

Annotated Bibliography

Academic Youth Development: Improving Achievement by Shaping the Culture of Algebra Classrooms

A program of the Charles A. Dana Center at The University of Texas at Austin

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Adelman, C. (2006). *The toolbox revisited: Paths to degree completion from high school through college.* Washington, DC: U.S. Department of Education. Available at www.ed.gov/rschstat/research/pubs/toolboxrevisit/index.html.

Adelman's 1999 publication, *Answers in the Toolbox*, demonstrated that what students study in high school is a better predictor than are test scores or GPAs for whether they will earn a bachelor's degree. In particular, Adelman found that the level of mathematics students study in high school has the strongest influence on completion of a college degree: "Finishing a course beyond the level of Algebra 2 (for example, trigonometry or precalculus) more than doubles the odds that a student who enters postsecondary education will complete a bachelor's degree."

For this 2006 follow-up study, Adelman followed a national sample of eighth graders from 1988 through their scheduled graduation in 1992 and beyond (until 2000)—conducting interviews with the students and studying their high school and college transcript data.

He found, again, that intensity of high school academics, particularly mathematics, influences whether a student will complete a bachelor's degree. Based on his findings, Adelman asserts that high schools "must provide maximum opportunity-to-learn" and "ratchet up the challenge of content" (p. 108) and that colleges must change some of their policies and practices to encourage more students to persevere in their work toward degree completion. Adelman also addresses students themselves, urging them to take control of their own learning and choose high-intensity academic courses in high school and college.

Aronson, J., Fried, C., & Good, C. (2002). Reducing the effects of stereotype threat on African American college students by shaping theories of intelligence. *Journal of Experimental Social Psychology*, 38, 113–125.

In various studies, Aronson and his colleagues have discussed how "stereotype threat" affects the test scores and grades of black students. A persistent U.S. cultural stereotype maintains that black students are intellectually inferior to white students. Aronson and his colleagues have shown how the awareness of this stereotype threatens the academic success of black students. Even when those students do not believe in the stereotype, their awareness of it can cause apprehension and anxiety that affects their academic performance and can lead to their disidentification with school altogether.

In this study, the authors establish three groups of undergraduates, with black and white students in each group. The experimental group and one control group participated in a penpal program in which they were told that they would exchange letters with middle school

students from impoverished communities. The middle school letters mentioned some problems students were having in school.

The experimental group was given information about the malleability of intelligence and how intelligence is not fixed but can grow with hard work; they were asked to communicate this learning to their penpals. The penpal control group was also given information to communicate to their penpals, but their information said that there are many different types of intelligence. The other control group did not have penpals or get information about the brain and intelligence.

The black students in the experimental group ended up with higher grades for the semester and a greater percentage of these students reported enjoying academics than did the black students in the other two groups. This result supports the authors' contention that stereotype threat exists and that it can be countered.

Blackwell, L., Trzesniewski, K., & Dweck, C. (2007). Implicit theories of intelligence predict achievement across an adolescent transition: A longitudinal study and an intervention. *Child Development, 78*(1), 246–263.

Blackwell and her colleagues furthered the work of Dweck and others by studying students' theories of intelligence as predictors of achievement across the transition through junior high school. They found that students who viewed intelligence as malleable (or capable of incremental change) also tended to hold stronger learning goals. Further, their data showed that students with incremental views of intelligence were less likely to experience the downward coursework grade trajectories that are typical as students move through their junior high years.

Since these researchers' data indicated more positive outcomes for students who believed that intelligence is malleable, they conducted a second study in which they implemented a modest intervention designed to shape students' self-theories. Junior high students were given an eight-session workshop about useful ideas and study skills; half of the students, however, were also taught an incremental theory of intelligence and how to apply it to their schoolwork.

Students who experienced the incremental intervention earned significantly higher mathematics grades than did their peers in the other workshop. This work provides further evidence that modest interventions can positively affect students' self-beliefs and their achievement, especially during major transitions in their education.

Dweck, C. S. (2002). Messages that motivate: How praise molds students' beliefs, motivation, and performance (in surprising ways). In J. Aronson (Ed.), *Improving academic achievement: Impact of psychological factors on education* (pp. 37–60) New York: Elsevier Science.

Dweck provides a thorough introduction to the different theories that students have of intelligence and describes how these theories affect students' achievement. She focuses on two major theories—*fixed* intelligence versus *malleable* intelligence.

Students who believe that intelligence is fixed and unchangeable tend to believe that failure in learning something, as well as the need to expend effort to learn something, indicate low intelligence. When these students encounter concepts they do not understand immediately, without effort, they tend to believe that they are incapable of understanding, and they react by expending even less effort.

Students who believe instead that intelligence is malleable are not as threatened by failure and are willing to expend effort to learn new concepts, believing that the effort is worthwhile because it will lead to greater understanding.

Dweck cites several studies that show how students' theories of intelligence can be changed. She then describes several of her own studies that examined the effect of specific types of praise on students' beliefs about their own intelligence. Praising children's intelligence when they completed a puzzle tended to cause the children to believe that intelligence is fixed; praising their hard work, however, tended to encourage a belief that intelligence is malleable. Finally, Dweck addresses some ways teachers can help students start thinking of intelligence as malleable and believe that, with hard work, they can achieve.

Good, C., Aronson, J., & Inzlicht, M. (2003). Improving adolescents' standardized test performance: An intervention to reduce the effects of stereotype threat. *Journal of Applied Developmental Psychology, 24*, 645–662.

Continuing their research on stereotype threat (see Aronson, Fried, & Good, 2002; Steele, 1997), the authors investigated ways of helping students who might feel its effects. The authors studied a group of 138 seventh-grade students in a rural Texas school district with a high percentage of economically disadvantaged students. All students in the group were vulnerable to stereotype threat, according to other research by these authors. The group was 67% Hispanic, 13% black, 20% white, and 45% female.

The 138 students were randomly placed in four groups. The first group learned that intelligence is malleable and can be increased; the second group learned that students tend to struggle academically at the beginning of seventh grade, but that they would likely see improvement when they got used to middle school; the third group learned a mixture of those two concepts; and the fourth group, the control group, learned from an anti-drug curriculum.

At the end of the school year, the authors examined the students' mathematics and reading scores on the state standardized test. In the control group, male students scored higher than

did female students, whereas in all three experimental groups, both male and female students had higher scores and no gender-related achievement gap was evident.

Marks, H. M. (2000). Student engagement in instructional activity: Patterns in the elementary, middle, and high school years. *American Educational Research Journal*, 37(1), 153–184.

Numerous studies have shown that student engagement in instruction contributes to students' academic, social, and cognitive development, and various researchers have recommended reforms geared specifically toward increasing student engagement.

Using student surveys, Marks investigated the effect of three influences on student engagement in a national sample of 3,669 students in mathematics and social studies classes in elementary, middle, and high schools. Those influences were

- 1) personal background and orientation toward school,
- 2) authentic (relevant and intellectually stimulating) work and social support for learning, and
- 3) course subject matter.

She found that both authentic work and social support for learning contributed strongly to student engagement, even reducing the effects of negative influences. Social support for learning included classroom environments in which teachers set high expectations and in which students could get help from the teacher and peers. She also found that elementary and high school students were more engaged in math classes than in social studies classes.

Steele, C. M. (1997). A threat in the air: How stereotypes shape intellectual identity and performance. *American Psychologist*, 52, 613–629.

Steele reviews literature on stereotype threat, closely examining when and how negative stereotypes—such as girls not being good at math, older people having faulty memories, and so on—can affect any group of people. Steele notes that members of a stereotyped group need not believe in the stereotype for it to affect their performance in an area; they only need to be aware of the stereotype for it to affect their performance.

Steele then narrows his focus to academic performance and the effects of stereotype threat on female students and black students, describing research he and colleagues conducted to test the effects of the threat. He offers several potential ways to weaken stereotype threat and reduce its effects on student performance. Among his recommendations are to

- 1) provide “optimistic teacher–student relationships,” in which the teacher shows optimism about students' abilities;
- 2) engage students in challenging work instead of remedial work; and
- 3) emphasize to students that intelligence is malleable and expandable.