going to show you this video right now. This is a video that can be showed in the classroom to show how we learn.

The human brain has the amazing ability to reorganize itself by forming new connections between brain cells (neurons) as you listen to, talk about or practice something..

This connection is made to the students by showing how to build a bridge. It is extremely difficult. Mistakes are made. After time, crossing the bridge becomes easier and easier – like learning. When you learn new things, tiny connections in the brain actually multiply and get stronger. The more that you challenge your mind to learn, the more your brain cells grow.

I show this during the first week of class and constantly refer back to it. I also have them write a math autobiography and follow up with the video of Ben Carson and the story of Jody. She had half of her brain removed. Her remaining half had to retrain itself to learn how to control both sides of her body. Things that were once found very hard or even impossible seem to come easy. We all can grow our brain. I often refer to Michael Jordan who did not make his varsity basketball team. He did not let this failure be the end of his career. He worked harder. Through effective effort and persistence, he is arguably the best basketball player ever.

<https://www.youtube.com/watch?v=VaDILD97CLM>

Teach the students that every time we push them out of their comfort zone, to learn something new and difficult, new neurons can form and become stronger making us 'smarter'.

Feedback and praise	
Less of this...	More of this...
<ul style="list-style-type: none">• Great job on that quiz!• You're so smart.• You're really good at this.	<ul style="list-style-type: none">• I like the effort you put in. What strategies have you tried? What will you try next?• I'm glad you chose to work on one of the harder problems—you're going to learn a lot.• You're improving in...• I'm giving you this feedback because I care about you.• What can you learn from these mistakes?• Confusion is a good sign that you are building new pathways in your brain.• Wow, you finished so quickly! Next time, I'll find something more challenging for you.

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One of Dweck's top finding was the way in which praise shapes students mindsets. In the failed self-esteem movement, we were encourage to provide students with lots of praise. It turns out some of this praise was not helping...and some of it was harmful.

HOW TO ENCOURAGE STUDENTS

Growth Mindset What to say:	Fixed Mindset What not to say:
<p>"When you learn how to do a new kind of problem, it grows your math brain!"</p>	<p>"Not everybody is good at math. Just do your best."</p>
<p>"If you catch yourself saying, 'I'm not a math person,' just add the word 'yet' to the end of the sentence."</p>	<p>"That's OK, maybe math is not one of your strengths."</p>
<p>"That feeling of math being hard is the feeling of your brain growing."</p>	<p>"Don't worry, you'll get it if you keep trying." <small>"If students are using the wrong strategies, their efforts might not work. Plus they may feel particularly upset if their efforts are fruitless."</small></p>
<p>"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?"</p>	<p>"Great effort! You tried your best." <small>"Don't accept less than optimal performance from your students."</small></p>
	
<small>SOURCE: Carol Dweck</small>	
<small>Carol Dweck is the Lewis and Virginia Eaton professor of psychology at Stanford University and the author of <i>Mindset: The New Psychology of Success</i> (Ballantine Books).</small>	

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I know you can't read this, but I will provide the article with the other materials.

Misunderstandings about Growth Mindset - Dweck

Misunderstanding #1: Many people take what they like about themselves and call it growth mindset.

Misunderstanding #2: Many people believe a growth mindset is only about effort, especially praising effort.

Misunderstanding #3: A growth mindset equals telling students they can do anything.

There are some misunderstanding about growth mindset that impact success.

People say they are open-minded or flexible. There's a different between being flexible or open-minded and being dedicated to growing talent. If people drift away from the actual meaning of a growth mindset, they drift away from the benefits.

It is more than just effort. IF we praise the process students engage in, they learn that the process they engage in brings about progress and learning, and that their learning does not just magically flow from some innate ability. They cannot continue to do the same thing and over. They must try new strategies if the one they are using is not working.

You can not simply say you can do anything. It puts the onus entirely on the student and may make them feel like a failure if they don't reach their goals. You have to help them gain the skills and find the resources to make progress toward their goals.

Dweck's latest recommendations

For educators

- Understand that we're all a mixture of growth and fixed mindsets
- Explore and watch for your own fixed mindset
- Focus on the learning process. Effort that leads to learning and improvement is the ultimate goal.
- Don't use mindsets to label students (or yourself)
- Treat mistakes and failures as beneficial for learning
- Teach students basic information about how the brain changes during learning.

Study shows that teaching study skills does not increase as much as teaching growth mindset alongside of study skills. With teaching growth mindset in the classroom, the meaning of effort and difficulty are transformed.

In past, students would give up. With the understanding of growth mindset, they know their brains can grow and make stronger neuron connections.

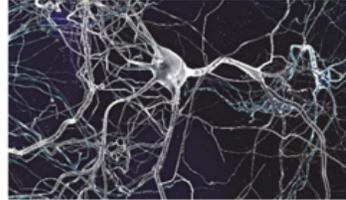
Growth Mindset

Lesson 6, Part B, Brain power

Theme: Student Success

Many people believe that if you do not have a "math brain," you cannot learn math and if you do have a "math brain," learning math is easy.

- 1) Do you think this is true? Why or why not?



Credit: whitehouse/Fotolia

Objectives for the lesson

You will understand that:

- Struggle, practice, and perseverance are key factors in learning.

You will be able to:

- Identify how the growth view of intelligence relates to learning math.

- I will share an activity with you to help students understand growth mindset.

Breakout #3: Self-Regulated Learning

Choose a reporter and a timekeeper

In your breakout, consider self-regulated learning and discuss:

What are some strategies for helping students develop their ability for self-regulated learning?



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I did all of the talking on growth mindset. We will have the opportunity to share more in a bit. Now let's focus on self-regulated learning.

Share-out #3: Self-Regulated Learning

Reporters:

What are some strategies for helping students develop their ability for self-regulated learning?

Other participants:

If there are other strategies that have not been shared, please share them in the chat box.



Self-Regulated Learning

- Exam or quiz “wrappers”
 - i.e. post exam reflection explicitly connecting exam preparation activities to exam performance
- Have students create mind-maps of a completed topic
- Incorporate self-reflection activities

Self-Regulated

Sample In-Class Activity

Developing self-regulation

You have been doing self-assessment in your preparatory assignments. How can you use this information to improve your learning?



Objectives for the lesson

- You will understand that:
- Self-assessment is a skill that improves with practice and reflection.
 - Self-regulation can help students study and learn more efficiently.
- You will be able to:
- Evaluate the accuracy of your self-assessment to this point.
 - Make a plan to continue to improve your self-assessment and use it to regulate your learning.

The Self-Regulation Cycle



Planning: Determining which resources and strategies to use to accomplish a specific task.
Implementing & Monitoring: Executing your plan and continuously assessing the progress you are making toward completing the specific task.
Evaluating: Assessing how well the planning and monitoring helped you complete the task.

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Sample In-Class Activity

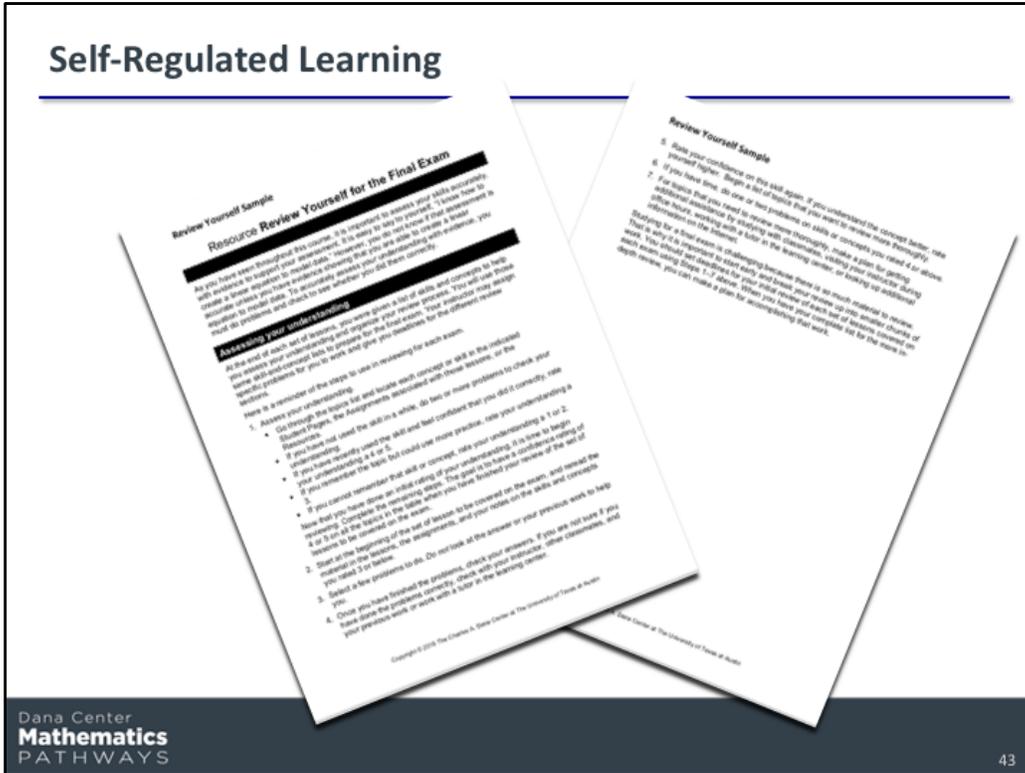
- 1) How well have you been using your self-assessments in the assignments to prepare for class? Consider the following in answering this question. Give specific examples in your answer:
 - Did your self-assessments match your performance? For example, if you rate yourself very low on every concept but you perform well, you are underestimating your understanding.
 - Have you been thoughtful about your self-assessments? Sometimes people just mark "ready" for every concept without really thinking about it.
 - Have you used your self-assessments to review material in order to be prepared for class?
- 2) List examples that you are currently using or will use in the future to prepare for class.

Self-Regulated Learning

The Self-Regulation Cycle

- **Planning:** Determining which resources and strategies to use to accomplish a specific task.
- **Implementing and Monitoring:** Executing your plan and continuously examining the progress you are making toward completing that specific task.
- **Evaluating:** Assessing how well the planning and monitoring helped you complete the task.

Self-Regulated Learning



- Here is an activity to help prepare students to take an exam.

Self-Regulated Learning

Assessing your understanding

1. Rate your understanding from 1 to 5 on skills and concepts to be covered on the exam.
2. Reread the material for all skills/concepts rated 1 to 3.
3. Select a few problems to do.
4. Check your answers.
5. Rate your confidence on this skill/concept again.
6. Do one or two problems on skills/concepts you rated 4 or 5.
7. Make a plan for getting additional assistance.

They must assess their own understanding of concepts
Review material
Practice problems
check answers
rate skills again
do more problems
still stuck - make a plan

Breakout #4: Other Resources?

Choose a reporter and a timekeeper.

In your breakout, consider all of the psychosocial factors and discuss:

- *Do you have any additional resources for helping students address these factors?*
- *How and when do you implement those resources?*



Share-out #4: Other Resources

Reporters:

- *Do you have any additional resources for helping students develop any of these factors?*
- *How and when do you implement those resources?*

Other participants:

If there are other resources that have not been shared, please share them in the chat box.



Primary Psychosocial Factors

- Self-perception
- Motivation
- Attributions
- Self-regulated learning
- Anxiety

Remember – your colleagues (both at your institution and around the country) have been implementing interventions related to these attributes for a while – ask around and don't be afraid to borrow their best practices!

- We can start by looking at the 5 categories of psychosocial factors.
- Note: some of the attributes straddle these categories – these are not necessarily distinct, but are rather ways to think about student attributes

Other Resources

CSU Collaboration Spaces

- <http://tiny.cc/csu-teams>
- <http://tiny.cc/csu-math>
- <http://tiny.cc/csu-english>

Calendar

- www.calstate.edu/professional-development-calendar

Recordings and resources are linked to event listings in the archive.

Upcoming Webinar

How do we ensure rigor in first-year mathematics courses?

- **Date: Friday, December 7**
- **Time: 12:00pm – 2:00pm Pacific**

Contact Information

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About the Dana Center

The Charles A. Dana Center at The University of Texas at Austin works with our nation's education systems to ensure that every student leaves school prepared for success in postsecondary education and the contemporary workplace.

Our work, based on research and two decades of experience, focuses on K–16 mathematics and science education with an emphasis on strategies for improving student engagement, motivation, persistence, and achievement.

We develop innovative curricula, tools, protocols, and instructional supports and deliver powerful instructional and leadership development.

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