

Growth Mindset Activity for STEM

<p>Overview</p>	<p>Previous research has shown that socio-psychological interventions are effective at mitigating some of the negative factors, such as stereotype threat, that result in racial, gender, and first-generation achievement gaps in STEM classrooms. This activity is an intervention to instill a growth mindset in students in a STEM classroom. Growth Mindset is the belief that abilities and traits can be developed through strategic efforts and hard work and are not simply innate or fixed. This is especially important for members of social groups that are negatively stereotyped by harmful and inaccurate messages about the innate intelligence or abilities needed to succeed in STEM disciplines. This activity has students write or discuss the science behind intelligence and its development.</p> <p>Research on the effect of a growth mindset intervention found that it was beneficial to have students complete a short writing assignment that consisted of them reflecting on their study habits and plans after being exposed to growth mindset and neuroplasticity materials. The research showed that it was especially impactful for underrepresented minorities and first-generation students.</p>
<p>Goals</p>	<ol style="list-style-type: none"> 1) To instill a mindset in students that motivates them to challenge themselves to grow and develop their intellectual abilities through strategic hard work. 2) To implicitly challenge negative gender-based or racial stereotypes about students' intellectual abilities. 3) To foster student reflection on their study strategies after exposure to growth mindset materials, in order for them to be strategic in their hard work at developing the abilities and traits they need to succeed in the class.
<p>Implementation</p>	<ol style="list-style-type: none"> 1) This activity is most impactful when the traits and abilities needed to succeed in the course are stated clearly for students as part of the activity. 2) It is beneficial if the instructor introduces the activity with a short narrative about how they have developed the traits and abilities they needed to master the material they teach, and how they try to maintain a growth mindset today. 3) This guide contains <i>two options</i> for fostering a growth mindset in students. 4) Students should be asked to complete the assignment two weeks before an exam according to the evaluation of this intervention.

Challenges	<ol style="list-style-type: none">1) There will be students who believe they already have a growth mindset, and they might think the activities are not a good use of their time.2) It is less effective, and potentially detrimental, to simply tell students to change from a fixed mindset to a growth mindset, or to simply tell them to work hard. It is more effective and important to explain why they should work hard.
Materials	<ol style="list-style-type: none">1) Internet and computer access for online videos2) Pg. 3 of Growth Mindset Lesson Plan for additional questions

Option 1 Session Sequence

Lesson Structure	Time <i>(Estimated amount of time for each component)</i>	Activity Content and Instructions
Introduction for Option 1: Writing Assignment	5-10 mins	The instructor introduces the assignment with a short story about how their understanding of an effective mindset and the nature of intelligence made it possible for them to develop the traits and abilities they needed to master the material they teach, and how they try to maintain a similar mindset today.
Assignment Description for Option 1: Writing Assignment	20-25 mins	<p>Students will submit a 200-word written reflection responding to the questions below after watching the 2 videos:</p> <ol style="list-style-type: none"> 1) View Growing your mind video by Khan Academy (3:04) 2) View Neuroplasticity video (2:03) 3) Please address the following questions in your reflection: <ol style="list-style-type: none"> a. Before watching these videos, what was your perspective on becoming more intelligent on [course topic]? What do you think now? b. What evidence from the video demonstrates how you can change what you know about [course topic] or any topic? c. How will you try to learn more about [course topic]? d. In the past, what is a habit you have had to start or stop? e. Would you be willing to stop an existing habit or start a new habit in order to try to become more intelligent on [course topic]? f. What is a habit that you need to refine, or make better, in order to change how much you know about [course topic]?

Option 2 Session Sequence

Introduction for Option 2: Class Discussion	<p style="text-align: center;">5-10 mins</p>	<p>The instructor should introduce the activity as a <i>neuroscience lesson</i> without telling students explicitly that they should have a growth mindset or that they should think in any particular way. The lesson on how it is possible to rewire the brain and increase intelligence can begin with a personal short story about how the instructor has developed the traits and abilities they needed to master the material they teach, and how they try to maintain a similar openness to intellectual challenges.</p>
Assignment Description for Option 2: Class Discussion	<p style="text-align: center;">5-10 mins</p> <p style="text-align: center;">10-15 mins</p> <p style="text-align: center;">10-15 mins</p>	<p>Before showing the video, do a brief exercise with the class by asking the following question:</p> <ol style="list-style-type: none"> 1) What determines our intelligence? <ol style="list-style-type: none"> a. Have students raise their hands if they believe it is something that is unchangeable and predetermined by nature (like genes) b. Have students raise their hands if they believe it is something that can be grown through strategic efforts 2) Show class: Growing your mind video by Khan Academy (3:04) 3) Follow with a discussion as a whole class, or in smaller groups, that then report back to the whole class: <ol style="list-style-type: none"> a. How will you try to learn more about [course topic]? <ol style="list-style-type: none"> i. Review of materials recommended by the professor. ii. If appropriate, practice problems that challenge you. b. There are additional questions on pg. 3 of the Khan Academy and PERTS lesson plan for Growth Mindset activity, if more time is available. 4) Show class: Neuroplasticity video (2:03) 5) Follow with a discussion as a whole class, or in smaller groups, that then report back to the whole class: <ol style="list-style-type: none"> a. What makes our brains adaptable, or change? <ol style="list-style-type: none"> i. <i>Instructor response using the language of the video:</i> <ol style="list-style-type: none"> 1. When you think or do something you are directing your mind down a particular road or pathway in your brain. 2. Repeatedly thinking a certain way or doing something strengthens the pathway. 3. The opposite is true, too: not thinking a certain way or ceasing to do something weakens a pathway.

		<p>b. How do people establish new habits or ways of thinking?</p> <p>i. <i>Instructor response using the language of the video:</i></p> <p>1. <i>With time new pathways (synaptic connections between neurons) can be carved through directed attention and repetition.</i></p>
Additional Resources		<p>Growth mindset video by The University of Arizona featuring STEM faculty</p> <p>Lesson plan for Growth Mindset activity by Khan Academy and PERTS</p> <p>TED talk on growth mindset research by Dr. Carol Dweck, Professor of Psychology at Stanford University</p>