

# A New Accountability Metric for a New Time: A Proposed Graduation Efficiency Measure

BY HOWARD COHEN AND NABIL IBRAHIM

**P**ublic higher education is a major investment for state governments and families. As the proportion of the cost of education that states have funded has decreased over time, tuition has increased to keep pace with rising education costs such as salaries, employee benefits, technology, and energy. States face difficult choices, once they have funded mandated programs, between higher education and K-12 education, social services, and health care in an environment in which tax-increase legislation rarely passes. Families also wrestle with budgets in which tuition increases compete with dollars allocated for other purposes. While neither state governments nor families doubt the value of higher education, both are inclined to spend precious dollars carefully, and both want to know what they get for their money.

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States and families have gravitated toward graduation rates as the outcome measure of choice in their assessment of the performance of higher education. Graduation rates figure prominently in the most widely used assessment of colleges and universities: the annual ranking published by *U.S. News and World Report*. *U.S. News* ranks schools based on peer assessments and reported data related to retention, faculty resources, student selectivity, financial resources, graduation rates, and alumni giving. Although reputation receives the greatest weight (25 percent) in the rankings, reputational variance is relatively small, diminishing its value as a way to differentiate among institutions. More significantly, *U.S. News* bases 16 to 20 percent of an institution's ranking on its six-year graduation rate.

That measure, along with the closely related measure of student selectivity (15 percent), tells most of the story. Indeed, Robert Zemsky, Gregory Wegner, and William Massy, in *Remaking the American University*, compared their own analysis of higher-education market segmentation to the *U.S. News* rankings and determined that "all one really needed to know was the six-year graduation rate for any set of institutions to order them ... ." Graduation rate is the "high-stakes" measure of success for American public higher education.

The emphasis on college graduation is quite understandable. Studies of the value of a baccalaureate degree demonstrate that the average household income of bachelor's-degree holders is about twice that of high-school graduates. This can amount to almost \$1 million in lifetime earnings. Partial progress does not have nearly the same payoff. From the perspective of the states, the higher the wages of an individual, the more the tax revenues the states collect. For the individual, more income generally translates into a more satisfying style of life. So from every perspective, graduation is important. Colleges and universities that do a good job of producing graduates are meeting public expectations.

## THE STANDARD METRIC

The graduation rate has become such a common indicator of institutional quality that we sometimes ignore what it does and does not measure. It is longitudinal: It tracks only the first-time, full-time

students entering a college or university in a given fall semester and calculates the percentage of those individuals who have graduated from that institution within the next six years. These data are collected for all colleges and universities through the Integrated Postsecondary Education Data System (IPEDS), the official federal repository for higher-education data.

In other words, the graduation-rate measure tracks specific individuals who enter college with a full-time course load and graduate from the university that originally admitted them. It does take into

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account the possibility that these students might take a break from their studies by using a six-year, rather than a four-year, time frame. Thus the measure does not penalize institutions for students who study abroad, change their majors, enroll in extended bachelor's programs such as engineering or accounting, or participate in cooperative programs that integrate work and study—the typical reasons that traditional students extend their time to graduation.

Nevertheless, this method of calculating graduation rate has significant limitations—mostly related to the fact that it no longer reflects the reality of college-going in America. These limitations have been well documented, most

recently by Clifford Adelman (formerly of the U.S. Department of Education and now a senior associate of the Institute of Higher Education Policy). In *The Toolbox Revisited*, Adelman observes that since the original *Toolbox* study in 1982, post-secondary-attendance patterns among traditional-age students "have become far more complex, with nearly 60 percent of undergraduates attending more than one institution."

In "The Propaganda of Numbers" (*Chronicle of Higher Education*, October 13, 2006), Adelman notes that the graduation rate formula "excludes from the denominator (a) the 18 percent who happen to enter in a term other than fall term; and (b) a somewhat overlapping 18 percent who enter part time. Furthermore, the numerator counts only those students who receive their degrees from the same institutions in which they began, thus excluding the 15 percent of bachelor's-degree recipients who transfer from community colleges and an additional 20 percent who start in a different four-year institution. Add those populations up and one finds that roughly half of traditional-age undergraduates are excluded from the Education Department's calculation of graduation rates."

So current discussions of the graduation-rate metric generally begin with the concession that it is, at best, a flawed measure of institutional quality. Perhaps there was a time in higher education when the six-year, first-time, full-time longitudinal measure captured most students in colleges and universities, but it clearly no longer does.

Initial responses to the deficiencies in the current method of calculating graduation rates have generally followed one of two paths. The first is to adjust the standard measure to take into account some obvious omissions. For example, some states and universities have proposed metrics that track students who transfer into an institution through to graduation. This approach is best suited to public university systems that are able to follow transfer students from one system institution to another. In large, multi-campus systems this approach can result in increases in graduation rates in the range of 10 percent. Although this is an improvement over an approach that treats all transfer students as dropouts, it is far from a complete solution to the problem. This strategy still does not track students

who transfer outside that state university system to other states, to private institutions, or (unless the state has a “student unit record system”) to other public institutions within the same state.

In 2006, the Secretary of Education proposed a national “unit record system” that would track every post-secondary student in the country and could be used to calculate a graduation rate that incorporated all transfer students. This proposal died as a result of concerns about the cost of implementation and the potential for violations of student privacy. But even if it had been implemented, students beginning in a semester other than fall and part-time students would not have been captured unless the graduation-rate formula also had been changed. Fine-tuning the graduation-rate measure does not really come to grips with the roughly half of the traditional-aged students referred to by Adelman.

To come at this problem from a different direction, one might begin with the number of graduates produced in a given year. After all, a graduate is a graduate, whether that person took four or 10 years to earn a diploma, attended one institution or several, attended continuously or intermittently, or began in a fall or spring semester. By beginning with graduates, at least we know that all who receive a diploma are included in the calculation. And in fact, a number of college and university presidents routinely point to the raw number of graduates that their institutions produce each year. For larger institutions, these numbers are very impressive.

Nevertheless, the raw numbers do not help us much with analysis, particularly if we are trying to understand how to produce more graduates. Generally speaking, analysis requires understanding a phenomenon relative to something else. We want to know how many graduates are produced in relation to the number of original matriculants, or the resources expended to produce them, or some other variable. There have been various attempts to look at graduation in this way. For example, the National Center for Public Policy and Higher Education, in its report card *Measuring Up*, calculates “Completion” for each state as a measure of the “certificates, degrees and diplomas awarded at all colleges and universities per 100 under-

graduates.” Taking a similar approach, the Indiana Commission for Higher Education is considering a “Graduation Productivity Index” to assess the production of graduates in relation to resources allocated for the task.

Since we believe this general approach can be very fruitful, we propose “graduation efficiency” as a metric that can show the success of universities in graduating students. We are not suggesting that the current measure of graduation rates be abandoned. It should, however, be supplemented with other

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measures that could round out the picture of how colleges and universities are doing in producing graduates.

Before defining and explaining graduation efficiency, we want to distinguish this metric from another one that looks at the efficiency of each graduate’s progression toward the degree. The “Graduation Efficiency Index”—used in Washington, Utah, Arizona and some other states—calculates efficiency in terms of a reduction of excessive credits attempted beyond a pre-determined maximum. That would include a student’s repeated course credits, dropped credits, and credits taken beyond the minimum required for graduation. These inefficiencies represent additional costs to educate each student and

certainly merit tracking. However, this measure does not address the more “macro” question of producing graduates.

## A NEW METRIC

To properly address the concerns of families and state governments, we ought to clarify what we need to know about college graduation. As a matter of public policy, what is important is the number of new graduates who enter a community each year. As a matter of family finance, it is the achievement of the milestone—more than the time taken to earn the degree—that is critical. Time-to-degree is often determined by personal obligations outside of college (work, family, and other financial obligations) that tend to work against the “faster-is-better” presumption of the traditional graduation-rate measure.

But for both states and students, the degree to which matriculants turn into graduates is important. So another way to think about graduation is in terms of a college or university’s efficiency each year at producing graduates in relation to the size of its full-time-equivalent (FTE) student body. To understand how to make this calculation, we begin with a simple model of an ideal case.

A completely efficient college or university would admit only full-time students and would retain them all to graduation four years later. Thus, a college with an enrollment of 1,000 students would have 250 freshmen, 250 sophomores, 250 juniors and 250 seniors. Each year all the seniors would graduate, and they would be replaced by 250 freshmen.

Graduation efficiency for this hypothetical university is 100 percent. It is calculated by dividing the number of degrees awarded (250) by the number that results from dividing the annual FTE student body (1000) by the number of years it takes for an “efficient” freshman to graduate (4), yielding the “efficiency factor.” In other words, 250 divided by 250 = 1 or 100 percent efficiency

Thus, the **graduation efficiency metric** measures an institution’s production of graduates in relation to the size of its full-time equivalent undergraduate student body, adjusted for the balance of beginning and transfer students. That ratio is then expressed as a percentage, compared to a standard of efficient completion (four years for a baccalaureate degree). The **efficiency**

**factor** is the number of years of continuous full-time study it would normally take a full-time student to complete a baccalaureate degree.

Our model uses four as the efficient number of years to complete a baccalaureate degree. Although four years is no longer the norm for degree completion, it is still the standard for completion with continuous full-time study for a degree requiring 120 credits. This accords well with the credit requirements of the vast majority of undergraduate-degree programs. Of course, some undergraduate degrees cannot be efficiently completed in four years because of the total credits required for graduation. In our model, programs that require credits beyond the 120-128 range for graduation reduce institutional efficiency. But variability by degree program could be addressed by determining the number of years needed to graduate and using that number to adjust the denominator for the graduation-efficiency calculation. For example, a program that required 150 credit hours for graduation would have an efficiency factor of five.

To apply this approach in actual cases, a number of features of students' college-attending patterns must be taken into account. First, the measure of efficiency must make room for part-time students and students who begin in semesters other than fall. These variants are captured by using FTE rather than headcount in the calculation.

Second, this model is static in the sense that it does not take into account a college or university's changes in enrollment from year to year. Students who find their way into the numerator (as graduates) are likely to have been calculated in the denominator over an extended period of years and may not have been enrolled in some of them. To account for this variability in an institution's enrollment change, whether growth or decline, we propose calculating graduation efficiency as a rolling four-year average. This dampens the effect of growing or declining enrollments on the efficiency measure but does not eliminate it. Institutions experiencing sharp growth would, for a time, have a somewhat lower efficiency ratio until increasing numbers of graduates begin to catch up with the increasing FTEs.

The third and perhaps most significant deviation from the hypothetical case

is the introduction of transfer students. To address this factor, we propose calculating the graduation efficiency metrics of beginning and transfer students separately and combining their sum in the denominator. This calculation will require a separate efficiency factor for transfer students to replace the efficiency factor of four in the ideal case above.

Different universities may well have different efficiency factors for their transfer students, depending on local conditions. An institution's efficiency factor for transfer students is a function of the average number of credits transferred and accepted toward degree completion. An institution that takes transfer students who bring an average of 60 credits with them would have an efficiency factor of two for its transfer students, because those students will need to take two more years of full-time coursework to complete the baccalaureate. Institutions that attract mostly students with senior standing would have an efficiency factor of one, while institutions that primarily attract transfers with sophomore standing would have an efficiency factor of three for those students. By calculating the average number of credits transfer students bring in a given year, the calculation of each institution's transfer-efficiency factor is straightforward. Once it is established, inter-institutional comparisons can more appropriately be made.

Our approach to taking transfer students into account in the calculation of graduation efficiency is to make separate calculations for entering freshmen and entering transfer students and to sum them. Thus, in a hypothetical university of 1,000 FTE students where 800 entered as first-time freshman and 200 entered as, on average, junior-level transfers, the average FTE/year would be  $800/4 + 200/2 = 300$ . If that university produced 250 baccalaureate degrees in a year, the graduation efficiency in that year would be  $250/300$  or 83.3 percent.

As noted, part-time students are incorporated by using all students in the denominator, and they are weighted by using FTE rather than headcount in the calculation. By using a "snapshot" rather than a longitudinal calculation, we factor out years to graduation. A student is counted in the numerator in the year of graduation no matter how many years previously he or she started college.

Thus the calculation would look like:

$$\frac{\text{Graduation efficiency} = \text{\# of graduates (BA degrees awarded) in an academic year}}{\text{Average FTE freshmen/Year} + \text{Average FTE transfers/Year}}$$

With FTE freshmen/year = FTE count of students who entered the university as freshmen

$$\div 4$$

And with FTE transfers/year = FTE count of students who entered the university as transfers

$$\div$$

2 (or other appropriate factor)

Graduation efficiency represents the fraction of students who graduate every year out of the number of FTE students who enter the university annually.

Applying this metric to colleges and universities across American higher education, a very interesting picture of graduation efficiency emerges. For illustrative purposes, we have calculated graduation efficiency on a sample of institutions drawn from the *U.S. News and World Report* classification categories.

## ANALYSIS

To "proof" the concept, Table 1 lists the calculated graduation efficiency for three different classifications of colleges and universities: liberal arts, national research, and master's institutions. A sample of institutions (four to six) with different enrollment mixes of freshman and transfer students was identified for each classification. Because of the lack of readily available data on transfer students, the fraction of those students who entered a given institution was estimated indirectly from IPEDS data based on the first-time freshman population and the total number of students who entered the institution in a given year, as follows:

$$\frac{\text{The fraction of students who entered as transfers} = \text{Total \# students entered} - \text{\# freshman students entered}}{\text{Total \# students entered}}$$

With FTE freshmen = total FTE fraction of students who entered as freshmen and FTE transfers = total FTE fraction of students who entered as transfers

**TABLE 1. AVERAGE GRADUATION EFFICIENCY (PERCENT)**

Institution	2001	2002	2003	2004	4-Year Avg Percent
Liberal Arts	95.4	96.2	98.3	95.7	96.4
National Research	88.7	90.1	90.3	91.5	90.2
Master's I, Tier I	70	75.8	78.8	76.7	75.3
Master's I, Tier II	57	58.3	64.8	64.6	61.2
Master's I, Tier III	47.8	45.5	47.8	59.8	50.2
Master's I, Tier IV	48.4	58.3	59	59	56.2
<b>Master's I, Average</b>	<b>55.8</b>	<b>59.475</b>	<b>62.6</b>	<b>65.025</b>	<b>60.7</b>

Source: Integrated Postsecondary Education Data System

**TABLE 2. AVERAGE GRADUATION RATE (PERCENT)**

Institution	2001	2002	2003	2004	4-Year Avg Percent
Liberal Arts	90.6	91.8	92.1	93.6	92.0
National Research	89.6	90.3	90.9	91.1	90.5
Master's I, Tier I	72.1	71.5	74	73.2	72.7
Master's I, Tier II	48.1	46.9	47.1	48.8	47.7
Master's I, Tier III	34.8	37.9	39.2	36.6	37.1
Master's I, Tier IV	29.7	30.7	36	36.7	33.3
<b>Master's I, Average</b>	<b>46.2</b>	<b>46.8</b>	<b>49.1</b>	<b>48.8</b>	<b>47.7</b>

Source: Integrated Postsecondary Education Data System

**TABLE 3. COMPARISON OF GRADUATION RATES AND GRADUATION EFFICIENCIES**

Institution	Graduation Efficiency 4-Year Avg percent	Graduation Rate 4-Year Avg percent	Change
Liberal Arts	96.4	92.0	4.4 points
National Research	90.2	90.5	0.3 points
<b>Master's I Average</b>	<b>60.7</b>	<b>47.7</b>	<b>13 points</b>

Source: Integrated Postsecondary Education Data System

We used a somewhat arbitrary transfer efficiency factor of two, which would mean that students transferred on average as rising juniors.

The graduation efficiency for liberal-arts institutions (typically a four-year baccalaureate private institution) shows the highest value of approximately 96 percent, followed by national research universities with approximately 90 percent, and masters institutions with an average of about 61 percent.

Table 2 shows the graduation rate of the same set of colleges and universities. **Graduation rate** measures the fraction of students who complete their program of study successfully in six years from a cohort of first-time, full-

time freshmen students. **Graduation efficiency** measures the fraction of students who graduate successfully every year out of the number of FTE students who enter the university annually.

Analysis of the data in Tables 1 and 2 reveals three salient facts:

1. The graduation rate and graduation efficiency of liberal arts and national research institutions are quite high and close in value.

2. Masters institutions' graduation efficiencies are significantly higher than their graduation rates.

3. There is a significant overlap in graduation efficiencies in the tiers of masters institutions, which is not true of their graduation rates.

Graduation rate and graduation efficiency are quite different measures, even though their results tend to converge at institutions that primarily enroll full-time students who remain at the same institution until they graduate. The graduation-rate metric is based entirely on the academic performance of a cohort of full-time, first-time freshman students, while the graduation-efficiency metric takes into account all students, including part-timers and transfers.

Liberal-arts institutions typically attract well-prepared, traditional students who are mostly freshmen. This seems to explain the fact that their graduation rates and graduation efficiencies are usually high and close in value, as shown in Table 3. National research institutions also have high graduation efficiencies and high graduation rates. Those institutions typically attract very able transfer students as well as freshmen, so they too have equally high graduation-efficiency and graduation rates.

On the other hand, master's institutions typically attract a mix of freshmen, transfer, and part-time students with varying degrees of academic preparation. This seems to explain the large discrepancy (13 points) between their graduation rates and graduation efficiencies (Table 3). Thus, while masters-level universities lag on graduation rates, they are more efficient than one might expect. In other words, part-time and transfer students in these institutions appear to be graduating in significantly greater numbers than first-time, full-time freshman students. This has typically been our experience with master's-level universities.

If the graduation efficiency measure were to be accepted as an accountability standard, IPEDS would need to define and collect data on transfer students. Given the increasing prominence and numbers of these students, we do not think that is unreasonable to ask that these data be collected.

### THE NEW METRIC'S ADVANTAGES

The new metric's advantages are sixfold.

1. It would be easy to calculate from existing data (once transfer-student data are publicly reported). The formula is straightforward, and it does not require looking at individual student records.

2. It addresses the public-policy concern about the production of graduates

in relation to the investment in higher education. Moreover, it does not encourage universities to turn away part-time students and transfer students as a response to pressures to increase graduation rates. The strength of our system is in the variety of students it serves, and our goal ought not to be to limit the options for non-traditional students in the name of improved graduation rates.

3. It captures all matriculated students rather than a small subset of traditional students. If we assess in order to improve, there is little value in restricting our assessment to an ever-shrinking proportion of the student population.

4. The metric would not require extensive tracking of, or data collection on, individuals. This is a tremendous advantage over a unit record system, which would be costly to construct and which could have privacy restrictions that limit access to the data.

5. It would not favor traditional colleges and universities. It does not use a private-education model to evaluate public higher education. Private universities are highly efficient, even on a level playing field. The graduation-efficiency metric does not “turn the tables”; it expands our vision.

6. The metric uses the traditional standard of four years as its graduation ef-

iciency factor. It does not require defending six years to graduation as the norm.

## CONCLUSION

Education is widely understood to be critical to the future of America in the 21st century. Our country’s capacity to innovate and compete will depend upon a more highly educated workforce. Much of the responsibility for expanding that workforce will fall to public colleges and universities, particularly master’s-level institutions that have the capacity to accommodate more students.

We need to have an accurate understanding of how institutions across the spectrum of American higher education are contributing to the expansion of our college-educated population. The changing patterns of college attendance have, over time, eroded the value of the traditional measure of graduation rates.

We believe that this simple measure of graduation efficiency will help colleges and universities benchmark their effectiveness at graduating students and engage in internal dialogue about how to be more successful. That can only be good for our collective future. ☐

## RESOURCES

- Clifford Adelman, *The Toolbox Revisited: Paths to Degree Completion from High School Through College*, U.S. Department of Education.
- Clifford Adelman, “The Propaganda of Numbers,” *Chronicle of Higher Education*, October 13, 2006.
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- University of Washington, Accountability Report, Appendix D, Defining the Graduation Efficiency Index (GEI), [www.washington.edu/reports/account/appendixd.html](http://www.washington.edu/reports/account/appendixd.html)
- Robert Zemsky, Gregory R. Wegner, and William F. Massey, *Remaking the American University: Market-Smart and Mission-Centered*, Rutgers University Press, 2005. ☺

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