

The Institutional Costs of Student Attrition

RESEARCH PAPER

This material is based on research funded by the Bill & Melinda Gates Foundation. The findings and conclusions contained within are those of the authors and do not necessarily reflect positions or policies of the Bill & Melinda Gates Foundation.

The Institutional Costs of Student Attrition

September 2012

Nate Johnson, Postsecondary Analytics LLC



AMERICAN INSTITUTES FOR RESEARCH®

1000 Thomas Jefferson Street, NW
Washington, DC 20007-3835
202-403-5000 • 800-356-2735

CONTENTS

- Overview and Objectives 1
 - What Do We Mean by Attrition and How Big Is the Problem? 2
- Defining and Measuring Attrition 3
- Measuring the Institutional Costs of Attrition 4
 - Measuring Attrition Using the Beginning Postsecondary Students Longitudinal Study 5
- A Simple Taxonomy of Attrition 11
- Estimating Attrition Costs Using State-Level Data 13
 - State-Level or Institution-Level Analysis: Details of Proposed Methodology 14
- Consultations With States 17
 - Methodology—Comments and Concerns 17
 - Politics and the Use of Attrition Analysis—Comments and Concerns 17
- State-Specific Data Availability 18
 - Washington State: Testing the Attrition Methodology 18
- Appendix 20
 - Beginning Postsecondary Students/Integrated Postsecondary Education Data System Analysis: Definitions and Methodology 20
- Project Participants 22
 - Delta Cost Project Staff and Consultants 22
 - Steering Committee 22
 - North Carolina 23
 - Texas 23
 - Ohio 23
 - Washington 23
- References 24

OVERVIEW AND OBJECTIVES

One-third of students who enter postsecondary education expecting to earn a degree leave without one. A few leave better off than they started, well employed and content with their accomplishment. But for many, especially for students from lower income backgrounds, leaving prior to completing a degree or credential is a missed opportunity and a lost investment. Students have devoted both time and money to their unsuccessful effort. The public has contributed as well, through state appropriations to postsecondary institutions and state and federal financial aid. Moreover, institutions have devoted resources to classes and support services that never attach to a degree.

Previous research on attrition has focused on the economic consequences of low graduation rates in terms of costs to students and families (from tuition and fees that do not culminate in a credential), lost time, and income and tax losses from low educational attainment in the workforce. However, no systematic attention has been given to another critical aspect of the cost of attrition, which is the cost to institutions (and to their financial supporters) from the “lost” credits that do not lead to degrees or certificates. Attrition clearly adds to the expense of producing college degrees, thus reducing it is crucial to enhancing productivity and increasing educational attainment.

How big is this lost investment, and what do these “unfinished degrees” from student attrition look like? Just as completed degrees come in different shapes and sizes, unfinished degrees vary widely from student to student, although there has not been a common language to talk about them nor a method to analyze their costs. The development of a simple definition of attrition, as well as a methodology that can be used with existing data to assign costs to it, is the focus of this effort. Guided by advice from a group of postsecondary education policy and data experts, this work sets forth the following:

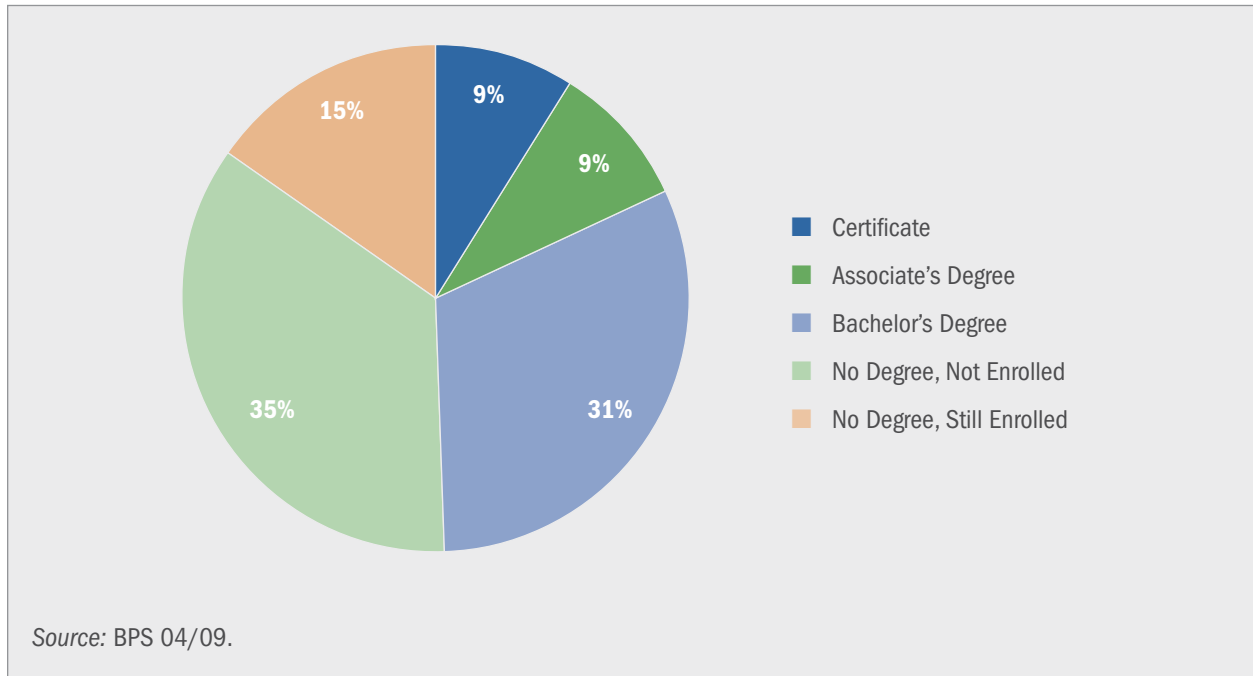
- A clear definition of attrition that can be used by institutions and policymakers to develop benchmarks and measure performance
- A methodology for assigning institutional production costs to attrition, both for national data sets and for states that wish to pursue a similar analysis
- Identification of benchmarks that can serve as the basis for setting goals and measuring performance in reducing attrition
- Suggestions of ways to use data on attrition and its costs to inform state- and system-level policy choices and budgets, including performance funding
- Dissemination of the project’s findings to leaders and decision makers around the country

This report should be of special interest to institutional leaders and state policy audiences, including system heads, presidents and provosts, governors and their staffs, legislators, state budget officers and legislative fiscal analysts, and statewide coordinating and governing boards. These audiences are best positioned to advance attainment goals by setting a clear agenda for reducing attrition and incorporating reductions in attrition into future accountability and financing strategies.

What Do We Mean by Attrition and How Big Is the Problem?

Higher education institutions spent more than \$263 billion in 2008–09 on education and related expenses, delivering the equivalent of 487.5 million semester-credit hours of instruction. Yet, as illustrated in Figure 1, 35 percent of new undergraduates in 2003–04 who sought a degree or other credential had left without completing one six years later (Beginning Postsecondary Students Longitudinal Study [BPS], 2004/09).¹

Figure 1. Degrees and Attrition for 2003–04 Students by 2008–09



The result of this attrition is a large number of unfinished degrees, which are costly for states, students, and institutions. Recent work by Schneider (2010), *Finishing the First Lap*, estimates that state and federal taxpayers spend more than \$9 billion educating first-year students who will not return the following year. When this happens, states' investments in subsidies yield a lower return, students' prospective incomes are less secure, and institutions—increasingly dependent on tuition as state budgets collapse—lose a valuable source of revenue.

Another report by Schneider and Yin (2011), *How Much Does Dropping Out of College Really Cost*, examined the opportunity costs of low graduation rates and found that college dropouts from just a single cohort of entering students lost \$3.8 billion in lifetime income, and states and the federal government lost \$730 million in potential tax revenue.

¹ Tables and charts that rely only on BPS data are taken from the public-use data interface available through PowerStats at <http://nces.ed.gov/datalab/>. Tables that are cited as BPS and Integrated Postsecondary Education Data System (IPEDS) data used the restricted-use BPS data set, matched to the (nonrestricted) institutional-level expenditure data available in IPEDS. For more details, see the appendix.

The analysis and methodology developed here, however, focus more narrowly on the definition of attrition and its associated institutional production costs, the different types of attrition that can be usefully distinguished, and ways to use data about attrition costs and patterns to reduce the costs of producing degrees through an increase in educational throughput. Despite considerable attention to the importance of the college completion agenda, a surprising paucity of language or measures exists to get at attrition. Most institutional, state, and national data systems currently used by policymakers are set up to provide information about students who complete degrees: graduation rates, award levels, race/ethnicity, gender, detailed major, and so on. The systems do not, however, provide a similar level of detail about students who fail to complete degrees. As a result, conversations about the causes, costs, and consequences of attrition tend to rely heavily on anecdotes or assumptions.

DEFINING AND MEASURING ATTRITION

We define attrition as departure from all forms of higher education prior to completion of a degree or other credential. Attrition can involve a high school graduate who drops out before receiving an associate's degree, or an associate's degree or certificate completer graduate who continues to take courses but does not finish an additional credential.²

This definition of attrition is intentionally conservative. It establishes a lower limit to the number of unfinished degrees that can be identified and allows this analysis to focus on the clearest cases. To the extent it is possible to make the distinction, students who leave one institution for another or who take a long time to finish a degree are not included in the definition of attrition. Extended time-to-degree and unplanned transfers have their own costs, causes, and consequences, some of which (although not all) are related to attrition. But the definition used here avoids them to keep the analysis as focused as possible.

In practice, states and institutions are limited in the extent to which they are able to separate students who are dropping out of higher education altogether from those who are leaving one institution, system, or state and enrolling and finishing elsewhere. States with comprehensive postsecondary databases and low rates of interstate mobility are better able to capture data on these students than individual institutions or systems in states with high rates of interstate mobility. The National Student Clearinghouse is a resource for states and institutions to identify some of their missing transfers-out, although it is costly to use and does not capture everyone.

Another limitation many states and institutions face in estimating their total attrition rates (or long-term graduation rates) is establishing a cohort that reaches far enough back in time to include those students who take a long time to finish their degrees. Even the standard six-year graduation rate calculation mandated by Congress as a national accountability measure requires data stretching back seven years from the time it is finally calculated. Ten to 12 years would capture a much larger proportion of eventual completers, especially among transfer students, who take considerably longer.

² Although the focus here is on undergraduate attrition, in principle this would extend to graduate education as well, with attrition taking place between bachelor's and master's or first-professional degrees, and between master's and doctoral degrees.

However, this presents two problems for many systems and states: first, many state data systems were only recently established and do not have the history required for a reasonable calculation. Second, and more importantly, attrition or graduation rates based on a cohort that started 6 to 12 years ago would have little credible link to policies or people currently in place.

The method developed by this project avoids both of these constraints by estimating long-term attrition rates based on just two or three years of data. Each year, different attrition (or persistence) rates can be calculated for first to second year, second to third year, third to fourth year, and so on. These rates can then be used to project the number of currently enrolled students who will persist or drop out in future years. A key advantage of using current attrition/persistence rates is that the derived long-term estimates are based on current students, context, policies, and practices, rather than those that were in place many years ago.

Despite the practical difficulties, the conservative approach proposed here establishes a general framework that states and institutions can adapt as their data systems permit, while clearly stating any limitations that are likely to result in understatements or overstatements of true attrition in their student populations. Because they are not institutionally precise, the measures are best used to set beginning benchmarks and measure progress over time, rather than as “accountability” metrics for individual institutions.

MEASURING THE INSTITUTIONAL COSTS OF ATTRITION

The idea of “cost” used in this analysis specifically zeroes in on the institutional costs associated with attrition, measured by education and related spending per student on credits that do not attach to a degree or certificate from any institution within six years of initial enrollment.³ This is not intended to discourage other ways of looking at the issue. More elaborate measures are possible and would be analytically “correct,” such as including the recruitment and enrollment costs for students who drop out, along with “lost” financial aid, and developing more fine-tuned cost estimates by level of instruction and discipline. Fuller cost estimates also could include the student opportunity costs from enrollment in college (rather than working full time) against lifetime changes in earnings associated with degree attainment.

The data requirements for these more precise measures would not, in our opinion, improve the essential accuracy of the average cost/credit-based measure. We also believe it appropriate to focus on the spending measures that are most controllable by institutions or policymakers, and that can be assigned back to budgets and the resource allocation decisions within institutions.

³ For more information on calculation of education and related expenses, see the Delta Cost Project, *Metrics for Improving Cost Accountability*, available at http://www.deltacostproject.org/resources/pdf/issuebrief_02.pdf

Measuring Attrition Using the Beginning Postsecondary Students Longitudinal Study

To get a general idea of the scope and associated institutional costs of undergraduate attrition nationally, we combined data from the BPS survey, which has information on students' persistence and attainment levels after six years—no matter whether or how many times they transferred among institutions, sectors, and states—with institutionally reported financial data from the Integrated Postsecondary Education Data System (IPEDS).

By linking the records of students in the BPS survey to the institutions they attended, and by using data on months of full-time and part-time enrollment from the survey, we were able to estimate total instructional and related expenditures for 95 percent of both dropouts and completers in the survey.

A key finding is that although 35 percent of students left without finishing, these students accounted for 19 percent of total instructional and related spending. This is primarily because students who left higher education spent less time enrolled, on average, than students who completed. Also, students who dropped out were more likely to be attending less expensive institutions, such as community colleges, than students who completed and spent more time in less expensive, lower level classes. The average (mean) estimated expenditure per completed degree was \$43,000, while the average expenditure per unfinished degree (measured as credits taken that will not be ultimately assigned to a degree) was \$18,000 (Table 1).

The BPS survey is intended to embrace a nationally representative sample of postsecondary students; each student is assigned a “weight” that reflects the number of students he or she represents nationally. Using these weights, along with institutional cost data, we can estimate the approximate share of costs that each group of students represents.

Table 1. Education and Related Costs per Student in BPS Cohort, 2003–09, by Persistence and Attainment Status

Status	Percentage of All Costs	Average (Mean) Cost per Student	Median Education and Related Cost per Student
Certificate	4.6%	\$ 16,127	\$ 12,777
Associate's	9.6%	\$ 33,856	\$ 31,400
Bachelor's	51.3%	\$ 53,781	\$ 45,461
Any credential	65.4%	\$ 43,035	\$ 38,467
No degree, not enrolled	19.5%	\$ 18,125	\$ 13,772
No degree, still enrolled	15.1%	\$ 32,455	\$ 30,222
Total	100.0%	\$ 32,684	\$ 28,503

Source: BPS 04/09 and IPEDS.

The rates of attrition and the costs of unfinished degrees are broken out for the largest sectors of postsecondary education in Table 2. (Other sectors were too small to have meaningful results.) Attrition accounted for 33 percent of all estimated expenditures at public two-year institutions, 13 percent at public four-year institutions, and 9 percent at private four-year institutions. For public two-year institutions (community colleges), the cost per completed associate's degree was roughly \$32,000 compared with \$15,000 per unfinished degree. At public four-year colleges, on average \$47,000 was spent on a completed bachelor's degree versus \$27,000 on an unfinished degree.

The numbers in Table 2 present a rough guide to the amount of attrition and the attendant costs in different sectors of undergraduate higher education. There are two reasons, however, why these numbers likely underestimate the amount of attrition and associated costs, on the one hand, and why they may overestimate the extent of attrition, on the other hand. First, they underestimate attrition because some students who complete a credential do reenroll in an attempt to complete another credential (e.g., associate's degree graduates who go on for a bachelor's degree), but ultimately fail to complete it. Of the BPS cohort students who did complete a credential, 11 percent reenrolled after completion but did not receive another degree. This amounts to about 5 percent of all students. On average, these students enrolled for 9.4 months after their last completion at an estimated average cost of about \$7,000 per student.

A more significant reason that these numbers may underestimate costs is that many students who were still enrolled after six years will eventually drop out. Thirteen percent of students who were counted as "no degree, still enrolled" in 2008–09—six years after starting out—said they did not plan to reenroll the following year, and it is likely that more will drop out in the following years (Table 3). Even if the numbers of students involved are small (13 percent of the 15 percent "still enrolled" is just 2 percent of all students), the costs per student would be relatively high because of the longer time spent in higher education.

Table 2. Education and Related Costs Relative to Persistence/Attainment by Sector of Students' First Enrollment

	Percentage of All Costs	Average (Mean) Cost per Student	Median Cost per Student	Percentage of Students
Public Four-Year (Total = 1,095,092)*				
Certificate	0.9%	\$25,277	\$ 20,272	1.5%
Associate's	5.1%	\$ 42,398	\$ 36,966	5.0%
Bachelor's	67.1%	\$ 46,700	\$ 42,231	59.7%
Any credential	73.2%	\$ 45,879	\$ 41,523	66.2%
No degree, not enrolled	12.9%	\$ 26,572	\$ 23,306	20.1%
No degree, still enrolled	13.9%	\$ 42,431	\$ 41,162	13.6%
Total	100.0%	\$ 41,523	\$ 39,221	100.0%
Public Two-Year (Total = 1,519,139)*				
Certificate	8.8%	\$ 19,364	\$ 17,397	10.0%
Associate's	19.6%	\$ 32,196	\$ 30,263	13.4%
Bachelor's	14.8%	\$ 41,621	\$ 39,743	7.8%
Any credential	43.2%	\$ 30,443	\$ 29,124	31.2%
No degree, not enrolled	32.7%	\$ 14,730	\$ 12,030	48.8%
No degree, still enrolled	24.2%	\$ 26,563	\$ 24,194	20.0%
Total	100.0%	\$ 21,998	\$ 18,638	100.0%
Private Four-Year (Total = 529,821)*				
Certificate	0.8%	\$ 26,848	\$ 19,960	1.8%
Associate's	3.6%	\$ 42,832	\$ 45,518	5.0%
Bachelor's	78.6%	\$ 71,430	\$ 59,944	65.5%
Any credential	83.1%	\$ 68,337	\$ 57,243	72.4%
No degree, not enrolled	9.4%	\$ 32,605	\$ 24,610	17.1%
No degree, still enrolled	7.5%	\$ 42,771	\$ 40,026	10.5%
Total	100.0%	\$ 59,530	\$ 50,455	100.0%

*Weighted number of students. Source: BPS 04/09 and IPEDS.

On the other hand, the numbers likely overestimate the extent of attrition and related costs because some of the students who were not enrolled after six years and did not have a credential do eventually come back and complete one (Table 3). Of the 35 percent of students who dropped out without a degree by the end of six years, 40 percent said they intended to reenroll in the seventh year, after the end of the study period.

Table 3. Percentage of 2003–04 BPS Cohort Leavers and Continuing Students Planning to Enroll in Year After End of the Study

	Plans for the 2009–10 School Year	
	NO, Plan to Enroll for 2009–10	YES, Plan to Enroll for 2009–10
No degree, not enrolled	60.5%	39.5%
No degree, still enrolled	13.1%	86.9%

Source: BPS 04/09.

Although it is important to be aware of these significant gaps in the analysis, to some extent they cancel one another out. Some of the “dropouts” will complete and some of those who have persisted will eventually drop out. A long-term completion rate of about 65 percent to 70 percent (and consequently an attrition rate of 30 percent to 35 percent) is consistent with other longitudinal studies of postsecondary attainment (Adelman, 2006). For the purposes of this analysis, which aims to estimate only the general magnitude of attrition and related costs, these numbers remain a reasonable approximation.

Short-Term Versus Long-Term Attrition

The costs and consequences of attrition for students who leave higher education soon after first enrolling are different from those for students who leave after a longer period of enrollment. Early attrition is the larger, more worrisome problem in terms of the nation’s educational attainment because it is so widespread. Yet for individual students, the lost investment of time and money is smaller when they have been enrolled for a few months than when they have spent several years pursuing a degree without completing one. The same is true for those who subsidize higher education—state governments, private philanthropists, and the federal government.

As Table 4 illustrates, although early dropouts (those with 24 or fewer months of total enrollment) accounted for 73 percent of all students who departed prematurely, they accounted for only half of the expenditures on unfinished degrees, or roughly equivalent to spending on the 27 percent of dropouts who left after more than two years. The students who left after more than 36 months enrolled were just 9 percent of all dropouts but accounted for 22 percent of expenditures. The average amount spent on those who left early was approximately \$12,000 per student, while expenditures amounted to \$34,000 per student for those who left later.

Table 4. Percentage of Unfinished Degrees and Costs by Detailed Time of Attrition

Years of Postsecondary Education	Average (Mean) Cost per Student	Percentage of Costs	Percentage of Students
One year or less	\$ 8,830	21.3%	43.8%
1–2 years	\$ 17,427	28.3%	29.4%
Subtotal: 2 years or less	\$ 12,285	49.6%	73.2%
2–3 years	\$ 29,417	28.8%	17.8%
3–4 years	\$ 42,036	16.8%	7.3%
4+ years	\$ 47,122	4.8%	1.8%
Subtotal: More than 2 years	\$ 34,039	50.4%	26.8%
Total	\$ 18,125	100.0%	100.0%

Source: BPS 04/09 and IPEDS 2008–09.

Academic Failure and Other Reasons for Dropout

Perhaps surprisingly, the proportion of students who leave higher education because of clear-cut academic failure—grades in the D and lower range—is relatively small. Only 10 percent of dropouts left with a grade point average (GPA) estimated to be below the “C” range, and if the “C” range is included, that proportion rises to only 19 percent (Table 5). These students accounted for 15 percent of the expenditures on unfinished degrees.

Conversely, fully 40 percent of dropouts had estimated GPAs in the A and B range, accounting for 43 percent of the costs. And 17 percent had “Mostly As”—a higher proportion than had Ds and Fs.

Table 5. Percentage of Unfinished Degrees and Costs by Detailed Estimated Cumulative GPA

GPA Estimate When Last Enrolled Through 2009	Average (Mean) Cost per Student	Percentage of Costs	Percentage of Students
Mostly As (3.75 and above)	\$ 17,067	16.3%	17.3%
As and Bs (3.25–3.74)	\$ 20,365	26.6%	23.7%
Mostly Bs (2.75–3.24)	\$ 19,105	22.8%	21.6%
Bs and Cs (2.25–2.74)	\$ 19,054	19.1%	18.1%
Mostly Cs (1.75–2.24)	\$ 16,793	8.5%	9.2%
Cs and Ds (1.25–1.74)	\$ 13,115	3.6%	4.9%
Mostly Ds or below (below 1.24)	\$ 11,196	3.2%	5.2%
Average for ALL leaving without degree	\$18,125	100%	100%

Source: BPS 04/09 and IPEDS 2008–09.

Of course, GPA is only one measurement of students' academic experiences. Students with GPAs in the B or C range may not perceive themselves as academically successful, or may weigh the trade-offs differently when deciding whether to stay in college or leave. But, clearly, a large number of students are leaving college with academic records at least as good as those of students who do graduate.

When asked why they left, the students' responses were roughly consistent with the distribution of grades in Table 5. As shown in Table 6, only about 8 percent of students who had dropped out later, by 2006, cited "academic problems" as one of their reasons for leaving (they could give multiple reasons). A higher proportion—15 percent—of those who left in their first year (by 2004) cited academic problems as at least one factor in their departure. Students' self-reports are not always reliable or useful, and reducing complex life decisions to multiple-choice questions inevitably leads to oversimplification (Porter, 2011). It is unknown, for example, what role academics might play in students' "personal reasons" for leaving postsecondary education, which were cited by half of those who dropped out. But taken together with the grade distributions, these responses suggest that nonacademic issues play a bigger role than academic problems for dropping out.

The fact that so many students are leaving higher education after substantial periods of enrollment, and that they are often leaving with academic records as good as those of students who do graduate, runs counter to the idea that attrition rates are high because "not all students are college material." It also suggests that more energy could be put into strategies to help potential late-stage dropouts with the nonacademic issues they worry about most.

Table 6. Reasons Cited for Leaving Higher Education, and Percentage of 2003–04 BPS Students Who had Left Without a Degree by 2008–09

Reason	Left Early (by 2004)	Left Later (by 2006)
Academic problems	14.6%	8.4%
Dissatisfied with program	15.5%	13.9%
Family responsibilities	18.4%	15.4%
Financial reasons	29.0%	22.4%
Finished desired classes	2.8%	7.2%
Other reasons	25.6%	22.2%
Personal reasons	57.4%	49.1%
Scheduling problems	7.6%	15.4%
Military service	—	1.9%

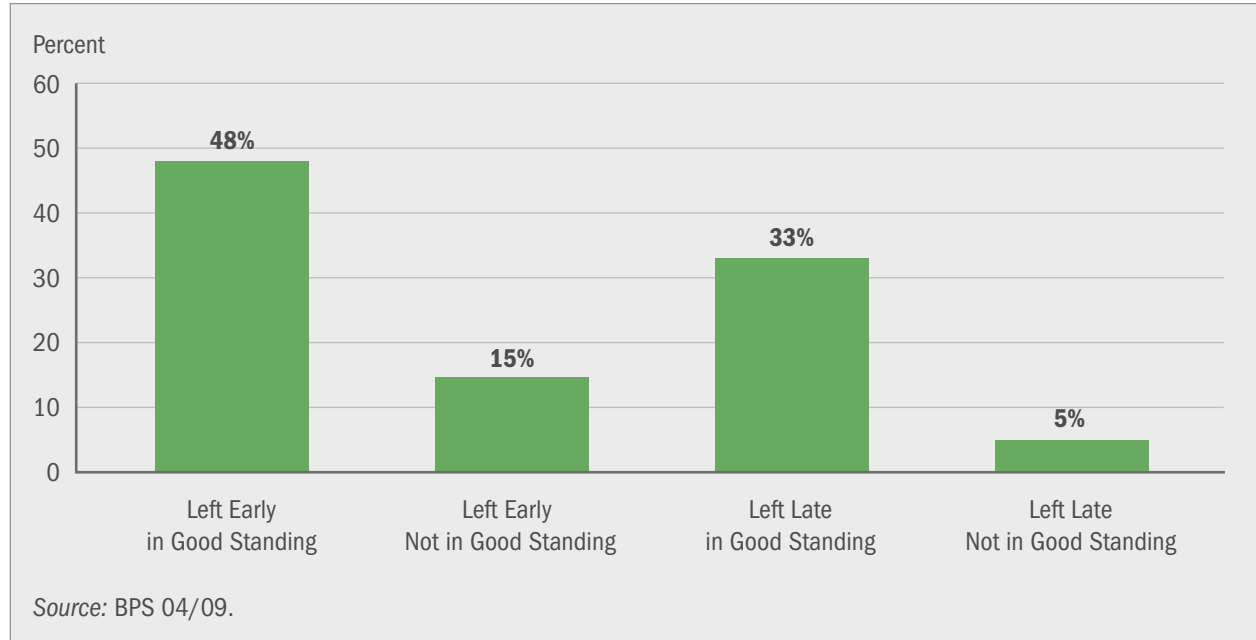
Source: BPS 04/09.

A SIMPLE TAXONOMY OF ATTRITION

Figure 2 combines enrollment duration with academic performance to illustrate a summary classification of attrition into four categories. The percentages represent the proportion of all dropouts who fall into that category. The largest group—48 percent—is composed of those who leave with less than two years of postsecondary education but who are in good academic standing. This group is important because it is so big and students in this category have shown that they can succeed in postsecondary-level work. Major gains in graduation rates are unlikely without reducing the numbers of students in this group.

The second largest group, at 33 percent of dropouts, consists of students who leave with more than two years of postsecondary education but who are in good academic standing. Not only have they shown themselves capable of college-level work, but they have also completed a substantial amount of coursework, representing a significant investment of time and money. Investments in strategies to help these students find ways to stay in higher education, or to return once they have left, may yield the highest “return on investment” in terms of increasing the number of college graduates. Much of their education has already been paid for. The \$47,000 spent on students who leave without a credential after four years (Table 4) is not much different from the average expenditures on public bachelor’s degree graduates (Table 2). If a few thousand dollars in additional aid, loan subsidies, or academic support could tip the balance to completion for these students, the marginal cost of the additional degrees would be much lower than what it takes to educate a new freshman.

Figure 2. Proportion of all Unfinished Degrees, BPS Cohort Students



This is one reason that a number of states and institutions have actively begun trying to recruit back to higher education the adult students who have already completed substantial numbers of credit hours. Institutions such as Western Governors University and Empire State College take very few first-time freshmen, and instead focus on tailoring academic programs for returning students who may have credits from a number of different institutions to provide them with exactly what they need to complete their degrees.⁴

The students who leave early with weak academic records, and who represent what many people might consider typical college dropouts, constitute a relatively small minority—15 percent. These students may have found postsecondary work too challenging or difficult to balance with other commitments, or they may have ended up in the wrong type of institution or program for their needs. When institutions create programs or interventions to help this group, they should take care to move students into the “completers” category rather than into the last group in the grid—those who stay in higher education for a prolonged period before finally dropping out.

The 5 percent of dropouts who attend for a long time but leave with a poor academic record are a small proportion of the whole. But this group illustrates why “retention” without completion should not be seen as an end in itself. Not only do these students leave without a degree and good prospects for returning later to complete one, but also they have spent much longer in the attempt than students in the previous group. For this group, the best approach could be to improve advising and tracking systems to ensure that students do not remain too long in programs in which they have not been successful.

⁴ Based on similar logic, the Lumina Foundation for Education supports a number of these efforts through its Adult Degree Completion Program, and many states are seeking ways to identify “near-completers” in their populations to help them finish.

ESTIMATING ATTRITION COSTS USING STATE-LEVEL DATA

The earlier analysis provides a broad perspective on attrition and its cost across the entire postsecondary undergraduate system in the United States. It could also serve as a template for states or institutions seeking to analyze their own attrition problems and think about the return on investment of different strategies to increase retention and completion. States and institutions that have the data can reproduce something similar to the BPS cohort analysis discussed earlier, using their own expenditure data in place of the IPEDS-derived estimates.

Typically the data available to states, however, do not resemble the BPS data set. With a few exceptions, statewide data systems are relatively new and may lack sufficient history for a long-term cohort study. Moreover, an analysis that uses current attrition rates would be more valuable to policymakers and institutional leaders than one that would be based on rates in effect in 2003, 2004, or earlier.

An alternative for states with younger databases or that need to account for more recent trends is to use current year-to-year attrition rates to estimate the number of students who will leave over the long term. This approach approximates the “Markov chain” method that many institutions use to project enrollments for budgeting and planning purposes (Armacost, Archer, Pet-Armacost, & Grey 2006; Donhardt, 1995).

This methodology is described in more detail in the ensuing section, but the basic steps include the following:

1. Determine how many of last year’s students who did not receive a degree reenrolled in the current year.
2. Group those students into first year, second year, and so on, according to their recorded dates of entry into the system.
3. Calculate persistence/attrition and degree completion rates for each group: first to second year, second to third year, and so on.
4. Apply those rates several times in succession to estimate how many students will receive degrees, remain enrolled, or drop out for the next several years (i.e., estimate how many current first-year students will enroll for a second year and then how many of those second-year students will persist to a third year).
5. Associate costs to each student based on institutional or systemwide costs per student.

State-Level or Institution-Level Analysis: Details of Proposed Methodology

This method estimates the proportion of each year's higher education expenditures that goes to pay for the instruction of students who never graduate. Unlike cohort studies of graduation and attrition, the proportion can be estimated with relatively recent data. The spreadsheet, the *Steps to Project Long-Term Attrition in Currently Enrolled Students*—a static version of which is presented on the following two pages—illustrates the sequential steps proposed for this analysis, and the formulas embedded in the spreadsheet show how each number is calculated.

As a resource to states or institutions that wish to analyze their own attrition patterns and costs, a free SAS program and manual were produced as a companion to this report. The basic steps are outlined below.

Estimating Current Attrition

(The numbers refer to the steps highlighted in the yellow column headings in the mock data tables.)

Setting up baseline data:

(1) Begin with all undergraduate students who enrolled at any time during the second most recent year of available data. Academic year 2008–09 is used in this example. Classify students by the number of chronological years since their initial enrollment in the system.

(2)–(3) For each year's "cohort," identify those who graduated with any credential in that same year and calculate a graduation rate.

(4)–(5) Of the remaining students who did not receive a credential, identify those who reenrolled at any time during the following year and calculate a retention rate.

(6)–(7) Estimate a returning stop-out adjustment rate by identifying all students in the most recent year available who are not new students but who also were not enrolled in the prior year. In this example, it would be 2009–10 students who are not new but who were not enrolled in 2008–09. Calculate a returning student adjustment by using this number as a proportion of all students enrolled the prior year (7). *NOTE: The groups should be single years for as many years as allowed without cell sizes becoming too small (e.g., 10th year to 11th year). Rates based on small cell sizes or on the remainder (e.g., 11th year and above) need to be adjusted to avoid skewing the results.*

(8)–(10) Subtract the graduates and retained students from the initial cohort (8) and calculate an unadjusted attrition rate (9). Use the stop-out adjustment rate to create the adjusted attrition rate (10). *NOTE: The groups should be single years for as many years as allowed without cell sizes becoming too small (e.g., 10th year to 11th year). Rates based on small cell sizes or on the remainder (e.g., 11th year and above) need to be adjusted to avoid skewing the results.*

Projecting Future/Current Attrition

Projection chains:

(11) Apply the rates derived above to the current year or most recent year's students to estimate year-to-year attrition for everyone enrolled.

(12) Advance the current year's students a year in the projections. Subtract the students projected to graduate or drop out from the current year's cohort, and add a year to their classification. Repeat as many times as needed until attrition numbers become insignificant.

Results:

(13) Add the results together to get estimates of total projected attrition for currently enrolled students.

Estimating Costs

Costs:

(14) Estimate total costs based on the proportion of credit hours taken by students in each group at each level.

This last step can be made more precise by using more detailed cost data, where available, or by calculating Steps 1–13 separately for full-time and part-time students.

Steps to Project Long-Term Attrition for Currently Enrolled Students

A static illustration (a spreadsheet) accompanies this report:

Page 1: Sample Baseline Data

	1	2	3	4	5	6	7	8	9	10
YEARS SINCE 1ST ENROLLED	2008-09 STUDENTS ANNUAL UNDUPLICATED HEADCOUNT	GRADUATED	% GRADUATED	2009-10 # RETAINED ANNUAL UNDUPLICATED HEADCOUNT	% RETAINED	2009-10 RETURNING STUDENTS	RETURN ADJUSTMENT	NON-RETAINED	UNADJUSTED ATTRITION RATE	ADJUSTED ATTRITION RATE
1	100	0	0%	80	80%	0	0%	20	20%	20%
2	87	0	0%	72	83%	1	1%	15	17%	16%
3	81	10	12%	60	74%	2	2%	11	14%	11%
4	60	40	67%	15	25%	1	2%	5	8%	7%
5	30	12	40%	12	40%	1	3%	6	20%	17%
6+	60	20	33%	30	50%	1	2%	10	17%	15%
	418	82	20%	269	64%	6	1%	67	16%	15%

CONSULTATIONS WITH STATES

To assess the viability of this approach and identify other methods of analyzing state-level costs of unfinished degrees, we consulted with officials in four states: Washington, Ohio, Texas, and North Carolina. One of these, Washington, tested this method on its own data; the results are discussed later. (The appendix includes detailed instructions and the SQL code for other states or institutions that wish to use the approach or a modified version of it.)

The state officials provided constructive feedback regarding both the methodology and politics of employing this proposed method for analyzing attrition.

Methodology—Comments and Concerns

- **Costs:** States are uncomfortable using IPEDS expenditure data, which often does not match internal budget documents, but they recognize that their own cost data may not be comparable with those of other states.
- **Student-level data** are generally available, but comparability among states will depend on how comprehensive the collections are: single system versus all public institutions; four-year only versus two-year and four-year; access to private college enrollments/completions versus no access.
- **The National Student Clearinghouse (NSC)** came up as a resource that states could use to track students into private or out-of-state institutions to ensure the “attrition” they capture within their system does not include students who had graduated or remained enrolled outside of their own collection systems. Yet, NSC has two serious disadvantages. First, although it covers a large proportion of institutions nationally, local gaps remain that could have significant effects on data for individual states or institutions if a major transfer destination is not included in the system. Second, it can be prohibitively expensive given the limited budgets available to many states.⁵

Politics and the Use of Attrition Analysis—Comments and Concerns

- **Misinterpretation:** Policymakers might interpret the costs of attrition simply as “waste,” even though there is value to higher education independent of the degree completed. They may also be tempted to compare costs among institutions or across states, even when the students (or data) are very different.
- **State versus student costs:** Some states will have higher public costs or student costs depending on their levels of subsidy to institutions.
- **Financial aid:** The results of the analysis could have implications for state financial aid policy if aid is “front-weighted” to students with high attrition rates in the early stages of their college careers.
- **Transfer students:** The method is helpful in explaining attrition to policymakers because it does not, as much as possible, lump transfer students together with dropouts.

⁵ In fact, we were unable to use NSC for this study because of the estimated costs involved.

STATE-SPECIFIC DATA AVAILABILITY

As part of the consultation with state officials, we attempted to identify the presence or absence of data that would be necessary or useful to support an analysis using the methodology developed in this report. The results of these consultations are summarized in Table 7. All four states had the basic elements needed to execute the analysis, although Ohio and Texas had considerably more data to support the work. In fact, both states had already performed an analysis of dropout and completion costs using their own assumptions and methods.

Table 7. State Data Systems for Unfinished Degree Analysis

	North Carolina	Texas	Washington	Ohio
Has state-level system	Yes	Yes	Yes	Yes
Has least six years of consistent data	Yes	Yes	No	Yes
Two-year and four-year data are joined	No (but can be)	Yes	No	Yes
Access to private institution data	No	Partial	No	Partial
Has used NSC in past or has subscription	Yes	Yes	No	Yes
Has cost analysis ready for use	Partial (12-cell budget matrix) ^a	Yes	No (but can infer from budget)	Yes
Has conducted degree or dropout cost study using different methodology	No	Yes ^b	No (but agreed to beta test this approach)	Yes ^c

^a University of North Carolina (2010).

^b Unpublished work in progress.

^c Ohio Board of Regents (2006).

Washington State: Testing the Attrition Methodology

Staff members at the Washington Higher Education Coordinating Board generously agreed to apply the methodology outlined here to data from the four-year colleges in that state. They were able to do so using two years of data manipulated in a large spreadsheet workbook.

The methodology worked well, with the exception of the calculated returning student rate for long-term students, which were grouped together as the “6+” year cohort. Many long-term students do leave and reenroll, so the return rate for all of these students together was very high. The method also is built around single-year cohorts, so a rate for a cohort that includes multiple years of students requires some adjustment to avoid skewing the results.

The methodology outlined was changed to recommend that analysts group students into as many single-year cohorts as possible (i.e., include separate cohorts for seventh-, eighth-, and ninth-year students) without resulting in small cell sizes. Where the returning student rates appear unreasonable because of small cell sizes, they could be adjusted to an annual average for long-term students. Because most attrition occurs before the sixth year, the method could also simply be stopped after five or six iterations without unduly distorting the results.

With adjustments for the problem described above, Washington's attrition rates within the four-year system were generally consistent with the results from the national BPS analysis, although attrition was somewhat higher, probably because data from private and out-of-state institutions were not available and the methodology was tested within the four-year public system only.

APPENDIX

Beginning Postsecondary Students/Integrated Postsecondary Education Data System Analysis: Definitions and Methodology

For summaries of attrition data without costs, the unrestricted PowerStats interface for the Beginning Postsecondary Students Longitudinal Study (BPS) 2004/09 was used. Where the analysis involved institutional expenditure data, the analysis used the restricted-use data set for the BPS survey. The BPS survey includes students who entered college for the first time in 2003–04 and were followed for six years through 2008–09.

Students

All students, degree-seeking or not, in the BPS cohort were selected. Only those whose enrollments could be matched to institutions that had expenditure data in the Integrated Postsecondary Education Data System (IPEDS) were used in the final analysis. This amounted to 95 percent of the students, so the results were not materially different from what they would have been if all students had had matching expenditure data.

Attrition

To identify “unfinished degrees,” students whose “cumulative persistence and attainment” by 2008–09 was “no degree, not enrolled” were counted as dropouts. This is different from single-institution attrition because students were only counted as dropouts if they did not reenroll or complete a degree anywhere at all.

Institutions

Each student was matched to all institutions they attended throughout the study period.

Full-Time Enrollment

To calculate the number of full-time enrollment (FTE) years a student was enrolled, the number of cumulative months of FTE for each student and one-third of the number of cumulative part-time enrollments were added, and the result divided by 12. An undergraduate FTE in IPEDS is calculated as 30 semester credit hours, so this calculation assumes that a typical full-time student would attempt 30 credit hours in each 12-month period and that a part-time student would attempt about 10. These numbers are roughly consistent with transcript studies and state-level reports on course load levels.

The result for each student was a total estimated cumulative FTE enrollment for the six-year period of the study.

Education and Related Expenditures per FTE

Each institution's education and related expenditures were calculated using the Delta Cost Project methodology, which includes all expenditures for instruction and student services, plus a prorated share of academic support, institutional support, and plant operations.

Total education and related expenditures over a three-year period were divided by total reported FTE enrollment over the same period. Graduate FTE was counted twice, a double-weighting that reflects the findings of the *SHEEO (State Higher Education Executive Officers) Four-State Cost Study* (Conger, Bell, & Stanley, 2010).

Assignment of Expenditures to Students

A total cost was assigned to students in the BPS survey based on their estimated FTE enrollment multiplied by the expenditure per FTE at the institution or institutions they attended. Where students attended multiple institutions, the expenditure per FTE was averaged across all institutions attended.

PROJECT PARTICIPANTS

Delta Cost Project Staff and Consultants

Jane Wellman, executive director

Donna Desrochers, deputy director

Colleen Lenihan, research analyst

Debby Friedman, administrative director

Patricia Steele, Higher Ed Insight

Nate Johnson, Postsecondary Analytics

Steering Committee

Tony Carnevale, Georgetown Center on Education and the Workforce

Tom Dawson, Bill & Melinda Gates Foundation

Kevin Dougherty, Teachers College, Columbia University

Jennifer Engle, Education Trust

Peter Ewell, National Center for Higher Education Management Systems

Aimee Guidera, Data Quality Campaign

Jan Ignash, Washington State Higher Education Coordinating Board

Stan Jones, Complete College America

Patrick Kelly, National Center for Higher Education Management Systems

Rebecca Martin, University of Wisconsin-System Administration

Kay McClenney, Community College Survey of Student Engagement

Raymund Paredes, Texas Higher Education Coordinating Board

Rich Petrick, Ohio Board of Regents

Nan Poppe, Completion by Design

Mark Schneider, American Institutes for Research

North Carolina

Cherry Callahan, vice chancellor, Student Affairs, University of North Carolina-Greensboro

Lewis Carson, associate director, Institutional Research, North Carolina State University

Karrie Dixon, associate vice president, Academic and Student Affairs, University of North Carolina-General Administration

Diana Haywood, director, Data Administration, University of North Carolina- General Administration

Karen Helm, director, Institutional Research, North Carolina State University

Bruce Mallette, vice president, Academic and Student Affairs, University of North Carolina- General Administration

Cindy Wallace, vice chancellor, Student Development, Appalachian State University

Van Wilson, associate vice president, Student Learning and Success, North Carolina Community College System

Xiaoyun Yang, director, Policy Analysis and Accountability, University of North Carolina- General Administration

Texas

Gary Hanson, consultant, Texas Higher Education Coordinating Board

Lee Holcombe, director, Higher Education Policy Institute, Texas Higher Education Coordinating Board

Jim Pinkard, program director, Finance, Texas Higher Education Coordinating Board

Ohio

Darrell Glenn, director, Data Management & Analysis, Ohio Board of Regents

Washington

Melissa Beard, Education Research and Data Center

Rick Heggie, fiscal policy analyst, Higher Education Coordinating Board

Jan Ignash, deputy director, Policy, Planning and Research, Higher Education Coordinating Board

Jim Reed, policy and planning coordinator, Higher Education Coordinating Board

Christy England Siegerdt, associate director, Research, Higher Education Coordinating Board

REFERENCES

- Adelman, C. (2006). *The toolbox revisited: Paths to degree completion from high school through college*. Washington, DC: U.S. Department of Education. Retrieved from <http://www2.ed.gov/rschstat/research/pubs/toolboxrevisit/toolbox.pdf>
- Armacost, R. L., Archer, S., Pet-Armacost, J., & Grey, J. (2006). *Using Markov chains to assess enrollment policies*. Presentation given at the annual forum of the Association for Institutional Research, Orlando, FL.
- Conger, S.B., Bell, A., & Stanley, J. (2010). *State Higher Education Executive Officers Four-State Cost Study*. Boulder, CO: SHEEO.
- Donhardt, G. L. (1995). Tracking student enrollments using the Markov chain comprehensive tool for enrollment management. *Journal of College Student Development*, 36(5), 457–462.
- Ohio Board of Regents. (2006). *Costs and consequences of remedial course education*. Columbus, OH: Author.
- Porter, S. (2011). Do college student surveys have any validity? *Review of Higher Education*, 35, 45–76.
- Schneider, M. (2010). *Finishing the first lap: The cost of first-year student attrition in America's four-year colleges and universities*. Washington, DC: American Institutes for Research. Retrieved from http://www.air.org/files/AIR_Schneider_Finishing_the_First_Lap_Oct10.pdf
- Schneider, M., & Lin, Y. (2011). *The high cost of low graduation rates: How much does dropping out of college really cost?* Washington, DC: American Institutes for Research. Retrieved from http://www.air.org/focus-area/education/index.cfm?fa=viewContent&content_id=1404
- University of North Carolina. (2010). *The University of North Carolina credit hour enrollment change funding model* [User manual]. Chapel Hill, NC: Author.

About the Delta Cost Project

The Delta Cost Project at American Institutes for Research provides data and tools to help higher education administrators and policymakers improve college affordability by controlling institutional costs and increasing productivity. The work is animated by the belief that college costs can be contained without sacrificing access or educational quality through better use of data to inform strategic decision making. For more information about the Delta Cost Project, visit www.deltacostproject.org.

About American Institutes for Research

Established in 1946, with headquarters in Washington, D.C., and offices across the country, American Institutes for Research (AIR) is an independent, nonpartisan, not-for-profit organization that conducts behavioral and social science research, and delivers technical assistance both domestically and internationally in the areas of health, education, and workforce productivity. As one of the largest behavioral and social science research organizations in the world, AIR is committed to empowering communities and institutions with innovative solutions to the most critical education, health, workforce, and international development challenges.

AIR currently stands as a national leader in teaching and learning improvement, providing the research, assessment, evaluation, and technical assistance to ensure that all students—particularly those facing historical disadvantages—have access to a high-quality, effective education. For more information about American Institutes for Research, visit www.air.org.



AIR[®]

AMERICAN INSTITUTES FOR RESEARCH[®]

1000 Thomas Jefferson Street, NW
Washington, DC 20007-3835
202.403.5000 | 800.356.2735