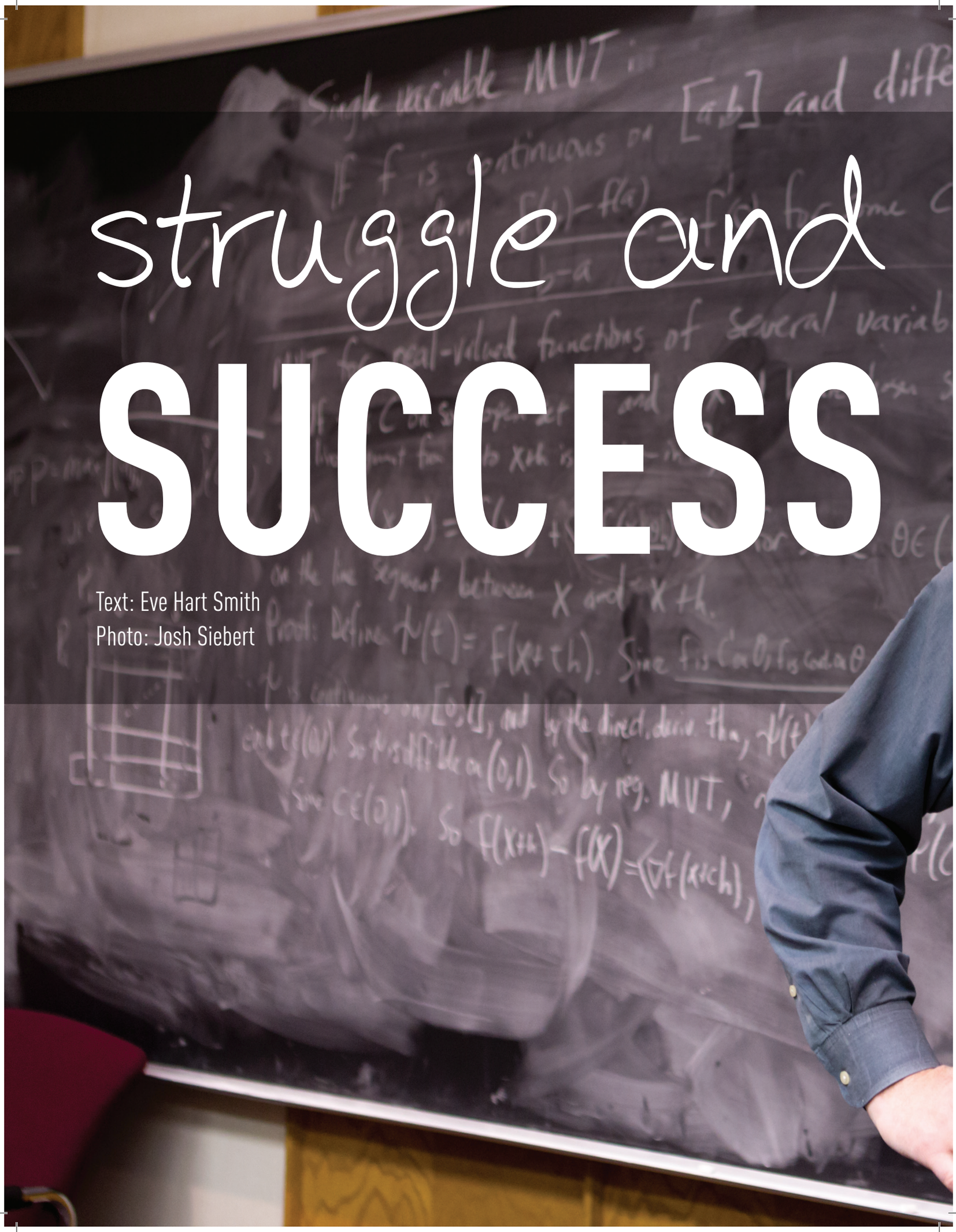
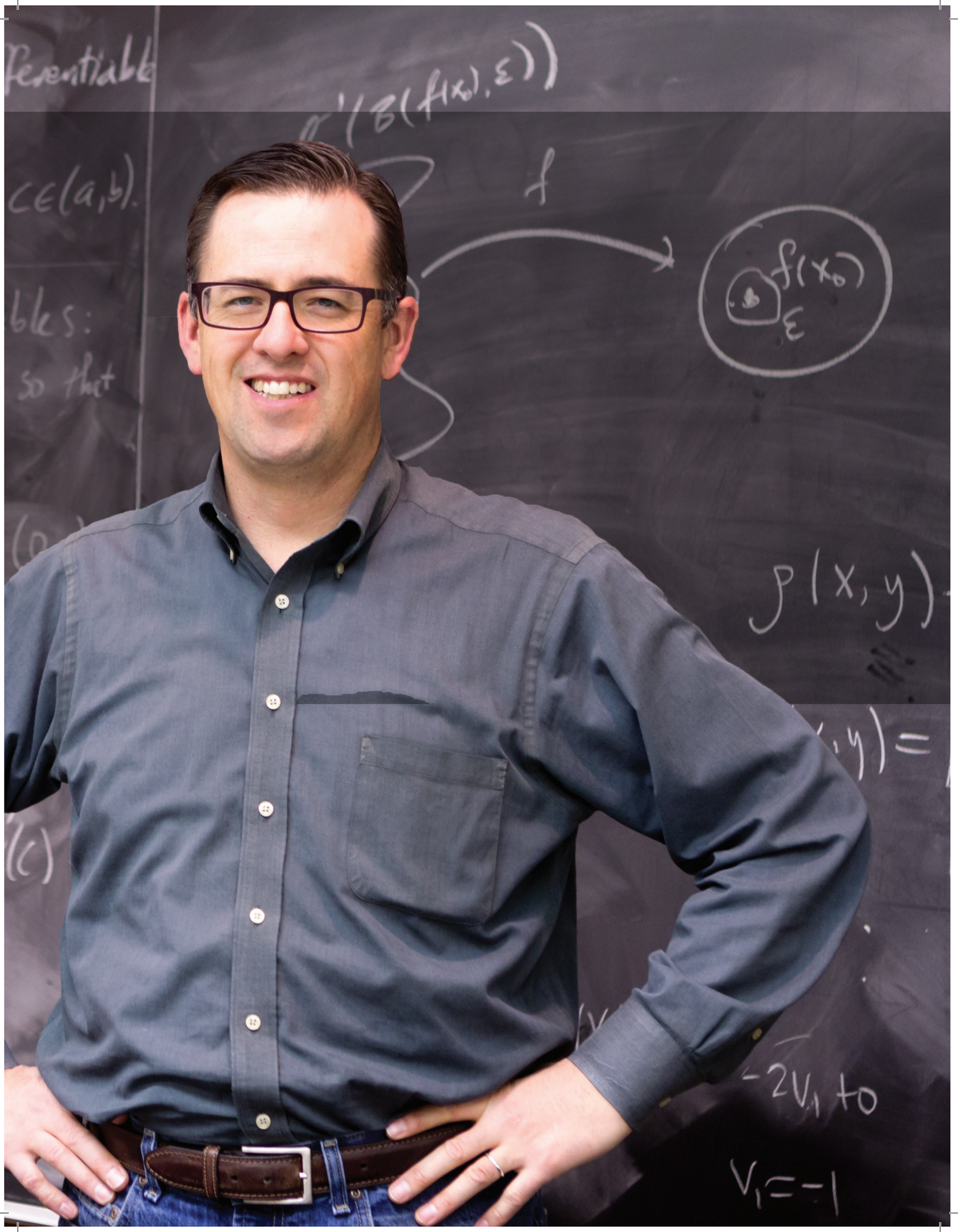


struggle and SUCCESS

Text: Eve Hart Smith
Photo: Josh Siebert


so that
$f(x_0)$
ε
$\rho(x,y)$
$-2V_1$ to
$V_1 = -1$

His bookshelves are lined with tomes about the moduli space of curves and other mysterious mathematical concepts. He has received several awards for teaching mathematics, including the Math Association of America's Intermountain Region teaching award, and he has lectured about mathematics from Wisconsin to Sweden. And to top it off, he recently finished a six-year assignment as the chair of the Department of Mathematics.

That may be why it's so surprising to hear Dr. Tyler Jarvis say that in his youth he "really, really hated math."

This repugnance for math is the last thing you would expect to hear from an accomplished mathematician.

"My math problems started early. But they got really bad in fifth grade," he said.

Jarvis's teacher often kept him in at recess to do arithmetic worksheets that other students could breeze through. "My teacher finally got so frustrated that she said, 'You will never be any good at math,'" he said humorously.

It was through some kind of miraculous fluke that Jarvis was allowed to take algebra in junior high rather than having to repeat arithmetic. Yet his old enemy, arithmetic, threatened to trip him up—until Jarvis discovered that studying his textbook helped him to unravel concepts that had so long confounded him. In fact, studying the text gave him insight into the why of mathematics, which was critical to inspiring his career choice.

"There was a reason for what we were doing in mathematics," Jarvis said. "Not only that, but if I worked hard enough, I could understand the reasons. If I thought about the problems long enough, they made sense. And when they did, they helped me understand how other things in the rest of the world worked. . . . That experience is probably why I'm a mathematician today."

While Jarvis's research is ground-breaking, it seems that the overriding theme of his career is to answer the cries of many math students around the world who think math is either too hard or just plain stupid—or both.

Jarvis explained that these attitudes stem from the age-old lie that intelligence is fixed and that subjects like math are only accessible to the naturally gifted.

"Even if their parent or teacher wasn't as blunt as my teacher was with me," he said, "they still got that message that 'I must be stupid' or 'math is stupid.'"

The truth is that you are not stupid, and neither is math. Anyone, with hard work, can conquer math. That is the message that Jarvis feels BYU students need to hear.

"I try to help students understand that just being at BYU means that you already have more than enough natural talent, whether you know it or not," he said. "So you don't need to worry about being smart enough; you just need to worry about doing the work necessary to learn."

Some of the lessons Jarvis learned as a struggling math student have been translated into the *We Use Math* film and website. Jarvis produced the film and was one of the professors interviewed in it. The idea for the project, he explained, was to help students realize that math is manifest in all aspects of life.

In his film interview, Jarvis eagerly echoed his hard-earned understanding of mathematics: "Luckily, math is not just about memorizing formulas and rules. It is about solving new problems and thinking about the world in deep ways. It is about seeing what different things have in common and how to use what you learned on one problem to solve something that looks completely different."

Despite his mathematical struggles—or perhaps because of them—Jarvis has made important contributions to mathematics research and teaching. He explained that embracing the struggle has been key to his success.

"Math lets me learn about things that are interesting and challenging and rewarding. It's fulfilling to take on the challenge, fight with it, finally beat it, figure out the answer, and move on," he said.

Jarvis hopes that other students, too, will discover the interesting and challenging world available to those who embrace struggle.

Jarvis suggests three ways for parents and teachers to help their children and students successfully tackle intellectual struggles.

1

Model and reward their intellectual struggles. Real learning is always hard work. Children and students need to see through your example that the rewards are worth the struggle. And you need to reward their struggles by always praising effort, not talent. It is well established that saying things like "you made a great effort" or "you worked really hard on that" can significantly increase childrens' and students' interest and confidence in learning. On the other hand, phrases like "you are talented" or "you are smart" actually discourage them from tackling harder challenges.

2

Respect the struggle. Don't tell your children or students that a problem is easy, because it usually isn't easy for them, and saying it is easy makes them feel dumb. Instead, tell them "you can do hard things." It is difficult but important to allow children and students to struggle with hard problems rather than giving too many hints or too much help in solving their problems for them. "Struggle is not weakness," Jarvis reminds parents and teachers. "Struggle is how we grow." Allowing children and students to struggle gives them opportunities to strengthen their abilities and their confidence.

3

For parents, insist on good teachers. Teachers who believe the lie about fixed intelligence can harm children' and students' learning. Good teachers understand the importance and power of hard work. And they model the struggle themselves, by embracing new challenges. Good teachers understand that struggle is how we grow rather than a sign of weakness.

Visit **weusemath.org** for more information or to view the We Use Math film.