

Technical Issues Underlying Dropout and Completion Indicators

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Dropout, graduation and completion statistics are the most basic indicators to consider in judging a school, school district or state education system. Not only do they show the degree to which students are successfully completing the expected course of study, they are strong indicators of students' prospects for future economic success.¹ While it may seem simple to make these calculations, judgments must be made about who to include in the base group of students being tracked, who to count as a graduate or dropout, how many years to follow these students, and how to construct the formula. Each decision substantially affects the resulting statistics. A number of reports have contrasted popular calculations in terms of their accuracy, bias, and ease of calculation (e.g., Swanson, 2003; Warren, 2004; Mishel & Roy, 2006). The technical definitional issues that are embedded in the calculations are at least as deterministic of bias and accuracy as the computations.²

This paper discusses the technical issues around calculating dropout/completion rates that exist beyond which formula is used to calculate them. Many of these issues have been documented in other places. Issues that are not documented elsewhere are exemplified here using data from the Chicago Public Schools—a district with many years of detailed, longitudinal records on students.³ The technical decisions discussed here are intrinsically tied to the calculation methods; they will affect the choice of an appropriate formula, and the type of calculation will affect the degree to which these issues may introduce bias and inaccuracy. While this paper does not delve into the different formulas that could be used, there is one major distinction between two general categories of calculations that has substantial implications for the technical issues discussed here; some calculations are based on longitudinal student-level data, others are based on aggregate statistics about groups of students. The same general

technical issues affect both types of calculations, but the technical issues vary in acuteness, depending on the method of calculation.

Technical decisions depend on the purpose for calculating dropout/completion indicators

There is no one best measure of high school dropout or completion. Different methods of calculating graduation, completion and dropout will be more or less useful for different purposes and more or less valid and reliable for different types of students (Swanson, 2003; U.S. Dept. of Education, 2005). Trade-offs must be made in terms of accuracy, stability, lack of bias, inclusiveness, sensitivity and data requirements. Recommendations are often made to produce multiple indicators, each giving slightly different information⁴. However, policy-makers, school staff and the public can lose confidence in indicators that appear inconsistent. Discrepancies among reported statistics can lead to accusations that schools, districts, or states are manipulating statistics. The technical issues need to be considered within the context of how the resulting statistics are to be used, knowing that they will be used to serve different purposes.

The most basic use of graduation and dropout statistics is simply to gauge the condition of education in a school, district or state. Because high school graduation is a strong indicator of social and economic well-being, this provides important information on the most basic measure of educational success in the population. There is also increasing recognition of the need to produce indicators separately for subgroups of students, (e.g., students receiving special education services, English language learners, low-income students, and students of varying races/ethnicities).⁵ Accuracy in measurement is of primary importance for determining the state of education for a population or subgroup.

Completion and dropout indicators are also increasingly used for accountability at the district, state, and federal level, and are a required component for the federal No Child Left

Behind Act (NCLB). Incorporation of dropout/completion statistics into accountability plans could be viewed as serving different functions. One function is to judge schools to determine sanctions. For this purpose, it is most important that the indicators be fair and unbiased. Another function is to push schools to engage in good practices, and ensure that no student gets overlooked. In fact, graduation statistics are often viewed as an accompaniment to test-based indicators, preventing schools from boosting their test scores by pushing low-achieving students out of school.⁶ For this purpose, statistics need to be inclusive—based on all students--as much as they need to be fair and accurate. Choices about how to include students into the statistics will affect incentives for accountability, and fairness in accountability.

Comparisons among schools are not just made by governmental units and school districts, but also by parents who have some choice in which school neighborhood they live, or where they enroll their child. In many places, these choices are growing. Charter schools are expanding, school vouchers are being offered to some families, and NCLB aims open up school options to parents in low-performing schools. As school choice expands, there is a need for unbiased indicators which parents can use to make good decisions about where to enroll their children. Decisions based on poorly-constructed statistics will lead to poor choices that undermine any benefits of the choice policies being implemented.

In addition, indicators of dropout and completion are used to evaluate the effects of programs and policies on students' educational attainment. Researchers who study schools require these indicators. Schools and school districts themselves are increasingly using data to guide their decisions about where to put resources, and which practices seem to be most effective in their schools. For this purpose, indicator stability and sensitivity are particularly important, as

flaws in the methods of defining groups/cohorts could lead to statistics that are insensitive or overly-sensitive to changes in students' likelihood of completion.

Guiding Principles and Measurement Considerations

The following discussion assumes that to the greatest extent possible, the methods for computing dropout/completion rates should: 1) give the most accurate assessment possible of how many students actually complete or drop out of school; 2) not be biased in favor of certain types of schools; 3) be inclusive of all students, but not double-count them; and 4) be stable enough to track over time, while being sensitive to real changes in students' outcomes. All of this must be done within the constraints of the data systems available to schools, and given the purpose for which the statistics are to be used.

An additional issue to consider when designing indicators is whether they will be aggregated to represent completion/dropout rates at higher levels of analysis. If individual-level student data are available, then the technical shortcomings of indicators tend to be less acute at higher-units of analysis (U.S. Dept. of Education, 2005). However, at this time, many districts and states do not have data systems that maintain longitudinal records on individual students. Therefore, state- and district-level statistics are often developed as weighted-averages of lower-level units. The process of aggregation itself can amplify problems of omission or double-counting students. Graduation/dropout rates that are accurately defined at the school level may not be accurate when aggregated to the district, state, or federal level.⁷ Furthermore, subgroup definitions (e.g., defining who is an LEP student or special education student) become more problematic at the state level where there may be less detailed longitudinal information on individual students.

Also, when designing completion and dropout indicators, we need to recognize that the technical issues involved in calculating dropout rates are most problematic for the students who actually drop out, and most difficult to measure at the schools with the lowest completion rates. Dropouts often have very low attendance while still in school, so that it is sometimes difficult to determine if they really are a student, and to decide when the act of leaving school occurred. Dropouts are also more likely to be mobile than students who complete school; they average higher numbers of residential moves and non-residentially based school transfers. Because mobility is a primary source of bias and inaccuracy in measuring dropout/completion, systematic differences in mobility between dropouts and completers further decrease their accuracy and fairness. We need to carefully attend to these systematic differences as we think about the degree to which indicators are accurate, inclusive, and free of bias for all students in all schools.

Who is a completer?

There is generally little ambiguity about who has obtained a diploma from a high school—lists of graduates must be maintained. However, there are multiple means of completing school besides a regular diploma, and not all students complete high school in the same time span. The question of different forms of completion has become increasingly complicated. In addition to granting diplomas, schools may offer programs where students receive GEDs, or students may receive GEDs outside of a K-12 school system.⁸ Some school districts offer alternative schools for students who have dropped out, or are at risk of dropping out, and these schools may grant diplomas with standards that are easier than the standards in regular high schools.⁹ A number of states offer different levels of diplomas, or grant certificates of attendance, for students who do not pass state-required examinations or meet other criteria.¹⁰

Growth in home schooling and distance learning further complicate the ways in which completers are defined.¹¹

Whether schools should produce graduation rates that only count diploma recipients as completers is a moot point--NCLB mandates that graduation rates used to define Annual Yearly Progress only include students who graduate on time with a regular diploma. Correspondingly, the Department of Education NCES Common Core of Data (CCD) for public high schools publishes graduation rates that only include diploma recipients. There are a number of valid reasons for producing graduation rates that do not include alternative forms of completion. There is little evidence that alternative methods of completion benefit most students. GED recipients, in particular, are more similar to dropouts than to high school graduates in terms of their economic outcomes and likelihood of obtaining higher education.¹² There is also substantial variability across states and districts in the extent to which other forms of completion are available and recorded in an accessible manner.¹³ Constraining completion statistics to include only graduates provides some degree of consistency across states and districts with different policies, different access to alternative programs, and different methods of recording alternative forms of completion. Constraining the statistics to diploma-recipients is also good for indicator stability over time, as more comprehensive completion statistics could increase simply because of an expansion in alternative forms of completion.¹⁴ For purposes of accountability, counting only diplomas prevents perverse incentives for schools to push students out of regular programs into alternative or GED programs.

Yet, even if completion statistics are confined to representing graduates, they are not completely equivalent indicators across states and districts. Graduation requirements vary widely. Even within the same state, and sometimes the same district, there may be different

levels of diplomas or alternative types of diplomas that are granted. Diploma requirements also change over time and may not be equivalent across different cohorts of students.¹⁵ Rates that only include graduates provide no incentive to districts to offer recovery programs for students with little chance of obtaining a regular diploma. In addition, diploma-based rates cannot be calculated for schools that offer alternative credentials, therefore, their effectiveness cannot be compared to other schools. Broadly-defined completion indicators could complement those representing graduation with a diploma to address some of these issues.

The timing of completion is the second major issue in defining who to count as a completer. It may seem desirable to include all completers in the indicator, regardless of how long it took them to complete their education, to most accurately measure the state of education. If being used as a tool to encourage good practices, it makes sense to allow a long time for completion so that schools do not have incentives to give up on students who do not complete high school in four years. In addition, time limitations for completion are problematic for students with disabilities whose IEPs specify that they remain in school beyond age 18, or who are ungraded and whose time in high school is not clearly defined. Time limitations may exclude summer graduates, or students who take just one extra term to complete school.

Practically, each extra year that is incorporated into the statistic requires an additional year from which the completion rate can be reported. For all potential uses of completion statistics--accountability, program evaluation, decisions about school enrollment, and knowledge of the current state of education in a school, district or state—it is critical to get timely information. Most of the completion indicators that are widely used are intended to capture “on-time” completers—those who finish high school in four years.¹⁶

Time limits on completion bring questions about how to count students still enrolled in school. Counting them as non-completers maintains the definition as a four-year rate. However, it may not be a good estimate of the true state of graduation/completion in the school or region, and it will be interpreted widely (e.g., by the media, general public, school practitioners) as the total percentage of students who graduate. An alternative is to exclude students still enrolled from the indicator—removing them from both the numerator and denominator. This allows the completion rate to be the opposite of the dropout rate, which is conceptually easier for a wide audience to understand. This also prevents incentives to push out students who can no longer be counted as graduates. However, if large numbers of students are excluded from the statistic, it could give a false sense of the completion rate.¹⁷

Students still enrolled after the date they should have graduated are often counted more than once in dropout/completion rates—particularly if the rates are calculated from aggregate numbers of students, rather than from longitudinal student records. First, they are counted as non-completers in their own cohort; they are counted again as completers in the cohort that follows, or sometimes counted for a second time as non-completers, depending on the calculation formula. This introduces inaccuracy in the indicators, but whether it inflates or deflates them depends on the specific ways in which students are double-counted, and if adjustments are made to adjust the denominator along with the numerator. Appendix A provides an example of the ways that completion statistics could be affected by double-counting students. Incorporating students who stay an additional year also makes the indicator less sensitive to changes in dropout and completion that may be occurring in the school, which makes them less useful for evaluating new policies and practices.

Who is a dropout?

Defining students as dropouts is much more difficult than defining them as completers. Just as completer statistics could incorporate or exclude different outcomes (e.g., receipt of a diploma, GED, certificate, alternative diploma), different outcomes may be included or excluded from the definition of dropout (e.g., incarceration, enrolled in a non-diploma program, absent from school for an extended period of time). However, records of completion, particularly attainment of a diploma, are usually clean and complete, so once a decision is made about who to include as a completer, those students can be correctly classified. In contrast, it is often not clear what happened to students who are no longer attending school. In addition, while students can graduate or complete a program only once, students can drop out of school repeatedly. Thus, their status could change repeatedly, making it even more difficult to know how to classify them at any given point in time and bringing the risk of double-counting them.

The city of Chicago enacted a policy in 2004 requiring all dropouts to sign a statement before withdrawing from school stating that they understand the consequences of dropping out on their chances for future economic and social success.¹⁸ This policy was widely disparaged by people familiar with the high school environment because it assumes that dropouts make clear, planned decisions to leave school, and that they inform school staff of their decisions before leaving. This is rarely the case. Often, students simply stop showing up to school—usually after missing substantial amounts of school. Schools must decide what happened to students who are no longer showing up. It takes resources to track down students whose status is unknown, and this burden can be excessive in schools with particularly high absence rates, high mobility, and high numbers of dropouts.

Because it is difficult to determine what happened to students who are no longer at a school, there is substantial concern about under-representing dropouts or miscoding them as transfer students. Particularly when these rates are used for accountability, there could be pressure to falsely claim students whose status is unknown as transfers. For this reason, it has been recommended validation requirements for schools to count students as having transferred (U.S. Dept. of Education, 2005). Validation includes verifying that the student has enrolled in another school (usually done through a transcript request), and verifying that the receiving school grants regular diplomas.

Coding unverified student leavers as dropouts provides a substantial incentive for schools to obtain valid records of transfers. However, there are financial costs associated with validation,¹⁹ and validation itself can reduce the accuracy of dropout/completion statistics and introduce bias. Schools that have the greatest demand for validation of transfers—those with large numbers of mobile students--may not want to put limited resources into data management, and may be less capable of carrying out validation if the administrative staff is overly-taxed or lack good organizational skills. In Chicago, we have seen noticeable dips in transfer validation when schools get new principals or a clerk who does not realize the importance of transfer validation for school accountability measures. Out-of-country validation may not always be possible, and schools serving large numbers of first-generation students can feel that validation requirements result in unfair statistics. For year-to-year dropout rates, validation can come too late, so that valid transfers are counted as dropouts. In general, requiring validation will inflate dropout rates and decrease completion rates, reducing their accuracy as estimators of the state of education in the school or district. Not requiring validation has the potential to allow under-reporting of dropouts, which could potentially have a large effect on indicators, depending on the

individual practices of schools, school leaders and school clerks. State-wide data systems with individual student identifiers should help with validation, although it will still be a problem for across-state and out of country transfers.

Students with high rates of absence present another problem—at what point should they be considered dropouts if they have not officially left school? Often districts have truancy standards that define the number of absences that students are allowed before being expelled. But it is not always clear at which date these students should be considered dropouts, since they may have been absent for school for very long periods of time before officially being dropped from the lists of enrolled students. Furthermore, some students never show up to high school. If a student finished eighth grade, but does not show up at a high school, should they be considered a dropout from the high school they never attended? NCES requires schools to define enrollment on October 1—how are students classified who leave ninth grade in September, after less than a month of school? These are decisions that need to be made clearly, or schools can easily fail to classify students who are no longer attending school as dropouts, even if they have clearly left.

A very substantial definitional issue that is growing in importance is whether to code students who have transferred to alternative schools or GED programs as dropouts or as transfer students. The NCES designation of dropouts treats students in adult GED programs as dropouts, but those in GED programs offered by K-12 institutions as non-dropouts. While this may make little sense conceptually, it is a practical differentiation—many school districts have no means of knowing if students are enrolled in external GED programs. In practice, many states do count all students in GED programs as transfers, if that information is available.²⁰ For schools, it can seem appropriate to count these students as transfers, since they are clearly attending a different

school. However, if a student has enrolled in a program that is not diploma-granting, they have left the program of education that is intended in their school district, and they no longer have the possibility of obtaining a diploma. Counting these students as transfers, therefore, can provide a false sense of the state of education in a school, district or state as it results in significantly lower dropout rates.²¹ There can also be perverse accountability incentives, encouraging schools to transfer students they view to be at risk of not graduating to programs from which they cannot receive a diploma.

Another source of controversy is in how to classify students who are incarcerated or otherwise institutionalized. It may seem logical to classify these students as transfers since the decision to leave their school was not voluntary, and the receiving institutions should continue to provide them schooling. However, there is often no verification that incarcerated students are enrolled in a program leading to an accredited high school diploma, or that they plan to re-enroll in a regular high school when released. Therefore, it has been argued that they should be counted as dropouts unless they re-enroll in school within the time-frame being studied.

Finally, decisions must be made about how to classify students whose leave status changes over time. There are many potential paths to eventually being a dropout or completer.²² Most problematic is that students who have already been counted as dropouts can be counted again as dropouts if they re-enroll. It is also unclear how to count dropouts who have re-enrolled in a different school, or entered a school system through an alternative school—since they enrolled as dropouts from another place, it does not seem fair to count them as regular transfers into the new school or system. Problems of re-enrollment overlap with issues of transfer between schools, and the ways in which they can be handled depends on the way that the group or cohort being measured is defined in the first place.

Who is considered a valid student and included in the dropout/completion statistic?

Decisions about who to count as a completer, graduate, or dropout have fairly obvious consequences—we can easily estimate how completion indicators would be different if they incorporated different forms of completion, or how dropout indicators would change if they did or did not include incarcerated students or GED recipients. However, it is often difficult to see how basic decisions about who to include in the basic definition of the dropout/completion indicator affect the resulting statistics. The most serious issues result from the ways that transfer students are counted in the statistics, although basic issues of group definition can also have substantial consequences for the usefulness of resulting statistics.

Defining the group or cohort—issues of grade level

The group/cohort represented by dropout/completion indicator is almost always defined by grade—as students in grade nine, or students entering grade nine, for completion statistics, and as students in grades 9-12 for dropout statistics. Rates that are based on longitudinal surveys, such as the National Education Longitudinal Study (NELS) are defined by the survey population, which is usually also based on students' grade level. For example, graduation and dropout rates based on NELS follow groups of students in grade 8 or grade 10 at the first survey year.

One problem with defining the base group by grade level is that students frequently repeat grades. Ninth grade, in particular, is frequently repeated, particularly by students who eventually drop out.²³ Thus, statistics defined by grade level often double- or triple-count students in rates representing different cohorts or years, and the students who are double-counted are those who are least likely to complete school. If students who are repeating a grade are not

removed from the calculations, the statistics will be biased against schools with high levels of grade repetition. Because these schools are also likely to have high dropout rates, this accentuates the real differences in dropout/completion rates across schools, and can make issues of equity appear more extreme than they really are.²⁴

Even grade retention prior to high school can be very problematic for graduation and completion rates in high schools. This is because students' probability of dropping out is very highly correlated with age.²⁵ If more students enter a school at age 16 than in the past, dropout rates will increase simply because a larger percentage of students at the school are at an age when they are likely to drop out. These age effects occur beyond any effects of grade retention, which itself raises the probability of eventually dropping out of school.²⁶ Even four-year dropout rates will be higher for these cohorts because students are more likely to remain in school until age 18 than until age 19 or 20. Changes in grade retention patterns prior to high school can also affect the comparability of ninth-grade cohorts over time by delaying the entry of the academically weakest students, students who are also at high risk of not completing school. If large numbers of students are held back in elementary school one year (e.g., because of the implementation of promotion standards), the dropout rate for one freshman cohort may improve simply because many low-achieving students from that cohort have been moved into the following cohort. Grade-based cohort rates are no longer comparable over time and cohorts when such policies are enacted. Appendix B provides an example of this occurrence in Chicago.

Grade-based rates also have the potential to miss students who never make it to the base grade. While this is usually a small percentage of students, policies such as grade retention increase the risk of missing students for this reason. In addition, schools that have uncommon grade configurations may not always be included in rates which define groups/cohorts by grade.

For example, middle schools that contain a ninth grade but not a twelfth grade would not produce a graduation rate, even though they have a full ninth grade class. Incorporating ungraded special education students into grade-based cohorts is also problematic.²⁷

A simple solution for many of these issues is to define cohorts by age instead of grade level. Defining cohorts by age has many advantages. Most importantly, cohorts are not affected by patterns of grade retention in years prior to high school, or during high school (see Appendix B for an example). This makes them much more sensitive, accurate, stable and unbiased indicators than those that define groups/cohorts by grade level. In addition, students who never make it to high school can be included in dropout/completion rates with their age-peers, allowing the statistics to include middle-grade dropouts. Special education students can also be included with their age peers, even if they are in ungraded classrooms. For districts and states, age-based rates are better than grade-based rates to gauge trends over time, and to assess the current state of education. However, they are not useful as indicators of school performance, as schools and parents generally want to know how many of the students who attend a school in a given year graduate or drop out later.

Defining the group or cohort—issues of timing

Besides being defined by grade level or age, there is also a time element involved in the definition of which students are included in the statistic. Sometimes groups are defined as students enrolled on a specific date (e.g., students enrolled on October 1). Because students could enroll in a school after a set date, or leave school before that date, it is more inclusive to define the group as including any student enrolled over the period of a year (e.g., from October 1 of one year to September 30 of the next year). Most commonly, schools define school year

enrollment from either October-to-October or June-to-June. Choosing one over the other has little effect on the resulting rates, but it does affect their interpretation--as students who dropped out in the school year, versus students who were enrolled one year and did not return by the second year.²⁸

Indicators that base their denominator on students enrolled on a particular date are particularly susceptible to undercounting students who transfer between schools. Those that compare the number of dropouts or completers over a set period (e.g., the school year, the next four years) to the enrollment at the set date will include students in the numerator who are not in the denominator. For example, any student who enrolled in a school after the date that defined the cohort, and then dropped out, will be included in the numerator but not in the denominator. This leads to the potential for schools to have dropout rates that exceed 100%. On the other hand, students could be included in the denominator who left the school soon after the cohort was defined, and have no chance of being in the numerator, deflating the statistic.²⁹ If in- and out-mobility rates are similar, and if the students that leave have the same probability of completing/dropping out as the students who enter, then this does not result in bias or inaccuracy. However, these latter conditions do not always hold.

Adjustments can be made to account for in- and out-mobility so that the numerator remains a subset of the denominator. However, some of these adjustments require demographic assumptions that, if untrue, can introduce more inaccuracy into the rates. Warren (2004) provides simulations that show how inaccuracies can be introduced when assumptions about in- and out-mobility, cohort size, and grade retention do not hold. In addition, adjustments that account for demographic instability must also assume that students who leave a school are similar to students who enter in terms of their probability of completion/dropout. This is often not the case when

schools have different enrollment policies, as discussed below under issues of transfer. If the students who leave a school are qualitatively different from the students who enter in a way that is systematically related to dropout/completion, the rates will be biased, even after adjustments are made to the denominator.

An alternative to defining the cohort on a specific date is to include all students enrolled at any time during the school year, or at any time over the four years of high school for completion rates (with students entering at higher grades in each year after ninth grade)³⁰. However, the data requirements are higher for this more inclusive definition--schools must keep individual-level data on students with their dates of enrollment and departure. Furthermore, this definition results in students being counted at multiple institutions; if statistics are aggregated to higher-level units, mobile students will be double-counted in the aggregate rates. Decisions also must be made about whether to include students who are enrolled for a fraction of a year—should schools be held responsible for students who enter and drop out within a week? If no minimum time period is set for inclusion, including all students enrolled at a school in the denominator will generally raise dropout statistics, since mobile students are more likely to drop out than other students. However, if a sizeable minimum time period is used to define who is a student (e.g., all students who enter after October 1 and remain through the end of the year) then dropout rates will be depressed, since by definition, new students are only included in the indicator if they stay in school. In the end, issues of transfer and mobility are no easier by including students enrolled over a period of time versus a snapshot; while the indicators are more inclusive, issues of aggregation and data requirements are more problematic.

Incorporating students who transfer

Problems with in-mobility and out-mobility for any given unit (school, district or state) are simply one side of the broader problem of student transfer between units. When a student transfers between schools, it is not clear which unit should take responsibility for that student. In theory, it may seem that there are four options—attribution to the receiving school, the sending school, both, or neither. In practice, statistics are often developed which classify some students one way, and others another way. For example, the graduation rate for the state of Illinois counts transfer students who graduate with their receiving school, but those who drop out to neither school. Most of the graduation rates based on aggregate counts of students (including the CPI and the graduation rate in the CCD) inherently attribute transfers who drop out to their sending school, but those who graduate to both schools—as a graduate at their receiving school and a non-graduate at their sending school. Mixing attribution inherently produces bias in the statistics. For simplicity, the remaining discussion focuses on each of the four options separately.

Counting students at both their sending and receiving schools is the most inclusive method for dealing with transfers. It ensures that all students are counted. However, as noted above, it also ensures that transfer students will be counted at least twice, and more than once among highly mobile students, as they are included in the statistics at each school in which they enroll. This is a problem if school statistics are aggregated to produce district- or state-level rates; the aggregate statistics will over-count mobile students who are most likely to drop out. Counting students with both schools also requires that schools share information, or that information on graduation/dropout is maintained in a way that students' final status can be attributed to their first school. An alternative might be to weight students' contribution to their school's statistic by their time enrolled. However, this would require information to be available

about students' dates of entry and departure at each school, and sharing of this information between the schools. It also would require strict guidelines for defining a dropout date for students with many absences to define the percentage of time enrolled at the final school. It is doubtful that such a method could be practically implemented.

Counting transfer students at neither the sending nor receiving school has the obvious disadvantage of excluding all mobile students, which would produce an overly-optimistic picture of the state of education at all levels of aggregation. The advantage is in ease of calculation and data requirements, because no knowledge of final status is necessary. There are also political advantages, because schools do not feel they are being held accountable for problems created in other schools. In practice, it is only non-graduates who sometimes get excluded from the statistics of all schools—schools tend to want to count all of their graduates. This makes rates appear even more positive than would occur by simply excluding all transfer students.

It is very common to include students with their final school. This approach makes practical sense because the final status is known to the school to which the student is attributed. It also makes intuitive sense to group students with the school from which they graduate or drop out. Schools generally feel that they should get credit for all of the students they graduate. In fact, almost all rates do attribute completers to their final school.

While there are many practical advantages to counting transfers with their receiving school, doing so produces rates that are biased in favor of schools that can control their enrollment, and it can provide perverse incentives to transfer students at risk of not completing school. Attributing dropouts to their receiving school, instead of their sending school, assumes the problems that led students not to complete school occurred at the final school. Yet, students' performance in their first year of high school is extremely predictive of eventual graduation.³¹ If

a student leaves a school because of problems at that sending school, it may not be fair to credit that student's eventual withdrawal to the receiving school, especially if the student spent little time at the receiving school. This results in bias when schools have different enrollment policies. Schools that can choose whether to enroll a transfer student can boost their graduation rate by accepting students who have already shown some success in high school (e.g., 11th or 12th graders).³² This can be seen in the example in Appendix C.

The final option is to count students with their first school. This is the method used for graduation rates at the college level in the NCES Graduation Rate Survey. Given the strong relationship between first-year course performance, and eventual graduation, it makes sense from a conceptual standpoint to count students with their first school. It also prevents schools from benefiting if they encourage students to transfer to schools that may not best serve their interests. It may seem unfair to count a student who transferred and then dropped out against the graduation rate of their original school. However, unless students are systematically leaving a school for a particular reason (e.g., because of safety concerns at the school that are forcing students out), the dropout and graduation rates of the school's former students should balance each other and not substantially affect the dropout rate. Using the first school also allows schools without 12th grades (e.g., middle schools with ninth grades) to be compared to other schools.

The problem with attributing students' outcomes to their first school is that students' final outcomes may not be known to the sending school. It can be done if student-level data are available at a district or state level, where students can be tracked across schools or districts. However, even if these data are available, there will be out-of-district or out-of-state transfers that cannot be included in the calculations. The NCES college graduation rate gets around this

problem by counting all transfer students as non-graduates from their original college. This results in statistics that are unbiased and accurately represent the graduation rate of students at a given college. It also prevents students from being counted more or less than one time if statistics are aggregated. The disadvantage is that it under-represents the percentage of students that graduate overall—it only tells the percentage of students who graduate from their initial institution. Thus, attributing students to their first school produces rates that are unbiased and stable over time, but that may under-estimate completion. For the purposes of accountability, this method does not produce perverse incentives to push students out of a school, but it also provides no incentive to ensure that students who transfer into a school are well served well by the receiving school. Politically, it is difficult to convince schools that students who graduate should not be counted in their completion indicators.

How do we calculate separate rates for subgroups of students?

Defining subgroups of students for dropout/completion statistics requires still further decisions about who should be included in the subgroup. NCLB requires schools to provide separate statistics for subgroups of students of different races/ethnicities, students with disabilities, and students with limited English proficiency (LEP). Yet, it is not always clear who should be included in the sub-group. For example, students can now self-identify their ethnicity and race, and can choose more than one category.³³ This can make classification difficult and inconsistent across schools. Changes in the ways students are classified result in statistics that are not comparable over time and which can lead to false conclusions about the state of education for particular groups.

Defining students as LEP can be particularly difficult. Definitions of English proficiency are not always consistent across districts and states (Abedi and Dietel, 2004). More importantly, unlike students' race/ethnicity, students' status as LEP changes over time, and those changes are correlated with students' probability of completing school. Students' rate of acquisition of English is correlated with their academic achievement and their socioeconomic status,³⁴ and these factors are correlated with dropout and completion. The higher the grade-level studied (e.g., high school), the more likely the students that remain classified as LEP are low-achieving and low-income. This is true even in districts and states that have time limits for LEP classification; highly-mobile students are more likely to have long periods of "service breaks" due to absence or transfer, and so remain classified as LEP longer than students who are stably enrolled. Furthermore, students classified as LEP at older ages are also more likely to have moved to the United States more recently than students who enrolled in the school as LEP students in the primary grades. Immigration at older ages is also related to likelihood of graduation, as children who move to the U.S. at older ages tend to obtain fewer years of education than children who immigrate when very young.³⁵ For these reasons, students in the bilingual program in high school are a select group of students who would be expected to have higher dropout rates than students not in the bilingual/ESL programs in high school. Appendix D provides an example of this.

It is best to classify students as LEP based on their status in the primary grades, before LEP status becomes highly defined by factors that are themselves correlated with completion/dropout (academic achievement, mobility, etc.). This requires data systems to include primary-grade records on LEP status that remain constant as students progress to higher grades. These primary-grade records need to accompany students who transfer so that receiving

schools can correctly classify students who are no longer classified as LEP. Otherwise, statistics that are aggregated from school records will fail to include formerly-LEP students who transferred out of their original school.

Unlike LEP status, students' disability status does not disappear over time. However, classification as a student with a disability is also not always consistent across schools or districts. It depends on the resources available in the school and district for diagnosis, and district policies about designating students as disabled.³⁶ Thus, the statistics that are developed on students with disabilities may not be comparable across units. Furthermore, students who have achievement well below grade level are sometimes classified as learning disabled simply on the basis of their low achievement. These students may be low-achieving because they have a disability, but they may be low-achieving for reasons related to the likelihood of completion, such as years of low engagement in school. By classifying students into the subgroup based on a designation (very low-achieving) which itself is highly correlated with dropping out/completing, the dropout/completion indicator looks worse for disabled students than it actually should. The time element in cohort/group definition is also particularly problematic for disabled students, as some disabled students are given more than four years to complete high school in their individualized education plan, or are to remain in the school system past age 18.

One further technical issue comes from the small number of students that some schools may have in their subgroups. If schools have a small number of students in a subgroup, rates for that subgroup may not be stable, and may not be calculated at all. Generally, rates are not reported if there are not sufficient numbers of students. However, if aggregate statistics are constructed from school statistics where students in small subgroups were not reported, then these students will not be included in the aggregate rates. In addition, completion/dropout rates

that are based on aggregate data require that breakdowns of subgroups be available (e.g., enrollment by race and grade), yet these are not always reported.³⁷

Data and record-keeping issues

Data requirements for dropout/completion statistics based on aggregate numbers are fairly simple—enrollment counts by grade by year, and lists of dropouts and graduates each year, broken down by subgroups for subgroup statistics. Cohort rates based on longitudinal student-level data provide the best measurement of dropout and completion,³⁸ but the data requirements are much higher. For true cohort calculations, schools need access to data systems in which they can regularly update students' records with new information on students' current enrollment status, school, grade, date of entry into the school, date of exit, status at exit, reason for leaving the school, and subgroup designation. To document transfers, the records should include information on the school to which transfer students left, and whether that transfer was verified. To best deal with issues of transfer, and to ensure that students who drop out before reaching high school are included in statistics, records should include a student identifier that is consistent across schools in the district (for district statistics) or state (for state statistics).

Snapshot files from these adjustable data systems must be extracted at regular intervals, at least at the beginning and end of each school year. The more often that snapshot files are extracted, the more complex the techniques for dealing like issues of transfer and in- and out-mobility can be. The accuracy of the snapshot files, on which calculations are based, will depend on the degree to which school clerks have kept records up-to-date and cleaned inaccurate records by the time the snapshot data are extracted. This limits the number of times that it is practical to take snapshot data by the efficiency of schools' administrative staff.

Calculation of dropout/completion rates depends on school clerks maintaining accurate records about student enrollment, graduation, and reasons for leaving school. Unfortunately, documentation of students' reasons for leaving (leave codes) are often fraught with error. Quite a lot has been written about concerns that using dropout/completion rates for accountability may bring incentives to miscode students who drop out, and this seems to have happened in some places.³⁹ However, even without accountability pressure, leave codes are often suspect. It is difficult for school staff to ascertain with certainty the status of students who are no longer attending the school. Even if the final status is known, clerks must decide how to enter that information and this may not be done systematically.⁴⁰ There is also error during data entry, when clerks make mistakes or are not fully knowledgeable as to established procedures. Documentation on how to classify leave codes may be imprecise so that the same code is used differently over time, or in different places, as clerks interpret the documentation in different ways.⁴¹ Furthermore, local policies, laws and data systems can affect the ways in which information is recorded.⁴² As these policies, laws and data systems change, rates may no longer be comparable over time. New schools and charter schools are particularly prone to have records that are not consistent with those of other schools in a district. At new schools, the staff may not know how to follow protocol. At charter schools, they may not even have the ability to follow district protocol, or the mandate to do so.⁴³

Completion/dropout rates depend on good, clean records on students, but even the best data systems are bound to have some problems with accuracy--not just in terms of recording leave reasons, but even in documenting enrollment needed for the denominator of the statistics.⁴⁴ While it is difficult to audit records on students, particularly those who have left a school district or state, periodic audits would allow districts and states to produce a confidence interval around

the reported rates. Audits could also point out specific weaknesses in their data system, and have implications for training or documentation. Good, systematic, training of clerks who enter student data is essential for accurate, unbiased, stable statistics, regardless of the methods of calculation that are used. The quality of the data is the most important factor for producing completion and dropout statistics, as even the best methods will produce flawed statistics if the data are maintained poorly.

Concluding Remarks

Calculating completion and dropout rates requires numerous technical definitional decisions, many of which have substantial effects on the degree to which the statistics are accurate, unbiased, inclusive, sensitive to change, and stable over time. The number of decisions can seem overwhelming, particularly as there is no one best solution. No method will produce a statistic which is ideal for all potential purposes for which it will be used, although some methods introduce more bias than others. If we are aware of the limitations of the statistic being used, we can estimate the degree to which it is inaccurate or biased. If schools, districts and states use consistent methods, we can gauge how different methods might affect estimates of overall rates and comparisons among different units. The more that there is inconsistency in methods, the more difficult it is to ascertain whether the differences that are observed truly exist, or are an artifact of measurement.

Because there is no best method of calculating dropout and completion rates, there will always be doubt about whether the rates are legitimate for particular schools or districts. If the purpose of producing these rates is to spur action, then they must be believed. The more that detailed data are available, the more feasible it is to produce rates that take into account the

different factors that may cause bias and inaccuracy. If research can accompany published statistics showing how resulting statistics would change with different methods, claims of bias or inaccuracy could be confirmed or refuted. Uncertainty about the degree and direction of bias leads to reluctance about how to use them. Knowledge of the degree to which the rates are biased or inaccurate for different types of schools and districts leads them to be more useful and more likely to be used to guide policy and practice.

Even if the rates that are produced are seen as unbiased and accurate, they may be seen as unfair for judging schools that serve very different student populations. While this is not a core technical issue in producing completion/dropout rates, it is a central problem for accountability, not just for comparing schools, but also for encouraging schools to adopt better practices that lead more students to complete school. Schools may show improving graduation rates because they have implemented better practices, or simply because there has been a shift in the types of students enrolling in the school. A magnet school may have high graduation rates simply because it only enrolls students who have shown a strong attachment to school, not because it operates in a manner that is particularly effective. Simple completion/dropout rates provide little information about how well schools are operating. A solution to this is to accompany regular statistics on dropout/completion with statistics that are adjusted for the types of students served by the school.⁴⁵ There are, of course, many ways to make these adjustments, which could result in controversy. Adjustments can also be criticized as producing different standards for different students, for example, expecting students in high-poverty schools to graduate at lower rates. However, without showing adjusted rates, or making comparisons to schools serving similar student bodies, there is almost no motivation for change among poorly-performing schools. Schools with above-average graduation rates will feel no pressure to improve, even if they are

graduating students at far lower rates than they should, given the students they serve. Schools with low graduation rates can justify their low rates by saying the problem is that they serve disadvantaged students—even if their rates are lower than other schools serving similar students.

Issues around who to include in statistics, and validation of transfers between schools, will likely become easier as individual-level student data are made available at higher units of analyses, such as states. Other problems, such as multiple means of school completion, different types of school-grade configurations, variation in enrollment policies across schools, will likely grow as schools and districts try more innovative approaches to educating their students. As a result of both improvements in data and changes in educational systems, the “best way” to calculate completion and dropout in any given place will likely change repeatedly. As different methods are developed and adopted, all of the technical, definitional issues need to be thought out explicitly, and biases tested and made explicit. With each formula, we need not only to consider who to count as a graduate/dropout, but who the rate really represents, whether students are being under- or over-counted, and whether the rate is overly-sensitive to variation in school policies on enrollment and grade retention. Most importantly, we need data systems that can be used easily and with minimal error, and processes for validating procedures across schools, districts and states.

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Appendix A.

Potential effects of double-counting students enrolled beyond four years in high school

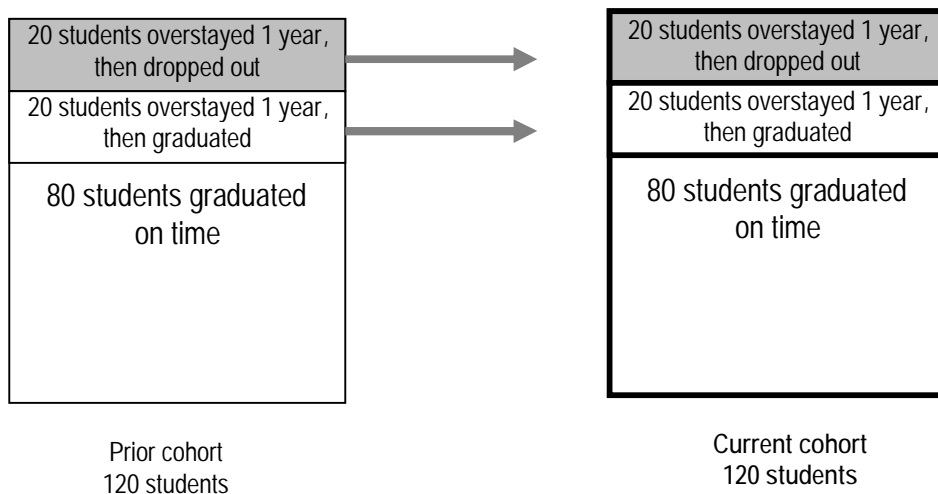
The following example demonstrates the potential for inaccuracy in completion rates introduced by counting students from a prior cohort into statistics for a given cohort. Assume there are two cohorts of students of equal size, and that in each cohort one-third of the students remained in school for an additional year (see Figure 1). Of the students that remained in school, half graduated and the other half did not. All students graduated unless they stayed an extra year.

- The on-time graduation indicator for the current cohort would be 80/120 students, or 67%.
- If graduates from the prior cohort were included, without adjustments for additional students made to the denominator, the graduation indicator for the current cohort would be 100/120 students or 83%. If the graduation rate of over-stayers remains the same, and the cohort size stays the same, the indicator represents the actual percentage of students who eventually graduate. However, these assumptions do not always hold.
- If the denominator were adjusted to account for the extra graduates from the prior cohort (making the numerator a subset of the denominator), the indicator would be 100/140, or 71%. Thus, the indicator would still be inflated as an estimate of on-time graduation because it includes extra students, all of whom are graduates.
- If the indicator were adjusted to include all students who stayed an extra year, it would be 100/160 students, or 63%. In this case, the numerator is a subset of the denominator, but the indicator is an inaccurate estimate of completion rates for the current cohort because the

students who have been added in from the prior cohort are less likely to graduate than typical in the current cohort. This is a problem inherent in many adjustments that are used to compensate for issues such as in- and out-mobility and grade retention, as well as over-staying time in high school—they adjust the indicator to make the numerator a subset of the denominator, but they do not adjust for systematic differences of the students entering/leaving compared to those that were initially defined as part of the cohort.

To the extent that there is inconsistency in cohort size, completion rates and over-stay rates, each method that incorporates over-stayers may become more inaccurate than demonstrated here. Incorporation of over-stayers also reduces the sensitivity of the rate to capture real changes in completion.

Figure 1. An Example of Students Remaining in School an Extra Year.

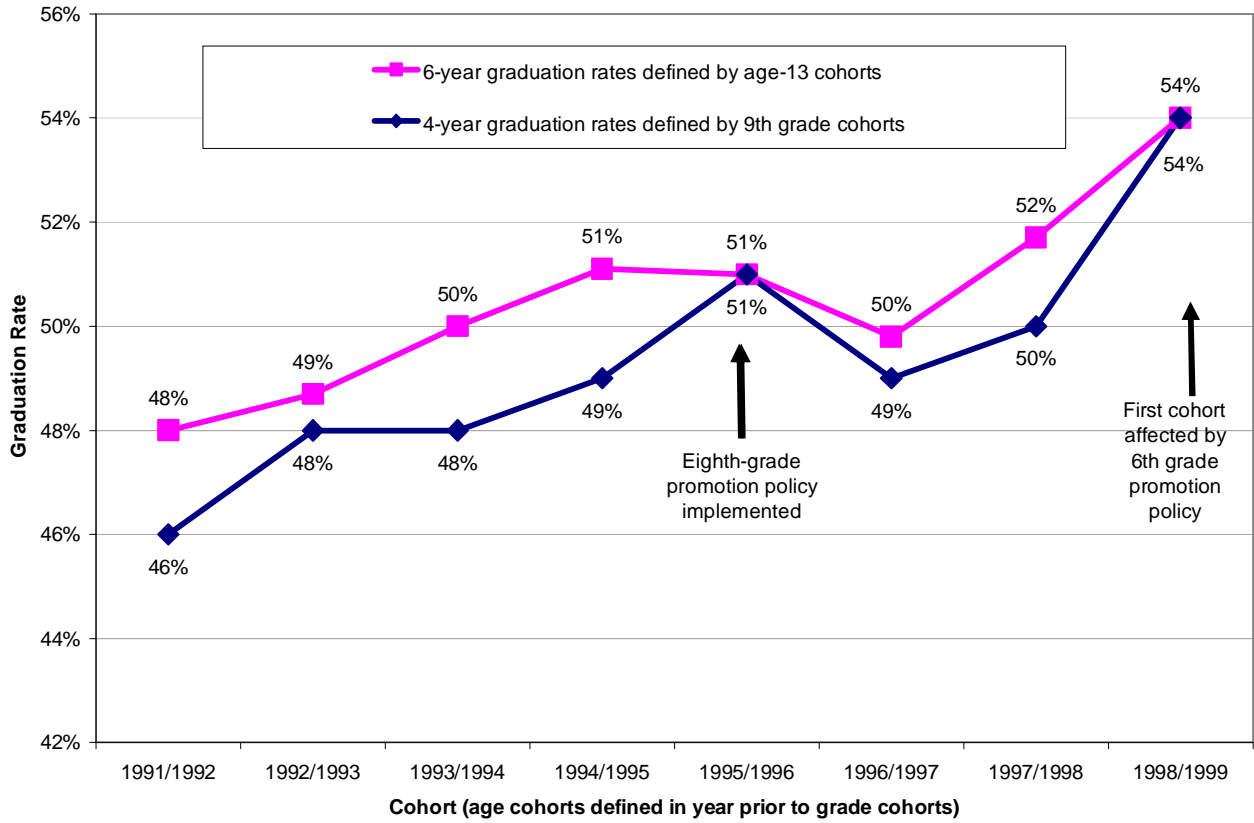


Appendix B. Comparison of age cohorts versus grade cohorts under a period of changing grade retention policies

Completion rates that are defined by students' grade in school are highly susceptible to changes in grade retention patterns in the earlier grades. This can be seen in Chicago's graduation rates, which were affected by promotion standards first put into place for students moving from eighth to ninth grade in 1996, and those moving from sixth to seventh grade in 1997. Figure 2 shows graduation rates produced by defining cohorts by students' age, defined as being 13-years-old as of September of each year from 1991 through 1998. It also shows the graduation rate for freshman cohorts defined the following year, when the 13-year-olds who had not been held back should have been in ninth grade. The graduation rates that are defined by students' age are generally higher than those defined by grade because they follow students for a longer period of time (until age 19, which is five years of high school for students who do not repeat a year).

The 1996 freshman cohort was the first subject to the eighth-grade promotion standard into high school. The promotion standard kept many of the lowest-achieving students, who would otherwise be in this cohort, from entering high school. Without these low-achieving students, it is not surprising that this freshman cohort shows a sizable increase in graduation rates compared to the previous cohort. Yet, if the cohorts were defined by students' age instead of their grade, we would not see this increase; it is an artifact of grade retention in the eighth grade. The same problem occurs with the first cohort affected by the sixth grade promotional standard. While graduation rates were improving in the system, the change looks dramatic for this cohort in part because so many students' entry into high school was delayed.

Figure 2.
Graduation rates defined by grade versus age



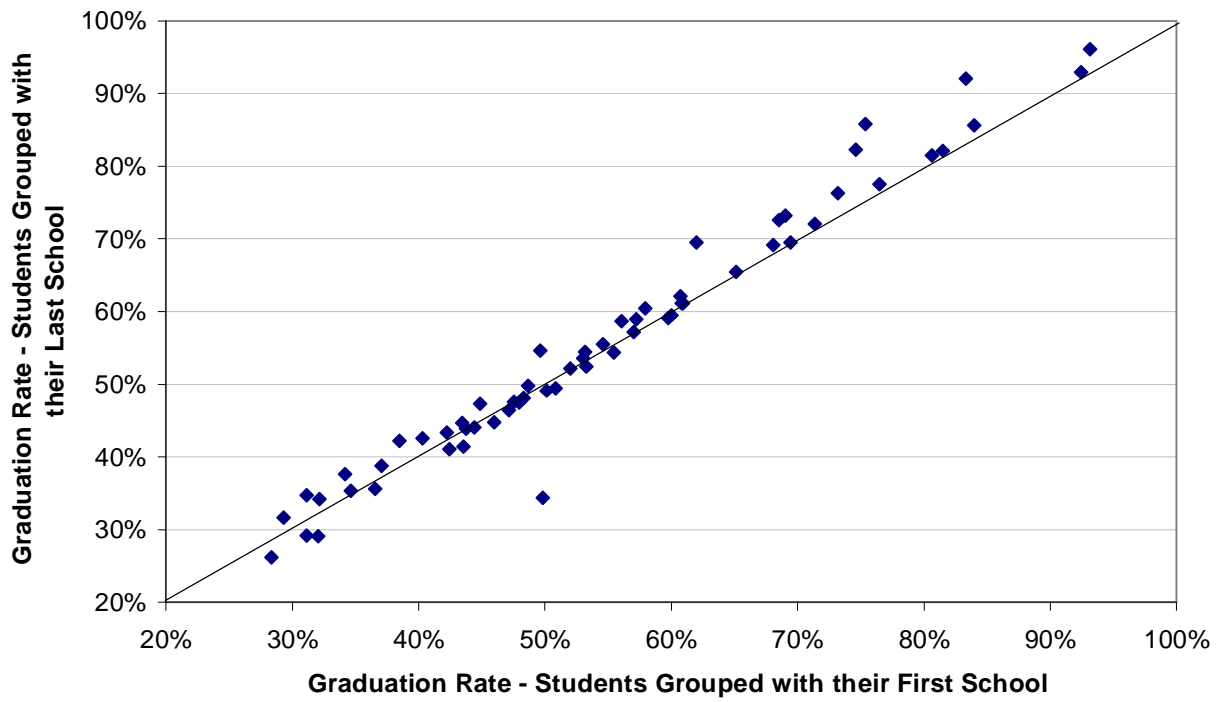
Appendix C.

Difference in graduation rates if transfers are grouped with their first school versus their last school

If graduation/dropout is attributed to students' final school, instead of their first school, schools that have some control over their enrollment have the capacity to improve their graduation rates by transferring out students who are not successful, and filling open spots with students who have shown some success in school. This can be seen in Figure 3, which graphs four-year graduation rates for students entering CPS high schools as first-time ninth graders in fall, 1999. The horizontal axis shows the graduation rate for each school if students are attributed to the place they begin ninth grade; the vertical axis shows the graduation rate if students are attributed to their last regular school. Among schools with average- or below-average graduation rates, the differences between the rates are modest, and are clustered around zero indicating no bias.¹ However, among the schools with higher graduation rates, many of which are charter schools, selective enrollment schools, or schools with magnet programs, all of which have some control over their enrollment, there are a number of schools whose graduation rates look much higher—by as much as 10 percentage points—if students are classified by their final school instead of their first school.

¹ The exception is one school which has much lower graduation rates when students are grouped with their final school than with their initial school (34% compared to 50%)—this school lost a substantial number of students when a new school opened within the same building; the students who remained in the original school were particularly unlikely to graduate.

Graduation Rates that Group Students by their First High School Compared to Rate that Group Students by their Last High School



Appendix D.
Selection of LEP students at older ages compared to younger ages

Indicators on subgroup populations should show the degree to which students in that subgroup population complete or drop out in a given district. However, as LEP students become fluent in English, they lose their classification as LEP students. Those students who are still defined as LEP by the time they enter high school are a select group who are particularly likely to drop out. If the district statistics on dropout/completion are based on the students still classified as LEP in high school, the indicators give a false sense of how well a school system is serving students with limited English proficiency. The following example shows this issue using data from Chicago.

Table 1 shows graduation rates at age 19 for a cohort of Latino students who were 13-years-old in 1998, broken down by whether they were enrolled in the English as a second language (ESL) program in the primary grades (at age 9), and whether they were enrolled in the ESL program in the middle grades (at age 13). Only Latino students are included in the comparison because the majority of students in Chicago who are in the ESL program are Latino. Students who entered the primary grades at CPS in the ESL program were at least as likely to graduate as their peers who began school not in the ESL program. Graduation rates for girls who were in the ESL program at age nine were 65.9 percent, compared to 64.4 percent among girls who were not in the ESL program. Graduation rates among boys who were in the ESL program at age nine were 51.6 percent, compared to 48.6 percent among Latino boys not in the ESL program. But if ESL-participation were defined at age 13—more typical for defining graduation rates than age 9—the opposite pattern would be seen. Among students enrolled in the ESL program at age 13, graduation rates were lower than those of Latino students not in the ESL

program at age 13. Only 60 percent of Latina girls in the ESL program at age 13 graduated by age 19, compared to 67 percent of other Latina girls; Only 44 percent of Latino boys in the ESL program at age 13 graduated, compared to 54 percent of other Latino boys.

Table 1. Graduation rates as of age 19 for Latino students in CPS

Female	Graduation Rate	Number of Students
Not in Bilingual program at age 9	64.4%	1,336
In Bilingual program at age 9	65.9%	2,022
Not in Bilingual program after age 13*	66.7%	3,172
In Bilingual program after age 13	60.1%	1,288
Male		
Not in Bilingual program at age 9	48.6%	1,356
In Bilingual program at age 9	51.6%	2,046
Not in Bilingual program after age 13*	54.3%	3,090
In Bilingual program after age 13	44.3%	1,403

Rates are based on cohorts of students who were 13-years-old on Sept. 1, 1998. Graduation status was determined six years later, when they were 19-years-old in September, 2004.

*This includes Latino students who exited bilingual/ESL programs and those who never participated.

Endnotes

¹ Dropouts are more likely to be unemployed than high school graduates, their earnings are lower, they also make up a disproportionate percentage of the nation's prisons and death row inmates (U.S. Department of Education. National Center for Education Statistics, 2000). A Rand report on the minority education gap concluded that because of its high cost to society in the form of low earnings, high social transfer costs, and rates of criminal activity, equalizing high school dropout rates between whites and Hispanics and whites and African-Americans provided the highest cost-benefit ratio of any policy option to equalize educational attainment (Vernez, Krop, & Rydell, 1999).

² Kaufman (2001), for example, found that differences in dropout and completion rates derived from the NELS versus the CPS exist more from differences in definitions of populations and dropout/completion than from differences in their methods.

³ For over two decades, Chicago has maintained linked student-level records on students' enrollment, grade progression, course-taking, test scores in both elementary and high school. These detailed, longitudinal records allow for many different means of calculating dropout and completion statistics, which allow us to see the effects of different technical decisions. Chicago has been in the forefront of a number of large-scale reforms that have gained popularity across the country. By studying Chicago, we can gauge the effects of different methods of calculating DCIs under different policy environments. In addition, because Chicago is a predominantly low-income minority school district, with a high degree of school choice and mobility, and a diverse population of students, many of the technical issues are particularly problematic, allowing for a good environment for better understanding their consequences. These issues may be less problematic in advantaged schools, but if we are to compare across schools, districts and states we need methods that are consistent across different types of schools and districts. Otherwise, the rates could minimize or exaggerate the real differences that exist.

⁴ e.g., U.S. Dept. of Education (2005)

⁵ Subgroup reporting is required in the federal No Child Left Behind Act (NCLB), but also needed by the advocates of particular subgroups.

⁶ The concern has been raised repeatedly that schools may try to improve test scores by having more students drop out, transfer, or enroll in GED or alternative programs—trading off graduation rates for better test scores (e.g., see discussion in Barton, 2004; Losen 2004).

⁷ For example, dropout rates in a district with two high schools might represent all students enrolled at each school over a period of four years. If there were high student mobility rates between the schools, so that many students transfer from one to the other, the resulting dropout rates for the schools would still be correct estimates of the percentage of students ever enrolled at those schools who dropped out. But the aggregate dropout rate for the district, based on an average of the two schools, would double-count students who had enrolled at each school. This would lead the district statistic to be inaccurate, even though based on accurate school statistics.

⁸ Pallas (1989) provides a good description of the GED, as well as issues around alternative credentials and the different paths through which students may eventually obtain a diploma, credential, or drop out.

⁹ This is the case in Chicago, where alternative schools require students to complete the requirements set by the state for a diploma, rather than the much more demanding requirements set by the district.

¹⁰ Laird (2008)

¹¹ U.S. Dept. of Education (2005)

¹² Economic outcomes are only slightly better among GED recipients than dropouts (Cameron and Heckman, 1993; Murnane, Willett and Boudett, 1995). GED recipients who enroll in 2-year colleges are only half as likely as high school graduates to receive Associate's degrees, and only about five percent GED recipients who enroll in a four-year college ever obtain a four-year degrees. The attrition rates of GED recipients who join the armed forces are much higher than regular high school graduates, and similar to those of dropouts without GEDs (Boesel, Alsalam and Smith, 1998).

¹³ Data on alternative diplomas, GEDs, not always recorded if provided by entities other than regular K-12 schools. This can be seen in the CCD, which allows three categories of completers to be reported (diploma recipients—included in the graduation rate, HS equivalency recipients, other); the variability in completers other than diploma recipients varies markedly across states (Mishel & Roy, 2006).

¹⁴ For example, Warren (2003) noted a rise in CCD data in regular diplomas in California from 1996 to 1997, but much less rise in the total number of high school completers—a fact he attributed to changes in how diplomas were classified.

¹⁵ In recent years, many states have raised their graduation requirements, or have developed plans to raise their graduation requirements. Currently, the standards for graduation vary widely across states. There are also different types of diplomas in some states, and some states allow parental waivers from the default curriculum (Achieve, 2008).

¹⁶ However, in practice, only truly cohort rates based on individual student records usually maintain strict time limits. Other computations are based on aggregate counts of completers; these rarely differentiate students by the number of years they took in school.

¹⁷ It may also, potentially, give a more accurate picture of the percentage of students who eventually graduate—if about half of the students remaining in school eventually graduate, something which can be tested empirically. In Chicago, this is the case, and excluding students still enrolled after four years produces rates that are similar to those that would be produced if students were allowed extra years to graduate.

¹⁸ For a description of the policy, see <http://www.edweek.org/ew/articles/2004/03/24/28dropout.h23.html>.

¹⁹ See Chapter 6 and Appendix D of the final report of the NISS task force on graduation, completion and dropout indicators (U.S. Department of Education, 2005) for a discussion of some of the issues around validation and data requirements.

²⁰ (Winglee, 2000)

²¹ Winglee (2000) shows this at the state level. In Chicago, many schools would have graduation rates more than 10 percentage points higher if they were allowed to count moves to system-run GED and alternative schools as transfers.

²² For a discussion of these issues, see Pallas (1989).

²³ This can be seen, for example, in Abrams & Haney (2004); Nield & Farley, 2004; Allensworth & Easton, 2005).

²⁴ For examples of these problems, see Mishel & Roy (2006) or Warren (2004).

²⁵ For example, dropping out becomes legal at age 16, pregnancy becomes more likely at older ages, full-time employment becomes more feasible as students get older. Using data from Chicago, we can see a positive relationship between grade level and the probability of dropping out, but it only exists because of the relationship between age and grade level. Holding age constant, there is no positive relationship between grade level and dropping out (the relationship becomes negative because of grade-retention effects). Holding grade level constant, there is still a strong positive relationship between age and dropping out.

²⁶ Alexander, Entwisle & Dauber (2003); Allensworth (2005)

²⁷ NCES includes ungraded students by prorating the total number across grades in the denominator proportional to known graded enrollment rates, with ungraded dropouts included in the numerator (Laird, et al., 2008).

²⁸ For the CCD dropout rates, some schools use the official October-to-October definition to define dropouts in the numerator, while some states use a June-to-June definition. Districts that use June-to-June dropout rates tend to report slightly higher numbers of dropouts, but the differences are small (Winglee, 2000).

²⁹ For example, a student may be counted in the September enrollment, but transfer out in November. Unless adjustments are made for out-mobility, that student will be in the denominator of the indicator for the first school, but not included in the numerator of the first school, even if he drops out in the spring, because his final status is known to his new school.

³⁰ For example, students entering as 10th graders are grouped with students who started in ninth grade the year before, those entering as 11th graders are grouped with students who started ninth grade two years earlier, etc.

³¹ Allensworth & Easton, 2007

³² Students who transfer in after ninth grade tend to boost graduation rates because they have already shown enough success to move on past ninth grade, and because they are followed for fewer years than students who enroll in ninth grade.

³³ U.S. Dept. of Education. August 2008. New Race and Ethnicity Guidance for the Collection of Federal Education Data. www.ed.gov/policy/rschstat/guid/raceethnicity/indx.html Modified 08/08/2008.

³⁴ Hakuta, Butler and Witt (2000) found that academic English proficiency takes at least four to seven years, and that the rate of acquisition is related to students' economic status. Abedi and Dietel (2004) note that high-performing English language learners get re-designated as they obtain proficiency, so that low-achieving students are increasingly concentrated in the subgroup, together with new LEP students.

³⁵ Allensworth (1997)

³⁶ Eligibility for special education services depends on referral, evaluation, and decisions of school staff and parents. These decisions may differ across schools. School policies and resources may affect whether students are referred or determined to be eligible. Chicago, for example, placed limits on the percentage of students who could be determined eligible for special education services, in part, to keep schools from excluding too many students from the accountability policy. When grade-promotion policies were put into place in grades 3, 6 and 8, there was a substantial rise in the identification of students in those grades. This seemed to be due to uncertainty as to how to handle students whose achievement remained low after repeatedly failing the exams and being held back one or more years (Miller & Gladden, 2002).

³⁷ Swanson (2003)

³⁸ This was the consensus of the NCES task force on graduation, completion and dropout indicators (U.S. Dept. of Education, 2005).

³⁹ See Haney (2001). Greene and Forster (2003) suggest this is a monumental problem, although the evidence they cite outside of Texas deals with the coding of graduates/GEDs, rather than transfers/dropouts.

⁴⁰ Because there may be many reasons for leaving school, clerks may enter the information in different ways. Long lists of potential reasons for leaving may be confusing to code, while short lists may be too general.

⁴¹ For example, in Chicago there is a code called "termination of IEP". This is meant to be used for students with IEPs who drop out of school. In conversations with district officials, it was not clear if the code had been applied in the same manner over time.

⁴² We can see a number of these instances in Chicago data. For example, when the legal dropout age changed from 16 to 17, there was a rise in the number of 16-year-olds who were coded as leaving without a reason given—likely because clerks were hesitant to code students as dropouts

if not legally allowed. In the 2006-07 school year, the system switched to a new data system and collapsed a long list of potential leave reasons into a shorter list. There was a sizeable drop that year in the percentage of students leaving the system who fell into a dropout category. Because the codes changed, it is not possible to know if this drop was due to a real decline in students dropping out of school, or a change in the way that school clerks interpreted the new leave codes.

⁴³ In Chicago, we have seen that even basic data on who has graduated from the charter school is not always maintained in a form that is consistent with data from non-charter schools, and is not always consistently reported to the central office for district reporting.

⁴⁴ See Phelps (2005) for a discussion of some of the issues involved in maintaining accurate records on student enrollment and the implications for completion statistics.

⁴⁵ Examples of how adjustments can be made, and a discussion of the issues around adjusting graduation rates are available in Allensworth (2005).