

**Lesson #M2: Why the Brain is Like a Muscle**   **Time: 50 minutes**

Overview

This lesson is the second in a three-lesson series, which mirrors the proven Growth Mindset intervention of Dr. David Yeager and Dr. Carol Dweck at Stanford University. The lesson, *Why the Brain is Like a Muscle,* compares the brain to a muscle that grows and changes through effort, strategies and seeking help. The facilitator will more likely shift youth beliefs to growth mindsets by operating as if all youth in the room believe in a growth mindset. The facilitator is advised to not explicitly try to convince youth to have that belief, but rather, allow the brain facts to work their wonder.

Youth think about what success means and they share their experiences in pairs. They hear true stories about people who changed their brains. Young people are introduced to the language about Fixed and Growth Mindsets. They learn that challenge is good for the brain and how challenge strengthens brain connections. Youth learn that intelligence and ability is shaped by challenge.

As an option, with an additional six minutes, youth observe Sarah Kay delivering a stirring poem on-stage. Her verbal imagery personifies a growth mindset.

Objectives

*By participating in this lesson, young people will:*

1. Understand that the brain is like a muscle that grows stronger with effort, trying strategies and seeking help.
2. Define fixed and growth mindsets.
3. Identify benefits of a growth mindset and apply a growth mindset to intelligence, personality, and physical ability.

Anchor Vocabulary

* *Fixed Mindset -* The belief that your intelligence and personality cannot be fundamentally changed.
* *Growth Mindset -* The belief that your basic qualities and abilities are things that you can change and grow.

Materials & Media

* Computer with MS PowerPoint installed; projector, screen, speakers
* PowerPoint: *Why the Brain is Like a Muscle*
* Video Clip: *Two Axons from the Eye*
* Scientific Article: *You Can Grow Your Intelligence*
* Optional Video Clip: Sarah Kay delivering her poem, “Point B.”

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| **Lesson Outline** | | **Lesson Description** |
| **ENROLL & EXPERIENCE** (11 min) | Door Greeting  (2 min)  Enrollment Activity:  “I’m Good at It!”  Pair/Share: Describe Activity that they do really well.  Writing  (1 min)  Pair share  (4 min)  Debrief  (4 min) | **Build relationships with youth as they walk in the door. Build relationships with young people as they arrive.**  **Use Four-At-The-Door! (Name, eyes, hand, heart)**  **Say:**   * Last time, we learned about how the brain thinks thoughts. In today’s session, we’ll learn more about the brain and hear true stories of how it changes and grows stronger with challenge.   **Activity: I’m Good at it!**  **Say:**   * Let’s start off by getting into Pairs, with a person sitting next to you. * I’d like each of you to think about some task or activity that you do really well.   (It might be making peanut butter and jelly sandwiches or fixing hair. Anything you want.)   * Take a minute to write the activity down, because you are going to share it with your partner. * Now, describe the activity to your partner, and what you did to become so good at it. * Then we’ll switch, and the other partner will share their activity. * Listen carefully, because I’ll ask some of you to repeat back what your partner said about how you became good at the activity.   **Allow youth four minutes to share, with a reminder to switch partners at the midpoint.**  **Debrief: Ask three or four youth to share what their partner said.**  **Ask:**   * Would some of you share your partner’s story? * What was the activity? * How hard do you think your partner had to work to become really good? * What strategies did he/she use? * Did you he/she mention getting any help? Partner….did you get any help?   **Slide #3: The Truth About Success**  Facilitator reads slide and explains.  **Say:**   * The researchers like to say that it takes effort, strategies and seeking help to improve. * Malcolm Gladwell wrote a famous book about highly successful people. * He points out that people like The Beatles put in 10,000 hours of practice to become great at what they do. * They didn’t start out as geniuses; they worked hard at becoming great. * The Beatles, used to play eight-hour shows to improve their playing. * Wilma Rudolph, an Olympic gold medalist in track and field, was paralyzed as a child, but she put in at least 10,000 hours of practice to go on and win three Olympic gold medals. * Well it’s good to know that effort, strategies, and getting help really does pay off. * Now let’s look at some slides that show how the brain is like a muscle. |
| **LEARN & LABEL**  (25 min) | Powerpoint*: Why Your Brain is Like a Muscle* | **Show PowerPoint and Deliver Lecture**  **Say:**   * Let’s quickly review some brain anatomy from the last lesson.   **Slide #4: Review From Last Session**  Answers:  1. Neurons, neurons  2. Information or signals  3. Eating, sleeping, challenging  **Slide #5: Review: Parts of a Neuron**  **Ask:**   * Who remembers the parts of a neuron? * Answers: cell body, axon, dendrites, axon transmitters   **Slide #6: How the Brain Learns**  Facilitator reads slide and explains.  **Slide #7: The Brain Muscle**  Facilitator reads slide and explains.  **Say:**   * Let’s look at some scientific experiments that show that the brain is like a muscle.   **Slide #8: Rat Study**  **Say:**   * Scientists at UC Berkeley took twin rats and put half of them in an empty cage with just food and water. * They placed the other half of rats in a rich environment, with puzzles, toys and exercise equipment. * After some time, they took out the rats and weighed their brains. * The rats that were in the cages with all the toys actually had 10% heavier brains.   **Ask:**   * Why do you think this happened? * This is great for rats, but what about humans? Do their brains also grow?   **Slide #9: Guerilla Fighters Study**  **Say:**   * A team of leading brain researchers took a group of Spanish-speaking guerrilla warriors who were completely isolated since they were young. They had never seen books and did not have any education. They didn’t know how to read or write. * After the war, and to help them readjust into society, the scientists worked with them and taught them how to read. * A couple of years after the classes, they measured their brains and just like the rats, their brains grew in the “reading areas,” compared to the people who were not taught how to read.   **Slide #10: Cabbies Study**  **Ask:**   * Has any of you ever been to London? If you want to figure out where you’re going it’s one of the hardest cities in the world.   **Say:**   * The streets are a tangled mess and there are almost no grids. * Scientists carried out this famous study with London cab drivers. * They measured the Hippocampus - the area of the brain that remembers information about places - in London cabdrivers and compared them to other people. * The cabbies’ brains were bigger, and the longer they were on the job, the bigger this area of the brain became! * This shows that learning and practicing this skill made that area of their brain grow.   **Slide #11: Phineas Gage**  **Say:**   * I’m going to tell you a story. At the end I’d like you tell me if you think it’s a true story or a made up story. * A man named Phineas Gage was a very successful railroad worker over 160 years ago, in 1848. He had a “well-balanced mind” - he worked quickly, was patient, planned ahead, and was very good at business. * All of this changed one day when an accidental gunpowder explosion sent a large iron spike through the front of his face! * It went through the frontal lobe of his brain. Fortunately, his injury healed pretty quickly and he did not die from the accident. But he was left without most of the frontal lobe in his brain. * Since the frontal lobe controls things like planning ahead or keeping your emotions under control, then without the frontal lobe, he had very little self-control. * Instead of being able to be a good businessman and being able to bite his tongue when he was angry, he would insult people, would say things that were mean, and he did not have any patience. * Later in life he stretched his brain, formed new connections, and created new pathways – even though his frontal lobe never grew back! * It took a long time, but he grew his self-control pathways. He no longer had angry outbursts, he was no longer mean to people, and was able to have more patience. * Do you think the story was true or false? (Answer: It’s true.)   **Slide #12: Forming New Connections by Working on Challenges**  **Say:**   * The next time you are faced with a challenge and you are struggling to learn something, remember: * Challenge is a good thing! * Everyone reach out their arms and stretch them: * This is what your dendrites are doing when faced with a challenge. * Imagine your dendrites as they stretch and grow in number, making stronger, thicker connections that can take in more information.   **Slide #13: Forming New Connections (continued)**  **Say:**  • Even when you don’t feel like you’re getting it, your brain is growing more connections…  • I heard a story about a student at \_\_\_\_\_ University.  • She was taking really hard math classes, but what helped her overcome her anxiety, is that when she did her math homework, she imagined that she was going to the brain gym.  • If there were no weights on the machines, how could she get stronger?  • Things need to be challenging (or heavy like weights) for brain to get a good work out.  **Slide #14: Brain Video: Two Axons from the Eye**  **Say:**  • Now we’re going to show you real-life footage of two eye axons stretching to make connections.  **Facilitator shows video: *Two Axons from the Eye*.**  **Say:**  • So again here, we see how your brain makes connections in live moments, through effort.  • Whenever you are struggling to learn something, remember that your brain is growing these connections.  **Slide #15: The Growth Mindset**  **Say:**  • This belief is called the growth mindset  Facilitator reads definition.  **Say:**  • Sometimes a young person comes back to us and says, “Hey, I listened to what you said  and tried REALLY hard and still didn’t succeed.”  • We let them know that just putting out a lot of effort doesn’t do it.  • You can flap your arms all you want, but you’re not going to fly.  • The trick is to put in the effort, the right strategies, and get help from others.  **Slide #16: Fixed and Growth Mindset**  **Say:**  • Unfortunately some people outside of this room have a fixed mindset.  **Ask:**  • What kind of fixed mindset things have you heard other people say?  **Say:**  • They believe that you are born an “artistic person” or a “math person” or a “natural  athlete” right? People think they can’t really change those labels.  **Ask:**  How do you think the brain responds to words of “I can’t?” (It shuts down the creative side that develops strategies and solutions.)  **Say:**  • Luckily we have proof that your brain can grow and change, and even people’s  mindsets can change from fixed to growth.  **Slide #17: Mindset: Many Aspects**  **Say:**   * Mindset can affect many parts of your life. * Like the rats and guerilla fighters, you can grow your brain to become better at math, writing, or any kind of academics. * Professional Surfer Bethany Hamilton, featured in “Heart of a Soul Surfer”, lost her arm to a 14-ft. Tiger shark in Hawaii in 2003. She was 13 years old and got right back on her board one month post-attack. She re-taught her brain how to balance without an arm. You have amazing ability to grow your physical skills. * Like Phineas Gage who changed his ways, you have amazing ability to grow aspects of your personality. |
| **LEARN & LABEL**  (8 min) | Scientific article: reading lends credibility & reinforces concepts. | **Handout Scientific Article: You Can Grow Your Intelligence**  **Slide #18: Scientific Article**  Facilitator reads slide and explains.  **Say:**   * Please take 4 minutes to write down your answers.   **Allow 4 minutes to pass. Ask the second partner to ask the same questions.**  **Ask a few young people to share what they wrote.** |
| **DEMONSTRATE**  (6 min)  **REFLECTION**  (Optional—with 6 min. extension) | Self-persuasion in pairs.  Video-Clip of Sarah Kay, Poet  (3 min)  Debrief:  (3 min) | **Fixed Mindset Statements**  **Say:**   * Now we’re going to give you chance to convince your peers.   **Slide #19: How would you answer these “Fixed Mindset” statements?**  **Say:**  • Please get into pairs.  • I’m sure you’re partner doesn’t believe this, but imagine that they do.  • Try and convince your partner by teaching them what you’ve learned.  • Partners, act this out for real. If you are really being convinced give us a thumbs up.  • Then we’ll switch and have the other partner do the convincing.  **Allow 2 minutes to pass for each partner.**  **Say:**   * Ok, whose partner did a really good job of convincing them? * Excellent, come on up and try to convince me.   **Reward all with a round of applause. Thank youth for a good session.**  **Slide #20:**  **Say:**  • In closure, life is a set of challenges.  • Thinking Growth Mindset helps people reach their goals.  **Video Clip: Sarah Kay, Poet**  **Say:**   * Let’s close by watching a famous current-day poet, 23-year-old Sarah Kay, as she acts out her poem. It starts out with: If I had a daughter, instead of “Mom,” I’d have her call me “Point B.”   Listen closely for Point B’s advice about life’s challenges.  **Debrief:**  What happened in the poem? (Answers: Life full of challenge; hands out wide-seeking help; give life a lot of effort; don’t quit, just keep going at it just like the ocean.)  So What?   * As you go forth with life’s challenges, remember Point B. |

Option:

* Use video clip of poet Sarah Kay, for discussion. (6 min)

http://www.youtube.com/watch?v=0snNB1yS3IE