Using Growth Mindset to Improve Teaching and Learning

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hem/him/his
Program Director, CTL
Learning Goals and Objectives

Learning Goal. To understand the value of having a growth mindset both for yourself and for your students.

Learning Objectives. By the end of this workshop, you will be able to:

● Define “growth mindset” and “fixed mindset.”
● Explain how students with a fixed vs growth mindsets view effort, attribute failure, and strategies, and how these can contribute to differences in their behavior.
● Describe why having a growth mindset matters.
● Develop strategies you can use in the classroom to help your students to develop a growth mindset.
Mindsets about Intelligence

Human traits are fixed

**Fixed mindset about intelligence:**
You have a certain amount of intellectual ability and can’t do anything to change it

Human traits are malleable, they can be shaped and developed

**Growth mindset about intelligence:**
Intelligence can be developed through personal effort, good learning strategies, and lots of mentoring, support, and feedback from others.
What is mindset?

Carol Dweck, Ph.D.
Professor of Psychology (Stanford)

For each of the six categories below, both a growth mindset and a fixed mindset characteristic are provided. Decide which characteristic is **growth mindset oriented** for each of the six categories and **box it**.

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“Do people with [growth] mindset believe that anyone can be anything, that anyone with proper motivation or education can become Einstein or Beethoven?

No, but they believe that a person’s true potential is unknown (and unknowable); that it’s impossible to foresee what can be accomplished with years of passion, toil, and training.”

-Carol Dweck
Why does having a **growth mindset** matter?
Why mindsets matter

GROWTH MINDSET

FAILURE MEANS: I didn’t work hard enough; mastery is a process.

FAILURE MEANS: I’m not smart enough or good enough at this.

PERSISTENCE: Increased effort and hard work

Increased academic engagement and performance

FIXED MINDSET

ATTRIBUTION OF FAILURE

GIVE UP AND WITHDRAW EFFORT: Trying harder is useless

Diminished academic engagement and performance

ACADEMIC DIFFICULTY: Failed test

COPING WITH FAILURE

ACADEMIC OUTCOME

MINDSET
• University-wide survey (Indiana?)
• 150 STEM faculty surveyed (out of 468 responded)
  • 7 semesters
  • 634 courses
  • 15,466 students

How do you think the Growth mindset teachers speak or behave differently in their class than their Fixed colleagues?

• Faculty asked (1- strongly agree; 6- strongly disagree):
  • “To be honest, students have a certain amount of intelligence, and they really can’t do much to change it.”
  • “Your intelligence is something about you that you can’t change very much.”

Canning et al. “STEM faculty who believe ability is fixed have larger racial achievement gaps and inspire less student motivation in their classes.” *Sci Adv*, 2019.
Which of these quotes do you think was said by a **Growth** mindset prof? Which of these were said by a **Fixed** mindset prof?

- “Sometimes you have to not push them through it but lead them through the forest a couple of steps ahead the first time. (...) You’re guiding them. (...) And then the hope is that they do this and learn from that. But then they have to be able to try to go through the forest on their own (...).”

- “Fundamentally, [teaching is] changing someone’s understanding of the world by making it deeper and in-line with the scholarship of what is rigorously true according to our scientific methods.”

- “[I]t’s about learning how to solve their own problems or the problems they encounter, so teaching for me is enablement. (...) Enabling an individual to encounter new problems and self-solve them. That’s teaching to me.”

- “But it’s not that important for you to understand how those facts were arrived at or those systems were developed. You just need to learn them. And in that case I think it’s important for people to be presented with those systems.”

- “I provide them with all of the basic information that they need to learn the material, and there are many complaints because they say the exams are at a much higher level, but that’s their job.”

- “[Y]ou can’t really teach people. You can facilitate that, but they have to do it. And so I see my place as more of a facilitator now. (...) I would want them (...) to still remember the core principles that were taught in the course...”
Why do faculty with fixed mindsets have worse learning outcomes?

Canning et al. “STEM faculty who believe ability is fixed have larger racial achievement gaps and inspire less student motivation in their classes.” Sci Adv, 2019.
Question:

In general, do people in [your discipline] believe that the raw, innate talent is the most important factor for success in your discipline, and motivation and sustained effort are secondary.

Answer to yourself on a 7-pt scale:

1= strongly disagree that innate, unteachable talent is the most important factor

7= strongly agree that innate, unteachable talent is the most important factor

Expectations of brilliance underlie gender distributions across academic disciplines

% of U.S. Ph.D.'s who are female (2011)

STEM

SocSci/Hum

How does your field see brilliance?

n= 1820 survey respondents (faculty, post-docs, grad students)

Expectations of brilliance underlie gender distributions across academic disciplines

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(2011)

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Growth Mindset Intervention

Growth mindset intervention:
- College students were pen pal mentors to a struggling middle school student
- **GM** college students were asked to help the middle school student see intelligence as a capacity that can grow “like a muscle”.

**Growth vs Fixed Mindsets in Chemistry Class**

Wash U., St. Louis.

**Three-part online intervention:**
1. Students read a short article on growth mindset as part of a hw assignment early in the semester.
2. Students were asked to reflect about how having a **growth mindset** will help them prepare for their second midterm.
3. Students were asked to reflect about how having a **growth mindset** will help them prepare for their final exam.

Three-part online intervention:
1. Students read a short article on **growth mindset** as part of a hw assignment early in the semester.
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3. Students were asked to reflect about how having a **growth mindset** will help them prepare for their **final exam**.


- 300+ studies
- Heterogeneous effects
- Overall positive significant impact
Motivating questions for Yeager et al., 2019

● Where does this heterogeneity come from?
  ○ Who benefits most from growth mindset trainings?
  ○ What conditions most effectively support the adoption of a growth mindset?

→ Random sample of regular US public high schools makes findings generalizable to US population of regular public high schools

● Regular US public high schools
  ○ Which kinds of students…
  ○ Which kinds of classrooms…
  ○ Which kinds of schools…
  ○ …benefit most from an online growth mindset training

"PERTS": Project for Education Research that Scales
A growth mindset intervention that can be delivered at scale (no instructor training/variability)

**Session 1: Baseline survey and first intervention session**
Week 2-5 of fall semester

- Participating students sign into study website...
- Baseline survey:
  - Demographic measures
  - Psychometric measures

**Double-blind student-level randomization to intervention or control**

**Growth mindset intervention:**
- Read article on scientific evidence for neural plasticity
- Complete writing exercises to internalize article’s lessons

**Control condition:**
- Read article on localization of brain functions
- Complete writing exercises to summarize article’s lessons

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**Session 2: Second intervention session and follow-up survey**
Week 5-10 of fall semester

- Participating students sign into study website...
- Growth mindset intervention:
  - Learn more about how students/celebrities have put a growth mindset into practice
  - Complete writing exercises

**Control condition:**
- Learn about how scientists have studied the brain
- Complete writing exercises to summarize article’s lessons

**Post-test survey:**
- Mindset manipulation checks
- “Make-a-math-worksheet” task
- Fidelity measures

**Follow-up: Monitoring academic records to assess whether...**
- Previously low-performing students earn higher core subject GPAs
- Previously low-performing students are less likely to show D/F averages
- D/F averages in general are reduced

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Study overview

- 9th graders (transitionary period, maximal impact)

- **Hypothesis**: lower-achieving students will benefit the most from growth mindset interventions

  - A growth mindset is most relevant for students who are confronting challenges

  - Impact can be measured in terms of grades (GPA)
    - “Core GPA” = math, science, English, and social studies
Revised intervention framing

1. **Strategies**, not just “hard work”: Hard word was previously defined as the opposite of “raw ability”
   - But, working harder without effective learning strategies doesn’t improve learning
   - Ex: “Sometimes people want to learn something challenging, and they try hard. But they get stuck. That’s when they need to try new strategies—new ways to approach the problem.”

2. Support **communal, interdependent values**
   - “You can grow your intelligence” may have emphasized independence too much
   - Goal: to remove stigma around asking for help
   - Ex: “People tell us that they are excited to learn about a growth mindset because it helps them achieve the goals that matter to them and to people they care about. They use the mindset to learn in school so they can give back to the community and make a difference in the world later.”

3. Aligning **peer norms**
   - Ex: “People everywhere are working to become smarter. They are starting to understand that struggling and learning are what put them on a path to where they want to go.”

4. Leverage **adolescent resistance**, growth mindset as a response to adult control
   - Include this quote from an upper-class student: “I hate how people put you in a box and say ‘you’re smart at this’ or ‘not smart at that.’ After this program, I realized the truth about labels: they’re made up… Now I do not let other people box me in… It’s up to me to put in the work to strengthen my brain.”

(Yeager *et al.*, 2016)
Revised intervention framing: “Indirect” rather than “Direct” Framing

• Direct (“this will help you.”)
  • “Why does getting smarter matter? Because when people get smarter, they become more capable of doing the things they care about. Not only can they earn higher grades and get better jobs, they can have a bigger impact on the world and on the people they care about. In this program, you’ll learn what science says about the brain and about making it smarter.”

• Indirect (“this will help others.”)
  • “Students do a great job explaining ideas to their peers because they see the world in similar ways. On the following pages, you will read some scientific findings about the human brain. We would like your help to explain this information in more personal ways that students will be able to understand. We’ll use what we learn to help us improve the way we talk about these ideas with students in the future.”

(Yeager et al., 2016)
Revised intervention (Yeager *et al.*, 2016)

Original intervention: 3-part structure

1. Read “You Can Grow Your Intelligence” (4 pgs.)
   - Your brain can get smarter the more it is challenged, like a muscle, because of phenomena like neuroplasticity.

2. Describe a personal experience of learning something

3. Write a letter to a future student who is struggling and may feel “dumb.” (“Saying is believing” exercise)
https://www.perts.net/orientation/hg

Growth Mindset for 9th Graders
A free, evidence-based program designed to increase students' engagement, motivation, and ultimately success by laying the foundation for a growth mindset.

Free for all high schools

GET STARTED
STUDENTS ENTER HERE
Already registered? Sign in

https://www.perts.net/orientation/cg

Growth Mindset for College Students
A free, evidence-based program designed to increase students' engagement, motivation, and ultimately success by laying the foundation for a growth mindset.

Free for all 2- and 4-year colleges

GET STARTED

and https://mindsetscholarsnetwork.org/
• Two 25-min online sessions, about 3 weeks apart

• **Session 1** (25 Minutes):
  1. Students a quick **survey** assessing their mindsets and related attitudes and about their school environment.
  2. Students complete the first part of the interactive growth mindset activity about neural plasticity, strategies for growing their intelligence, and stories from other students.
  3. Students then complete writing exercises where they are asked to help us explain the concept to other students
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Not just about working hard (a common oversimplification)

It's Not Just About Effort: Use the Right Strategies

Sometimes people want to learn something challenging, and they try hard. But they get stuck. It won't help your brain if you just keep doing the same thing that didn't work, over and over again. That's when they need to try new strategies—new ways to approach the problem.

Here are three things that can be helpful when you're stuck on a tough problem.

**Which ones have you ever done before?**

Select all that apply.

- Ask a student who knows how to do the problem for ideas
- Ask your teacher for suggestions about how to get un-stuck
- Step back and try a new approach on the problem
• Two 25-min online sessions, about 3 weeks apart

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Kayla L., high school student

People always say that we're supposed to use our brains. But they don't always tell us how to do it, and they don't ask us what our personal reasons for learning are—like, what makes us want to use our brains. I'm glad somebody finally took the time to explain things, and to ask for my opinion. For me, I want to have a good life. I also want to help my family and make my community better. I like how somebody finally cared enough to ask me what I thought.
• Two 25-min online sessions, about 3 weeks apart

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Session 2 (25 min): Reinforce and Extend

• Reminder of lessons from Session 2

• Community values - motivate changing their mindset

• Read responses from other students
Synthesize it into a Plan

• Students asked to synthesize ideas and apply them to their own life

Please answer this question: How might you use a learning mindset more in your classes?

For instance, you could write about using a learning mindset when math class is hard, or when a teacher tells you how to improve your writing. As a reminder, when students use a learning mindset they:

• Welcome challenges and stick to them
• Try new strategies
• Ask for advice when they are stuck
• Use their mistakes to learn and improve

In the box, please share your plan for using a learning mindset. We’ll share these with future students.

Please write 1-2 sentences.

Work SMART. Use a s
Overall results

- The GM intervention decreased fixed-mindedness in students overall and lower-achieving students.
- Lower-achieving students had the biggest impact in their grades.

Further breakdown:

- **CATE**: “Conditional Average Treatment Effect” for grades

  → **How can we help our students cultivate supportive, challenge-seeking norms?**

  “Make-a-math” worksheet:
  Students chose from math problems that were described either as **challenging and offering the chance to learn a lot** or **as easy and not leading to much learning**.

Per school, GM effect is almost always positive
How can we help our students develop a growth mindset?
Design strategies that promote a **growth mindset** in your students

1. Destigmatize mistakes and challenges
2. Optimize feedback giving (you) and receiving (your students)
3. Challenge the notion that learning does not require struggle.
4. Communicate that abilities can grow.

Work with your neighbors for 5-7 min:

- Discuss how the provided strategies for your **assigned category** promotes students’ growth mindset.
- Come up with specific strategies for your category to encourage a growth mindset in your students.
- Be prepared to share out to the group. (Person whose last name is earliest in the alphabet.)
1. Destigmatize mistakes & challenges

Using examples of others who have struggled
1. Destigmatize mistakes & challenges

Using examples of others who have struggled

https://www.youtube.com/channel/UC1Z9a0Pdxa4vF3O9_HofRBw
2. Optimize feedback giving (you) & receiving (your students)
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Wise criticism
high standards + suggestions for improvement

Wise feedback:
I'm giving you these comments because I have high standards and I know that you can meet them.
Assurance and Wise Feedback

Convey respect for students as individuals, rather than judging them in light of a negative stereotype. Use feedback primarily as a mechanism to help students improve.

Give “wise” feedback to encourage students:

● Feedback reflects teachers’ high standards

● Feedback confirms the belief that the student can achieve those high standards

● Feedback provides concrete guidance for student improvement

2. Optimize feedback giving (you) & receiving (your students)

Teach students how to handle & learn from feedback

A. Dismantle distortions:

**contain the story**

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<th>What <em>isn’t</em> this about?</th>
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<td>Whether I might have the qualifications the internship program/fellowship is looking for.</td>
<td>Whether I might not get to work in this company or a good company in the future.</td>
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- change your vantage point:
  - imagine you’re an observer/friend
  - look back from the future

B. When critical feedback is provided —> lean into taking a coaching approach
3. Challenge the notion that learning does not require struggle.

“Illusion of Knowing”

3. Challenge the notion that learning does not require struggle.

“Desirable difficulties”

Retrieval practice:

• encouraging students to test themselves rather than review problems/content while studying
• implementing weekly classroom quizzes

Space & Interleave practice:

• interleaving problem types rather than practicing solving same type of problems
4. Communicate that abilities can grow.

Teaching students about neuroplasticity

What are other ways to communicate that abilities can grow and expand provided the right experiences?
4. Communicate that abilities can grow.

Explain how expertise is acquired
4. Communicate that abilities can grow.

Explain how expertise is acquired

**Deliberate practice**: activity that one engages in with the purpose of improving performance.
Mastery

what people think it looks like

what it actually looks like

Image from Daniel Gibson
The Nature of Science, and of LPSA

• **Questions and Problems**
  “Know how to solve every problem that has been solved” – Richard Feynman

• **Collaboration and Solidarity**
  “If I have seen further it is by standing on the shoulders of giants.” – Isaac Newton

• **You!**
  “We look at science as something very elite, which only a few people can learn. That's just not true.” - Mae Jemison

• Normalizing struggle and challenges

• Motivate students to support one another

• Set high expectations
Strategies to promote a growth mindset in your students

1. Destigmatize mistakes and challenges

2. Optimize feedback giving (you) and receiving (your students)

3. Challenge the notion that learning does not require struggle.

4. Communicate that abilities can grow.

5. Continue on your own mindset journey
Resources

● Mindset Scholars Network: http://mindsetscholarsnetwork.org/
● Project for Education Research That Scales: https://www.perts.net/
● Quick intro: Carol Dweck’s TED talk
● More in-depth resources:
Guiding principles we can use

1. **Offer Process praise instead of person praise**
   - Process praise emphasizes student effort and strategy use □ student resilience
   - Person praise ties their performance to their sense of self-worth □ making a mistake implies they are not smart

2. **Skill** - Teach strategies for successfully taking on challenging tasks that extend the frontiers of students’ current ability.

3. **Resilience** - Create a culture of high expectations and safety that enables students to be resilient academic risk takers.
   - Convey confidence that your students can meet high expectations, and help them not get too down when they are challenged.
   - Making challenging oneself the norm.
   - Teach students to support each other.

4. **Assessment** - Teach students the real value of assessments and how they can be used for improvement.
   - teach students how to use tests to identify areas for growth and learn from mistakes
   - Help students use homework and tests to identify where they are in their learning, and where they need to be.
   - Encourage revisions so they can develop mastery
Thank you!

Stay in touch and let us know how we can help!

- Farber 2
- ctl@brandeis.edu
- msamuels@brandeis.edu
- CTL Events page
- Keep an eye out for our CTL Newsletter!

### Weekly CTL Teaching+Learning Lunches

**Spring 2023**

All Brandeis faculty, graduate students, and post docs are invited to attend our weekly T+L Lunches:

- **Workshops**: explore specific areas of teaching and learning with practical applications (hybrid format).
- **Journals Club**: discuss recent pedagogical research and its application for your classroom practice (hybrid format).
- **Colloquium**: colloquial conversations about teaching and learning (in-person).

#### T+L: Workshop: Active Learning

**January 27, 2023**

- 1:30 pm - 3:00 pm, Farber 2
- Instructor: Brandeis BDS

Weekend has shown that active learning significantly improves student learning, but how can we best leverage it in our classrooms? In this workshop, we will discuss a variety of ways to implement active learning techniques, including how to apply some active research about what students actively learn from worked examples and how to get students buy-in.

#### T+L: Workshop: Making Your Students Think Like Experts

**February 10, 2023**

- 1:30 pm - 3:00 pm, CTL/CTLMB/CTLBU
- Instructor: Brandeis BDS

This workshop will explore ways to help students think like experts in their disciplines. We will discuss recent research on how to foster more effective learning strategies and how to help students develop a deeper understanding of their subject matter.

#### T+L: Workshop: Using Growth Mindset to Improve Teaching and Learning

**February 24, 2023**

- 1:30 pm - 3:00 pm, CTL/CTLMB/CTLBU
- Instructor: Brandeis BDS

Grow mindset is the belief that your skills and intelligence are malleable and can be improved with hard work and practice. This workshop will explore how to develop a growth mindset in your students, and how to foster a learning environment that values effort and learning over innate ability.

For more information or to register, please contact us at CTL@brandeis.edu.
Opening reflection activity

Think about something in your academic past that you think measured you. For example:

- a test score
- not getting an internship
- a meeting where you research work was ripped to shreds
- a disparaging comment from a professor/advisor

1. Write down (on one side of index card):

   the scenario in question and how it made you feel about your own abilities.
Opening reflection activity

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- a test score
- not getting an internship
- a meeting where you research work was ripped to shreds
- a disparaging comment from a professor/advisor

1. Write down (on one side of index card):
   the scenario in question and how it made you feel about your own abilities.

2. Re-examine your experience of failure. Answer (on the other side of index card):
   What can I learn from that experience? How can I use it as a basis for growth?