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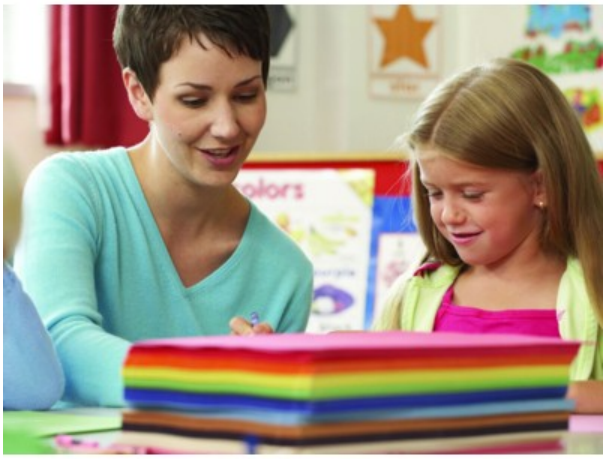
Learning Strategies Outperform IQ in Predicting Achievement

By Scott Barry Kaufman | April 8, 2013



In the 1960s, the legendary psychologist Albert Bandura rejected the view that learning is passive. Instead he emphasized the importance of the active use of learning strategies. Today, Bandura's legacy lives on, and has been extended in exciting new directions.

Grounded in Bandura's pioneering research, in 1986 Barry Zimmerman and Martinez Pons published a paper that helped spur an entire new field of study on self-regulated learning strategies. Zimmerman and Pons interviewed 40 tenth-grade students who were on a "high achievement track" and compared their responses against those of 40 tenth-graders who were in "lower achievement tracks." Specifically, they asked the students about the learning strategies they used to participate in class, study, and complete their assignments. Through the course of their interviews, they identified fourteen self-regulated learning strategies. They found that the high-achieving students differed from the low-achieving students in regard to whether they used these strategies, how much they used the strategies, and their consistency in using the strategies.

Over the past few decades there have been multiple studies showing the effectiveness of the self-regulated learning strategies approach using a variety of methodologies (e.g., think-aloud protocols, diaries, observation). In one recent large review, John Dunlosky and colleagues evaluated the relative utility of ten learning strategies. While some of the learning strategies (e.g., highlighting, rereading) were found to have low utility in benefitting learning outcomes, the following strategies were assessed as having moderate to high utility: practice testing (high), distributed practice (high), elaborative interrogation (medium), self-explanation (medium), and interleaved practice (medium). **Practice testing had the most evidence supporting its benefits for learning across context and over time.**

Researchers have also recently begun to integrate the learning strategies approach with the expert performance approach. A plethora of research shows that a very deliberate type of practice involving the active use of strategies to maximize performance and overcome limitations is *essential* to greatness across many domains, including the arts, sciences, and sports. Excitedly, recent research suggests that the expert performance approach can also be applied to increase our understanding of the acquisition of school-based knowledge.

In one study, Kiruthiga Nandagopal and K. Anders Ericsson investigated the use of self-regulated learning strategies among advanced undergraduate bioscience majors. Because these students "made active decisions to embark on the road to acquiring expertise in the biological sciences," they met the expert performance approach criteria. Adopting one of the key methodologies of the expert performance approach, they analyzed student diaries over the course of three weeks, estimating the presence, frequency, and duration (in terms of total number of hours) of self-regulated learning strategies. They grouped fourteen self-regulated learning strategies into six main categories: *self-regulating* (self-assessing, goal-setting, planning, and so on), *organizing*, *seeking information*, *mnemonic usage*, *seeking social assistance* (for instance, seeking assistance from peers, tutors, and professors), and *reviewing* (reviewing prior problems,

notes, textbook, and such). Then they compared the diary responses among the following three groups of achievers based on their GPA before entering the course: high-achieving students (GPA > 3.7), average-achieving students (GPA ≥ 3) and low-achieving students (GPA < 3).

Comparing the diary responses of the different groups of achievers, they found that the high-achieving students reported employing a larger number of different strategies. The high-achieving students were particularly more likely to engage in organizing and transforming, seeking information, and reviewing strategies compared to the low-achieving students. Timing was also critical. While students engaged in organizing, transforming, and reviewing notes more frequently and for longer stretches of time during the midterm week than other weeks, **high-achieving students sought more assistance from their peers and spent more time studying during midterm weeks compared to low-achieving students.** In contrast, low-achieving students engaged in these strategies more than average-achieving students toward the end of the semester. High-achieving students also spent more time overall in study-related activities earlier in the semester compared to average and low-achieving students, whereas there was no such difference between the groups later on in the semester.

The most important learning strategies for predicting end-of-semester GPA were (1) seeking information, (2) reviewing the textbook, and (3) seeking assistance from peers during the midterm week. While the correlation between prior SAT scores and semester GPA was significant, **once the most predictive learning strategies were considered, prior SAT scores didn't explain any additional variation in end of semester GPA.** Considering IQ scores (which are highly correlated with SAT scores) are known to be excellent predictors of academic achievement, this finding is actually quite striking! This suggests that one of the crucial reasons why those with higher general cognitive ability tend to do so well across so many learning situations is due, in large part, to their use of efficient learning strategies that maximize learning outcomes.

This idea is consistent with a fascinating study conducted by Nandagopal, Roy Roring, and Jeanette Taylor. They had twins think aloud while they were taking three cognitive tests that are significantly correlated with IQ– associative learning, working memory, and processing speed. After analyzing the thought processes of the participants, the researchers found that performance on all three cognitive tests was heavily influenced by cognitive strategies (e.g., mnemonic encoding techniques). Most compellingly, differences in strategy use on the associative learning task (which was most amenable to the use of strategies) explained a significant amount of the genetic influences on performance. While there certainly needs to be more research on the development of learning strategies, **this study is the first to demonstrate that the heritability of performance on cognitive tasks is due, in part, to the use of specific cognitive strategies.**

Another recent study further supports the importance of learning strategies for predicting long-term growth and achievement. Kou Murayama and colleagues investigated the simultaneous prediction of motivation, learning strategies and IQ for explaining the long-term growth in mathematics achievement from Grades 5 to 10 among a sample of German students. Their measure of math achievement tested competencies such as arithmetic, algebra, and geometry. At the start of their study, IQ, motivation, and learning strategies significantly predicted math performance, with motivation and learning strategies adding additional prediction above IQ.

A different story emerged, however, once they looked at the predictors of long-term growth. **IQ was not related to growth in mathematics achievement after taking into account demographic information.** In contrast, perceived control (e.g., "*When doing math, the harder I try, the better I perform*"), intrinsic motivation (e.g., "*I invest a lot of effort in math, because I am interested in the subject*"), and deep learning strategies (e.g., "*When I study for exams, I try to make connections with other areas of math*"), significantly predicted growth of mathematics knowledge. What's more, surface learning strategies ("*For some math problems I memorize the steps to the correct solution*") negatively predicted mathematics growth.

The researchers related their findings to *The Matthew Effect*: those with high intrinsic motivation and effective learning strategies will tend to increase their ability, while those without those characteristics will tend to decrease their ability. Over time, the gap between those with higher ability and those with lower ability will widen. **Which is all the more reason why we ought to set up the right conditions for active engagement for everyone, and teach people the proper strategies for success.**

If you'd like to learn more about different kinds of minds and the many paths to greatness, you can pre-order "Ungifted: Intelligence Redefined," coming this summer from Basic Books.

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