CHAPTER 4:

Efficiency Metrics

This chapter details the following set of efficiency metrics:[1]

Efficiency Metrics

While much of this framework focuses explicitly on student access to, progression through, and completion of higher education, resource-related metrics help provide additional context to inform efforts to effectively and efficiently improve college attainment. Increased attainment and parity in educational outcomes are the ultimate goals of an improved postsecondary system; moving students through the system more efficiently is a supporting goal, as many institutions must better serve students with the limited resources already at their disposal. Thus, efficiency metrics can help institutions evaluate how effectively they are using existing funds to educate students.

The efficiency metrics included in this framework are based mostly (but not exclusively) on the metrics and methodology developed by the Delta Cost Project, which uses publicly available data from the Integrated Postsecondary Education Data System (IPEDS).[2] Because Delta Cost is at the forefront in analyzing college and university finance data, many efforts have drawn on their work. For example, the National Governors Association (NGA) developed its set of efficiency metrics for state policymakers based on Delta's data.[3] Additionally, as states embrace outcomes-based funding, many have incorporated similar efficiency measures into their funding structures.[4] Of the initiatives reviewed for this framework, Complete College America (CCA) and Completion by Design (CBD) also include efficiency metrics in their data reporting.

The drawbacks to IPEDS finance data are well-known.[5] For example, the expenditures data in IPEDS combine undergraduate, graduate, and noncredit expenditures, inflating any estimates that attempt to focus on credential-seeking undergraduates alone, as this framework does. Further, parent/child issues are known to affect institutions that report finance data for more than one campus.[6] However, the field has not yet developed efficiency metrics, nor a publicly accessible database, that improve on current practice, so IPEDS and Delta Cost data remain the most accurate finance information currently available. The framework also recommends adjusting dollars for inflation for metrics that trend over time.

Institutions can extract much of the data for these metrics directly from the Delta Cost Project, which relies on IPEDS data. Table 4-1 notes the variables and label names from Delta Cost that correspond to the calculations in this chapter. If data elements are not available through Delta Cost, or this framework's recommendation differs from Delta Cost, those details are noted throughout the chapter. For example, neither Delta Cost nor IPEDS includes data on credits attempted and completed, so institutions must gather it from their student information system. In addition, Delta Cost and IPEDS data on retention are based on fall enrollment, not the 12-month enrollment cohorts recommended by this framework.

Table 4-1: Framework Metrics Mapped With Delta Cost Variables

Framework's Proposed Metric	Data Elements Needed to Calculate Proposed Metric	Data Source and Corresponding Variable
Expenditures per Student	Expenditures for instruction and student services	Expenditures for instruction: current year total (instruction01) Expenditures for student services: current year total (studserv01)
	Expenditures for instruction, student services, research, and public service	Expenditures for instruction: current year total (instruction01) Expenditures for student services: current year total (studserv01) Expenditures for research: current year total (research01) Expenditures for public service: current year total (pubserv01)
	Expenditures for academic support, institutional support, and operations and maintenance	Expenditures for academic support: current year total (acadsupp01) Expenditures for institutional support: current year total (instsupp01) Expenditures for operations and maintenance of plant: current year total (opermain01)
	12-month full-time equivalent (FTE) enrollment	Total 12-month FTE student enrollment (fte12mn)
	Education and related expenditures	Education and related expenses (eandr)
Cost for Credits Not Completed*	Number of credits not completed by cohort in the first year	
	Number of students attempting credit-bearing courses in the cohort in the first year	
Cost for Completing Gateway Courses*	Number of development and gateway course credits attempted before completion	
	Number of gateway completers in a given year	
Change in Revenue From Change in Retention	Net tuition revenue	Net tuition and fees revenue (nettuition01)
	Change in retention rate	Full-time retention rate (ftretention_rate) for each cohort year** Part-time retention rate (ptretention_rate) for each cohort year
	Number of student in cohort	Full-time first-time degree/certificate-seeking undergraduate for current year (grscohort)** Part-time first-time degree/certificate-seeking undergraduate for current year (pt_ugentering)
Cost of Excess Credits to Credential*	Total earned credits for each completer with excess credits	
	Average credits across all completers	
	Total number of completers with excess credits	
Completions per Student	Completions per 100 FTE students	Total completions (totalcompletions) Total 12-month FTE student enrollment (fte12mn)
Student Share of Cost*	Net tuition revenue paid by students	Net tuition directly from students (net_student_tuition)
Expenditures per Completion*	Expenditures per completion	Education and related expenses per completion (eandr_completion)

Note: Blank rows in the Data Source column indicate that the variable is to be determined by the institution.
* Uses education and related expenditures (per credit) as part of calculation, itemized in Expenditures per Student variable.
** Delta Cost and IPEDS data do not break out first-time and transfer students and are available for only fall entrant cohorts, not 12-month enrollments.

ACCESS

Expenditures per Student	
Definition	Education and related (E&R) expenditures per full-time equivalent (FTE) student based on 12-month enrollment
Population	Twelve-month FTE enrollment calculated using 12-month instructional activity credit hours in IPEDS
Disaggregates	Disaggregations (including separating undergraduate from graduate students) are not available due to finance data limitations.
Submetrics for further analysis	• Distribution of students by credential level or program of study • Instructional expenditures per FTE student and as a percentage of E&R expenditures • Salaries as a percentage of instructional expenditures • Student support expenditures per FTE student and as a percentage of E&R expenditures • Administration expenditures per FTE and as a percentage of E&R expenditures • E&R expenditures as a percentage of total education and general expenditures • FTE faculty/staff per FTE student

2 initiatives measure Expenditures per Student

Field Usage and Convergence

This metric relies on IPEDS data and Delta Cost's methodology for calculating E&R, which was developed as a measure of spending on direct educational costs. Per Delta Cost, E&R includes spending on instruction, spending on student services, and a prorated share of spending on academic and administrative support and operations and maintenance (e.g., administration).[7] To determine the prorated amount of indirect spending, Delta first finds the "education share" as the spending for instruction and student services divided by the spending for instruction, student services, research, and public service.

$$\textit{Education Share} = \frac{\textit{Expenditures for Instruction and Student Services}}{\textit{Expenditures for Instruction, Students Services, Research, and Public Service}}$$

The education share then is multiplied by the spending for academic support, institutional support, and operations and maintenance, which is then added to spending on instruction and student services, resulting in the E&R.

In other words, Delta defines E&R as all spending on instruction and student services, plus a prorated share of indirect expenditures that support the academic mission (e.g., academic support, institutional support, and operations and maintenance).[8] Because of changes in IPEDS survey reporting formats, Delta has made adjustments to reported data in some years to maintain comparability over time.[9]

$$\textit{Education and related expenditures} = \textit{Expenditures for Instruction and Student Services} + \left(\textit{Education Share} \times \textit{Expenditures for Academic support, Institutional support, and Operations and Maintenance} \right)$$

The metric also relies on data already available from IPEDS that calculate 12-month full-time equivalent (FTE) enrollment based on credit-hour activity rather than headcounts[10] because full- and part-time enrollment is not currently available in IPEDS' 12-month enrollment survey, as this framework recommends.

$$\frac{\textit{Education and related Expenditures}}{\textit{12-month FTE Enrollment}}$$

However, Delta Cost does not employ 12-month enrollment in their trend analyses, which date back to 1998, relying instead on fall FTE enrollment because 12-month enrollment was not available in IPEDS before 2004. The 12-month enrollment data are recommended here to be more inclusive of all students, and because more than 10 years of trend data are probably sufficient for most institutions today. Trend analyses of this metric, or any cost or efficiency metric, should be inflation-adjusted over time.

Use Cases

This metric provides a basic understanding of how much institutions are spending to provide an education for each student, which is useful to both institutions and policymakers. Colleges also can use these data to track trends in their spending per student over time and in relation to peer institutions. The recommended submetrics (also available from Delta Cost) can help colleges determine how changes in spending over time impact resource allocation to core educational functions, such as instruction and student services, which can help contextualize changes in student completion rates. When interpreting trends in expenditures per student, institutions should evaluate whether changes in the metric resulted from changes in enrollment, changes in expenditures (or available revenues), or both, for better interpretation and use. For students, this metric is not usually a concern or consideration in the decision-making process, but may be indicative of how much an institution makes available to spend on students relative to other institutions. It also can be useful for policymakers in clarifying the causes of price increases. It is a widely held belief that increases in student tuition and fees are the result of surges in college spending, but analysis from the Delta Cost Project shows that institutional spending has not risen as fast as prices. Rather, they find that a decrease in public subsidies is a primary contributor to price increases.[11]

PROGRESSION

Cost for Credits Not Completed	
Definition	The per-student expenditures by the institution for credits attempted but not completed by first-year students
Population	Twelve-month cohorts of first-year students (e.g., first-time full-time [FTFT], transfer full-time [TFT], first-time part-time [FTPT], transfer part-time [TPT])
Disaggregates	Credential level, academic preparation, economic status, race/ethnicity, gender, age, first-generation status, and program of study
Submetrics for further analysis	• Number of credits attempted, not completed • E&R per credit • Total E&R for credits attempted, not completed • Total and average net tuition paid by *students* for uncompleted credits

0 **initiatives measure Cost for Credits Not Completed**

Field Usage and Convergence

The cost for credits not completed metric is built on the credit completion ratio performance metric and illustrates the monetary impact for the institution of credits attempted but not completed. Prior credits attempted from Advanced Placement (AP), International Baccalaureate (IB), dual enrollment, and transfer are not counted; however, credits attempted through remedial coursework are counted, following the definition for the Credit Completion Ratio metric.

The framework recommends building the metric calculation based in part on Delta Cost Project metrics and methodology, using IPEDS finance data. Dividing the E&R expenditures (discussed in more detail in the Expenditures per Student metric) by all 12-month credit-hour activity provides the E&R spending per credit.[12]

E&R per credit is then multiplied by the number of credits not completed in the first year, which is divided by the number of students attempting credit-bearing courses in the first year.

$$\frac{\textit{Education and related expenditures per credit} \times \textit{Number of credits not completed by cohort in the first year}}{\textit{Number of students attempting credit-bearing courses in the cohort in the first year}}$$

Use Cases

Institutions waste money and students lose money when students attempt credits but do not complete them—whether they withdraw from the course or receive failing grades.[13] Institutions may be able to save or at least better allocate scarce resources by improving student course completion.[14] To interpret accurately the metric's results, institutions should also consider the recommended submetrics, which indicate whether the metric is changing over time because of changes in the number of uncompleted credits, the expenditures per credit, the number of students attempting credits, or all of these factors. This metric may also be of interest to state and federal policymakers concerned with whether public funds are being used to subsidize multiple course repeats.

Cost for Completing Gateway Courses	
Definition	For all gateway course completers in a given year, the per-student expenditures associated with all developmental and gateway courses attempted before gateway course completion, tracking English and math courses separately
Population	Gateway course completers in a given year
Disaggregates	Credential level, academic preparation (at any time), enrollment status, attendance intensity (at any time), economic status (at any time), race/ethnicity, gender, age, first-generation status, and program of study
Submetrics for further analysis	• Net tuition cost to *students* to complete gateway courses • Enrollment in developmental courses (if applicable) • Completion of developmental courses (if applicable) • Number of developmental course attempts (if applicable) • Enrollment in gateway courses • Number of attempts to complete gateway courses • Completion of both gateway courses • Availability of developmental and gateway courses in sequence • Percentage of D's, F's, W's, I's in gateway courses • E&R expenditures per credit

1 initiative measures Cost for Completing Gateway Courses

Field Usage and Convergence

Drawing on IPEDS data and Delta Cost methodology, this efficiency metric largely follows the CBD definition to evaluate the cost associated with students passing math and English gateway courses—including the expense associated with course repeats.[15] Specifically, this metric measures the cost of all coursework undertaken to lead to gateway completion—including developmental courses in that subject, as well as all gateway attempts that eventually led to course completion. This metric provides a financial lens that complements the metric that measures the percentage of students completing gateway courses in the first year.

$$\frac{\textit{Number of developmental and gateway course credits attempted prior to completion} \times \textit{Education and related expenditures per credit in the year attempted}[16]}{\textit{Number of gateway completers in a given year}}$$

However, this efficiency metric, unlike the performance metric, is not cohort-based. Instead, it looks retrospectively at gateway *completers* to examine the efficiency of students' pathways to earning gateway course credit. The efficiency of these pathways is related to, but distinct from, the percentage of students completing gateway courses in a given cohort. Interpretation of the metric should evaluate whether efficiency is changing over time because of changes in the number of gateway credits attempted per student, the number of students completing gateway courses, the expenditures per credit, or a combination of factors. The disaggregates and submetrics align with the framework's 12-month cohort specifications and encourage a deeper dive into the institutional costs to help students complete gateway courses.

Use Cases

Frequent failed attempts at prerequisite remediation or gateway courses require institutions to spend money delivering courses that do not result in credit accumulation, and this decreases institutional efficiency. These failed attempts also require students to spend money and financial aid that does not help them progress toward a degree. Quantifying the cost of the various steps toward completing a gateway course can help institutions focus on ways to increase efficiency and decrease both student and institutional expenses. Federal and state policymakers, who subsidize developmental and gateway course attempts, also have a vested interest in students progressing toward completion in an efficient manner, especially in light of time limits on Pell Grant and Direct Loan eligibility.

Change in Revenue From Change in Retention	
Definition	The impact of changes in first-year retention rates from one cohort to another on tuition revenue available to the institution
Population	Twelve-month cohorts of students (e.g., FTFT, FTPT, TFT, TPT)
Disaggregates	Credential level, enrollment status, attendance intensity, academic preparation, economic status, race/ethnicity, gender, age, first-generation status, and program of study
Submetrics for further analysis	• Change in first-year retention rates over time • Change in net tuition per student over time • Change in net tuition revenue per student due to change in retention • Change in subsidy revenue due to change in retention (total and per student) • Change in net tuition plus subsidy revenue due to change in retention (total and per student)

2 initiatives measure Change in Revenue From Change in Retention

Field Usage and Convergence

The change in revenue from change in retention metric is related to the retention rate performance metric in that it compares first-year retention rates for two cohorts and evaluates how that change impacts net tuition revenue for an institution. CBD includes a similar efficiency metric as an optional measure for use by its community colleges, but variations on this measure have been used widely by the field.[17]

Change in the first year retention rate from Cohort 1 to Cohort 2 x *Number of students in Cohort 2* x *Net tuition revenue per student for year 2*[18]

Similar to CBD, this metric calculates changes in net tuition revenue only, related to changes in retention, because institutions receive tuition on a per-student basis, whereas other funding sources may be allocated in a variety of ways.[19] However, based on recent studies, institutions might also consider estimating the impact of changes in retention on other revenue sources, such as local and state appropriations.[20] To fully understand the results, institutions must determine whether the revenues are changing over time because of changes to the number and percentage of students retained, changes in net tuition, or both. When trending these data over time, it is essential to adjust for inflation and consider changes in the size of cohort as well as in tuition for accurate analysis.

Use Cases

By highlighting the possibility for increased revenue generation resulting from retention rate increases, the results of the metric can support institutions advocating for additional funding for student support services that improve retention. The metric also can quantify the return on investment of those support services, which can ultimately offset some of their costs.[21] Considering the investment of the state and federal governments in higher education, these data can help policymakers to understand and support efforts to increase student retention because of the impact these efforts have on institutional, state, and federal budgets.

COMPLETION

Cost of Excess Credits to Credential	
Definition	The per-student expenditures for excess credits to credential for all completers with excess credits in a given year
Population	All completers in a given year by credential level
Disaggregates	Enrollment status, attendance intensity (at any time), academic preparation (at any time), race/ethnicity, economic status (at any time), age, gender, program of study (at exit)
Submetrics for further analysis	• Excess credits earned by transfers by number/percentage of prior credits accepted • Total (instead of average) cost of excess credits to credential • Total and average net tuition cost to student of excess credits to credential

2 initiatives measure Cost of Excess Credits to Credential

Field Usage and Convergence

The metric is related to the average credits to credential metric in this framework, which mostly follows CCA calculation guidelines to determine the average number of credit hours completed by credential earners by credential level. The framework goes further by calculating the number of credits earned above the average number of credits, to calculate excess credits to credential, based on CBD's optional average number of excess credits metric. This framework's proposed efficiency metric combines these approaches with IPEDS data and Delta Cost methodology by assigning costs to the excess credits.

It does so by calculating the total number of credits earned above the average, summed across completers who accumulated more than the average. Multiplying by expenditures per credit (E&R expenditures divided by 12-month instructional credit activity) provides the total cost of these excess credits, and dividing by the number of completers with excess credits translates this metric into a cost per completer (with excess credits). Using the average credits to credential to calculate excess credits includes some inefficiency because many students may take more credits than required, thus increasing the average above catalog credit requirements. Ideally, this metric would use the number of credits required by the course catalog for each credential level and program of study instead of the average number of credits to credential. However, that level of detail currently is not readily accessible to institutional researchers based on our discussions with the field. As such, this metric should be interpreted with caution as some of the "excess" may be explained by requirements that differ across programs and degrees.

Use Cases

This metric measures the financial outlay by the institution for students taking excess credit hours to credential. Because of the multitude of factors affecting this metric, it is imperative to determine whether efficiency is changing due to more students taking more excess credits, the expenditures per credit, or both over time. Changes in expenditures per credit over time can be controlled for by using the expenditures per credit in the year the credit was taken, instead of the year the student completed, for more precision. If costs increase largely due to excess course taking, institutions can proactively address degree pathways and academic advising to improve efficiency and help students complete more quickly and at a lower cost. The metric also provides institutions and policymakers with another piece of the cost–of-college puzzle, identifying a possible intervention strategy to reduce costs for both students and taxpayers. By creating efficient pathways to a credential, institutions and students can minimize excess credits to credential, lessening the cost per completer for the institution, student, and taxpayer.

Completions per Student	
Definition	The number of completions divided by the number of FTE students (based on 12-month enrollment) in a given year expressed as completions per 100 FTE
Population	Twelve-month FTE undergraduate enrollment and undergraduate credentials (certificates, associate's, bachelor's) conferred in a given year
Disaggregates	Race/ethnicity, gender, age, credential level, program of study (at exit), academic preparation (at any time), economic status (at any time), first-generation status, enrollment status (at entry), attendance status (at any time)
Submetrics for further analysis	• Change in number of completers • Change in FTE enrollment • Completion rates

8 initiatives measure Completions per Student

Field Usage and Convergence

Simply stated, this metric is intended to show how effectively institutions turn credential-seekers into credential-holders. The recommended metric follows Delta Cost Project and CCA methodology with some proposed modifications.[22] These include using 12-month undergraduate enrollment, instead of fall, and disaggregating at least by credential level, race, gender, age, economic status, and academic preparation. IPEDS collects disaggregations for completions by program of study, credential level, race/ethnicity, and gender, but does not disaggregate 12-month FTE enrollment by any demographic characteristics.[23] While CCA does not currently disaggregate completions per student by these student characteristics, they could disaggregate this metric by most of the characteristics recommended here given the level of disaggregation available for both their enrollment and credential production metrics.[24]

Completers would be the ideal option for the numerator because they count unduplicated students, as opposed to *completions*, which count students more than once if they earn multiple credentials in the same year. However, data on completers were not added to IPEDS until the 2012–13 collection, so these data cannot be trended over a longer span of time.[25] Once more data are available for completers, the framework recommends amending this metric to calculate completers per student, to produce an unduplicated measure.

When examining this metric over time, it should be noted whether changes in the metric are due to changes in the number of credentials awarded, the number of FTE students, or both, for better interpretation and use.

Use Cases

Some institutions use this metric to illustrate student progress toward graduation. For example, the University of Texas-El Paso uses a similar degree-production ratio that compares the total number of FTE undergraduates enrolled four years earlier with the total number of baccalaureate degrees awarded that year.[26] These data can supplement the traditional IPEDS graduation rates by capturing completions regardless of whether the student began with a first-time, full-time status, although the more inclusive completion rates recommended as part of this framework can alleviate this issue. Policymakers can also use this metric, in conjunction with success rates, to determine how many credentials institutions award in relation to how many students they enroll. Some states, like Tennessee, include a similar completion per 100 FTEs metric in their outcomes-based funding models.[27]

COST

Student Share of Cost	
Definition	The percentage of E&R covered by net student tuition revenue versus institutional subsidies in a fiscal year
Population	All students
Disaggregates	Disaggregations (including separating undergraduate from graduate students) are not available due to finance data limitations.
Submetrics for further analysis	• Sticker price and net price • Net tuition revenue per 12-month FTE enrollment • E&R per 12-month FTE enrollment • Subsidy per 12-month FTE enrollment

1 initiative measures Student Share of Cost

Field Usage and Convergence

This metric is drawn directly from the Delta Cost Project, which refers to it as the net tuition share of E&R. The metric quantifies the proportion of education-related expenditures paid for by net tuition revenue relative to other institutional resources, such as state and local appropriations, investment or endowment incomes, or other revenues generated by the institution—or what Delta Cost calls the "subsidy share."

$$\frac{\textit{Net tuition revenue (gross tuition revenue minus institutional grant aid)}}{\textit{Education and related expenditures}}$$

The metric includes the entire student population, rather than only undergraduates, because graduate and undergraduate expenditures cannot currently be separated in IPEDS/Delta Cost Project data. Further, while no disaggregates are recommended due to data limitations, the submetrics are intended to better explain whether and how burden has shifted to students, so that institutions and policymakers may seek to lessen the financial impact on students, particularly those with the greatest need.

Use Cases

Net tuition revenue accounted for roughly 50 to 62 percent of education-related spending at public four-year institutions in 2013. The student share of costs at public institutions was between 10 and 19 percentage points higher than it was in 2003, varying by institution type.[28] The tuition share of E&R at private institutions was also about 4 to 5 percentage points higher in 2013 than it had been a decade prior.

This metric is highly relevant to policymakers because it quantifies the impact of decreased state support for higher education—and its direct impact on students. As per-student state investment has declined, students and families have had to pick up an increasing share of college costs, affecting their ability to access and succeed in college, especially for low-income students with fewer resources to draw on.[29] A report using Delta Cost Project data noted that decreased state funding is responsible for almost 80 percent of the rise in public education tuition between 2001 and 2011.[30] While more recent analysis shows a slight increase in per-student state and local funding for public colleges and universities (5.4 percent between 2013 and 2014), longer-term trends in state disinvestment in higher education have had a major impact on college affordability.[31] State policymakers should work to restore appropriations to at least prerecessions levels, and institutions should realign institutional aid practices to address the financial hardships of low-income students and families, who were unduly burdened by cuts.

Expenditures per Completion	
Definition	E&R divided by the number of completions in a fiscal year
Population	All credentials conferred in a given year
Disaggregates	Disaggregations (including separating undergraduate from graduate students) are not available due to finance data limitations.
Submetrics for further analysis	• Distribution of completions by award level and program of study • Change in number of completions over time • Change in E&R over time

5 initiatives measure Expenditures per Completion

Field Usage and Convergence

This metric, also drawn directly from the Delta Cost Project, calculates E&R per completion, including all credentials because undergraduate and graduate students cannot currently be disaggregated in the IPEDS expenditure data. Additional disaggregates also are not included for this metric due to data limitations, but the recommended submetrics can help to explain whether the metric is changing due to changes in the number of completions, the level of expenditures, or both over time. Further, understanding the distributions of completions by award level and program of study can help interpret why expenditures at a given institution may be higher or lower than at other institutions with different credential and program mixes.

Completers would be the ideal option for the denominator because they count unduplicated students, as opposed to *completions*, which count students more than once if they earn multiple credentials in the same year. However, data on completers were not added to IPEDS until the 2012–13 collection, so these data cannot be trended over a longer span of time.[32] Once more data are available for completers, the framework recommends amending this metric to calculate completers per student, to produce an unduplicated measure.

Use Cases

This metric is a proxy for the resources required to educate students through to credential completion. It is a proxy because the data are not readily available to assign actual costs to individual students as they progress (or do not progress) toward completion. As such, this metric captures the costs associated with both completers but also noncompleters, by comparing the resources spent to educate all students in a given year with the number of credentials awarded by the institution in that same year. Initiatives like CBD and the Voluntary Institutional Metrics Project already use the expenditures per completion metric to measure the cost associated with achieving the ultimate goal of degree completion.[33]

1 Because it is closely tied to the Completers performance metric, Time and Credits to Credential is included as a stand-alone metric in Chapter 2, which details the Completion performance metrics. Additionally, because it is closely tied to the Median Earnings performance metric, the Earnings Threshold metric is described in Chapter 2 under Workforce Outcomes.

2 Delta Cost Project. (2009, February). *Metrics for improving cost accountability* (Issue Brief No. 2). Retrieved from http://www.deltacostproject.org/sites/default/files/products/issuebrief_02.pdf

3 National Governors Association. (2011, July). *From information to action: Revamping higher education accountability systems*. Retrieved from http://www.nga.org/files/live/sites/NGA/files/pdf/1107C2CACTIONGUIDE.PDF

4 Davies, L. (2014, March). *State "shared responsibility" policies for improved outcomes: lessons learned*. Washington, D.C.: HCM Strategists. Retrieved from http://hcmstrategists.com/wp-content/uploads/2014/04/HCM-State-Shared-Responsibility-RADD-2.0.pdf

5 Delta Cost Project. (2009, February). *Metrics for improving cost accountability* (Issue Brief No. 2). Retrieved from http://www.deltacostproject.org/sites/default/files/products/issuebrief_02.pdf; National Center for Education Statistics (2012, August). *IPED analytics: Delta Cost Project database 1987–2010*. Retrieved from https://nces.ed.gov/pubs2012/2012823.pdf; Delta Cost Project. (2011, December). *Delta Cost Project documentation of IPEDS database and related products*. Retrieved from National Center for Education Statistics website: https://nces.ed.gov/ipeds/deltacostproject/download/DCP_History_Documentation.pdf

6 Specifically, the Delta Cost Project database collapses data from institutions that are part of a parent/child reporting relationship into a single observation each year, to maintain comparability over time and across multiple IPEDS surveys. These reporting relationships are more common in the public sector, but affect only a small proportion of public institutions. This parent/child relationship in IPEDS finance data could affect empirical results, but the effects appear small. Jaquette, O., & Parra, E. (2016, February). *The problem with the Delta Cost Project database*. New York, NY: Research in Higher Education. Retrieved from http://link.springer.com/article/10.1007/s11162-015-9399-2

7 E&R excludes spending on sponsored research, public service, auxiliaries, and other operations. Delta Cost Project. (2016, January). *Trends in College Spending: 2003–2013*. Retrieved from http://www.deltacostproject.org/sites/default/files/products/15-4626%20Final01%20Delta%20Cost%20Project%20College%20Spending%2011131.406.P0.02.001%20....pdf

8 A portion of indirect expenditures also supports the research and public service functions in institutions with these activities.

9 Institutions report finance data to IPEDS either through a GASB form (primarily used by publics) or FASB form (primarily used by privates). A new GASB form was phased in during fiscal year (FY) 2008 and FY09, with institutions required to use the new form in FY10. To maintain consistency over time and across surveys, Delta Cost adjusts some expenditure elements. Institutions can use Delta's data as part of this framework or replicate Delta's adjustments using their institutional (not IPEDS) data. For institutions using (1) the GASB form in FY10 and after, (2) the new "aligned" form during the transition period in FY08 and/or FY09, or (3) the FASB form in FY97 and after, Delta extracts spending on operations and maintenance (O&M) and interest out of the six main functional expenditure categories (instruction, research, public service, student services, academic support, and institutional support). Each of the O&M totals is then resummed into a stand-alone O&M category for each institution. Interest remains excluded to maintain consistency over time because public institutions did not report interest to IPEDS in early years.

10 IPEDS reports calculated 12-month FTE estimates based on instructional activity. Integrated Postsecondary Education Data System (2015). *12-month enrollment full instructions*. Retrieved from https://surveys.nces.ed.gov/ipeds/VisInstructions.aspx?survey=9&id=30069&show=all

11 Kirshstein, R. (2015, April 8). *How the New York Times got it wrong about college tuition*. Retrieved from Noodle website: https://www.noodle.com/articles/how-the-new-york-times-got-it-wrong-about-college-tuition-opinion

12 This framework recommends using total credit hour activity, including undergraduate and graduate activity to align with the numerator, which includes expenditures on undergraduate and graduate students combined. CBD includes only undergraduate credit activity in the denominator because they work only with community colleges, at which graduate expenditures would be minimal.

13 Credit earned and not earned is based on institutional standards. In the case that an institution accepts a D grade as passing, those credits would be considered completed. The use of institutional standards to determine credit earned is consistent in this framework across relevant metrics, including credit accumulation and credit completion ratio.

14 Belfield, C., Crosta, P., & Jenkins, D. (2014, September). *Can community colleges afford to improve completion? Measuring the costs and efficiency effects of college reforms*. Retrieved from Community College Research Center website: http://ccrc.tc.columbia.edu/publications/can-community-colleges-afford-to-improve-completion.html

15 Coffey Consulting (personal communication, March 5, 2016).

16 The calculation for E&R per credit can be found in the description for the previous metric, cost for credits not completed.

17 Ruffalo Noel Levitz. Retention revenue estimator. Retrieved from https://www.ruffalonl.com/college-student-retention/retention-revenue-estimator; Noel-Levitz. Return on investment estimator. Retrieved from https://www.ruffalonl.com/upload/Student_Retention/ReturnonInvestmentEstimator.pdf; Walmart, Lumina Foundation, Delta Cost Project, & Jobs for the Future. (2009, December). *Calculating cost-return for investments in student success*. Retrieved from Delta Cost Project website: http://www.deltacostproject.org/sites/default/files/products/ISS_cost_return_report.pdf

18 Depending on data availability, average credit load and tuition charge per credit can be used in lieu of net tuition revenue per student, which is how CBD calculates this metric.

19 The CBD metric measures the revenue in year 1 for retained students instead of year 2 because their metric seeks to evaluate how many more students would have persisted and what the potential tuition revenue gain would have been in year 1 had the institution already had year 2's retention rate.

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21 Walmart, Lumina Foundation, Delta Cost Project, & Jobs for the Future. (2009, December). *Calculating cost-return for investments in student success*. Retrieved from Delta Cost Project website: http://www.deltacostproject.org/sites/default/files/products/ISS_cost_return_report.pdf

22 We considered using headcount instead of FTE based on concerns that using the latter may inflate the metric for institutions with larger part-time populations, but we opted to use 12-month FTE here for consistency with other metrics using these data in this framework.

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33 Also collecting this metric: College Measures, the Consortium for Student Retention Data Exchange, and the NGA efficiency metrics.