

Study of young adolescents suggests that intelligence is malleable

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One in five students in the United States will not earn a high school

diploma—and young adolescents who fall behind in school risk never catching up, leading to unemployment, poor health and poverty, research has shown.

But a new University of California, Davis study of intermediate [school](#) students in urban California and New York shows promise for underachievers. Researchers found that [early intervention](#) with [teachers](#), training students that [intelligence](#) is malleable and achievable, caused struggling students to flourish and improve their grades.

"These results were exciting," said the study's lead author, Tenelle Porter, a postdoctoral scholar in the Department of Human Ecology who studies the psychology of education. "Here we show that we can change people's minds about how education works—that abilities can improve with effort, and struggling students can see progress."

The study was published June 14 in the journal *Psychological Science*.

Porter explained that there is often a [mindset](#) among children, their families and even teachers that students who are low achievers in [middle school](#) may never catch up—that intelligence levels will not increase much after early adolescence.

The study showed, however, that implementing an educational philosophy called a mindset intervention, which holds that the brain, like a muscle, can be strengthened and trained—combined with training teachers on how to implement the program in classrooms—raised grades a couple of percentage points over a year, on average. The intervention used in this case was a particular program called "Brainology."

The study was the first of its kind to include the effect teachers have on the technique, which proved to be doubly effective, grade-wise, to delivering the message by computer to each [student](#) without teacher

involvement. Underachieving students benefited more than students who already had higher [grades](#).

"Students learned, 'wow, I can be smarter,'" Porter said.

The randomized study included nearly 2,000 ethnically diverse sixth and seventh grade students and 50 teachers in 12 schools located in Orange County and New York City during an entire school year prior to COVID-19 closures. The method was delivered alternatively in math, science and English courses to test the results in different subject areas.

"We can be confident this method works in various subjects," Porter said.

In Brainology, used in hundreds of schools throughout the United States and internationally, students learn the foundation of a growth mindset by studying how the brain works and how it grows smarter through effort, learning and use of effective strategies, researchers said.

In the study, teachers were given a prominent role in delivering the intervention. This conveys to students, researchers said, that teachers endorse a growth mindset and believe students can improve. Teachers delivered three of every four lessons in Brainology and led students in actively processing the material. For example, teachers might ask students to identify subjects where they wanted to improve and help them design a plan for maximizing their learning in those subjects, demonstrating the concept of malleable intelligence.

Ongoing support was provided to teachers. They were given a curriculum guide, video-based resources, in-person training, and were taught pedagogical techniques for communicating growth mindsets to students. In addition, staff with expertise in growth mindset and teaching observed Brainology lessons regularly and provided coaching throughout

the intervention, researchers said. Teachers' mindset beliefs grew as well, they said.

Study co-authors include senior author Kali Trzesniewski, and Diego Catalan Molina, who are both Department of Human Ecology researchers in the UC Davis SELF lab.

More information: Tenelle Porter et al, Growth-Mindset Intervention Delivered by Teachers Boosts Achievement in Early Adolescence, *Psychological Science* (2022). [DOI: 10.1177/09567976211061109](https://doi.org/10.1177/09567976211061109)

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