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TRENDS IN EDUCATION RESEARCH

Expanding Beyond Academics: Who Benefits and How?

by John Deke and Joshua Haimson

This brief summarizes the findings of Mathematica's Valuing Competencies study, which analyzed the effects of students' high school competencies on their postsecondary earnings and educational attainment. We estimated the effects of several competency measures, including academic achievement (as captured by test scores) and composite measures of leadership skills, sports-related skills, work habits, prosocial behavior, and locus of control (a measure of students' belief that they control their future). Using the National Education Longitudinal Study (NELS), a survey of students, parents, and school staff, as well as tests administered during high school, we estimated the fraction of students who benefited most from gains in each competency measure and how these benefits depended on a student's existing strengths and weaknesses.

Debate Over Academic Test Scores

The growing use of math and reading test scores to measure school and student performance, spurred by the passage of the No Child Left Behind Act (NCLB), has heightened an old debate about which competencies public schools should encourage students to develop. Does the growing focus on academic test scores to measure educational success aid schools in helping students develop the most important skills and abilities? Or might it discourage teachers from working with students to enhance other valuable skills, habits, and attitudes?

The answers to these questions depend in part on a school's capacity to help students develop specific skills. A more basic issue—and the focus of our study—concerns the value of building various competencies. We sought to identify competencies with substantial effects on students' later success in higher education and the labor market. We also estimated how the value of improving each of these competencies depends on students' existing strengths and weaknesses.

Methods, Data, and Measures

Research has already examined the benefit for the average student of improving test scores and some other competencies. But this focus on average effects can obscure important differences among students. Using a flexible model to analyze nonlinear effects and interactions among competencies, we estimated the effect of a marginal improvement in each competency on postsecondary earnings and educational attainment as a function of students' existing competencies.

We used data collected for NELS, which followed a cohort of students who were in eighth grade in 1988. Our competency measures and control variables were based on the NELS high school tests and surveys of students, teachers, and parents conducted in 1988, 1990, and 1992. The 2000 wave of NELS, conducted eight years after students were scheduled to complete high school, provided the outcome measures of postsecondary educational attainment and earnings. Our base sample consisted of 9,977 high school graduates.

Because students' true competencies cannot be observed directly, we analyzed composite variables that serve as indicators, or statistical markers, for these competencies. We grouped individual NELS variables into categories on the basis of the underly-

COMPETENCIES AND THEIR MEASURES

1. **Academic achievement as measured by math test scores.** We analyzed the NELS math, reading, history, and science tests administered in eighth, tenth, and twelfth grades. Our models relied on math scores because they are highly correlated with scores on the other tests and more strongly related to postsecondary education and earnings. (The NELS reading test, in particular, is a weak predictor of postsecondary outcomes).
2. **Work habits.** NELS asked questions of students and teachers about students' work habits. We combined these data into one composite. Questions focused on how much time students spent on homework, how hard they worked in class, how often they came to class with books and other materials, and how often they were tardy or absent.
3. **Sports-related competencies.** Sports participation is associated with competencies such as teamwork, competitiveness, and ability to set and work toward goals. Our primary measure in this area was the number of sports a student participated in during high school, transformed into a percentile. The model measured the effect of competencies correlated with sports participation, some of which students may possess before participating.
4. **Leadership skills.** NELS recorded leadership roles students play in extracurricular activities, including student government, sports, and nonathletic organizations and clubs. Our measure is the number of leadership roles a student had during high school, transformed into a percentile. As with sports, this measure is an indicator of competencies students possessed before the leadership activity, as well as skills developed through the activity.
5. **Prosocial behavior.** NELS asked students and teachers whether students got in trouble for disrupting or not following rules. This measure does *not* include questions on illegal activity or expulsion from school, because these events are too rare to analyze reliably and may be substantively different from other items in this composite.
6. **Attitudes toward determinants of success.** Students who believe that success results from hard work rather than good fortune may be more likely to succeed both in school and on the job. NELS included a locus of control composite designed to measure the extent to which students believe success is the result of hard work as opposed to luck.

ing type of competency and then formed measures for each of six competencies (see box). The four academic test scores we analyzed—math, reading, science, and history—are highly correlated with one another, so it was not possible to isolate the effects of the skills captured by each test. Instead, we focused on the math test because it is the strongest predictor of postsecondary education and earnings.

To control for other factors that affect outcomes, our model included variables corresponding to students' backgrounds and school characteristics. The student variables included gender, race, socioeconomic status, household structure, disabilities, and an indicator of whether a student was ever held back. The school variables included the proportion of students who received a free or reduced price lunch, the proportion who enrolled in a college-prep curriculum, the number of extracurricular activities offered, and a set of variables that measured a school's discipline policies.

Math Versus Other Competencies

A key question is which competencies are most valuable—in other words, which ones benefit the largest numbers of students if improved. For each student in our sample, we identified the competency that, when raised 10 percentile points, generated the largest jump in earnings and likelihood of completing a postsecondary program. This analysis compared the postsecondary outcomes of students with a higher level of a given competency to outcomes for students with a lower level.

Increasing math test scores had the largest effect on earnings for a plurality of the students, but most students benefited more from improving one of the nonacademic competencies (Table 1). For example, with respect to earnings eight years after high school, increasing math test scores would have been most effective for just 33 percent of students, but 67 percent would have benefited more from improving a nonacademic competency. Many students would have secured the largest earnings benefit from improvements in locus of control (30 percent) and sports-related competencies (20 percent). Similarly, for most students, improving one of the nonacademic competencies would have had a larger effect than better math scores on their chances of enrolling in and completing a postsecondary program. A large

fraction would have benefited most from improvements in work habits. However, for more than half of the students, better math test scores would have had the largest effect on the likelihood of completing a bachelor’s degree.

Improved Competency	Complete Postsecondary Program	Complete Bachelor’s Degree	Earnings
Math Test Score	30	56	33
Nonacademic Competencies	70	44	67
Work Habits Composite	43	31	2
Sports-Related Competencies	9	5	20
Prosocial Behavior Composite	5	6	2
Leadership Roles	5	1	14
Locus of Control	9	1	30

*Eight years after high school.

Different Students Have Different Needs

The benefits to students from gains in each competency depended on the mix of competencies they possessed at the outset. The benefit of improving math test scores appeared to be largest for students who were weak in math. For students whose math skills were stronger, the benefits of additional gains in math depended on their other competencies. In particular, those with better work habits were more likely to experience substantial benefits from further improvements in their math skills. In general, students reaped the most benefit from improving in areas where they were weak. As such, the recent emphasis on improving the academic performance of low achievers may be well placed. On the other hand, our findings also support the view that children with high levels of academic achievement could benefit substantially by developing nonacademic skills.

Considering individual strengths and weaknesses when deciding which competencies to improve might be a more effective strategy than simply encouraging all students to improve the same competencies. In

Table 2, we present percentage point differences in effects between a hypothetical “individualized” policy and a hypothetical “one-size-fits-all” policy on four postsecondary outcomes. In the case of the individualized policy, a *different* competency—the one of greatest value to each student—is increased by 20 percentile points for each student. In the case of the one-size-fits-all policy, the *same* competency—the one with the largest overall average effect—is increased by 20 percentile points for each student. For example, increasing the competency of greatest economic value to each individual student by 20 percentile points is associated with an average increase in earnings of 9.3 percent (not shown). This contrasts with an increase in earnings of 5.6 percent if math test scores were improved by 20 percentile points for each student, a statistically significant difference of 3.7 percentage points (the last row in Table 2).

Outcome	Differences in Policy Effects
Enrollment in a Postsecondary Program	2.0*
Completion of a Postsecondary Program	1.9*
Bachelor’s Degree	1.4
Earnings	3.7*

Source: Authors’ calculations using data from NELS.

*Significantly different from zero at the .05 level, two-tailed test.

Note: Positive numbers correspond to cases where the individualized policy is more effective.

Moving Forward

Our findings have two implications for educational policy and practice. First, the increasing focus on academic skills, and particularly skills captured by standardized tests, may be misplaced if it leads schools and parents to neglect the development of valuable nonacademic competencies. Second, an individualized approach to setting and pursuing

competency objectives for each student could benefit students in terms of their future educational attainment and earnings.

Educators are likely to face at least two challenges in developing nonacademic competencies:

- **Measuring these competencies objectively is difficult.** For many measures used in this study, we relied on student self-reports or reports from teachers. In practice, schools could not depend on this type of subjective and informal assessment, particularly if they are held accountable for students' mastery of these competencies. Furthermore, little is known about how teachers can develop most nonacademic competencies.
- **Schools may find it hard to help individual students identify and develop the competencies they need most.** Expanding the use of individualized education plans, currently required for students with special needs, is one possible strategy schools could use to gauge individual needs. The plans could help schools advise parents and students on classes and activities that could be most beneficial. This approach would require a large investment in guidance staff and professional development. Additional teacher training, curricu-

lum changes, and reductions in class size might help teachers create customized assignments and projects for students.

Finding ways to help students and schools respond to the accelerating demands of our knowledge-driven society is a national priority. Despite the challenges and costs involved in developing a more individualized approach to schooling, the investment may be worthwhile. Additional research could help clarify what types of investments would be most beneficial. It could also address the value of a broader range of competencies, including ones not captured in our study, and illuminate how the benefits of specific competencies interact with students' existing skills, attitudes, and interests. Research can also play a role in helping educators develop methods for measuring competencies, particularly ones that cannot be evaluated well through standardized tests. Finally, future education experiments could help policymakers identify cost-effective ways to increase academic and nonacademic competencies.

For more information, contact John Deke, senior researcher, at (609) 275-2230, jdeke@mathematica-mpr.com. The full report is available at www.mathematica-mpr.com.

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To Find Out More:
Communication Services
Phone: (609) 799-3535
Fax: (609) 799-0005

Princeton Office
PO Box 2393
Princeton, NJ 08543-2393
Phone: (609) 799-3535
Fax: (609) 799-0005

Washington Office
600 Maryland Ave., SW, Suite 550
Washington, DC 20024-2512
Phone: (202) 484-9220
Fax: (202) 863-1763

Cambridge Office
955 Massachusetts Ave., Suite 801
Cambridge, MA 02139
Phone: (617) 491-7900
Fax: (617) 491-8044