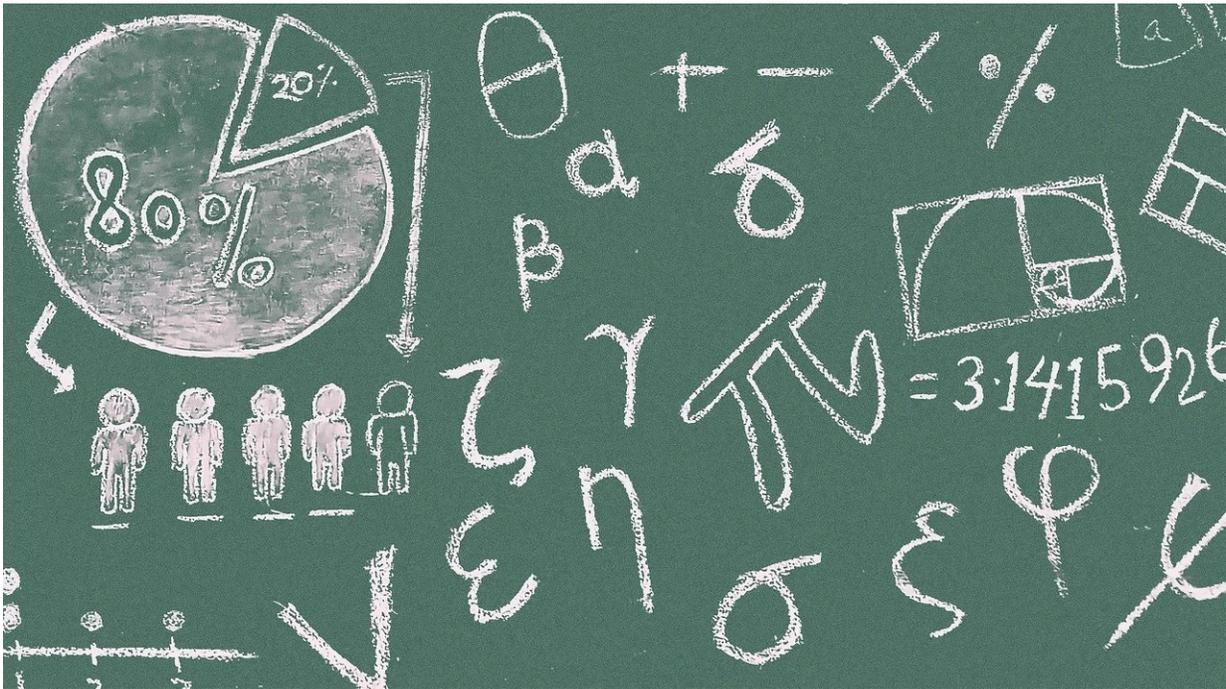


Changing students' attitudes to mathematics improves test scores

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A free 'massive, open, online course' (MOOC) designed to change students' attitudes towards mathematics makes them more engaged in class—leading to significantly higher test scores. Published in open-access journal *Frontiers in Education*, these findings go against the discouraging results of previous studies. It is the first of its kind to show the impact of an online course in changing students' mindsets and beliefs

about mathematics and their achievement, with the potential for more widespread dissemination.

From an early age, children are exposed to the belief that people fall into two categories: 'math people'—those who naturally have a way with numbers—and non 'math people'—those born without a predisposition to become the next Albert Einstein.

Professor Jo Boaler, professor of [mathematics](#) education at Stanford University and lead author of the study, believes this way of thinking has a damaging impact on children throughout their school experience.

"There is a connection between students' mindsets and their learning outcomes," says Boaler. "When they struggle in [class](#), they think this means they do not have a math brain and they give up."

With the aim to change students' perceptions about math and their own mathematics potential, Boaler and her team conducted the study with more than 1,000 students across four schools in California, USA. Over several months, these students participated in a free math MOOC designed to change their ideas about learning mathematics and their own potential. Some of the key ideas covered in the course were that mathematics is all around us in life, everyone can learn math to high levels, and that drawing and talking are good strategies for learning math.

"Many students hold damaging 'fixed mindsets,' believing their intelligence is unchangeable," explains Boaler. "But when there is a shift to a 'growth mindset' and they believe their intelligence can be altered, their attitude to math changes—and their achievement increases."

Once the students completed the [online course](#), the results of the study showed just that.

"The online course changed students' ideas about mathematics and their futures in the subject. This is the first online class that has had such an impact," says Boaler. "It led to students feeling more positive about math, more engaged during math class, and scoring significantly higher in mathematics assessments."

So, what made this study so much more successful than previous MOOC studies?

Boaler believes it was their innovative approach to the online course which led to such impressive results. "Our study centered on changing these ideas and teaching students how to learn mathematics well—specifically targeting [student](#)'s beliefs about mathematics. The course was also designed and taught by educators so that students would be actively involved, not just watch videos."

"The US and many other countries have widespread mathematics underachievement and anxiety, which threatens the development of science and technology. I really hope that the impact this online class had on students' mindsets and achievement shows the importance of the class itself, but also of changing students' attitudes towards mathematics," Boaler concludes.

More information: Jo Boaler et al, Changing Students Minds and Achievement in Mathematics: The Impact of a Free Online Student Course, *Frontiers in Education* (2018). [DOI: 10.3389/feduc.2018.00026](https://doi.org/10.3389/feduc.2018.00026)

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