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New study yields instructive results on how mindset affects learning

BY LISA TREI

When psychology Professor Carol Dweck was a sixth-grader at P.S. 153 in Brooklyn, N.Y., she experienced something that made her want to understand why some people view intelligence as a fixed trait while others embrace it as a quality that can be developed and expanded.

Dweck's teacher that year, Mrs. Wilson, seated her students around the room according to their IQ. The girls and boys who didn't have the highest IQ in the class were not allowed to carry the flag during assembly or even wash the blackboard, Dweck said. "She let it be known that IQ for her was the ultimate measure of your intelligence and your character," she said. "So the students who had the best seats were always scared of taking another test and not being at the top anymore."

Asked what seat number Dweck occupied during that memorable year, the professor paused, and silently raised her right index finger. "But it was an uncomfortable thing because you were only as good as your last test score," she said. "I think it had just as negative an effect on the kids at the top [as those at the bottom] who were defining themselves in those terms."

From that experience, Dweck became fascinated with intelligence, convinced that IQ tests are not the only way to measure it. "I also became very interested in coping with setbacks, probably because being in that classroom made me so concerned about not slipping, not failing," she said.

Dweck, a soft-spoken, elegantly attired woman, joined Stanford's faculty in 2004 as the Lewis and Virginia Eaton Professor. Before that, she taught at Columbia for 15 years, as well as at Harvard and the University of Illinois. A native New Yorker, Dweck earned a bachelor's degree from Columbia and a doctorate in psychology from Yale.

According to Dweck, people's self-theories about intelligence have a profound influence on their motivation to learn. Students who hold a "fixed" theory are mainly concerned with how smart they are—they prefer tasks they can already do well and avoid ones on which they may make mistakes and not look smart. In contrast, she said, people who believe in an "expandable" or "growth" theory of intelligence want to challenge themselves to increase their abilities, even if they fail at first.

Dweck's research about intelligence and motivation, and how they are variously influenced by fixed and growth mindsets, has attracted attention from teachers trying to help underperforming students, parents concerned with why their daughters get turned off math and science, and even sports coaches and human-resources managers intent on helping clients reach higher levels of achievement.

The journal *Child Development* is releasing a paper Wednesday, Feb. 7, co-authored by Dweck titled "Implicit Theories of Intelligence Predict Achievement Across Adolescent Transition: A Longitudinal Study and an Intervention." The research shows how at one New York City junior high school students' fixed and growth theories about intelligence affected their math grades. Over two years, she said, students with a fixed mindset experienced a downward academic trend while the others moved ahead.

The psychologists then designed an eight-week intervention program that taught some students study skills and how they could learn to be smart—describing the brain as a muscle that became stronger the more it was used. A control group also learned study skills but were not taught Dweck's expandable theory of intelligence. In just two months, she said, the students from the first group, compared to the control group, showed marked improvement in grades and study habits.

"What was important was the motivation," Dweck said. "The students were energized by the idea that they could have an impact on their mind." Dweck recalled a young boy who was a ringleader of the troublemakers. "When we started teaching this idea about the mind being malleable, he looked up with tears in his eyes, and he said, 'You mean, I don't have to be dumb?'" she said. "A fire was lit under him."

Later on, the researchers asked the teachers to single out students who had shown positive changes. They picked students who were in the growth mindset group, even though they didn't know two groups existed. Among them was the former troublemaker, who "was now handing in his work early so he could get feedback and revise, plus study

for tests, and had good grades," Dweck said. The research showed how changing a key belief—a student's self-theory about intelligence and motivation—with a relatively simple intervention can make a big difference. Since then, Dweck and her colleagues at Columbia have developed a computer-based version of the intervention, dubbed "Brainology," that has been tested in 20 New York City schools.

Although "Brainology" is not yet commercially available, Dweck has brought her work to public attention with her latest book, *Mindset: The New Psychology of Success*. The author of many academic books and articles, Dweck noted *Mindset* was her first foray into mainstream publishing. "My students [at Columbia] kept saying to me, 'You write for these professional journals and that's important, but what about people in the world?' We are in a profession that talks to each other and writes for each other. That's what we're rewarded for. But my students kept saying, 'Everybody should know this.'"

Mindset certainly resonated with Ross Bentley, a world-renowned car racing coach based in Seattle. Unlike coaches who stress technical skills, Bentley focuses on teaching mental competitiveness. He said great drivers strive to attain "a state of flow—a moment when you lose yourself in the act of driving, when it becomes effortless and time slows down. When you get into the flow, or the zone, you're at your peak."

Bentley was thrilled to learn that Dweck's research confirmed his personal approach to coaching. "One of the things that's fascinating for me is that someone with her knowledge has verified things I've known," he said. "She brings a scientific approach and we're able to give her real-world experience. The majority of champion racing drivers have a growth mindset."

This month, Dweck and Bentley are launching a study of about 40 racing-car drivers to learn how applying a growth mindset approach improves their speed times during the 2007 racing season. Bentley explained that car races can last hours and drivers may lose their concentration at pivotal points, making it possible to lose a race by only a few seconds. The objective of coaching is to help drivers recover quickly and maintain an optimal state of flow, he said. The research, carried out by psychology graduate student Fred Leach, will use surveys to gauge the mindset of drivers before, during and after races to see if there is a correlation with their race results, Bentley said. "The goal is to build a growth mindset," he said.

In addition to sports coaches, parents and teachers have written to Dweck to say that *Mindset* has given them new insight into their children and students. "One very common thing is that often very brilliant children stop working because they're praised so often that it's what they want to live as—brilliant—not as someone who ever makes mistakes," she said. "It really stunts their motivation. Parents and teachers say they now understand how to prevent that—how to work with low-achieving students to motivate them and high-achieving students to maximize their efforts." The point is to praise children's efforts, not their intelligence, she said.

Last year, Dweck taught a freshman seminar based on *Mindset*. She chose 16 students from more than 100 who applied, selecting those who expressed personal motivation rather than intelligence. "You can impress someone with how smart you are or how motivated you are, and I picked students who expressed their motivation," she said.

It turned out that embracing a growth mindset was critical to the students' transition to Stanford. The freshmen loved being on campus and quickly became involved in activities, Dweck said, but failed to anticipate the approach of midterm exams. "They were just really overwhelmed," she said. "How did they deal with it? They told me they would have dealt with it poorly, thinking they weren't smart or were not meant to be at Stanford. But knowing about the growth mindset allowed them to realize that they hadn't learned how to be a college student yet. They were still learning how to be successful as a Stanford student." Dweck described the seminar as a "peak experience" in her long teaching career. "The students were fantastic," she said.

Dweck continues to conduct research into what motivates people and what holds them back. Based on the success of *Mindset*, which is being published in nine countries, Dweck has been asked to collaborate on other non-academic projects involving business and sports. "I'm such an egghead," she said with a smile. "My book was my first foray into the real world. Articles go out into the [academic] field and it's very gratifying, but a book goes to all corners of the earth. People take a lot from it, and they introduce themselves into your life."

Dweck's work is to be featured on National Public Radio and in *New York* magazine. She also will present her research at the upcoming annual meeting in San Francisco of the American Association for the Advancement of Science.



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