DATAQUALITY CAMPAIGN
Using Data To Improve Student Achievement

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Do "College-Preparatory" Courses Live Up to Their Labels?

Using Statewide Longitudinal Data Systems To Assess the Rigor of Academic Courses

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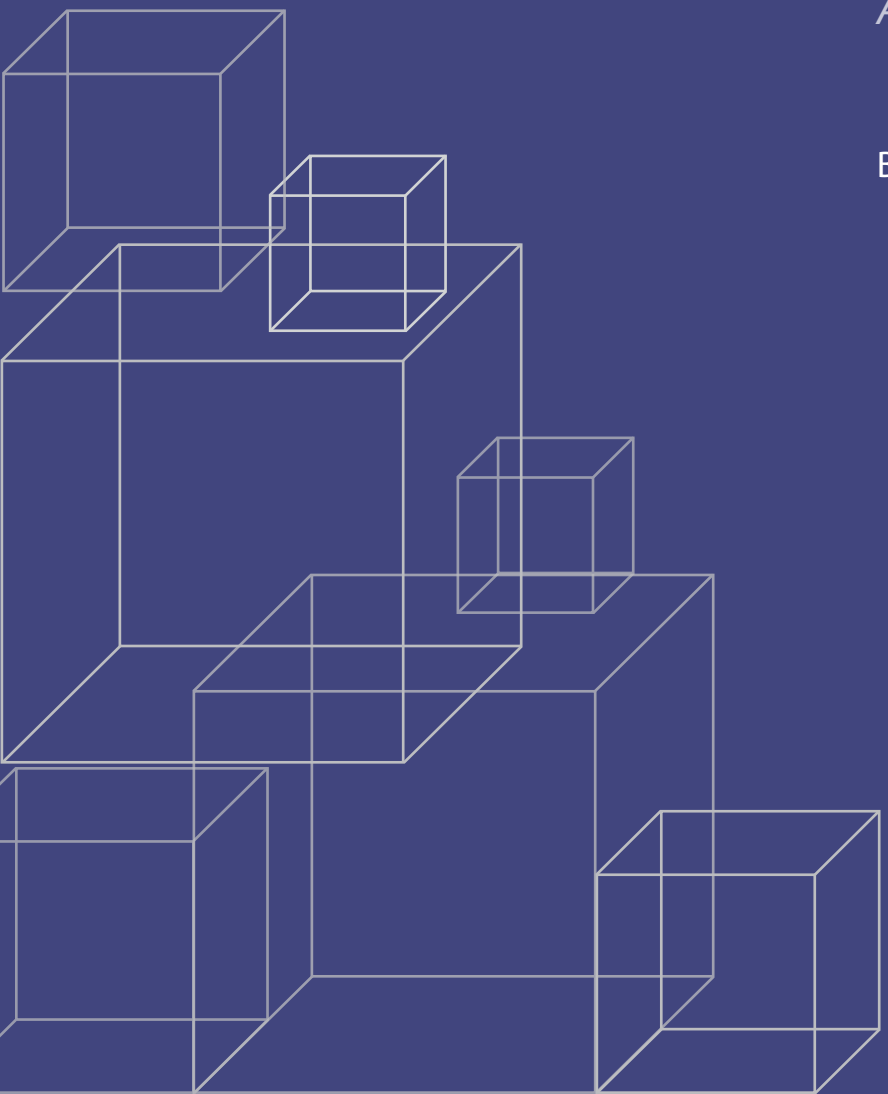

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DATA QUALITY CAMPAIGN

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Managing partners of the Data Quality Campaign include:

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- 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
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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.

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Learning Content, Not Just Completing a Course[1]

A growing number of educators and policymakers have begun focusing on the goal of preparing all or nearly all high school students for college and other advanced postsecondary learning opportunities. To meet this goal, states are adopting policies to encourage nearly all students, not just those seeking entry into competitive four-year colleges, to take a full core curriculum of college-preparatory courses in high school.[2] Yet it is much easier to give students credit for a course labeled "Algebra II" than it is to ensure that those students actually learn algebra. So how do educators and policymakers know that students are actually learning the content implied by the course titles?

Course Credit Inflation

As enrollment in college-preparatory courses expands to include a large percentage of the student population, troubling evidence has accumulated that many students — particularly disadvantaged ones — are receiving credit for the courses but are not learning the content. For example, in one state with a longitudinal student data system:

- 63 percent of low-income, 61 percent of African American and 59 percent of Hispanic students who graduated under the state's new recommended college-preparatory graduation plan in 2000 needed remediation in one or more subjects when they enrolled in the state's public higher education institutions. The corresponding percentages for white and non-low-income students were 27 percent and 33 percent.[3]
- 58 percent of low-income, 67 percent of African American and 57 percent of Hispanic students who received course credit for Algebra I in 1999 failed the corresponding end-of-course exam. For white and non-low-income students, the corresponding figures were 35 percent and 39 percent.
- In the 2002 high school graduating cohort, the passing rate for low-income students who took academic Advanced Placement (AP) courses *and* the corresponding AP exams was less than 25 percent. The passing rate for non-low-income students who took both AP courses and exams was 58 percent.

The course-taking patterns of students who took the ACT exam provide national evidence that courses completed may overstate content learned.[4] For example, of students who reported that their high school mathematics curriculum consisted of Algebra I, Geometry and Algebra II, only 26 percent met the ACT college readiness benchmark for college algebra. Only with additional mathematics coursework did the percentage rise above 50 percent.[5]

[1] The thesis of this report is taken from 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/.

[2] By 2008, 19 states included at least four years of English, three years of mathematics, three years of science and three years of social studies in their high school graduation requirements (www.achieve.org/files/50-state-2008-final02-25-08.pdf). Two states have adopted policies making a college readiness core course curriculum the default graduation plan for all high school students (www.act.org/news/data/07/states.html). Twenty-four states have "State Scholars" programs that encourage students to take college-preparatory courses in high school (www.wiche.edu/Statescholars/).

[3] E-mail communication from James Dilling, Texas Higher Education Coordinating Board, March 3, 2005. This and the following two examples are taken from Dougherty, Mellor and Jian, 2006. An earlier analysis by Lopez, 2000, using data on 1997 high school graduates found that about half of students receiving "Advanced" or "Advanced with Honors" diplomas needed remediation in one or more subjects when they entered Texas public higher education institutions.

[4] This report uses data from ACT, Inc. due to availability. Similar analyses could be done with SAT data.

[5] ACT, Inc., *Rigor at Risk: Reaffirming Quality in the High School Core Curriculum*, 2007.

An analogy may be made to truth-in-labeling laws in business. A company selling an orange-colored beverage under the label "orange juice" can get in legal trouble if the beverage contains little or no actual juice. But there are no consequences for giving students credit for Algebra II even if they have learned little algebra. In some cases, the problem is the lack of a standard definition of what content should be covered in an Algebra II course; in other cases, districts and states lack measures of whether the defined content has been taught and learned; and in still other cases, students receive credit for courses even though available measures indicate that they have not learned the content implied by the course titles.[6]

Like the concept of grade inflation, giving students credit for courses when they have not learned the content may be labeled "course credit inflation." In the case of grade inflation, the knowledge and skill level of the median student receiving an A declines over time. In the case of course credit inflation, the level of content mastery by the median student receiving credit for a course with a given title declines over time.[7]

[6] The problem of course titles not reflecting course content, let alone what students are learning, has received attention from national organizations. The College Board has announced an initiative to review the content of courses taught under the AP label. ACT has developed a system to audit the content of high school courses and has written a report with The Education Trust on the content of model advanced high school courses.
[7] See Dougherty, Mellor and Jian, 2006.

Addressing Content Mastery with the 10 Essential Elements

The 10 essential elements of a statewide longitudinal student data system make addressing questions about course completion, course credit inflation and college readiness possible.

1. *A statewide student identifier* is needed to link individual students' course-taking data with their scores on state tests and SAT and ACT exams and with information on their success in higher education.
2. *Student-level enrollment and demographic data* are needed to see whether the problem of course credit inflation is worse for low-income and minority students than for non-low-income and white students and whether the problem shows up mainly in certain schools and districts.
3. *The ability to match student-level test records across years* can be used to assess whether the students who are getting course credit when they haven't mastered the content are the same students who entered the class poorly prepared at the beginning of the year.
4. *Information on untested students* can be used to see whether these students tend to be the ones who were less well prepared at the beginning of the year.
5. *Matching students with their teachers* is critical for identifying classrooms in which course credit inflation is or is not a problem. In addition, educators and researchers may want to identify teachers who appear to be effective at working with students who are academically behind.
6. *Student-level transcript (course completion and course grade) information,* when connected to end-of-course exam data on the same subject, can be used to tell whether students who receive credit for a course appear to have mastered the course content. The information on student grades can be used to check for grade inflation.
7. *College readiness test data (SAT and ACT exam results)* can be used to assess whether students completing a sequence of college-preparatory courses appear to be college ready. For example, a student who completed mathematics courses through Algebra II should be able to score at or above the college readiness benchmark on the ACT Mathematics exam or receive an analogous score on the mathematics section of the SAT Reasoning Test.[8]
8. *Student-level graduation and dropout data* can be used to see whether students completing various course sequences are graduating. In addition, graduation data often contain information on the course sequences ("graduation plans") that students completed to earn their diplomas.
9. *The ability to match student records between the P–12 and higher education systems* is necessary to see whether students who complete various course sequences in high school succeed when they get to college. For example, students who complete mathematics courses through Algebra II shouldn't need remediation in mathematics when they get to college.
10. *A state data audit system assessing data quality, validity and reliability* is necessary to ensure that trends in course completion and course credit inflation are being evaluated using accurate data.

[8] ACT and the College Board have collaborated on comparing scores of students who take both exams to identify what SAT Mathematics score best corresponds to a given score on the ACT Mathematics exam.

Using Longitudinal Data To Address Key Questions about Course Completion and College Readiness

As states develop longitudinal student data systems, educators and policymakers in those states should be able to answer questions such as the following:

Question One: To what extent are students who receive credit in college-preparatory courses actually learning the content implied by the course titles?

Answering this question requires the state to administer an end-of-course exam covering the specific content of the course and link student-level results from this exam with transcript data indicating which students earned credit for the course. For example, one state linked individual students' course credit and grade information on Algebra I with the same students' Algebra I end-of-course exam results. The state found that the majority of low-income and minority students receiving course credit for Algebra I failed the state end-of-course exam on the same subject.[9]

Moreover, collecting information on course grades makes looking at grade inflation possible. In the Algebra I study above, the state looked at average Algebra I end-of-course exam scores for students earning course grades of 60, 70, 80, 90 or 100. Although students from all groups with course grades of 90 or 100 averaged better than a passing score of 1500 on the exam, minority students with a course grade of 80 — a comfortable B-minus — averaged a failing score on the exam. Thus, the data indicated that grade inflation was more pronounced for minority students (Table 1).

Table 1

Average Algebra I End-of-Course Test Scores for Given Algebra I Course Grades

	Course Grade				
Group	60	70	80	90	100
All Students	1365	1396	1483	1594	1728
African American	1348	1379	1438	1569	1659
Hispanic	1368	1385	1447	1536	1645
White	1372	1416	1515	1616	1751

Source: Texas Education Agency, 2000
Failing scores on end-of-course test are shaded.

Question Two: To what extent are students who complete a core sequence of college-preparatory courses prepared for college-level academic work?

This question calls for matching data on the courses that students completed with evidence that the same students were well prepared for college. Preparation for college, in turn, can be assessed by results on college readiness tests taken in high school, academic placement tests taken when the students get to college, and students' success in staying in college and receiving a degree or credential.

[9] This result also is mentioned on page 1 of this resource guide.

In the example mentioned on page 1, the graduation data provided information on course sequences completed, academic placement tests reported on whether each student needed remediation in college prior to taking credit-bearing work, and demographic data were used to disaggregate the students by income and ethnicity.

Question Three: What is the relationship between students' academic achievement levels prior to enrolling in the courses and their success in mastering the course content?

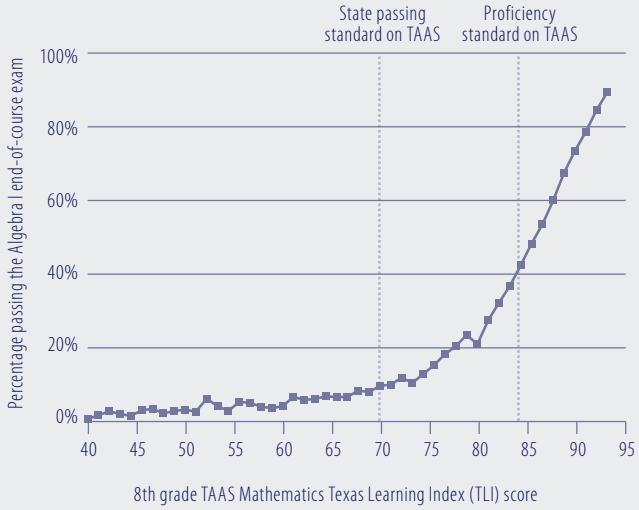
By matching the same students' prior year state test results with their current year score on end-of-course exams, it is possible to identify what level of prior performance is predictive of student success in each course. An example of this approach is illustrated in Figure 1, which matches students' scores on the 8th grade state mathematics test with the same students' scores on the state's Algebra I end-of-course exam. The figure shows that a student just barely meeting the state's passing standard of 70 on the 8th grade mathematics exam was unlikely to pass the Algebra I exam in the following year. This finding indicates that many students who passed the state test were likely to require extra help in their algebra class. School systems that are forewarned by this kind of information are more likely to plan for the necessary assistance for students.

Question Four: Which schools and classrooms are doing the best job of teaching the content of specific courses, controlling for their students' prior academic preparation?

If students at a certain grade level aren't learning the content that they should be, it is important to be able to identify whether the problem is concentrated in certain

Figure 1

9th Grade Algebra I Exam Passing Rates in 2000 by Results on 8th Grade Mathematics TAAS Exam in 1999



Source: NCEA analysis, 2000

classrooms, allowing for students' level of prior preparation. For example, in some classrooms, even well-prepared students may be having trouble with Algebra I. In other schools and classrooms, well-prepared students may be learning algebra while poorly prepared students are not. Still other Algebra I teachers may be enjoying unusual success with poorly prepared students. Distinguishing these three types of cases entails matching students to their teachers as well as matching prior and current year test records for the same students.

Recommendations

School systems and local and state policymakers must monitor whether students who enroll in and complete college-preparatory courses are in fact well prepared to do college-level work.[10] This monitoring can be done most efficiently on a statewide basis so that each school district does not have to conduct its own separate research project. To make this analysis possible, states should:

- Develop a longitudinal student data system with the 10 essential elements, each of which can contribute to understanding students' levels of college readiness in the ways described in this resource guide.
- Develop end-of-course exams for core high school courses. Because much of the development work on these exams already has been done, they do not need to be created from scratch. For example, ACT, Inc., has created a nationwide set of end-of-course exams as part of its QualityCore program, and Achieve is working with a consortium of states on an Algebra II end-of-course exam.
- Once the necessary data are in place, begin the analysis — or contract with outside researchers to conduct the analysis — to answer the four questions listed in this resource guide.

In general, putting all or nearly all high school students into college-preparatory high school courses will accomplish the desired goal of preparing students for college only if adequate steps are taken to prepare students in advance for success in the courses and to offer additional support to students who enter high school with gaps in their academic preparation. With a longitudinal data system, states can monitor student academic results over time to see if these things are happening.

[10] For many students, college-level work will include technical training in community colleges and other venues to qualify for skilled careers.

References

Achieve, Inc., American Diploma Project Network, *2008 Closing the Expectations Gap: An Annual 50-State Progress Report on the Alignment of High School Policies with the Demands of College and Careers*, retrieved Sept. 5, 2008, from www.achieve.org/files/50-state-2008-final02-25-08.pdf.

ACT, Inc., *Rigor at Risk: Reaffirming Quality in the High School Core Curriculum*, 2007, retrieved April 11, 2008, from www.act.org/research/policymakers/pdf/rigor_report.pdf.

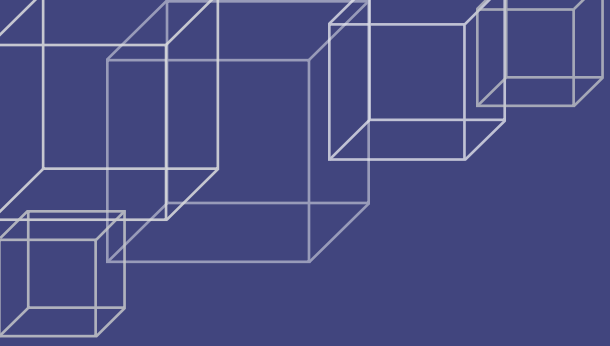
Bureau of Labor Statistics, 2007, retrieved April 14, 2008, from www.census.gov/population/socdemo/education/cps2007/Table2.xls.

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/.

O. Lopez, *The Relationship of the Texas High School Curriculum to College Readiness: An Update. Implications for Increasing Student College Participation and Success*, NCEA, 2000, unpublished paper.

State Scholars programs, retrieved April 14, 2008, from www.wiche.edu/Statescholars/.

Texas Education Agency, *Section VI: A Study of the Correlation between Course Performance in Algebra I and Algebra I End-of-Course Test Performance*, 2000, retrieved April 11, 2008, from www.tea.state.tx.us/student.assessment/resources/studies/correlation.pdf.



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