



CAN WE MAKE OUR STUDENTS SMARTER?

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WHEN I WENT TO SCHOOL, the dominant view was that intelligence was innate and fixed – and that it could be measured by an IQ test. In fact, my Grade 6 teacher had such faith in this view that she seated us around the room in IQ order and handed out all responsibilities and privileges on the basis of IQ. Where did this view come from?

In large part, it came from Lewis Terman, an extremely influential psychologist, who was active throughout the first half of the 20th century. He strongly believed that genes and only genes determined children's intelligence. He also believed that if we could measure this intelligence, we could classify children and assign them to the academic and vocational slot in which they belonged. The problem was how to measure that intelligence.

When Terman translated and adapted the test developed in France by Alfred Binet and Theophile Simon, he had his tool. Now, using a 50-minute-long IQ test, educators could put every child in his or her predestined place. Of course, not everyone was on board. Walter Lippman, the prominent intellectual and journalist, protested: "I hate the impudence of a claim that in 50 minutes you can judge and classify a human being's predestined fitness in life...I hate the sense of superiority which it creates, and the sense of inferiority which it imposes."¹ Nonetheless, intelligence testing took hold and with it Terman's view of intelligence as innate, fixed, bestowed upon some children and not others, and bestowed upon some groups and not others.

EN BREF Pendant longtemps au 20^e siècle, l'intelligence était principalement perçue comme étant innée et fixe, un don attribué à certains et refusé à d'autres. La recherche actuelle démontre cependant à quel point l'intelligence est malléable. Les différences constatées entre les groupes raciaux et ethniques ou entre les sexes dans les résultats de tests de rendement scolaire ont souvent servi à justifier la notion que l'intelligence est surtout héréditaire; mais des preuves convaincantes indiquent maintenant que les conditions d'examen peuvent atténuer considérablement ces différences. Par ailleurs, la nouvelle perception des « êtres doués » reconnaît qu'il s'agit d'une habileté ou d'un talent particulier qui peut augmenter et diminuer au fil du temps, selon les comportements et les circonstances. La recherche précise des façons dont les aptitudes intellectuelles peuvent être accentuées et dont le rendement intellectuel peut être amélioré à l'aide de pratiques pédagogiques rehaussant la perception qu'ont les élèves de leurs propres habiletés.

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Interestingly, Alfred Binet, the originator of the 'intelligence' test, did not share Terman's view at all. Like Lippman, he railed against the idea that people might look at a student's performance at one point in time and believe that they had understood the child's future potential. Originally, Binet and his colleague Simon had simply devised this test to help them identify children in the Paris public schools who were not profiting from the existing curriculum. Once these children were identified, new materials could be designed that would better foster their learning. It is important to reiterate that in Binet's view, a low score on his test signaled a need for extra teaching, not an inability to learn.

Binet was very clear about the limitations of his test. He did not think it measured 'intelligence'. He emphasized the idea that intelligence manifests itself differently in different children and could not be captured with one quantitative measure. He also emphasized the idea that intellectual development progressed at different rates for different children and that it could be influenced by the environment. And he condemned those who promoted the concept of intelligence as a fixed quantity: "Some recent philosophers seem to have given their moral approval to these deplorable verdicts that affirm that the intelligence of an individual is a fixed quantity, a quantity that cannot be augmented. We must protest and react against this brutal pessimism; we will try to demonstrate that it is founded on nothing."²

Where do we stand today?

TODAY'S CONCEPTIONS OF INTELLIGENCE

The debate over whether intelligence is largely fixed or malleable is not over. What is most exciting, however, is the research from social psychology, developmental psychology, cognitive psychology, and neuroscience that is highlighting just how malleable intelligence is. Let us turn to these findings.

Group Differences in Intellectual Test Performance Can Be Decreased

Differences in achievement among racial, ethnic, or gender groups have often been seen as evidence that intelligence is largely hereditary and fixed. However, there is now very strong evidence that when testing conditions are altered, the racial, ethnic, and gender gaps in achievement tests are greatly reduced.

Literally hundreds of recent studies have shown us when achievement gaps are likely to be large and when they aren't. When minority students are given tests of intellectual ability (or females are given tests of mathematical ability) under conditions in which they are aware of their lower status in these areas, they perform substantially worse than their non-stereotyped peers. That is, Black or Hispanic students perform worse than White students and females perform worse than males. However, when the exact same test is given, but students are told that there is no achievement gap, or they are told that the traditional gap is due to experience rather than genes or fixed ability, that gap is significantly decreased – and in some cases eliminated.

There are some remarkable demonstrations of this phenomenon. For example, when Asian girls are oriented toward their gender (by colouring feminine pictures before taking a math test), they do worse than males on a test of mathematical ability. But when they are oriented toward their Asian identity (by colouring pictures with Asian-related themes before taking a math test), they are equal to the males in tested ability. In another fascinating study, White male math majors were told that the study they were participating in was trying to understand why Asians outperform Whites in math. Lo and behold, the White male math majors now performed substantially worse than normal because now they were a negatively stereotyped group! This means that at least part of the racial or gender gaps in measured abilities, often ascribed to innate differences, is instead due to the psychological burden of labouring under a negative stereotype.

There are also very encouraging studies showing that relatively short-term psychological interventions can boost students' (particularly minority students') intellectual performance substantially. In my research, we have discovered that students' beliefs about their intelligence – their mindsets – play a key role in their intellectual performance. Some students have a fixed mindset, believing that their intelligence is simply a fixed trait. Other students, however, have a growth mindset, believing that their intelligence can be developed through learning. Researchers around the globe have now shown that students who believe their intelligence can be developed (i.e., have a growth mindset) show superior academic performance across challenging school transitions, enhanced learning on challenging cognitive tasks, and superior performance on IQ tests.



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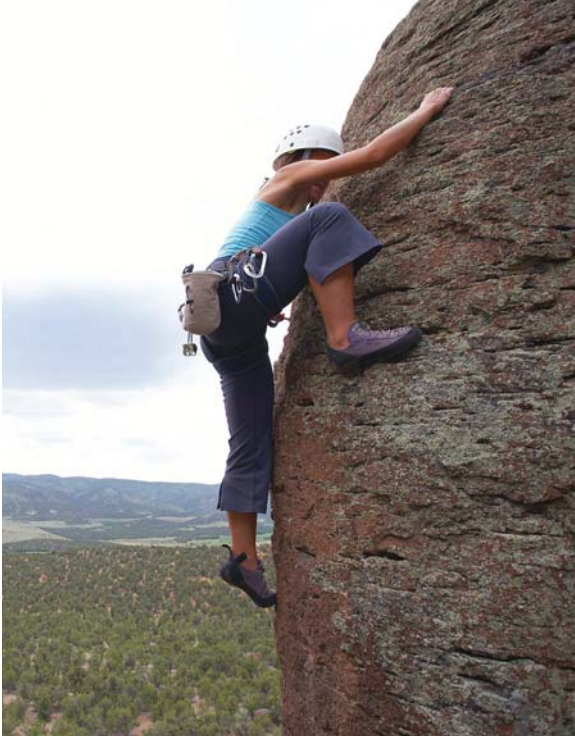
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These mindsets can be changed. Interestingly, praising students' effort (vs. intelligence) creates a growth mindset and enhances performance on difficult intellectual tasks, even on IQ tests. In the past few years, I and other researchers have created growth mindset workshops for students making difficult school transitions. These workshops teach students about the brain, emphasizing that their brains form new connections every time they work hard to learn and that over time this increases their intellectual abilities. Students also learn how to apply this lesson to their schoolwork. Across studies, students in the growth mindset workshops earned higher grades and achievement test scores than matched controls who learned other useful things, such as study skills.

These gains in academic performance have been seen in both at-risk populations and students at elite schools, and in minority students as well as majority-group students. However, there is growing evidence that a growth mindset may be especially important for the cognitive performance of students who are the targets of negative stereotypes that imply limited ability. Negative stereotypes can convey to students that their group is lacking in an important ability. When students already have a fixed mindset about intelligence, that negative message can resonate for them, especially when they are struggling. On the other hand, if students hold a growth mindset, they can acknowledge that their group may have underperformed in certain areas, but nevertheless continue to believe that gains can be made through their own effort and through the input and support of educators.³

Basic Intellectual Skills and Intelligence Itself Can Be Trained

Executive function is at the heart of intellectual ability and is a recognized predictor of academic performance. It includes the ability to control one's attention, to hold information in memory, and to exhibit cognitive flexibility. In groundbreaking studies, four- and six-year-olds were given five days of extensive attention training and then compared to a no-training control group. The trained group showed improvement in physiological and behavioural measures of attention control and in their intelligence test scores. In a real-world setting, researchers at the University

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of British Columbia compared the impact of a preschool curriculum that was infused with executive-function training to an identical curriculum without this training. After they experienced the curriculum, the trained group showed superior performance on new, demanding tests of executive function.

Are these kinds of benefits found only with young children? A recent study with college students testifies to the continuing plasticity of intellectual ability. This study showed for the first time that one could train fluid intelligence – the ability to reason and solve new problems – and that one could raise students' scores on a test of fluid intelligence that was entirely different from the task they were trained on. Fluid intelligence is considered a major factor in learning and is a known predictor of academic success.

This is an exciting time. Researchers are rapidly learning more and more about the foundations of intellectual ability, and as they do, they are learning more and more about how to foster it.

CHANGES IN CONCEPTIONS OF GIFTEDNESS

The field of gifted education is undergoing a similar transformation. In the past, giftedness tended to be portrayed as a global and stable attribute. As a result, experts in the field sought more to measure giftedness than to develop it. After all, if it is fixed, why bother trying to develop it in those who do not have it? And why worry about fostering or maintaining it in those who do? The emerging view, in stark contrast, recognizes that giftedness or talent is often very specific, that it can wax and wane over time, and that one of the most exciting questions facing educators today is how to encourage and sustain it.

In two major new volumes on giftedness published in the past year, experts talk about talent less as a pure gift and more as something that develops and reaches fruition through dedication and learning. They highlight the many, many hours of engagement that typically go into developing an exceptionally high level of ability and tell us that even in prodigies, ability is accompanied by a tremendous zest for the skill area and by constant engagement with it. Thus much of the 'gift' may be a passion for an area and the desire to engage with it vigorously over long periods of time.

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Indeed, this dedication often appears to create giftedness. Thomas Edison's biographer tells us that he was an ordinary Midwestern boy of his day, no more gifted than his peers. What set him apart was his insatiable appetite for mechanical and electrical gadgets and the desire to learn everything possible about them. As a little boy, Warren Buffett requested a business book for his birthday. Paul Cezanne showed little early talent for art, but unrelenting passion.

When talent withers on the vine, it may often be because the zest for learning is lost, not because the gift of ability was somehow not great enough. To the extent that young people believe they simply have a gift that makes them intelligent or talented, they may not put in the work necessary to sustain that talent. As I noted earlier, in my research I have shown that praising children's intelligence (person praise), as opposed to their effort or strategies (process praise), can put them into a fixed mindset, make them afraid of challenges or mistakes, and stunt their passion for learning. It is possible that the gifted label that many students receive, and that their parents relish, may act like intelligence praise. It may turn some children into students who are overly cautious and who avoid challenges in the fear that if they make mistakes they may no longer merit the label 'gifted'. It may make them afraid to venture out of their comfort zone and may dampen their love of learning. These may be precisely the circumstances under which talent fails to thrive.

This means that the challenge for educators is to create environments that foster the development of talent over time; that allow children to identify and pursue their spe-

cific fascinations; that teach them to love challenges, to enjoy effort, and to be resilient in the face of setbacks. When we do this, it takes us further and further from the idea that 'some kids have it and some kids don't'.

When the study of giftedness was mainly about identifying the gifted few, it was an enterprise of somewhat restricted interest. However, with the new perspective on giftedness, it turns out that developing and sustaining talent is one of the most important and exciting areas of study. It encompasses many researchers studying many abilities, how they develop, and the factors that can promote them. And it takes as its target many students of diverse cultures and backgrounds and ages. It is a field that has become less about *who has it* and more about *how to promote it*.

ENVIRONMENTS THAT FOSTER INTELLIGENCE

If intelligence can in fact be fostered in our students, how do we go about it? Here are some suggestions.

Teach a growth mindset. Teaching them a growth mindset allows students to venture forth and take risks. Instead of worrying about how smart they are, they focus on getting smarter through learning. This message is important both for students who are struggling and for students who are high achievers. Programs such as our *Brainology* program (www.brainology.us) can be used to teach adolescents a growth mindset. Also, make particularly sure that students labouring under negative stereotypes understand that you believe in their ability to learn.



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Give challenging work to all students. Students' minds grow when they stretch themselves. Try to incorporate tasks that train students' attention (e.g., learning to tune out distractions), memory (learning to hold a number of things in mind at the same time), and cognitive flexibility (switching back and forth between ideas that can be confusing in their similarity). Programs such as *Tools of the Mind* (toolsofthemind.org) can be used to teach these intellectual skills to young students.

Make sure to emphasize process. Students need to learn that what is important is the process they engage in – not so much the end product (like a test score or grade) and certainly not how smart they look. Students are highly influenced by what we value. We need to convey to them that process – applying effort, trying many strategies, persevering through difficulty – is what we value. They need to know that we consider hard tasks, not easy ones, to be fun and that we admire people who struggle on hard tasks more than people who glide to success on easy tasks.

Make sure students know that virtually all the heroes they admire got there through effort. Whether we are talking about sports, the sciences, the arts, or business, the people who are the great successes developed their abilities through dedication and labour, not simply as a natural by-product of their talent.

In summary, much recent research is supporting the idea that intelligence and talents are not just gifts that are given to some students and withheld from others. Instead, this research is pinpointing ways in which intellectual abilities can be augmented and intellectual performance can be enhanced through educational practices. As educators, we have our task cut out for us. Is there any more important job in the world than helping students fulfill their extraordinary potential? |

Recommended Reading

Dweck, C.S. (2006). *Mindset: The New Psychology of Success*. New York: Random House.

Horowitz, F.D., Subotnik, R.F., & Matthews, D.J. (2009). *The Development of Giftedness and Talent Across the Life Span*. Washington, D.C.: American Psychological Association.

Diamond, A., Barnett, W. S., Thomas, J., & Munro, S. (2007). Preschool program improves cognitive control. *Science*, 318, 1387-1388.

CAROL S. DWECK is Professor of Psychology at Stanford University and author of *Mindset: The New Psychology of Success*. She recently won the Ann Brown Award for contributions to developmental psychology (2009), the Donald Campbell Award for contributions to social psychology (2008), the Klingenstein Award for Leadership in Education (2010), and the E.L. Thorndike Career Achievement Award for research in educational psychology (2010).

Notes

- 1 Walter Lippmann, "The Great Confusion," *The New Republic* 33 (3 January 1923): 146.
- 2 Alfred Binet, *Les Idées Modernes Sur les Enfants* (Paris: Flammarion, 1909/1973).
- 3 For more on fixed and growth mindsets, see Carol Dweck, "Boosting Achievement with Messages that Motivate," *Education Canada* 47, no. 2 (Spring, 2007): 6-10.

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