Research Overview & Introduction
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Growth Mindset Research Background
Carol Dweck, Ph.D.

• Dr. Carol Dweck is one of the world’s leading researchers in the field of motivation and has devoted decades to growth mindset research. She is Brainology’s co-founder and the program is based on her research.

• Her books include: *Mindset* and *Self-Theories*

• More on Dr. Dweck at:
  – [https://psychology.stanford.edu/cdweck](https://psychology.stanford.edu/cdweck)
## Mindsets

<table>
<thead>
<tr>
<th>Fixed Mindset</th>
<th>Growth Mindset</th>
</tr>
</thead>
<tbody>
<tr>
<td>intelligence is a fixed trait</td>
<td>intelligence is a malleable quality, a potential that can be developed</td>
</tr>
</tbody>
</table>
Recent Research in Cognitive Psychology & Neuroscience is Supporting the Growth Mindset

a Scientific American article summarizing this research can be found at

http://www.sciam.com/article.cfm?id=the-secret-to-raising-smart-kids
## What Mindsets Do Goals

<table>
<thead>
<tr>
<th>Fixed Mindset Students Say</th>
<th>Growth Mindset Students Say</th>
</tr>
</thead>
<tbody>
<tr>
<td>Looking Smart is Most Important</td>
<td>Learning is Most Important</td>
</tr>
<tr>
<td>“The main thing I want when I do my school work is to show how good I am at it.”</td>
<td>“It’s much more important for me to learn things in my classes than it is to get the best grades.”</td>
</tr>
</tbody>
</table>
### What Mindsets Do Effort Beliefs

<table>
<thead>
<tr>
<th>Fixed Mindset Students Say</th>
<th>Growth Mindset Students Say</th>
</tr>
</thead>
<tbody>
<tr>
<td>Effort is negative</td>
<td>Effort is positive</td>
</tr>
<tr>
<td>“To tell the truth, when I work hard at my school work it makes me feel like I’m not very smart.”</td>
<td>“The harder you work at something, the better you’ll be at it.”</td>
</tr>
<tr>
<td>Fixed Mindset Students Say</td>
<td>Growth Mindset Students Say</td>
</tr>
<tr>
<td>---------------------------</td>
<td>-----------------------------</td>
</tr>
<tr>
<td>Helpless</td>
<td>Resilient</td>
</tr>
<tr>
<td>“I would spend less time on this subject from now on.”</td>
<td>“I would work harder in this class from now on.”</td>
</tr>
<tr>
<td>“I would try not to take this subject ever again.”</td>
<td>“I would spend more time studying for the tests.”</td>
</tr>
<tr>
<td>“I would try to cheat on the next test.”</td>
<td></td>
</tr>
</tbody>
</table>
Study #1 on Students Making a Transition to 7th Grade, from:
Math Achievement in Junior HS

Math Grades

Entering Academic Year
Fall Year 1
Spring Year 1
Fall Year 2
Spring Year 2

77.0
76.5
76.0
75.5
75.0
74.5
74.0
73.5
73.0
72.5
72.0

growth mindset
fixed mindset

Fixed
Growth
Study on How Mindsets Are Communicated from:
Each student worked on a non-verbal IQ test & was given one kind of praise

<table>
<thead>
<tr>
<th>Intelligence Praise</th>
<th>Effort Praise</th>
</tr>
</thead>
<tbody>
<tr>
<td>“Wow, that’s a really good score. You must be smart at this.”</td>
<td>“Wow, that’s a really good score. You must have tried really hard.”</td>
</tr>
</tbody>
</table>

| Control Group | “Wow, that’s a really good score.” |
Effects of Intelligence vs. Effort

Praise

Fixed

Looking Smart
Low
Low
Decreased

Growth

Learning
High
High
Increased

Goals
Confidence
Motivation
Performance

After difficult trial
# of problems solved on the IQ test
Trial 1 (before failure) and Trial 3 (after failure)
Lying: Students who misrepresented their scores

Proportion of Children

Intelligence  |  Control  |  Effort
Study #2 on Students Making a Transition to 7th Grade, from:

Changing Mindsets

The Brainology® concept was initially piloted as an instructor-delivered intervention.

<table>
<thead>
<tr>
<th>Experimental Procedure</th>
<th>Control Group</th>
<th>Growth Mindset Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Study Skills Training</td>
<td>8</td>
<td>6</td>
</tr>
<tr>
<td>Growth Mindset Training</td>
<td>-</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>8</td>
<td>8</td>
</tr>
</tbody>
</table>
Growth Mindset Material Used

- the growth mindset training used a 4-page article developed for the study
  - you can read this article at:
### Change in Math Grades

- **Time 1**
- **Time 2 (Pre-Intervention)**
- **Time 3 (Post-Intervention)**

**Control**

**Growth**

Math Grades
% Identified as Increasing in Motivation

<table>
<thead>
<tr>
<th></th>
<th>Control</th>
<th>Growth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identified as Increasing in Motivation</td>
<td>9</td>
<td>27</td>
</tr>
</tbody>
</table>
Zone of Prox. Dev. View of Mindsets

Student w/ Fixed Mindset
- Known: Feels Smart
- Unattainable: Disengages

Student w/ Growth Mindset
- Known: Is Bored
- Attainable (ZPD): Feels Challenged
- Unattainable: Remains Effective

The Brainology® Program
The Brainology® Program

• Interactive, online program to cultivate a growth mindset.

• Students follow animated characters as they tackle issues in their most difficult subjects.

• Brainology® Growth Process:

  Brain Science

  “I can develop my brain!”

  +

  Study Skills

  “I know how to develop my brain!”

  =

  Motivation & Achievement
From Brainology® to Outcomes

Brainology® Use → Behavior → Outcomes

Learn Brain Science
When I make the effort to learn, my brain changes & my abilities increase

Learn Skills
I know brain-friendly behaviors and study skills so that I can take action

Increased Motivation
My abilities are up to me to develop!

Apply Skills
Apply & practice acquired skills

Improved Outcomes
Increased Learning & Achievement
Brainology® Structure

• students follow animated characters as they tackle issues in their most difficult subjects
• brief introduction + 4 units
• content made relevant and placed in context of school and student challenges
• relevant content + interactivity + humor = high level of engagement
• summary handouts, assessments, teacher’s guide, teacher tools to view usage data
Intro & Unit 1: Brain Basics

• Intro: an introduction to the characters, purpose of the program, structure and tools available
• Unit 1: basics of brain structure & function, particularly what is required to maintain readiness to learn

Sample takeaways:
– the brain needs certain things in order to function well (e.g. sleep & certain foods)
– the brain is the body’s control center: it gets information from all your senses, and is in charge of all of the body’s voluntary and involuntary movement
– different areas of the brain do different things
– your senses serve as different “pathways” to the brain: using more than one sense to learn about something lets you use more of your brain and aids learning and memory
– using different complementary modes of learning helps focus attention and increase learning
– in contrast, competing pathways can interfere with learning
– active learning approaches are best
Unit 2: Brain Behavior

• brain behavior, how it functions, effect of emotions and strategies to manage emotions

• Sample takeaways:
  – the brain is made up of nerve cells, called neurons, in a network of many connections
  – neurons communicate with each other through these connections
  – the branching parts, called dendrites, receive messages, and the long part, called the axon, transmits a signal through the neuron
  – thinking is influenced by the emotions, especially anxiety
  – when facing any type of threat, the brain sets off a fight-or-flight response that causes physical signs of anxiety and interferes with thinking
  – many students have performance anxiety—stress related to taking tests, giving presentations, or other performance-oriented situations—that can interfere with performance even when they know the material
  – you can lower your anxiety level by being prepared, thinking positively, and calming your breathing
Unit 3: Brain Building

- how learning changes the brain and what sort of activities promote learning
- Sample takeaways:
  - the brain and intelligence are not fixed—they both change when you learn
  - the brain grows more new cells and connections when you learn
  - you get smarter by exercising your brain, much the same way that you get stronger by exercising your muscles
  - how can you exercise the brain?
    - by exploring new information, learning new concepts, and practicing skills.
    - practice is the key to learning—only by practicing can you grow new connections in that area of your brain responsible for learning that thing
    - the more connections you make, the easier it gets to make new ones
  - different environments can influence brain growth--active learning is the key
  - you are never too old to learn and develop your brain!
Unit 4: Brain Boosters

• how memory works and study strategies to apply the Brainology® lessons in real life.

• Sample takeaways:
  – memory is stored in the new connections your brain makes between neurons when you have a new experience
  – there are different stages in memory, each lasting different amount of time: sensory memory, working memory, and long-term memory
  – memory is a process, and if you skip one stage, the memory will not last
    • all information enters through sensory memory
    • things you pay attention to go on to working memory, which can only hold 5-7 separate pieces of information at once
    • information moves from working memory to long-term memory through a process called encoding. In order for encoding to happen, you must pay attention, attach new information to existing information that supports it and repeat the information
  – other mnemonics (memory strategies) include connecting information together by chunking, visual images and acronyms
  – most good study strategies are those that reinforce this memory process, helping your brain to make many strong connections between neurons and build a strong network of knowledge
Brainology® Tools

• e-Journal: students are prompted for reflections throughout the program, and have access to the e-journal at any time

• Brain Book: reference guide about the brain. Summary of key lessons learned

• Formative challenges at the end of each unit to review material

• Map: navigate to any section of the program
Why is Brainology® the Most Effective Way to Motivate Students?

• research-based program fully focused on the growth mindset, which leads to motivation & self-efficacy
• motivation & self-efficacy are the most powerful levers to catalyze student learning
• engages students in a fun, interactive way, in relevant context, so that they’re receptive to it
• ensures, consistent, comprehensive, high quality delivery across the district
Student testimonials

"The brainology program was very useful because it taught me a lot about my brain and how it works so that I now can apply that knowledge to my academic education."
  – Sarah, 6th grade

"If you want to remember things for tests, make everything easier and more fun and interesting, go to Brainology! You will learn all you ever wanted to know – and didn’t even know you wanted to know – about the brain!"
  – Meira, 7th grade

"It will totally help me out, especially the part about working long term and short term memory."
  – Dillard, 7th grade

"This program helped me a whole lot. Its really good because it breaks down the information in an accurate way that I can I understand it"
  – Radwa, 9th grade

"Every student in the United States should learn about this."
  – Greg, 9th grade
"It was very fun and educational. I learned a lot about my brain and how to help it learn things, thus leading to a successful education"
– Yasmeen, 8th grade

"I really enjoyed this program. It has helped me in so many ways because I have used these skills I learned from this program and now I have A's and B's in all my classes and before I had all F's with a very low GPA now I have a 3.14 GPA passing all of my classes"
– Markeece, 9th grade

"I had a great time doing brainology and I think it will help me in the future"
– Leshwin, 8th grade

"I think that brainology was amazing. It helped me learn so much about the brain. But it still made it fun and easy to learn"
– Blair, 8th grade
Teacher testimonials

"YES I truly believe that this has helped. The students are self reporting that their grades have raised and that the strategies that Brainology teaches them are helping. They report that they imagine their dendrites growing :-) They talk about needing to never give up. The relationships I have with these students are stronger than any I have ever had (not including coaching) and I attribute it to my work with them in this realm."

– Emily, High School Teacher, California, USA

"I find students using the content/process vocabulary of Brainology in their academic and social interactions. They have also generalized the lessons to help with dealing with stress and sustain problem solving during high-stakes test. Brainology does a wonderful job with addressing both the cognitive and emotional components of brain structure and function… The interactive format combined with pre-teaching and post-review, with boosters dramatically increases not only attention but also retrieval. As a consequence I have found students to be more willing to take risks and support others. The change in attitude is contagious for teachers as well."

– Manuel, High School Psychologist, California, USA
"The best word I can think of to describe its effects is empowering. It allows students to know that they are in control of their brains and learning -- and it's not based on the “cards they are dealt.” … For the past several years, we have been teaching our students about the brain at the beginning of the year for the purpose of empowerment. However, the delivery of similar (yet more in-depth) information through Brainology is straight-forward, informative, and appealing to kids. I think the plan to have them go through each level and then discuss it as a class is a good one. That way the lessons are reinforced through another channel."

– Sue, 8th & 9th Grade Teacher, Minnesota, USA

“Brainology definitely helped my students. They all enjoyed it very much and came away with more self-confidence and belief that they could improve their "brain power"."

– Louise, Educational Aide, Idaho, USA
Teacher testimonials (cont’d)

"I really do think that it made them consider their own roles in their success, as well as how to improve their success. It allowed students to be proactive about their learning. They could point to what they did try and what they didn't as they sorted through how they learned, and what worked for them. They tried new study skills and explained why the skills worked or didn't in terms of the vocabulary introduced... It really helped us grow in our understanding of the students' challenges as well as our own development."

– Suzanne, High School Math Teacher, California, USA

“Yes, because kids truly believe that Mary sitting across the room is smarter than them because she gets A's all the time. When I show them why and how Mary gets A's, they understand that it is the "effort" factor that makes a difference, and perseverance is important.”

– Rose, Social Studies Teacher, Connecticut, USA
Screenshots
Screenshots

Go to Level 4: Brain Boosters
continue where you left off
restart the unit
Screenshots

Click to enter your first Reflection!
Screenshots

Chris' e-Journal

Brain connections like basketball passes!

entered by Chris while in Unit 2: Brain Behavior

WOW I’m an Apprentice! Who would have thought that the brain is made up of a network of so many nerve cells all passing signals around--like how a good basketball team passes the ball from one player to the next down the court, until they get to the basket for a slam-dunk. Now scoring is something I can relate too! I have to start thinking of what I'm going to do and how I'm going to do it--cause you need strategy and a game plan in math just like in b-ball. That square breathing thing sounds weird but I'm going to try it.
Thank you!

www.mindsetworks.com