Achieve, Inc.

math works

Advanced Math Equals Career Readiness

The equation is simple: No matter their background, students who take challenging mathematics courses in high school get better jobs and earn more money throughout their entire lives.

Higher-level math opens doors for any and all postsecondary programs and keeps it open for advancement beyond entry-level jobs.

- 80 percent of U.S. jobs require some postsecondary education or training. This includes bachelor's and associates's degrees, vocational certifications apprenticeships, and other credentials.[1]
- About half of 2010 graduates wish they had taken different courses in high school, with math being the most commonly referenced course. 40% of graduates say they wish they had taken "more math/higher level math."[2]
- Simply taking advanced math has a direct impact on future earnings, apart from any other factors. Students who take advanced math in high school have higher incomes ten years after graduating—regardless of family background, grades and college degrees.[3]
- Black, male students particularly benefit in terms of annual earnings later on, with each additional mathematics course completed increasing their annual earnings by 8% on average. This figure it particularly powerful given many other estimates find each additional year of schooling increases earnings by about 15% in total.[4]
- Juniors and seniors who take higher-level math make larger learning gains during their last two years in high school, particularly in the much sought-after "advanced skills," such as multi-step problem solving and the application of analytic logic—and students who make big gains on math tests during high school have higher earnings seven years later.[5]
- Three-fourths of adults in the top-paying quarter of jobs took Algebra II.[6]
- Members of the baby boomer generation held an average of 11 different jobs between the ages of 18 and 42, a trend that will continue to grow with new generations of workers.[7] Higher-level mathematics equips students with the critical thinking and analytic skills, as well as the adaptability and flexibility, necessary to navigate multiple job and career changes in the 21st century economy.

The 81 Career Cluster Pathway Plans of Study, developed by secondary, postsecondary, business, industry and government leaders, to serve as a guide for career and technical education (CTE) students' educational and career goals in a wide range of careers–in health care, manufacturing, finance, among others–recommend that students take a rigorous set of math requirements at the secondary and postsecondary levels. At a minimum, every plan of study recommends that students complete Algebra II and one additional higher-level math course, such as Statistics and Pre-Calculus.[14]

American employers are demanding advanced math skills.

- 98 percent of the business organizations surveyed by the U.S. Chamber of Commerce put a premium on improving math and science in upper elementary, middle and high school, with more than three-fourths placing a "very high level of priority" on improving math and science to strengthen America's workforce.[8]
- A little over half of all U.S. occupations require a significant level of "knowledge of arithmetic, algebra, geometry, calculus, statistics, and their applications." Included in these nearly 500 occupations are about 45% of low skills jobs, about half of middle skills jobs, and over 80% of high skills jobs.[9]
- One study found that the math skills required by electricians, construction workers, upholsterers and plumbers—traditional "blue collar" jobs—match what's necessary to do well in college courses.[10]
- For example, the International Brotherhood of Electrical Workers' test to screen prospective apprentices includes algebra problems;[11] the FAA's exam for incoming aircraft mechanics also includes algebra;[12] and the National Center for Construction Education & Research (NCCER) Construction Technology Certification curricula includes geometry.[13]

ENDNOTES

1 Biroonak, Armand & Kermit Kaleba (2010). *The Bridge to a New Economy: Worker Training Fills the Gap. The Institute for America's Future and the National Skills Coalition*. http://www.nationalskillscoalition.org/assets/reports-/the-bridge-to-a-new-economy.pdf

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4 Goodman, Joshua (2009). The Labor of Division: Returns to Compulsory Math Coursework. http://isites.harvard.edu/fs/docs/icb.topic630262.files/NBER_EducGroup.pdf

5 Finding related to advanced math coursetaking and achievement from Bozick, R., and Ingels, S.J. (2008). *Mathematics Coursetaking and Achievement at the End of High School: Evidence from the Education Longitudinal Study of 2002*. (NCES 2008-319). Washington, DC: U.S. Department of Education, National Center for Education Statistics. Finding related to math gains and later earnings from Rose, H. (2006, August). Do gains in test scores explain labor market outcomes? *Economics of Education Review*, 25(4), 430-446. (p. 445)

6 Carnevale, A. P. & Desrochers, D. M. (2003). The democratization of mathematics. In Bernard L. Madison and Lynn Arthur Steen (Eds.), *Quantitative Literacy: Why Numeracy Matters for Schools and Colleges*, 21-31. Available from http://www.maa.org/ql/qltoc.html. (p. 26)

7 Bureau of Labor Statistics News Release. (2008, June) *Number of Jobs Held, Labor Market Activity, and Earnings Growth Among the Youngest Baby Boomers: Results from a Longitudinal Survey*. Washington, DC: Author.

8 U.S. Chamber of Commerce Statistics and Research Center. (2006) *Education Reform: Insight into the Business Community's Views About the U.S. Education System*. (p. 6)

9 Achieve analysis of O*NET data

10 ACT, Inc. (2006). *Ready for College or Ready for Work: Same or Different?* Iowa City, IA: Author.

11 National Joint Apprenticeship and Training Committee for the Electrical Construction and Maintenance Industry, http://www.njatc.org/training/apprenticeship/index.aspx.

12 www.faa.gov/mechanics/become

13 The National Center for Construction Education & Research, www.nccer.org

14 See http://www.careertech.org/ for more information on the State's Career Clusters.