The Real Difference Having a Growth Mindset Makes

A growth mindset helps us learn successfully by influencing how we tackle difficult tasks, respond to feedback, and what we tell ourselves when confronting challenges.

Essential Question

How can I develop the expertise and mindsets I need to accomplish my most important goals, despite the challenges I face along the way?

Guiding Questions

Why does having a growth mindset help me learn better?
How can I keep my self-talk, mindsets, and actions positive and productive?

Objectives

- Students will be convinced of the positive effects of having a growth mindset, based on the results of a landmark EEG study
- To help students learn to keep their self-talk, mindsets, and actions positive and productive

Advance Preparation

- Practice running through the lesson slideshow.
- Place handouts for students to pick up on arrival.

Materials/Resources

- PowerPoint slideshow 2.7 (adapt as needed)

Student Materials

- "Our Partnership's Prediction" activity sheet and marker (one for each pair of students)
- "Positive Self-Talk…" reading selection handout
- "Practicing Positive Self-Talk" activity sheet

Vocabulary

- Echoencephalograph (EEG) – a machine that records brain activity
- Fixed mindset
- Self-talk
- Disparaging
- Stamina

Do Now 3 min.

Slide 1: As students enter the classroom, they read the scenario given on slide 1 and write down answers to the five questions that Jorge answered at the quiz night. (They can guess at answers, but may not use phones or other devices to look answers up.)

Introduction (Framing/Overview) 8 min.

1. Slide 3: Student Dedication (30-60 seconds)
2. Then, show slide 4 so that students can check their answers.
3. Show slide 5 and review agenda with students.
   - Review: ask students what they learned from London taxi drivers in lesson 6.
     - They watched a video showing strategies the drivers used to become expert navigators in London, and the instruction, feedback, and support they relied on to prepare for their licensing exam.
     - They saw brain images and data charts showing how the navigation centers in the taxi drivers' brains kept growing as they kept learning.
   - Remind students that this research encourages us to have a growth mindset as you tackle difficult tasks, because your brain never stops learning new things as you give it new challenges while trying various learning strategies.
   - Click to reveal the rest of the day's agenda and note the additional items.
4. Pair and Share: Read slide 6 aloud, or have a student volunteer read it. Tell students that a recent survey asked teenagers from 78 countries whether they agreed with the statement in red, "*Your intelligence is something that you can't change very much*." Students will have two minutes to work with a partner to guess what percentage of teenagers demonstrated a growth mindset by **disagreeing** with that statement. When the timer sounds, they are to write their guess on the activity sheet. Then they will hold up their answers at the signal "Ready… Set … Go."

   Give students two minutes (using a timer) to agree on a percentage. When students have had a chance to write down their answers, give the signal ("Ready… Set … Go") and have them hold up their responses for the class to see.

   Read the question on slide 7, then click to reveal the answer (63%). Point out that this means almost two-thirds of the world's 15-year olds showed a growth mindset by disagreeing with the statement. Of course, just <u>believing</u> you can increase your brainpower is not enough—you also have to exercise it with challenging tasks, good learning strategies, and the support and feedback from others. But, believing in your brain's capacity to grow **is** the first step in becoming an expert at things you want or need to learn.

Activity 1: Visiting the Brain Wave Lab 14 min.

5. Tell students that the next activity is a virtual field trip to the brain wave lab at Columbia University (slide 7). Ask students whether any of them know what an EEG is and how it is used. After students have had a chance to respond, explain that an EEG is a special machine that scientists use to measure brainwaves, the electrical activity that occurs in the brain as we act and think. The EEG is attached by wires to a special cap fitted with small metal discs called electrodes to sense and record the electrical activity of the different parts of the brain.

Virtual Field Trip

   Explain to students that one scientist wanted to find out whether college students with a growth mindset used their brains differently from others, those with a "fixed mindset" (show slide 8). Using a brief survey, she identified students with a growth mindset and others with a fixed mindset. She invited some from each group to come to the brain wave lab to play a quiz game while they were hooked up to an EEG. However, this quiz game included more than 200 questions.

Direct Instruction

6. Tell students that you don't know the real names of the students in the study, but just to simulate what happened to when the students came to the lab, you will pretend that one of the students with a growth mindset was named Ronnie. When Ronnie arrived at the lab, he sat down at a computer and an assistant put a brain cap on him, hooked the electrodes to the EEG machine, and explained how the quiz game worked. When a question appeared, Ronnie had as much time as he needed to think of an answer. After he entered an answer, a symbol would come up on the screen. If the answer was wrong, a red asterisk would then appear; if the answer was right, it would be a green asterisk would appear. Then another symbol would appear with the correct answer printed on a bar in white. Let's play along with Ronnie as he answers the first three questions that he was given.

   (Slide 9): What is the capital of Australia?] Ronnie knows names of some cities in Australia—for example, Melbourne, Sidney, Brisbane, Adelaide, and Perth. But which is the capital? If you were Ronnie, what would you type in? (Let students offer suggestions. If anyone suggests "Canberra," say "Unfortunately, Ronnie's never heard of Canberra.")

Interactive Simulation

   After you've heard students' suggestions, click to reveal Ronnie's answer. Tell them that Ronnie's guess was "Sydney."

Click once to slide 10 (blank screen). Tell students that after Ronnie typed in his answer, the computer went blank for 2 seconds. Click to show crosshair and explain that the crosshair symbol appeared next. Click again (red asterisk) and explain that the red asterisk that came up showed Ronnie that his answer was incorrect.

Click to slide 11 (large crosshair] Tell students that Ronnie watched the screen carefully to learn the correct answer. Click again to show the correct answer, Canberra. Tell students "When Ronnie saw the answer he thought, 'I never even heard of that city, but the name Can**berra** reminds me of Kooka**burra** – the Australian bird that laughs. Maybe imagining a Kookaburra laughing in an old gum tree will help me remember **Canberra** is Australia's capital.'"

Show slide 12 and read the question "When is Pi Day celebrated?" Ask students to suggest answers. After they reply, tell them Ronnie knew that answer: Pi Day is on March 14 (3.14). Click to show it.

Slowly click through slides 13 and 14 to show what Ronnie saw: the blank screen, crosshair, and green asterisk showing that the answer was correct, then the large crosshair and the correct answer.

Show slide 15 and read the question, "The Bhagavad Gita is the sacred text of which people?" Tell students that Ronnie knows the Bhagavad Gita is used in one of the religions of India, but he's not sure whether it's Buddhists or the Hindus that consider it sacred. He guesses Buddhists because Bhagavad and Buddhist both start with B. (Click to show the answer "Buddhists.")

Click through slides 16 and 17 to reveal the red asterisk and then the correct answer. Tell students, "When the correct answer appears, Ronnie tries to lock it into his memory. Ronnie knows a little about a Hindu leader named Mahatma Gandhi who developed the principle of nonviolent resistance. Ronnie thinks of the phrase "Gandhi studied Gita," and repeats it twice before the next question appears.

Tell students that this is just a small sample of the 200 questions Ronnie had to answer. Overall, he got 41% of the questions right. They will hear more of his story later.

7. (Slide 18) Tell students that they will next visit the EEG lab with Jocelyn, one of the students who did NOT have a growth mindset—she did not yet realize that she can learn <u>anything</u> with hard work and good strategies. They will see how Jocelyn responded to two of the questions she got during the quiz game.

Read the question on slide 19, "The Artful Dodger is a skilled pickpocket in which novel?" Tell students that Jocelyn knew the answer to this question because she had just read Charles Dickens' novel *Oliver Twist*. Click through to show Jocelyn's answer, then click through slides 20 and 21 to show the green asterisk and then the correct answer.

Then read the question on slide 22, "7-year old Jeanne Wakatsuki was among 120,000 Japanese Americans forcibly relocated during WWII. What was the name of her internment camp in the desert of California…?" Ask students whether anyone has read Jeanne's book about what life was like in the internment camp. If yes, ask whether they remember the name of the camp.

Tell students that Jocelyn knows she has heard about this, but she's not sure of the camp's name. "Manzanita" sounds right so she types that in. Click to show her answer, then click through slides 23 and 24 to show the red asterisk and then the correct answer, "Manzanar."

Ask students how they think Jocelyn responded to getting the answer wrong. (Remember, she did not have a growth mindset.) After they answer, confirm that Jocelyn felt frustrated and annoyed, and moved on quickly to the next question.

Tell students that out of the 200 questions, Jocelyn—just like Ronnie—answered 41% of the questions correctly. Then, explain that the computer was programmed to make sure **every** student got about 41% of the questions correct. It customized the questions as the quiz went on to make the game was challenging but not overwhelmingly hard for each student, by choosing easier or harder questions based on how well the student was doing. In this way it ensured that **every** student got about 41% of the questions correct.

After students completed the quiz game, their EEG caps were removed and they were given an 8-minute rest break. But after the break, students were surprised to learn that they had to go back and take a **test** on the questions they had answered incorrectly!

Activity 2: Examining and Discussing Findings 8 Min.

8. Show slide 25 and tell students that it represents the average scores on the surprise test. Ronnie and the other 24 students with a growth mindset got 84% right; Jocelyn and the other 21 students with a fixed mindset got 78% right. Both groups had learned many correct answers through the feedback they received, but which group learned more?

Examining a Bar Graph

After students respond, confirm that the growth mindset group learned 6% more correct answers than did those with a fixed mindset. For example, if Ronnie and Jocelyn both gave 120 incorrect answers and then had a chance to try those questions again on the surprise test, Ronnie might answer 101 of the questions correctly, while Jocelyn would only give 94 correct answers.

9. Invite students (slide 26) to take one minute to think about the results shown on the previous slide. Can they come up with a hypothesis explaining **why** the growth mindset students learned more than the other students? What were they doing during the game that helped them remember more of the correct answers? After students have had time to think, click to show the directions "Pair and Share" and give students three minutes to share their thoughts with a partner. Then, invite several pairs to report their ideas to the class.

Think-Pair-Share

Then, tell students that one possible reason why students with a growth mindset often learn more successfully than others is that their confidence in being able to gain new knowledge makes them pay close attention to new information when it arrives and encourages them to use strategies to try to commit that information to memory.

Direct Instruction

Tell students that EEG recordings of brain activity during the quiz game helped to pinpoint when students were focused on processing and memorizing correct answers to questions they had missed. As soon as they saw the red asterisk and knew that their answer was wrong, they were alerted to watch for the correct answer. Slide 27 shows what the brain's activity looked like **just after the correct answer was revealed** in students who successfully learned correct answers and then performed well when the surprise test was given.

Explain to students that the dark blue and red regions on this top view of the brain show where the most electrical brain activity was occurring. The left temporal lobe, the part of the brain that works to store long-term memories, is circled, showing that it was much more active in the growth mindset students (compared to fixed-mindset students) when they saw the correct answers. This suggests that students with a growth mindset were working harder to **process corrective feedback and use strategies to store the new information.**

Activity 3: An Encouraging "Voice of Truth" to Myself 9 min.

10. (Slide 28) Introduce the vocabulary term "self-talk." Point it out on the Word Wall or write it on the board. Explain that self-talk is the set of messages we tell ourselves when we face a challenge. Self-talk can be positive and encouraging or can consist of negative messages that question our potential and belittle our value and importance. These messages have a powerful effect on us by influencing how we respond to situations and how we interact with others.

Direct Instruction

Direct students (slide 29) to the reading, "Positive Self-Talk = More Stamina and Enthusiasm." Have students partner read the selection.

Partner Reading

Review the selection with students, answering any questions. The following questions may be helpful in guiding discussion.

Whole Class Discussion

- *Have you ever paid attention to your own self-talk? If so, what did you notice about it?*
- *Why do you think it is so easy to fall into disparaging self-talk? What factors might contribute to this?*
- *How does negative self-talk lead to additional negative outcomes?*

Closure 3 min.

(Slide 30) Work with the class to think of positive and negative self-talk responses to the FIRST scenario given in the *Practicing Positive Self-Talk* activity sheet ("you have just started high school and very few of your friends are in your classes"). Ask students how they think positive self-talk might affect the experience of the person in the scenario.

Extensions

If you have extra time, have students work with a partner to filling out the remaining two rows of the *Practicing Positive Self-Talk* activity sheet. If time permits, have several students share the positive self-talk that they proposed in response to these events.

Alternatively, have students finish completing the *Practicing Positive Self-Talk* activity sheet as a homework assignment.

My Partnership's Prediction[1]

Agree on a prediction to make, use a marker to write it in the box below, and be ready to hold it up for everyone to see when your teacher asks all partnerships to reveal their predictions.

What % of 15-year-olds **disagree** with the statement: "Your intelligence is something that you can't change very much?"

[1] If you would prefer students to display their prediction on a sturdy card rather than a flimsy sheet of paper, just print this page on cardstock (one for each pair of students)

Positive Self-Talk = More Stamina and Enthusiasm

Who do you talk to the most every day? Your best friend? Your teacher? A parent? Wrong.

The person you talk to the most every day is *yourself.*

That's right. What is playing on the podcast inside your head? On your internal "chat" with yourself? Is it positive or negative? Researchers who study human behavior have concluded that paying attention to what you say to yourself—and changing that message to one that is more encouraging, positive, and productive — can help you to avoid discouragement or depression and find the stamina and enthusiasm that you need to accomplish your goals.

Many teens are bombarded by disparaging messages from a variety of sources, by negative voices that write them off, disrespect their potential, and suggest that they will never amount to much. That is why it is essential that our self-talk and our mindsets be voices of truth that remind us that the sky's the limit, because of our brain's growth potential and because of the learning opportunities, strategies, supports, and wise counsel available to us when we confront challenges.

Think about your own self-talk. Does it reflect a hopeful, can-do mindset that encourages you to sustain prolonged effort to meet your goals? Do your beliefs and internal messages encourage you to embrace challenges and take strategic actions to make things better?

Positive self-talk means correcting the disparaging things you say to yourself or hear from others and replacing them with positive messages that highlight possibilities for change and improvement, rather than giving up hope. This is important! People that embrace an optimistic view -- a conviction that they are of value and importance and have a hope and a future -- get back on their feet and find a path forward when they get knocked down by negative events.

Read about a challenging event, disparaging self-talk, and positive self-talk in the chart below. Then think about how to apply positive self-talk to the other situations listed on the next page.

The Event	Disparaging Self-Talk	Positive Self-Talk
Joe doesn't want to be my friend anymore	I'm unlovable.	I didn't work hard enough at that relationship.
I failed the unit test in math.	I'm stupid. I always do badly in math.	I could have done better if I'd studied more and reached out for some tutoring. I'll try both these things on the next unit.
I didn't get the part I wanted in the school play.	I don't get big parts because I have no talent. And, the director hates me.	I'll ask the director about tips on what to work on and on an acting coach, class, or summer program to help me improve.

Practicing Positive Self-Talk

The Event	Disparaging Self-Talk	Positive Self-Talk
It's next year. You have just started high school. Very few of your acquaintances are in your class section. None of your close friends has the same lunch period as you. High school feels like a lonely, friendless place where you don't belong.		
You have to do a science fair project, but you've never done one before. It seems like some of your classmates already know what to do because they did science fairs in their old school.		
Your freshman English class requires a lot of writing every week. But, you've never had a class teaching you about how to write. You struggle deciding what to write about and how to best convey your ideas in words.