

## Fostering Growth Mindsets in the College STEM Classroom

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### What is a Growth Mindset?

The idea of a “growth mindset” stems from the work of Carol Dweck, first published in her book *Mindset: The New Psychology of Success* in 2006. To summarize a large body of work, a learner with a “growth mindset” believes that intelligence can grow by working through challenges and fixing mistakes. In contrast, a “fixed mindset” is characterized by the belief that talent is innate. According to a “fixed mindset” perspective, a talented individual can naturally avoid mistakes without working hard, while encountering mistakes signals a lack of inherent ability. Individuals may have a mix of both growth and fixed mindsets, and mindsets can be learned when conscientiously practiced. Studies have found that individuals with a more growth mindset outperform those with fixed mindsets.

### The Growth Mindset in STEM

Jo Boaler studies applying growth mindset in teaching math, and shares her findings in her book *Mathematical Mindsets: Unleashing Students' Potential through Creative Math, Inspiring Messages and Innovative Teaching*. She battles the stereotypes stemming from a fixed mindset, such as “I’m not a math person,” by developing effective teaching tools backed by her research. She makes these tools, aimed primarily at the K12 level, available to instructors through YouCubed at Stanford to help teachers enable their students to succeed in math.

This fixed mindset can still be pervasive in higher ed and beyond, disproportionately affecting women and underrepresented minorities. Field-specific ability belief (FAB), coined by Sarah Jane Leslie in a [2015 Science paper](#), suggests that academic disciplines perceived to require innate ability for success often have a larger gender gap. The pervasive fixed mindset of the field-specific ability belief perpetuates an already imbalanced gender gap in the STEM fields.

Studies have shown that diverse groups working in an inclusive environment lead to higher success and achievement. Therefore, promoting a growth mindset in college STEM classroom could inspire the next generation of scientists and engineers to take on the challenge of solving the hardest problems that we face today.

### How to Integrate a Growth Mindset into the College STEM Classroom:

- **Remind students that skills are not innate and can be learned and improved.** Offer resources for extra practice to enable students to develop skills, and stress that it’s okay to feel like you’re struggling while learning.

- **Assure students that the course is designed such that everyone can succeed.**  
Avoid grading on a curve that pits students against each other, and using wording such as “weed-out class” or separating the “cream of the crop.” Instead, use verbiage such as “it is possible for every student to do well in this class.”
- **Focus on the thinking process rather than attaining the correct answer.**  
Assign open-ended questions with more than one “right” answer, and encourage students to document their thinking process, not just attain a particular solution.
- **Frame mistakes as learning moments, not a reflection on ability or skill.**  
Develop a grading scheme that allows students to submit corrected assignments to improve their grades.
- **Solicit feedback from the class, and explain common misconceptions.**  
Use flashcards or clickers to poll a large lecture class in order to gauge understanding. Explain common misconceptions along with the correct answers.
- **Provide additional resources for those interested in learning more about a topic.**  
By generating connections beyond the course, you remind students that learning continues beyond the classroom.
- **Acknowledge growth mindset in your classroom.**  
As an instructor, talk about times that you may have struggled and how you improved. Inform students about growth mindset thinking, why it is important, and their ability to consciously adopt it.

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## Resources:

[Boosting Achievement With Messages that Motivate](#)

[Understanding and Using Growth Mindset](#)

[Growth Mindset Interventions](#)

[YouCubed at Stanford University](#)

[Belief that Some Fields Require Brilliance May Keep Women Out](#)

[How the 'Culture of Brilliance' Drives Gender Gaps in Academic Fields](#)

[Expectations of Brilliance Underlie Gender Distributions Across Academic Disciplines](#)

[Weed-out Classes are Killing STEM Achievement](#)

[No You're Not an Impostor](#)