

**Adelman, C. (2006). *The Toolbox Revisited: Paths to Degree Completion From High School Through College*. Washington, D.C.: U.S. Department of Education.**  
([www.ed.gov/rschstat/research/pubs/toolboxrevisit/index.html](http://www.ed.gov/rschstat/research/pubs/toolboxrevisit/index.html))

*The Toolbox Revisited* is a “data essay,” or “story” based on a research project designed as a replication of a previous study published by the U.S. Department of Education in 1999—*Answers in the Toolbox*. Both were based on analyses of cohorts of high school students: *Answers in the Toolbox* was based on a cohort of students who were scheduled to graduate in 1982. *The Toolbox Revisited* is a study of a national sample of eighth graders (over 12,000 students) scheduled to graduate from high school in 1992, and who were tracked through December 2000 (NELS:88/2000). The universe of students followed include only those who graduated from high school and had attended a postsecondary institution by age 26.

In the introduction to *The Toolbox Revisited*, Adelman explains that “This study explores the academic resources and momentum students build through their high school and college careers, and analyzes the relationships between those factors and degree completion rates. It departs from most previous research on attainment by focusing on the details of students’ high school and college curricula and academic performance that are available from transcript records” (p. 3). Typical measures of “college graduation rates” and “retention” rates, referred to by Adelman as “anachronistic formulas,” are considered, but the focus of this study is on “persistence”—following the student, not the institution, in an effort to determine what student characteristics and academic behaviors explain bachelor’s degree completion. “Retention,” a common measure of student success, is regarded as a passive measure, while “persistence” is active, requiring decisions on the part of students, who are considered “active players, seeking and discovering paths to their education goals” (p. xxvi).

The analysis in *The Toolbox Revisited* contains seven steps reflecting a collection of variables: (1) demographic background and high school history; (2) postsecondary entrance (timing and type of institution); (3) first postsecondary year history (curriculum and performance); (4) factors of financing postsecondary education in the early years; (5) postsecondary attendance patterns; (6) extended postsecondary history (curriculum and performance); and (7) the final model, with complete academic history. A variety of sophisticated statistical tools are used in the analysis, including descriptive and logistical models. The text is enhanced by 34 tables; twelve appendices, including many additional tables, are included in the report. Adelman discusses the findings reported in *Answers in the Toolbox*, and describes the changes in data collection and analysis strategies used in *The Toolbox Revisited*, as well as differences in findings.

Adelman’s findings include student characteristics and behavior prior to and following college matriculation. He devised an “academic intensity” index based on the number of Carnegie units taken in particular subject areas to evaluate the students’ secondary academic experience. The following are considered minimums: English (3.75 units or more), math (3.75 or more, the highest being pre-calculus, calculus or trigonometry), science (2.5 or more), foreign language (2 or more), history/social studies (2.0 or more), more than one AP course, and no remedial English or math. This high school curriculum variable had a positive impact on degree completion by race/ethnicity, closing the “gap” for many students. It had the potential to increase African-American degree completion by 28%, Latino completion by 18%, and white students’ completion by 10%. Among additional findings on the impact of curriculum intensity on performance are:

- For Latino students, high school academic curriculum attainment and entering college directly from high school narrows the gap with white students from 22.2% to 16.4%.

- For white and Asian students, moving into the top 40% of the high school academic curriculum intensity index and completing high school mathematics beyond Algebra 2 is the “strongest engine” for boosting college graduation rates.
- For African-American students, the curriculum attainment index does not significantly close the completion gap; however, earning four or more credits in summer terms narrows the gap with white students from 15.5% to 6%.
- For low SES students (for whom bachelor’s degree completion is most problematic) a strengthened high school curriculum and improved quality of the learning environment have great potential for increasing the probability of completing a college degree.
- When demographics alone are analyzed, Adelman found that minority status, gender, and socioeconomic status (SES) reduce the probability of earning a bachelor’s degree.
- The academic quality and the intensity of a student’s high school curriculum is a key factor in determining that student’s success in college.
- Because the “disconnect” between high school and college is less for students entering selective institutions, more attention should be paid to “broad access colleges,” such as community colleges and public universities, as these are the colleges students are most likely to attend.

Adelman was also interested in the “aspirations” of high school students—particularly as he differentiated it from “anticipation”—“aspirations” requiring greater action on the part of the student and reflecting student intent. In comparing data with the earlier study, he found that the percentage of 1992 12th graders who expected to earn at least a bachelor’s degree doubled from the anticipations of the 1982 seniors. Continuing one’s education after high school had become a “norm” for the 1992 seniors: 92.6% of them expected go to college “at some time.” Therefore, in the ten years between studies, college attendance was no longer an aspiration, but had become an “anticipation” or expectation.

In the previous study, a key measure used was Academic Resources, which combined curricular record, academic performance (class rank/GPA) as an indicator of student effort, and performance on tests of general learned abilities. A multivariate analysis was performed on these variables; the results were reported in quintiles and used to analyze the NELS:88/2000 data. Compared with the earlier results, academic curriculum retained the highest weight, but the gap between curriculum and performance narrowed, and the strength of test scores was weakened. Adelman ran correlations of Academic Resources and high school graduation status, college entry and bachelor’s degree completion. When bachelor’s degree completion is the reference point, curriculum exhibits the strongest correlation, followed by class rank/GPA, followed by test score. Academic Resources emerged as the strongest overall indicator of postsecondary performance and bachelor’s degree attainment. Some specific findings include:

- When reviewing changes in the distribution by highest level of mathematics studied in high school, Adelman found that the “higher the average level of mathematics attainment, the more student effort,” reflected in grades, will count (p. 36).
- Bachelor’s degree attainment rates for students who took at least Algebra 2 in high school were stable; however, the rate declined for every level at or below Algebra 2.

Remediation at the high school level was found to be a deterrent to college attendance:

- Fewer 1992 students took remedial courses than 1982 students; however, taking even one remedial course decreased college attendance significantly.

Postsecondary persistence and performance are reviewed by tracking course taking patterns (with a focus on both the first and second college years), attendance patterns (including number of colleges a student was enrolled in), and time-to-degree. Bachelor’s degree attainment figures depend on a variety of

variables. Adelman analyzes a number of college-going patterns, concluding that, among students who earn a degree from the same four-year college at which they started, “roughly a third” will earn their degree within four years, and 54-58% within six years. 62-67% of students who earn a degree at a different four-year college will complete within six years. The following outline the key findings for the postsecondary student experience:

### Demography

- For all 1992 seniors who entered college, 82.1% started in the fall term; Latino and African-American students are less likely than white students to begin their college education in the fall term, as are those in the lower SES quintiles.
- SES plays a significant role in bachelor’s degree completion: each step in the “SES ladder” increases the probability of degree completion for this population” by around 6%.
- Race/ethnicity is not a factor when postsecondary academic performance is consistently high. “Performance variables overwhelm demography” (p. 70).

### The Critical First Year

- The first calendar year of attendance is where students’ preparation is “most sorely tested”; both remediation and college level math serve as indicators of that preparation. “Remediation stalls student momentum toward success” in first-year or “gateway” courses; college-level math itself is a “gateway.” (p. 47)
- If a student’s first-year GPA falls in the top two quintiles, “the probability of earning a degree increases by nearly 22%.” (p.48)
- Earning less than 20 credits in the first calendar year in college decreases the probability of completing a bachelor’s degree by one third.
- In addition to earning 20 credits or more in the first year, being full-time and continuously enrolled also had a positive impact on degree completion. Remaining continuously enrolled, in fact, increases the probability of earning a bachelor’s degree by 43.4%.
- Withdrawing from or repeating courses within the first year is negatively associated with degree completion.
- Withdrawing from or repeating 20% or more of courses registered for decreases the probability of degree completion by nearly 50%.

Adelman found that students who took any remedial courses at the college level earned bachelor’s degrees at a 48.7% rate, compared with 69.9% for those who did not take a remedial course. However, remediation did not affect either transfer or earning an associate’s degree. Adelman says that “the evidence that students who successfully pass through remedial course work gain momentum toward degrees is beginning to build. He also found that, by the end of the second year of college attendance, a “significant spread in credit generation, academic performance, and curricular participation had opened up between those who eventually completed a bachelor’s degree and those who did not” (p. 61). Additional important findings include

- The more summer term courses a student took, the better, in terms of probability of degree completion.
- Whether the student was ever part-time negatively influenced degree completion, reducing the probability of completion by over 35%.

The “missing element” of Adelman’s “story” is content standards for high school curricula. Below are the broad conclusions he has drawn from his analysis of the NELS:88/2000 data—constituting recommendations to colleges as well as to high schools.

- Secondary schools must provide “maximum opportunity to learn, by which we mean not merely course titles, but course substance” (p. 108)
- Colleges must become “active players and reinforcers” at the high school level (p. 108).
- The first year of college has to “begin in high school, if not by AP then by the growing dual enrollment movement” (p. 108).
- Algebra 2 is no longer sufficient to meet the mathematical requirements of any field of study, including occupationally-oriented programs.
- The more time that elapses between the taking mathematics courses, the less likely the student is to succeed in the next level of mathematics.
- Every first-time college student must be supported by counseling and advising to ensure completion of 20 credits by the end of the first calendar year of enrollment.
- Summer term should be promoted, and courses offered that meet basic core requirements.

### Implications for AVID

In general, greater collaboration and articulation between high schools and colleges will benefit students, in their college “aspirations” as well as their college experiences—particularly strengthening the transitions between high school and college in terms of curricula and teaching/learning strategies. AVID Postsecondary has tremendous potential to provide incentives, especially in areas where AVID high schools are the primary feeders. Other implications derived from *The Toolbox Revisited* include:

1. Encourage high school students to take advantage of Advanced Placement and dual enrollment opportunities.
2. Ensure that high school students complete a mathematics course at least at the Algebra 2 level.
3. Counsel all students, particularly Latino and African-American students to begin college in the fall term, when colleges place the most emphasis on the first-year experience.
4. Encourage student to take summer courses, while in high school and in college.
5. Ensure that college students earn at least 20 college credits in the first academic year.
6. Colleges need to consider tightening up policies for allowing “excessive no-penalty withdrawals and no-credit repeats, which appear to do irreparable damage to the chances of completing degrees” (p. 109).
7. Colleges should develop specific course-taking options for new students, planning their first year curriculum intentionally and mindful of Adelman’s findings.
8. Colleges should closely track the performance and course-taking patterns of first-year students and have interventions in place to immediately address problems.