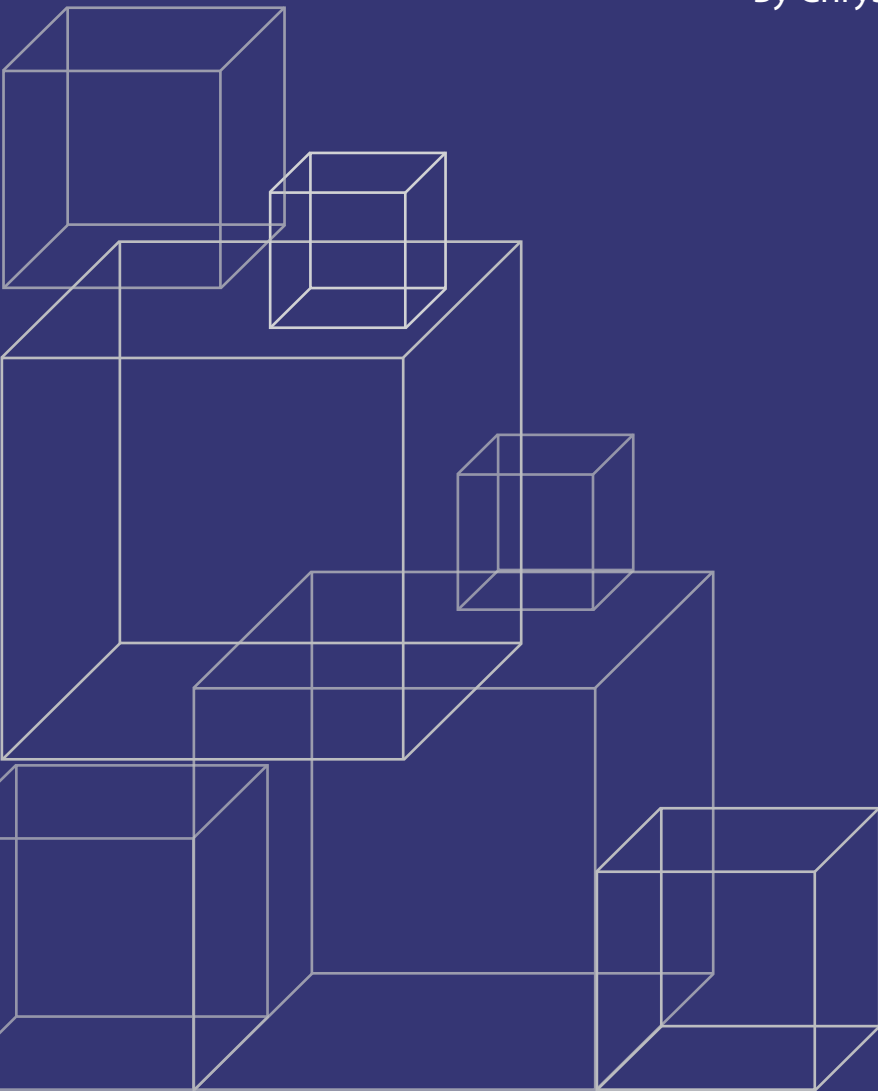


# Information Won't Be Used If No One Can See It

*Why States Should Publish Statistics  
Based on Longitudinal Student Data*

By Chrys Dougherty, Ph.D.



September 2008



**Managing partners of the Data Quality Campaign include:**

- ▶ Achieve, Inc.
- ▶ Alliance for Excellent Education
- ▶ Council of Chief State School Officers
- ▶ Education Commission of the States
- ▶ The Education Trust
- ▶ National Association of State Boards of Education
- ▶ National Association of System Heads
- ▶ National Center for Educational Achievement
- ▶ National Center for Higher Education Management Systems
- ▶ National Governors Association Center for Best Practices
- ▶ Schools Interoperability Framework Association
- ▶ Standard & Poor's School Evaluation Services
- ▶ State Educational Technology Directors Association
- ▶ State Higher Education Executive Officers

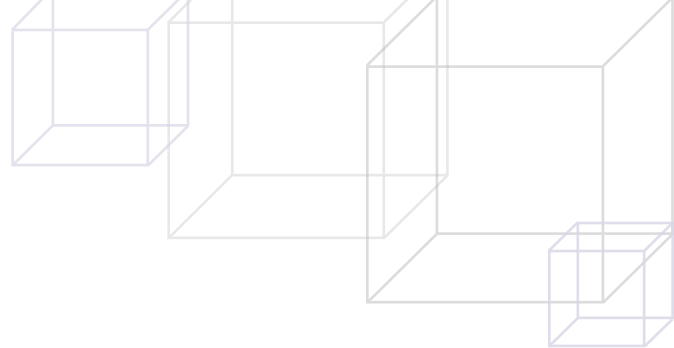
**Endorsing partners of the Data Quality Campaign include:**

- ▶ ACT
- ▶ Alliance for Quality Teaching
- ▶ American Association of Colleges for Teacher Education
- ▶ American Association of State Colleges and Universities
- ▶ American Board for Certification of Teacher Excellence
- ▶ American Youth Policy Forum

- ▶ APQC
- ▶ Business-Higher Education Forum
- ▶ Center for Teaching Quality
- ▶ College Summit
- ▶ Consortium for School Networking
- ▶ Educational Policy Institute
- ▶ ETS
- ▶ GreatSchools
- ▶ Institute for a Competitive Workforce
- ▶ Institute for Educational Leadership
- ▶ James B. Hunt, Jr. Institute for Educational Leadership and Policy
- ▶ Jobs for the Future
- ▶ Knowledge Alliance
- ▶ League of Education Voters Foundation
- ▶ Learning Point Associates
- ▶ Midwestern Higher Education Compact
- ▶ National Alliance for Public Charter Schools
- ▶ National Association of Secondary School Principals
- ▶ The National Center for Public Policy and Higher Education
- ▶ National Council for Accreditation of Teacher Education
- ▶ New England Board of Higher Education
- ▶ Pathways to College Network
- ▶ Postsecondary Electronic Standards Council
- ▶ Pre-K Now
- ▶ Roads to Success
- ▶ Southern Regional Education Board
- ▶ Western Interstate Commission for Higher Education

*The Data Quality Campaign is a national, collaborative effort to encourage and support state policymakers to improve the collection, availability and use of high-quality education data and to implement state longitudinal data systems to improve student achievement. The campaign aims to provide tools and resources that will assist state development of quality longitudinal data systems, while also providing a national forum for reducing duplication of effort and promoting greater coordination and consensus among the organizations focusing on improving data quality, access and use.*

*This publication was produced by the Data Quality Campaign/National Center for Educational Achievement. It was written by Chrys Dougherty, Ph.D., senior research scientist, National Center for Educational Achievement, and produced with support from the Bill & Melinda Gates Foundation.*



# Table of Contents

Raising the Visibility of Critical Issues with Longitudinal Data	1
Increasing the Availability of Longitudinal Data	3
<b>Category 1:</b> Student Academic Performance and Growth Disaggregated by Students' Prior Achievement Levels	4
<b>Category 2:</b> Longitudinal Graduation Rates, Including Rates Disaggregated by Prior Achievement	5
<b>Category 3:</b> Statistics on the Relationship between Course Completion and Exam Results	6
<b>Category 4:</b> Feedback Reports from Higher Education to K–12 Schools and Districts	7
<b>Category 5:</b> Feedback Reports from High School to Middle School and from Middle School to Elementary School	8
Conclusion	9





# Raising the Visibility of Critical Issues with Longitudinal Data

The Data Quality Campaign (DQC) encourages states to build longitudinal data systems to help educators and policy-makers make better decisions to improve student achievement and school performance. Longitudinal data systems make it possible to follow students across grades, schools, districts and levels (preschool, K–12 and higher education) and assess whether students are on track and programs are working. The DQC has identified 10 essential elements of comprehensive longitudinal data systems (see sidebar, page 2). However, the value of these systems depends on how often and how well the information is used.

Encouraging the productive use of data is in large part a matter of getting the right information to users when they need it, as well as ensuring that:

1. The data are readily available in a user-friendly format;
2. Users know how to interpret the data; and
3. The data help answer questions in which the users are interested.<sup>1</sup>

An example of applying these three conditions for productive data use is automobile fuel consumption. Miles per gallon statistics on cars are readily available, drivers feel they can interpret them and their relevance to the cost of driving is readily apparent. As a result, these statistics are widely used.

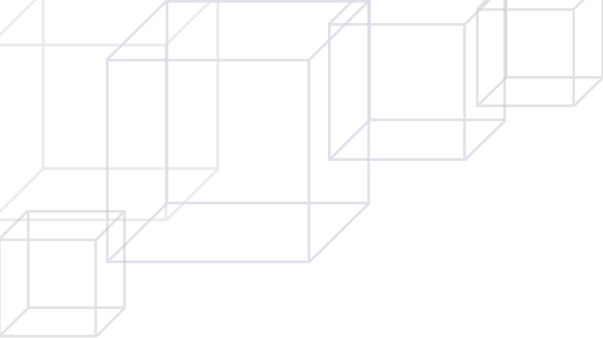
However, statistics calculated from longitudinal data generally are not readily available. Although nearly every state is building a longitudinal student data system, the vast majority of publicly available school and district information is based on “snapshot” data — information

on a group of students at a moment in time. Using snapshot data, one can readily learn how many of today’s high school students are proficient and how many students are graduating this year, but not how these results are related to the academic readiness of the same students in 8th grade or how many students dropped out along the way.

The availability of information can affect how policy-makers and school system administrators see the world — if there is no information available about a problem, it is less visible and less likely to be addressed.<sup>2</sup> Longitudinal data are better suited than snapshot data for showing the importance of early intervention and prevention; the need to coordinate across preschool and elementary, middle and high school; the necessity of adapting instruction and intervention to students’ level of academic preparation; and the value of a long time horizon. If snapshot statistics are all that are available, school improvement planners are less likely to see and apply the lessons contained in longitudinal data.

<sup>1</sup>See, for example, J.C. Wayman, V. Cho and M.T. Johnston, *The Data-Informed District: A District-Wide Evaluation of Data Use in the Natrona County School District*. Austin: The University of Texas, 2007.

<sup>2</sup>An example of this general rule is the greater prevalence of high blood pressure among African Americans becoming visible as a health issue when statistics on the problem became publicly available. In education, if there are no statistics on students’ learning in a subject because the subject isn’t tested, then problems of poor student learning in that subject lose visibility.



## Elements and Components of Longitudinal Data Systems

The DQC has identified *10 essential elements* that states must include to build a highly effective longitudinal data system:<sup>3</sup>

1. A unique statewide student identifier that connects student data across key databases across years
2. Student-level enrollment, demographic and program participation information
3. The ability to match individual students' test records from year to year to measure academic growth
4. Information on untested students and the reasons they were not tested
5. A teacher identifier system with the ability to match teachers to students
6. Student-level transcript information, including information on courses completed and grades earned
7. Student-level college readiness test scores
8. Student-level graduation and dropout data
9. The ability to match student records between the P–12 and higher education systems
10. A state data audit system assessing data quality, validity and reliability

As outlined in *Creating a Longitudinal Data System: Using Data To Improve Student Achievement*,<sup>4</sup> a white paper by the DQC, a longitudinal data system also needs to include the following components:

- ▶ **A technology infrastructure.** Schools, districts and state agencies have access to computers, servers, networks and the Internet to collect, transfer and use data.
- ▶ **A data architecture** that defines how data are coded, stored, managed and used. Data definitions are important. When everyone uses standard definitions, different systems can share information, staffing resources and process time are minimized, and data are provided to users when they need them. Privacy protection measures allow unique student identifiers to be used without revealing the data associated with a specific student when the data are shared with other organizations. Security protocols, like encryption, allow the secure transmission of data among systems.
- ▶ **A data warehouse** that stores, organizes and links student, school and district information — over time. Warehouses are designed to make it easy for users to “query” the database and produce standard or customized reports for different stakeholders. Researchers can use the data warehouse to answer questions such as the value-added of schools, identify which programs work for which students or identify which schools are closing the achievement gap — without violating student privacy.
- ▶ **Ongoing professional development** for those who are charged with collecting, storing, analyzing and using the data. Training ranges from how data are input locally to how teachers access and use the data for school and instructional improvement to how state education leaders use the system to make policy changes. Professional development continues as the system is refined and gains capacity for data-driven decisionmaking.

<sup>3</sup>Data Quality Campaign, *Creating a Longitudinal Data System: Using Data To Improve Student Achievement*, 2006, [www.DataQualityCampaign.org/files/Publications-Creating\\_Longitudinal\\_Data\\_System.pdf](http://www.DataQualityCampaign.org/files/Publications-Creating_Longitudinal_Data_System.pdf).

<sup>4</sup>Ibid.



# Increasing the Availability of Longitudinal Data

One way to increase the public availability of longitudinal statistics is to provide student-level longitudinal data to third-party data analysts interested in calculating those statistics.<sup>5</sup> For some state agencies, assistance from outside researchers has been a valuable way to supplement limited agency staff time.

For example, the Florida Department of Education provides a list of key research areas and invites third parties to submit proposals for investigations in these areas using Florida's statewide longitudinal student database.<sup>6</sup> The agency also works with analysts who propose investigations of other topics. Researchers then provide the reports and statistics from their analysis of those topics back to the state agency before making the results public. North Carolina and Texas also have sponsored education research centers to address important educational questions using those states' longitudinal data, and Kansas has developed a research agenda in collaboration with the state's universities.

A second, complementary approach is for states to calculate a routine set of statistics from longitudinal data and make those statistics available for download from the

Web. This report identifies five categories of longitudinal statistics that states might produce:

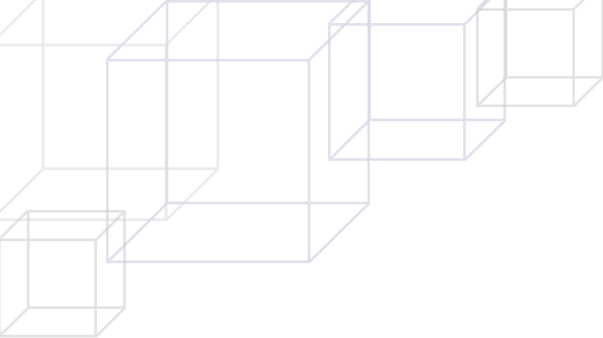
1. Student academic performance and growth disaggregated by students' prior achievement levels;
2. Longitudinal graduation rates, including rates disaggregated by prior achievement;
3. Statistics on the relationship between course completion and exam results;
4. Feedback reports from higher education to K–12 schools and districts; and
5. Feedback reports from high school to middle school and from middle school to elementary school.

What statistics each state can calculate depends on the completeness of the state's longitudinal data system — how many of the 10 essential elements it has — and how long the system has been in place. The following sections provide examples of questions that these five categories of statistics can address; however, states may be able to answer additional questions with the right longitudinal statistics.

<sup>5</sup>See C. Dougherty, *Getting FERPA Right: Encouraging Data Use While Protecting Student Privacy*, Thomas B. Fordham Institute, forthcoming, 2008, for a discussion of the circumstances under which states may share confidential student data with third-party researchers and data analysts under the Family Educational Rights and Privacy Act (FERPA).

<sup>6</sup>These areas include effective ways of training teachers; research on teacher effectiveness; effects of retention and promotion policies; performance of charter schools; and the relationship between earlier academic performance and student success in higher grades, college and the workforce. E-mail communication with Jay Pfeiffer, Florida Department of Education, March 4, 2007.





## Category 1: Student Academic Performance and Growth Disaggregated by Students' Prior Achievement Levels

If the state's longitudinal data system divides students into prior achievement groups (for example, advanced, proficient, basic, below basic) and calculates statistics on the progress of each group over time, policymakers can learn the answers to the questions in the right side of Table 1. By comparison, the questions on the left can be answered with snapshot data.

Disaggregating test scores can provide sobering information on the relationship between prior academic preparation and later student success. In Figure 1 — taken from actual data in one state — students who are well below the college/career readiness benchmark in 8th grade have slim odds of reaching the benchmark by 11th grade, regardless of income.

Confronted with this information, policymakers may want to ask further questions, such as:

- ▷ Which high schools have the best rates of success with previously lower-performing students?

- ▷ What are those high schools doing that is different?
- ▷ How much emphasis should be placed on high school reform versus intervention prior to high school?

Figure 1

### The Importance of Prior Academic Preparation

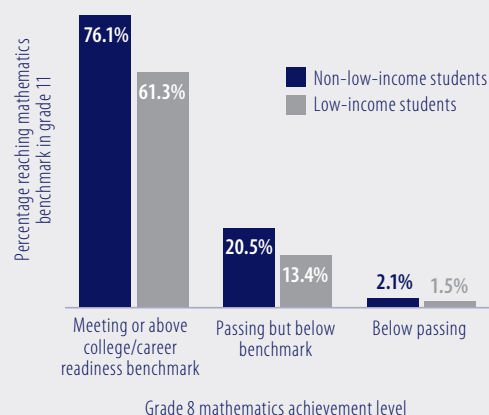
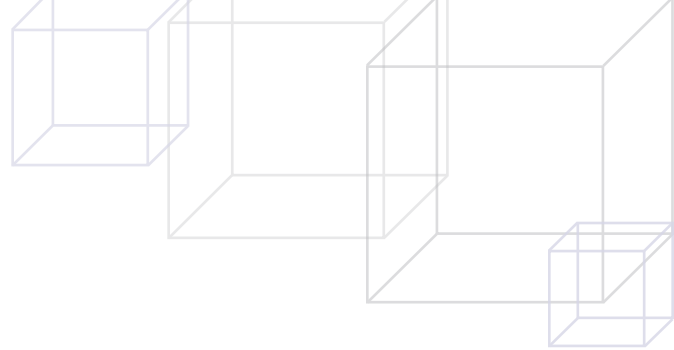


Table 1

### What Policymakers Can Learn from Test Results

Snapshot information	Additional information from longitudinal statistics
How many students were proficient in 8th grade?	How many students who were proficient in 8th grade stayed proficient in 10th grade?
How many students scored below basic in 4th grade?	What percentage of below-basic 4th graders normally reach proficiency by 8th grade?
What percentage of this year's high school seniors took at least one Advanced Placement (AP) course and passed the corresponding AP exam?	How is completing an AP course and passing the AP exam related to students' 8th grade achievement levels?
Which schools and districts have the highest test scores within their demographic category?	Which schools and districts do the best job of producing growth among academically advanced students? Are these different from the schools and districts that do the best job of helping students who are academically behind catch up?



## Category 2: Longitudinal Graduation Rates, Including Rates Disaggregated by Prior Achievement

Calculating longitudinal graduation rates involves keeping track of how many students transfer or drop out along the way and how many students are still in high school five or six years after they completed 8th grade. Bringing in prior test scores for each student can reveal how students' level of academic preparation leaving 5th or 8th grade affects

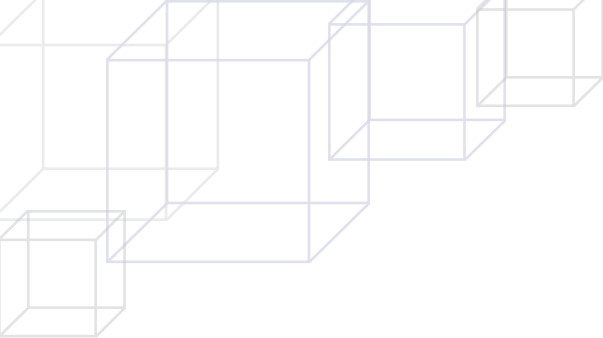
their likelihood of on-time graduation. States also may disaggregate graduates based on the level of diploma that they receive — for example, regular and special education diplomas and those earned by students who met college and career readiness benchmarks.<sup>7</sup>

Table 2

### What Policymakers Can Learn from Graduation Rate Calculations

Snapshot information	Additional information from longitudinal statistics
How many students graduated this year?	What percentage of students who completed 8th grade four years ago graduated on time this year, taking into account transfers and dropouts?
How does the number of 12th graders in each high school compare to the number of 9th graders three years earlier?	What causes these differences, taking into account transfers, dropouts and students held back a grade?
Does the number of graduates relative to 8th graders in this district appear to be declining? Were 8th grade test scores increasing or declining four years ago?	How are students' graduation, dropout and transfer rates related to their academic performance levels in 8th grade, and how are those relationships changing over time?

<sup>7</sup> For a discussion of those benchmarks, see C. Dougherty, L. Mellor and N. Smith, *Identifying Appropriate College-Readiness Standards for All Students*, NCEA, 2006, [www.just4kids.org/en/research\\_policy/college\\_career\\_readiness](http://www.just4kids.org/en/research_policy/college_career_readiness) and J. Allen and J. Sconing, *Using ACT Assessment Scores to Set Benchmarks for College Readiness*, ACT, 2005, [www.act.org/research/researchers/reports/index.html](http://www.act.org/research/researchers/reports/index.html).



## Category 3: Statistics on the Relationship between Course Completion and Exam Results

Receiving credit for a course labeled “Algebra II” does not in itself say how much algebra the student learned.<sup>8</sup> To keep track of the learning of students who have completed specific courses, states should publish statistics on how

students who complete the courses fare on end-of-course, college readiness and college placement exams that assess the content of those courses. This information can be used to fill in the right side of Table 3.

Table 3

### What Policymakers Can Learn from Comparisons of Course Completion and Exam Results

Snapshot information	Additional information from longitudinal statistics
What percentage of students in each grade received course credit for Algebra II?	<p>What percentage of students receiving course credit for Algebra II met college readiness benchmarks on the ACT or earned a corresponding score on the SAT?</p> <p>What percentage of students who completed Algebra II also demonstrated proficiency on an Algebra II end-of-course exam?<sup>9</sup></p>
What percentage of high school juniors and seniors took Algebra II or courses beyond Algebra II in the past two years? What percentage of students in the state’s colleges needed remediation in mathematics this year?	How many of last year’s graduates who completed mathematics through at least Algebra II in high school and entered college this year needed remediation in mathematics?
What were 8th grade proficiency rates for math two, three and four years ago?	How do the answers to the questions above vary for students based on their mathematics performance level in 8th grade?

<sup>8</sup>See C. Dougherty, L. Mellor and S. Jian, *Orange Juice or Orange Drink? Ensuring that “Advanced Courses” Live Up to Their Labels*, NCEA, 2006, [www.just4kids.org/en/research\\_policy/college\\_career\\_readiness](http://www.just4kids.org/en/research_policy/college_career_readiness).

<sup>9</sup>Although states generally administer end-of-course exams when students are finishing the course, combining course completion and exam data for the same student generally requires a longitudinal student data system.



## Category 4: Feedback Reports from Higher Education to K–12 Schools and Districts

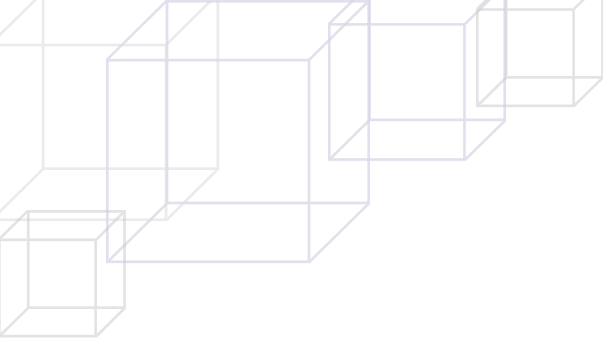
These statistics provide information on how the graduates of a particular high school or school district perform later in college: Do they stay in school, earn good grades, and eventually receive a degree or credential? Linking this

information to K–12 student data can be used to relate elementary, middle and high school results to student enrollment and success in college, answering questions such as those on the right side of Table 4.

Table 4

### What Policymakers Can Learn from Feedback Reports from Higher Education to K–12

Snapshot information	Additional information from longitudinal statistics
What are the high school graduation trends in this district? What are the college enrollment trends in the region and state?	What percentage of the students from this district enroll in higher education within two years of high school graduation?
What are the trends in student grades, majors and graduation in the two- and four-year colleges in the region and state?	What are the trends in college grades, majors and graduation for students from this district, and how are those related to those students' 8th grade achievement levels, high school course-taking patterns and high school academic achievement?
What are the trends in the academic achievement levels and course-taking patterns of this district's high school students?	



## Category 5: Feedback Reports from High School to Middle School and from Middle School to Elementary School

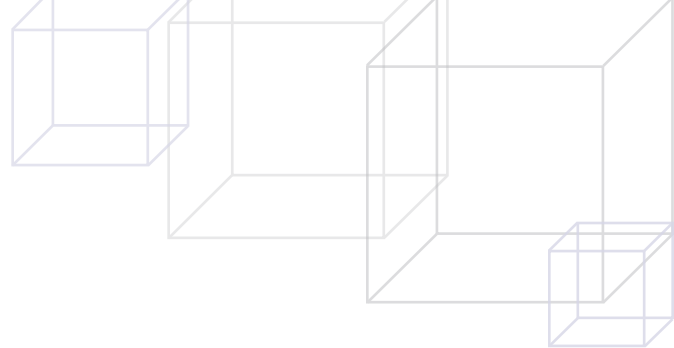
Like high schools, elementary and middle schools can use feedback on their graduates’ performance in the next higher level of education. Individual school districts can organize this information for students who stay within their boundaries, but states with longitudinal data can

organize this information for everyone at once, reducing costs and making it possible to track students who change districts. Therefore, these states can provide answers to the questions on the right side of Table 5 for all elementary and middle schools in the state.

Table 5

### What Policymakers Can Learn from Feedback Reports to Middle and Elementary Schools

Snapshot information	Additional information from longitudinal statistics
What are the achievement trends in this district’s elementary, middle and high schools?	How do students from this elementary school perform after they move on to middle school? How do these middle school students perform on state assessments and college readiness tests in high school?
What are the course-taking patterns in this district’s high schools?	How many of the students from this middle school take rigorous courses in specific subjects in high school, and how do they do in those courses?
What percentage of students are performing at specific achievement levels in the middle and high schools that students leaving this school normally attend?	How does the performance of this school’s students in the next level of education relate to their academic achievement level when they left this school?



# Conclusion

By publishing a well-chosen set of longitudinal statistics, states can put their statewide longitudinal data systems to work providing important information to educators and policymakers. Unlike snapshot statistics, longitudinal statistics can help educators and policymakers:

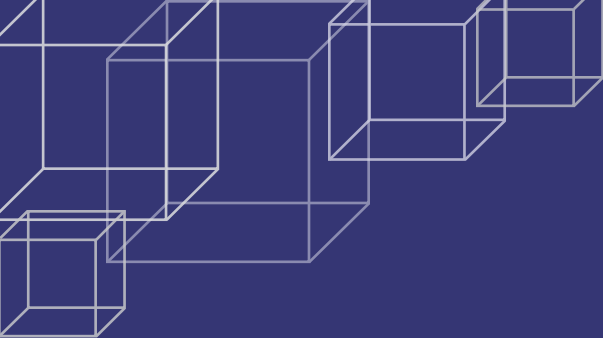
- ▷ Diagnose how well the school's and district's interventions are working for students at different levels of initial achievement;
- ▷ See whether handoffs are working well across pre-school, elementary school, middle school, high school and higher education;

- ▷ Diagnose the long-term impact of each level of education based on students' success in the next level; and
- ▷ Assess which courses have sufficient rigor to prepare students for later success.

In short, longitudinal statistics are better suited for supporting the systemic, long-term effort needed to get large percentages of disadvantaged students ready for college and skilled careers.







**DATA**QUALITY  
CAMPAIGN  
Using Data To Improve Student Achievement

[www.DataQualityCampaign.org](http://www.DataQualityCampaign.org)

Phone: 512.320.1816

Fax: 512.320.1877

