

## Examples of Precision Journalism Story Ideas Using NCES Data and Publications

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## Access to National Center for Education Statistics Data and Publications

For reporters in search of easily accessible data and publications that touch on all sorts of national and international education issues, the National Center for Education Statistics is a key resource. NCES collects, analyzes and reports data related to domestic and international education topics. Each year, its numerous research programs generate more than 100 publications involving elementary, secondary and postsecondary education, in both public and private sectors. The publications range in scope from comprehensive digests of education statistics to two-page issue briefs. NCES also makes available raw data and tabulated data sets on which the publications are based.

NCES administers National Household Education Surveys, NAEP tests, several longitudinal studies and other major research programs. In doing so, NCES "fulfills a congressional mandate to . . . report full and complete statistics on the condition of education in the United States; conduct and publish reports and specialized analyses of the meaning and significance of such statistics; assist state and local education agencies in improving their statistical systems; and review and report on education activities in foreign countries."<sup>1</sup>

NCES data and publications are available on the Web at <http://www.ed.gov/NCES/>. Unless otherwise noted, all of the NCES data and publications cited herein can be retrieved from the online site. The full text and graphics of the publications can be downloaded in *.pdf* format and viewed through Acrobat. NCES also maintains a gopher server ([gopher.ed.gov](http://gopher.ed.gov)). To obtain a catalog and instructions on the usage of the NCES mail server, send mail to [almanac@inet.ed.gov](mailto:almanac@inet.ed.gov), and in the body of the message type "send catalog." Leave the Subject line blank. If electronic retrieval is not an option, contact the National Library of Education (1-800-424-1616) for single

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<sup>1</sup> "U.S. Department of Education, National Center for Education Statistics. *Learning About Education Through Statistics*, NCES 96-871, by Claire Geddes. Washington, DC: 1996.

copies of NCES publications. For large orders, contact the Order Desk at the U.S. Government Printing Office (202-512-1800).

*Learning About Education Through Statistics* is the best resource for a quick review of NCES programs and for phone numbers and names of contacts at NCES. The publication can be downloaded from the Web, or ordered through NCES or the GPO. For more detailed documentation on NCES activities, see *Programs and Plans of the National Center for Education Statistics*. A new volume should be in print within a few months.

## **NCES Data and Publications as Reporting Resources**

### **1. A Source for Tidbits or Factoids**

If you need to figure out what the pupil/teacher ratio was in the fall of 1969 in Georgia and South Dakota public schools, and then you also want to see what the pupil/teacher ratio was in those states in the fall of 1993, NCES publications yield such tidbits quickly. The recurring publication titled “Statistics of Public Elementary and Secondary Day Schools” will provide the answers, or go to the digest publication *State Comparisons of Education Statistics: 1969 to 1993-94*. For what it’s worth, the pupil/teacher ratio in Georgia’s public schools was 25.9 in 1969 and 16.5 in 1993. The pupil/teacher ratio in South Dakota’s public schools was 18.7 in 1969 and 15.5 in 1993.

It is not possible to provide examples of every possible way to use NCES data and publications to retrieve information factoids, but a listing of all ongoing NCES programs illustrates the wide reach of the research.

- Elementary and Secondary Education

*Common Core of Data* -- The Center's primary database on U.S. public education, the CCD survey annually collects data from every public elementary and secondary school in the nation, every school district and every state education agency. The CCD includes basic descriptive data and serves as a resource for drawing samples of public schools and school districts.

*Schools and Staffing Survey (SASS)* -- SASS is designed to gather information on the characteristics of teachers and administrators in the nation's public and private schools, and school districts. Plans are to conduct the SASS every five years.

*SASS Teacher Follow-up Survey* -- Carried out one year after the SASS, the Follow-up Survey is designed to gather information on teacher attrition and retention in public and private schools and to estimate future teacher demand.

*Private School Survey* -- The Private School Survey is used to establish the universe of private elementary and secondary schools from which samples may be drawn. The Survey is conducted every two years and generates descriptive data on the characteristics of all U.S. private schools that meet NCES criteria of a school.

*National Household Education Survey (NHES)* -- Because NHES gathers education data through a survey of 10,000 to 15,000 households, not schools or teachers, it enables NCES to consider many new issues. Plans are to conduct the surveys every two years. Past Surveys have measured early childhood program participation levels and school safety and discipline.

*Fast Response Survey System* -- Established in 1975, this survey program is used to collect data quickly on timely issue topics.

*NCES Items in the Current Population Survey* -- NCES has funded a supplement to the Census Bureau's monthly Current Population Survey. Since the 1960s, the NCES items have been asked every October. The supplement is used to gather data on school enrollment and attainment.

*Other Activities* -- The School District Mapping project (reconfigures Census data by school district boundaries), the Cooperative System Fellows Program, the National Forum on Education Statistics and the National Data Resource Center

- Postsecondary Education

*Integrated Postsecondary Education Data System (IPEDS)* -- IPEDS is the Center's primary postsecondary education data collection effort. The annual survey includes all postsecondary institutions, approximately 11,000 in all.

*National Household Education Survey (Adult Education Component)* -- The Adult Education segment of NHES was created in 1991 and allows researchers to measure course-taking patterns, by demographic and labor force characteristics.

*Recent College Graduates Study (RGG)* -- The RGG was conducted from 1976 to 1991 and has now been replaced by the Baccalaureate and Beyond survey, which tracks groups of college graduates.

*National Postsecondary Student Aid Study* -- The Student Aid Study is used to gather data on student characteristics, family income, education costs, employment, education aspirations and other variables. The data collected in the Student Aid Study are used to fashion federal policy concerning financial assistance programs.

*National Survey of Postsecondary Faculty* -- The survey collects postsecondary labor force data and also measures faculty job satisfaction and compensation. Data are available from 1998 and 1993 surveys.

*Survey of Earned Doctorates Awarded in the United States* -- Data are collected each year and published by the National Academy of Sciences. The survey tracks doctorates awarded annually, by field of study, and includes data on financial aid and research facilities.

*Postsecondary Education Quick Information System (PEQIS)* - PEQIS is designed to gather data on timely issues of interest to policy analysts, program administrators and decision makers in postsecondary education. PEQIS gathers data from a standing panel of 1,500 postsecondary education institutions and a panel of 51 state education agencies.

- Educational Assessment

*National Assessment of Educational Progress (NAEP)* -- NAEP tracks achievement of the nation's elementary and secondary students in a variety of subject areas, including reading, mathematics, geography and science. Results, based on complex samples, are reported for the nation as a whole and for regions and participating states. Established in 1969, NAEP first assessed students at ages 9, 13 and 17 and now has been modified to cover age-group and grade-specific populations.

*High School Transcript Studies* -- Based on analysis of thousands of high school transcripts, the studies are designed to document course-taking patterns of students.

*National Adult Literacy Studies* -- The research provides a wealth of information concerning the reading levels of U.S. adults.

- National Longitudinal Studies

*National Longitudinal Study of the High School Class of 1972* -- The initial survey of 1972 high school graduates and the several follow-up surveys were designed to give researchers insight into the way young adults make the transition from high school or college to the job market. The data can provide details on quality, equity and diversity of education opportunities.

*High School and Beyond* -- The survey is based on a highly stratified national sample of more than 1,100 secondary schools and collects data on topics such as educational attainment, employment, family formation, personal values and community involvement since 1980. This study supplements the NLS-72 research by tracking high school students from 1980.

*National Education Longitudinal Study of 1988* -- NLS-88 is the third major longitudinal study from NCES, and it broadens the scope of prior work by following students from a younger age (8th grade) through their school course work and beyond.

*Beginning Postsecondary Student Longitudinal Study (BPS)* -- BPS provides information on students' persistence and progress at many types of postsecondary institutions and also considers issues related to graduate studies.

*Baccalaureate and Beyond Longitudinal Study (B&B)* -- The B&B research provides information concerning attainment of graduate students and addresses issues of employment beyond graduate studies.

- NCES also administers major research efforts and generates the following publications in three additional areas: International Education, *OECD International Education Indicators Project (INES)*, *IEA Reading Study*, *Third International Mathematics and Science Study (TIMSS)* and *International Adult Literacy Study*; Vocational Education, *Secondary Data Collection*, *Postsecondary Data Collection* and *Longitudinal Surveys*; Library Statistics Program, *Public Library Statistics*, *Academic Library Statistics* and *School Library Statistics*.

## **2. Background Data or Context**

The latest data from the Third International Math and Science Study is an example of research that can provide context for complex data on math achievement tests. The latest data, released in December 1996, reveal that U.S. eighth-grade students spend considerably more class time on mathematics than eighth-graders in Japan and German. Also, U.S. teachers assign mathematics homework to eighth-grade students more frequently than Japanese teachers, and U.S. students even spend as much time as their Japanese and German counterparts studying math after school.

Yet U.S. eighth-graders performed far below Japanese eighth-grade students on all six TIMSS mathematics achievement measures, and the U.S. students perform about the same as their German counterparts on five of the measures and below the German students on one. Overall, the TIMSS results reveal that the U.S. students score below the 41-country mathematics average. TIMSS research suggests that the relatively poor quality of U.S. mathematics instruction is a primary explanation of students' low achievement. Based on an analysis of videotapes of mathematics classroom instruction, a panel of experts judged 87 percent of the U.S. mathematics lessons as low-quality. None of the

U.S. instruction was considered high-quality. Of note in the TIMSS research: eighth-graders in all three countries generally devote similar amounts of after-school time to TV viewing, sports, playing with friends and homework.

### **3. State vs. National Comparison**

Mark D. Musick, president of the Southern Regional Education Board, used NAEP state averages to illustrate how dramatically proficiency standards differ from state to state. For instance, 88 percent of 3rd-grade students in Louisiana meet reading proficiency standards on the state's own 1994-95 assessment tests. But on the 1994 NAEP reading assessment, only 15 percent of Louisiana 3rd- and 4th-grade students meet NAEP reading proficiency requirements. Similar discrepancies were found in Tennessee, Wisconsin, Georgia and South Carolina, according to Musick's publication, "Setting Standards High Enough."

In reporting on the state-national education debate, NCES research instruments can also be used to develop your own research tools for local or state projects that replicate NCES works. Also, researchers at NCES are working on research aimed at linking TIMSS international assessments data with individual state-level results, which would make it possible to compare individual state math and science achievement with the scores of other countries. Finally, NCES researchers are also working to devise a system that would make it possible to report states' own testing program results in a metric comparable to NAEP assessments.

### **4. What We Know About Learning, Achievement and Testing**

NCES researchers, particularly those with the Data Development and Longitudinal Studies Division, are terrific sources of information for questions about what is known and not known about student progress. For instance, you may want to know how many points, on average, students gain in a school year on certain types of



achievement tests, and how the average gain may differ for various populations of students. Or, you want to know whether black-white achievement gaps evident in high school can be predicted by test-score gaps at middle or elementary school levels -- or even by first-grade testing programs. Or, you may be working on a story involving issues of grade inflation -- whether letter grades are associated with learning or achievement. NCES data and publications can serve a valuable resources for reporters taking on these big-picture themes related to student learning, achievement and testing.

### **5. Reporting NCES Research Results: A NAEP Reading Example**

On Feb. 27, 1997, NCES released NAEP reading results at 2 p.m., at the National Press Club in Washington, D.C. At the same time that afternoon, NCES posted the data and publications on its Web site. The following three tables (Table 2.3, Table B.5 and Table B.) showing 8th grade NAEP reading scores, by state, were downloaded from the NCES Web site in *.pdf* format and the viewed and printed using Acrobat. The analysis was carried out in one afternoon and evening, so the information presented can be produced on deadline for a daily story.

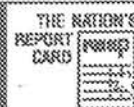
A quick look at the NAEP state scores reveals large state-to-state variance. Table 2.3 lists state scale score averages for the 8th grade 1996 NAEP reading scores. The highest-scoring states -- North Dakota, Maine, Minnesota and Iowa -- posted average scale scores of 284 (out of 500), and the lowest scoring group -- the District of Columbia -- posted an average scale score of 233.<sup>2</sup> So there is a 51-point difference separating the highest averages from the lowest.

While it is appropriate to acknowledge that the highest-scoring states are leading the way in 8th-grade reading achievement, it is also appropriate to ask whether characteristics of the test-taking populations in D.C. and participating states may be

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<sup>2</sup> Scores for Guam, the Department of Defense Domestic Dependent Elementary and Secondary Schools (DDESS) and the Department of Defense Dependents Schools (DoDDS) were excluded from this analysis.

Table 2.3

Average Mathematics Scale Scores  
Grade 8 Public Schools

	1996 Average Scale Score	Change from 1992 Average Scale Score	Change from 1990 Average Scale Score
North Dakota	284	1	3*
Maine	284	5††	—
Minnesota	284	2	9**
Iowa ‡	284	1	6**
Montana ‡	283	—	3
Wisconsin ‡	283	5†	8**
Nebraska	283	5††	7**
Connecticut	280	6††	10**
Vermont ‡	279	—	—
Alaska ‡	278	—	—
Massachusetts	278	5†	—
Michigan ‡	277	10††	12**
Utah	277	2	—
Oregon	276	—	5**
Washington	276	—	—
Colorado	276	3†	8**
Indiana	276	5††	8**
DoDDS	275	—	—
Wyoming	275	0	3**
Missouri	273	2	—
Nation	271	5†	8*
New York ‡	270	4	9**
Texas	270	6††	12**
Virginia	270	2	5**
Maryland ‡	270	5	9**
DDESS	269	—	—
Rhode Island	269	3††	9**
Arizona	268	3	8**
North Carolina	268	9††	17**
Delaware	267	4††	6**
Kentucky	267	4††	9**
West Virginia	265	6††	9**
Florida	264	4	8**
Tennessee	263	4†	—
California	263	2	6**
Georgia	262	3	4
Hawaii	262	5††	11**
New Mexico	262	2	6**
Arkansas ‡	262	5††	5**
South Carolina ‡	261	0	—
Alabama	257	4	4
Louisiana	252	2	6**
Mississippi	250	4†	—
Guam	239	4	7**
District of Columbia	233	-2	1

The changes between scale scores were calculated using unrounded average scale scores for the two assessments.

‡ Indicates jurisdiction did not satisfy one or more of the guidelines for school participation rates in 1996 (see Appendix A).

†† Indicates change in scale scores from 1992 is significant at a 5-percent level of significance using a multiple comparison procedure based on 37 jurisdictions (excluding the nation).

† Indicates change in scale scores from 1992 is significant at a 5-percent level of significance if only one jurisdiction is being examined.

\*\* Indicates change in scale scores from 1990 is significant at a 5-percent level of significance using a multiple comparison procedure based on 32 jurisdictions (excluding the nation).

\* Indicates change in scale scores from 1990 is significant at a 5-percent level of significance if only one jurisdiction is being examined.

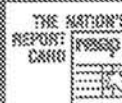
— Indicates jurisdiction did not participate in 1990 and/or 1992.

DDESS: Department of Defense Domestic Dependent Elementary and Secondary Schools

DoDDS: Department of Defense Dependents Schools (Overseas)

SOURCE: National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 1990, 1992 and 1996 Mathematics Assessments.

Table B.5

Average Mathematics Scale Scores  
by Race/Ethnicity Grade 8, Public Schools Only

	White		Black		Hispanic		Asian/ Pacific Islander		American Indian	
	Percentage of Students	Average Scale Score	Percentage of Students	Average Scale Score	Percentage of Students	Average Scale Score	Percentage of Students	Average Scale Score	Percentage of Students	Average Scale Score
Nation	68 (0.5)	281 (1.4)	15 (0.4)	242 (2.1)	17 (0.5)	250 (2.1)	---	---	1 (0.3)	243 (3.3)
Alabama	59 (2.3)	271 (2.4)	34 (2.2)	233 (1.8)	4 (0.5)	232 (5.0)	1 (0.2)	*** (***)	2 (0.5)	*** (***)
Alaska ‡	68 (1.8)	287 (1.5)	4 (0.4)	*** (***)	6 (0.8)	253 (6.5)	5 (0.5)	277 (6.7)	16 (1.6)	257 (4.7)
Arizona	58 (2.2)	278 (1.2)	3 (0.4)	254 (3.5)	30 (1.7)	251 (2.4)	2 (0.3)	*** (***)	6 (1.3)	254 (8.6)
Arkansas ‡	74 (2.2)	270 (1.3)	20 (1.9)	235 (3.0)	3 (0.5)	*** (***)	1 (0.4)	*** (***)	1 (0.4)	*** (***)
California	39 (2.1)	279 (1.5)	8 (0.8)	239 (3.9)	38 (1.8)	246 (1.8)	12 (1.3)	279 (4.0)	1 (0.3)	*** (***)
Colorado	69 (1.4)	283 (1.0)	5 (0.9)	255 (2.8)	21 (1.5)	257 (2.3)	3 (0.3)	287 (4.9)	2 (0.4)	*** (***)
Connecticut	77 (1.4)	288 (1.1)	9 (1.0)	245 (2.3)	11 (1.0)	252 (1.8)	3 (0.4)	281 (6.2)	1 (0.2)	*** (***)
Delaware	66 (1.0)	275 (1.2)	24 (0.8)	244 (2.5)	5 (0.6)	244 (4.6)	3 (0.4)	*** (***)	2 (0.3)	*** (***)
District of Columbia	4 (0.5)	303 (8.6)	83 (1.2)	231 (1.4)	10 (1.0)	221 (3.4)	2 (0.4)	*** (***)	1 (0.3)	*** (***)
Florida	54 (2.1)	278 (1.5)	22 (2.0)	236 (2.5)	21 (2.2)	252 (2.3)	2 (0.3)	*** (***)	1 (0.2)	*** (***)
Georgia	57 (2.5)	276 (1.9)	36 (2.5)	241 (1.5)	4 (0.5)	246 (4.9)	2 (0.4)	*** (***)	1 (0.2)	*** (***)
Hawaii	15 (0.9)	273 (2.3)	3 (0.4)	*** (***)	18 (0.7)	244 (2.7)	61 (1.0)	266 (1.1)	2 (0.4)	*** (***)
Indiana	82 (1.5)	281 (1.3)	10 (1.2)	247 (2.1)	6 (0.8)	254 (4.8)	1 (0.2)	*** (***)	1 (0.2)	*** (***)
Iowa ‡	91 (0.9)	285 (1.3)	3 (0.6)	255 (4.4)	3 (0.5)	268 (4.7)	2 (0.4)	*** (***)	1 (0.2)	*** (***)
Kentucky	87 (1.0)	269 (1.1)	9 (0.9)	248 (3.3)	2 (0.4)	*** (***)	1 (0.1)	*** (***)	1 (0.2)	*** (***)
Louisiana	53 (2.3)	266 (1.3)	41 (2.4)	235 (1.8)	4 (0.6)	242 (3.5)	1 (0.3)	*** (***)	1 (0.4)	*** (***)
Maine	95 (0.7)	285 (1.3)	1 (0.2)	*** (***)	2 (0.3)	*** (***)	1 (0.3)	*** (***)	2 (0.3)	*** (***)
Maryland ‡	55 (2.2)	285 (1.9)	33 (2.2)	243 (1.8)	5 (0.5)	248 (4.2)	5 (1.0)	306 (5.4)	1 (0.3)	*** (***)
Massachusetts	80 (1.6)	283 (1.5)	7 (1.0)	250 (4.2)	8 (1.0)	242 (4.1)	5 (0.6)	277 (6.4)	1 (0.2)	*** (***)
Michigan ‡	75 (2.3)	285 (1.6)	15 (2.1)	246 (3.7)	5 (0.6)	249 (4.4)	2 (0.5)	*** (***)	1 (0.3)	*** (***)
Minnesota	86 (1.6)	287 (1.2)	4 (0.7)	249 (5.0)	3 (0.4)	266 (5.9)	5 (1.0)	274 (5.1)	2 (0.5)	*** (***)
Mississippi	48 (1.9)	266 (1.2)	45 (1.8)	236 (1.4)	5 (0.6)	225 (3.3)	1 (0.3)	*** (***)	0 (0.1)	*** (***)
Missouri	82 (1.2)	278 (1.3)	12 (1.0)	243 (3.8)	3 (0.5)	259 (4.3)	1 (0.2)	*** (***)	1 (0.3)	*** (***)
Montana ‡	84 (1.8)	287 (1.2)	0 (0.1)	*** (***)	5 (0.5)	256 (5.6)	1 (0.4)	*** (***)	10 (1.7)	265 (3.6)
Nebraska	59 (3.1)	291 (1.7)	15 (2.7)	252 (3.6)	18 (2.0)	257 (2.3)	6 (0.8)	296 (4.0)	1 (0.2)	*** (***)
New Mexico	36 (1.7)	280 (1.0)	3 (0.5)	*** (***)	51 (1.7)	252 (1.5)	1 (0.3)	*** (***)	9 (1.4)	252 (2.6)
New York ‡	60 (2.4)	283 (1.3)	16 (1.8)	246 (3.0)	16 (1.3)	245 (2.7)	6 (0.9)	283 (5.9)	2 (0.5)	*** (***)
North Carolina	64 (1.8)	278 (1.3)	28 (1.2)	247 (1.6)	4 (0.5)	253 (3.5)	2 (0.3)	*** (***)	2 (1.1)	*** (***)
North Dakota	92 (0.9)	286 (0.9)	1 (0.2)	*** (***)	3 (0.3)	264 (5.0)	1 (0.2)	*** (***)	3 (0.8)	252 (3.8)
Oregon	82 (1.4)	279 (1.3)	3 (0.7)	*** (***)	8 (0.8)	259 (3.7)	4 (0.5)	285 (4.4)	4 (0.6)	257 (4.5)
Rhode Island	79 (0.7)	275 (0.8)	5 (0.5)	244 (3.9)	10 (0.5)	239 (4.3)	4 (0.3)	267 (4.7)	1 (0.3)	*** (***)
South Carolina ‡	53 (1.8)	274 (1.6)	40 (1.8)	246 (1.5)	4 (0.4)	235 (6.0)	1 (0.4)	*** (***)	2 (0.3)	*** (***)
Tennessee	78 (1.3)	271 (1.5)	18 (1.2)	234 (2.9)	3 (0.5)	246 (5.2)	1 (0.2)	*** (***)	1 (0.2)	*** (***)
Texas	48 (2.0)	285 (1.4)	12 (1.3)	249 (2.6)	37 (2.2)	256 (1.8)	3 (0.6)	299 (5.6)	1 (0.2)	*** (***)
Utah	87 (0.8)	279 (0.9)	1 (0.2)	*** (***)	8 (0.7)	256 (2.9)	2 (0.2)	274 (3.6)	2 (0.2)	*** (***)
Vermont ‡	93 (0.7)	281 (0.9)	1 (0.2)	*** (***)	3 (0.4)	*** (***)	1 (0.3)	*** (***)	2 (0.4)	*** (***)
Virginia	66 (2.2)	279 (1.3)	24 (2.2)	244 (2.6)	5 (0.5)	258 (4.8)	4 (0.6)	284 (4.6)	1 (0.2)	*** (***)
Washington	76 (1.9)	282 (1.2)	4 (0.6)	245 (4.3)	9 (1.2)	251 (3.2)	6 (0.9)	278 (3.4)	4 (0.8)	255 (5.3)
West Virginia	92 (0.8)	266 (1.1)	3 (0.7)	246 (3.8)	3 (0.4)	244 (5.6)	1 (0.1)	*** (***)	2 (0.3)	*** (***)
Wisconsin ‡	84 (1.5)	288 (1.2)	6 (1.0)	240 (2.6)	5 (0.7)	258 (3.5)	2 (0.5)	*** (***)	2 (0.4)	*** (***)
Wyoming	86 (0.7)	278 (0.8)	1 (0.1)	*** (***)	9 (0.6)	256 (3.2)	1 (0.1)	*** (***)	3 (0.4)	250 (5.4)
DDESS	46 (1.1)	285 (4.0)	20 (1.0)	252 (4.5)	15 (0.7)	264 (6.0)	13 (0.6)	*** (***)	2 (0.3)	*** (***)
DoDDS	4 (0.5)	284 (1.4)	1 (0.4)	255 (2.1)	17 (1.4)	268 (2.6)	76 (1.4)	280 (3.4)	0 (0.2)	*** (***)
Guam	40 (1.9)	*** (***)	30 (1.8)	*** (***)	22 (1.5)	218 (4.9)	4 (0.9)	242 (2.1)	2 (0.8)	*** (***)

National results are based on the national assessment samples, not on aggregated state assessment program samples.

\*\*\* Sample size insufficient to permit reliable estimates.

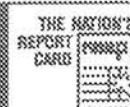
‡ Indicates that the jurisdiction did not satisfy one or more of the guidelines for school participation rates (see Appendix A).

-- Quality control activities and special analyses involving state assessment data raised concerns about the accuracy and precision of national grade 8 Asian/Pacific results. As a result, they are omitted from the body of this report. See Appendix A for a more detailed discussion.

SOURCE: National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 1996 Mathematics Assessments.



Table B.9

Average Mathematics Scale Scores by  
Parents' Highest Level of Education Grade 8, Public Schools Only

		Did Not Finish High School		Graduated From High School		Some Education After High School		Graduated From College		I Don't Know	
		Percentage of Students	Average Scale Score	Percentage of Students	Average Scale Score	Percentage of Students	Average Scale Score	Percentage of Students	Average Scale Score	Percentage of Students	Average Scale Score
Nation	5 (0.5)	254 (1.9)	23 (0.8)	260 (1.0)	19 (0.8)	279 (1.5)	39 (1.4)	281 (1.6)	11 (0.6)	255 (1.7)	
Alabama	10 (0.8)	246 (2.3)	30 (1.5)	245 (2.6)	15 (0.8)	265 (2.3)	37 (2.1)	269 (2.8)	9 (0.7)	240 (3.0)	
Alaska ‡	4 (0.7)	*** (***)	19 (1.1)	265 (2.9)	20 (1.1)	281 (3.3)	43 (1.5)	292 (1.9)	14 (1.3)	258 (5.0)	
Arizona	9 (0.9)	247 (3.1)	18 (1.1)	260 (2.5)	21 (1.0)	273 (1.5)	38 (1.8)	281 (1.4)	14 (0.9)	250 (2.4)	
Arkansas ‡	10 (0.8)	245 (2.7)	30 (1.6)	256 (2.2)	19 (1.0)	270 (2.1)	30 (1.4)	274 (2.1)	11 (0.8)	248 (3.1)	
California	10 (0.8)	246 (2.4)	17 (0.8)	251 (2.1)	16 (1.0)	271 (1.9)	38 (1.7)	278 (2.3)	18 (1.3)	244 (2.4)	
Colorado	6 (0.6)	247 (3.3)	19 (0.9)	264 (1.6)	20 (0.8)	280 (1.7)	45 (1.5)	287 (1.3)	10 (0.7)	256 (2.7)	
Connecticut	5 (0.6)	253 (4.3)	19 (0.9)	264 (1.6)	17 (0.8)	277 (2.0)	51 (1.3)	292 (1.3)	9 (0.5)	264 (2.0)	
Delaware	5 (0.5)	245 (4.1)	27 (1.2)	257 (2.3)	19 (0.9)	268 (2.0)	38 (1.2)	279 (1.5)	10 (0.7)	252 (3.8)	
District of Columbia	7 (0.6)	222 (5.1)	28 (1.1)	221 (1.8)	18 (0.9)	240 (3.6)	33 (1.3)	245 (2.2)	14 (0.9)	226 (3.7)	
Florida	8 (0.7)	245 (2.3)	23 (1.1)	255 (2.4)	18 (0.9)	269 (1.7)	40 (1.6)	275 (2.6)	11 (0.8)	248 (2.4)	
Georgia	8 (0.7)	246 (2.7)	27 (1.4)	248 (1.8)	18 (1.0)	269 (1.9)	39 (2.0)	277 (2.4)	8 (0.6)	247 (3.2)	
Hawaii	4 (0.5)	252 (5.0)	26 (1.1)	252 (1.8)	16 (0.8)	267 (1.7)	38 (1.0)	274 (1.5)	15 (1.0)	248 (2.6)	
Indiana	7 (0.7)	251 (2.7)	30 (1.2)	268 (1.7)	21 (1.1)	281 (2.0)	36 (1.4)	287 (1.5)	7 (0.7)	260 (3.4)	
Iowa ‡	5 (0.5)	264 (3.9)	24 (1.6)	276 (2.0)	19 (0.9)	288 (1.6)	46 (1.7)	291 (1.5)	6 (0.6)	266 (3.3)	
Kentucky	13 (0.8)	251 (2.1)	31 (0.9)	260 (1.4)	17 (0.8)	271 (1.8)	30 (1.3)	281 (1.6)	9 (0.6)	256 (2.7)	
Louisiana	9 (0.7)	245 (2.1)	33 (1.0)	246 (1.8)	19 (0.8)	262 (1.6)	30 (1.3)	259 (2.5)	9 (0.6)	244 (2.7)	
Maine	5 (0.5)	260 (3.0)	23 (0.9)	273 (1.9)	21 (1.1)	285 (1.7)	44 (1.6)	295 (1.6)	7 (0.6)	269 (3.6)	
Maryland ‡	5 (0.6)	243 (3.7)	24 (1.3)	256 (2.0)	17 (1.0)	274 (2.0)	45 (1.6)	281 (2.8)	8 (0.8)	259 (4.1)	
Massachusetts	6 (0.6)	254 (3.0)	18 (1.0)	263 (2.3)	15 (0.8)	277 (2.0)	51 (1.7)	290 (2.0)	10 (0.8)	256 (3.1)	
Michigan ‡	5 (0.5)	252 (4.0)	22 (1.5)	266 (2.0)	21 (0.9)	282 (1.9)	42 (1.6)	286 (2.2)	9 (0.8)	264 (3.9)	
Minnesota	3 (0.3)	253 (5.1)	21 (1.1)	272 (2.1)	19 (1.1)	287 (1.7)	50 (1.6)	293 (1.5)	8 (0.7)	265 (3.0)	
Mississippi	11 (0.6)	241 (2.0)	29 (1.1)	244 (1.7)	15 (0.7)	260 (1.7)	36 (1.2)	257 (1.9)	9 (0.7)	241 (3.3)	
Missouri	8 (0.6)	259 (2.6)	27 (1.0)	266 (1.5)	19 (0.9)	280 (1.9)	37 (1.6)	282 (1.7)	9 (0.7)	259 (2.6)	
Montana ‡	6 (0.8)	251 (5.6)	21 (1.1)	275 (2.2)	20 (1.2)	286 (1.9)	48 (1.5)	292 (1.4)	6 (0.5)	263 (4.6)	
Nebraska	6 (0.7)	257 (3.5)	19 (1.5)	265 (2.5)	18 (1.2)	280 (2.2)	49 (2.4)	290 (2.1)	8 (0.9)	257 (4.5)	
New Mexico	11 (0.9)	245 (2.9)	25 (1.1)	255 (2.0)	19 (1.0)	268 (2.0)	34 (1.3)	277 (1.5)	11 (0.8)	243 (2.4)	
New York ‡	6 (0.6)	254 (3.8)	20 (1.1)	262 (2.5)	17 (1.0)	273 (2.5)	45 (1.5)	282 (1.9)	12 (0.9)	247 (3.7)	
North Carolina	7 (0.5)	250 (2.9)	24 (1.1)	257 (2.0)	20 (0.9)	272 (1.9)	40 (1.5)	279 (1.9)	9 (0.6)	254 (2.7)	
North Dakota	3 (0.4)	267 (5.0)	19 (1.0)	273 (1.7)	16 (0.7)	287 (2.0)	55 (1.2)	291 (1.0)	7 (0.5)	263 (3.2)	
Oregon	7 (0.6)	256 (2.8)	18 (0.9)	263 (2.0)	20 (1.0)	280 (1.7)	44 (1.7)	288 (1.8)	12 (0.7)	263 (2.9)	
Rhode Island	8 (0.5)	249 (3.4)	22 (0.9)	258 (2.2)	17 (0.7)	274 (2.0)	40 (0.9)	282 (1.7)	13 (0.8)	253 (2.2)	
South Carolina ‡	9 (0.7)	248 (2.0)	28 (1.1)	249 (2.2)	17 (0.9)	269 (2.2)	37 (1.4)	272 (2.2)	9 (0.7)	251 (2.6)	
Tennessee	10 (0.7)	250 (2.5)	32 (1.4)	256 (1.7)	19 (0.8)	270 (1.8)	31 (1.6)	275 (2.3)	8 (0.6)	247 (3.1)	
Texas	13 (1.1)	254 (2.1)	21 (1.0)	262 (1.9)	15 (1.0)	276 (1.8)	38 (2.0)	283 (1.8)	12 (1.1)	252 (2.7)	
Utah	3 (0.4)	254 (3.3)	17 (0.8)	264 (1.7)	18 (0.8)	281 (1.3)	53 (1.3)	284 (1.1)	9 (0.6)	260 (2.9)	
Vermont ‡	5 (0.5)	253 (3.9)	25 (1.1)	268 (1.9)	16 (0.9)	280 (1.9)	49 (1.4)	290 (1.4)	6 (0.6)	264 (4.0)	
Virginia	8 (0.8)	248 (2.6)	26 (1.1)	257 (2.5)	16 (0.9)	271 (2.0)	42 (1.7)	284 (1.7)	9 (0.7)	261 (3.2)	
Washington	6 (0.6)	252 (4.3)	16 (0.9)	265 (1.9)	21 (0.8)	279 (1.9)	46 (1.4)	287 (1.4)	12 (0.8)	260 (2.9)	
West Virginia	11 (0.8)	249 (2.3)	33 (0.9)	259 (1.6)	19 (0.8)	269 (1.7)	30 (1.1)	276 (1.5)	6 (0.5)	253 (3.2)	
Wisconsin ‡	5 (0.7)	262 (3.4)	26 (1.1)	278 (2.1)	21 (0.9)	285 (1.8)	40 (1.6)	292 (1.5)	9 (0.6)	264 (2.9)	
Wyoming	5 (0.5)	262 (3.6)	21 (0.9)	268 (1.8)	20 (0.8)	277 (1.6)	44 (1.2)	283 (1.1)	10 (0.6)	257 (3.0)	
DDESS	2 (0.3)	*** (***)	15 (0.9)	257 (4.0)	24 (1.0)	277 (4.2)	49 (1.1)	277 (3.1)	10 (0.8)	252 (4.7)	
DoDDS	8 (0.9)	*** (***)	30 (1.5)	267 (2.3)	14 (1.3)	276 (2.4)	27 (1.3)	280 (1.1)	20 (1.3)	264 (2.7)	
Guam	2 (0.6)	225 (7.3)	21 (1.5)	232 (4.2)	22 (1.7)	254 (3.9)	43 (2.1)	246 (4.2)	11 (1.3)	234 (3.9)	

National results are based on the national assessment samples, not on aggregated state assessment program samples.

\*\*\*Sample size insufficient to permit reliable estimates.

‡ Indicates that the jurisdiction did not satisfy one or more of the guidelines for school participation rates (see Appendix A).

SOURCE: National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 1996 Mathematics Assessments.

associated with performance. This is important because it is known that certain groups of students tend to score higher on standardized tests than other groups, and that these different types of students are not distributed uniformly throughout the United States.

Characteristics expected to be related to achievement include the racial make-up of the test-taking population in each state and the education level of the parents of the students in the test-taking population in each state. Table B.5 documents the racial breakdown of the test-taking group in each state, and it is easy to see that the characteristics differ greatly between states. Part of Table B.9 details the share of each state's test-taking population with parents who graduated from college.

So this gives us three key pieces of information: each state's average 8th-grade NAEP reading scale score; the share of each state's test-taking population that is minority; and the share of each state's test-taking population with parents who graduated from college. Reporting the first piece of information will be a key part of NAEP coverage, but you may be able to report additional information by taking into account the way in which the two subsequent pieces of data related to NAEP performance.

The scatterplot in Figure 1 reveals that the percentage of each state's test-taking population that is black is negatively associated with NAEP state reading scores. The one outlier, to the farthest lower-right of the plot, represents Washington, D.C. and is responsible for substantial portion of the linear relationship, a concern that could be addressed in several ways. The scatterplot in Figure 2 reveals that parents education -- the share of each state's test-taking population with parents who graduated from college -- is positively related to NAEP state reading scores. The distribution is not genuinely linear, which is another concern that could be addressed in a number of ways. These are but two of the many cautions related to the use of scatterplots and regression analysis, but aside from urging reporters to take great care in use of statistics, this paper will focus primarily on the results of the analysis and strongly encourage you to attend the two statistics panels scheduled for later in this conference. There are always many questions to consider when

Fig. 1. 1996 8th Grade Math by Race

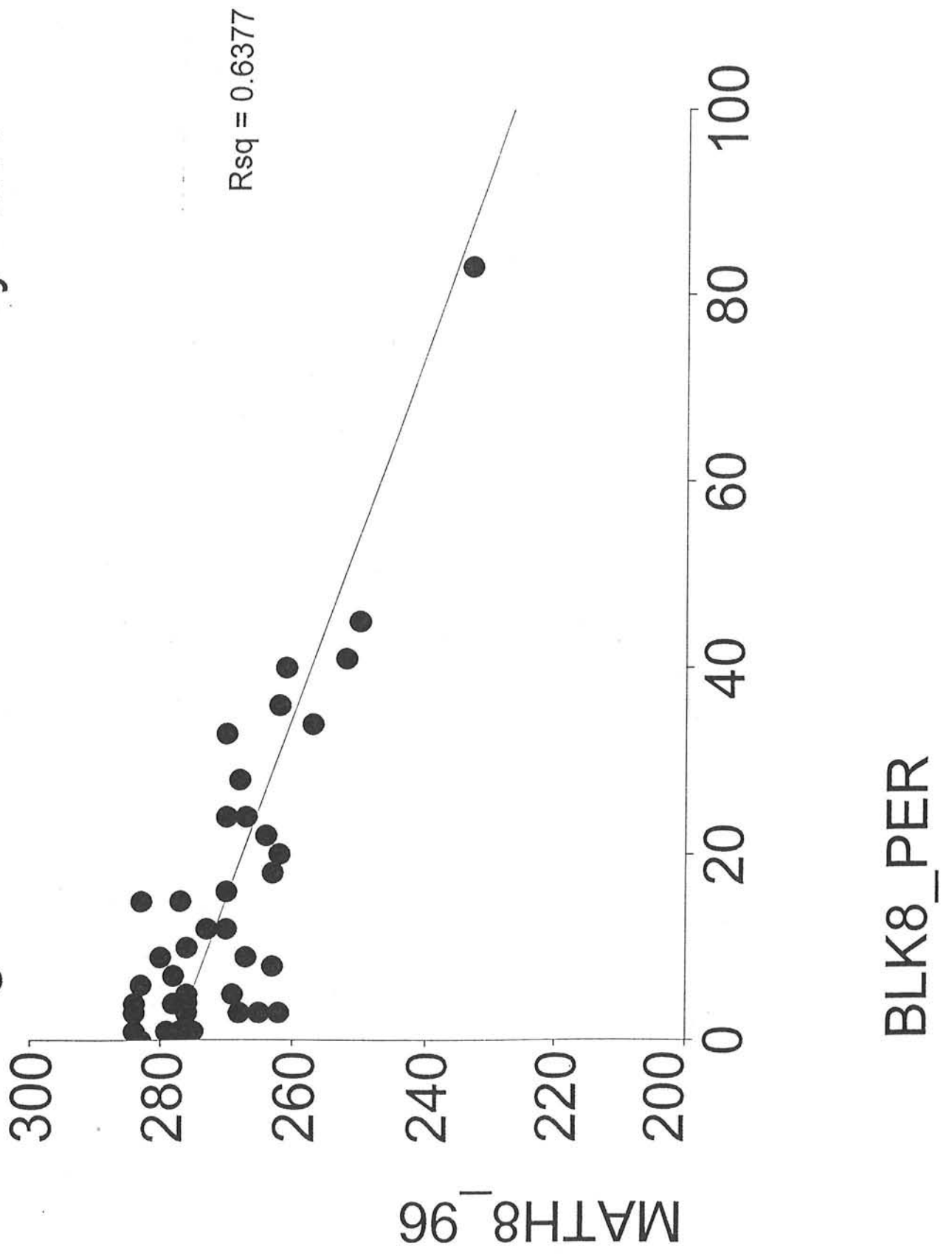
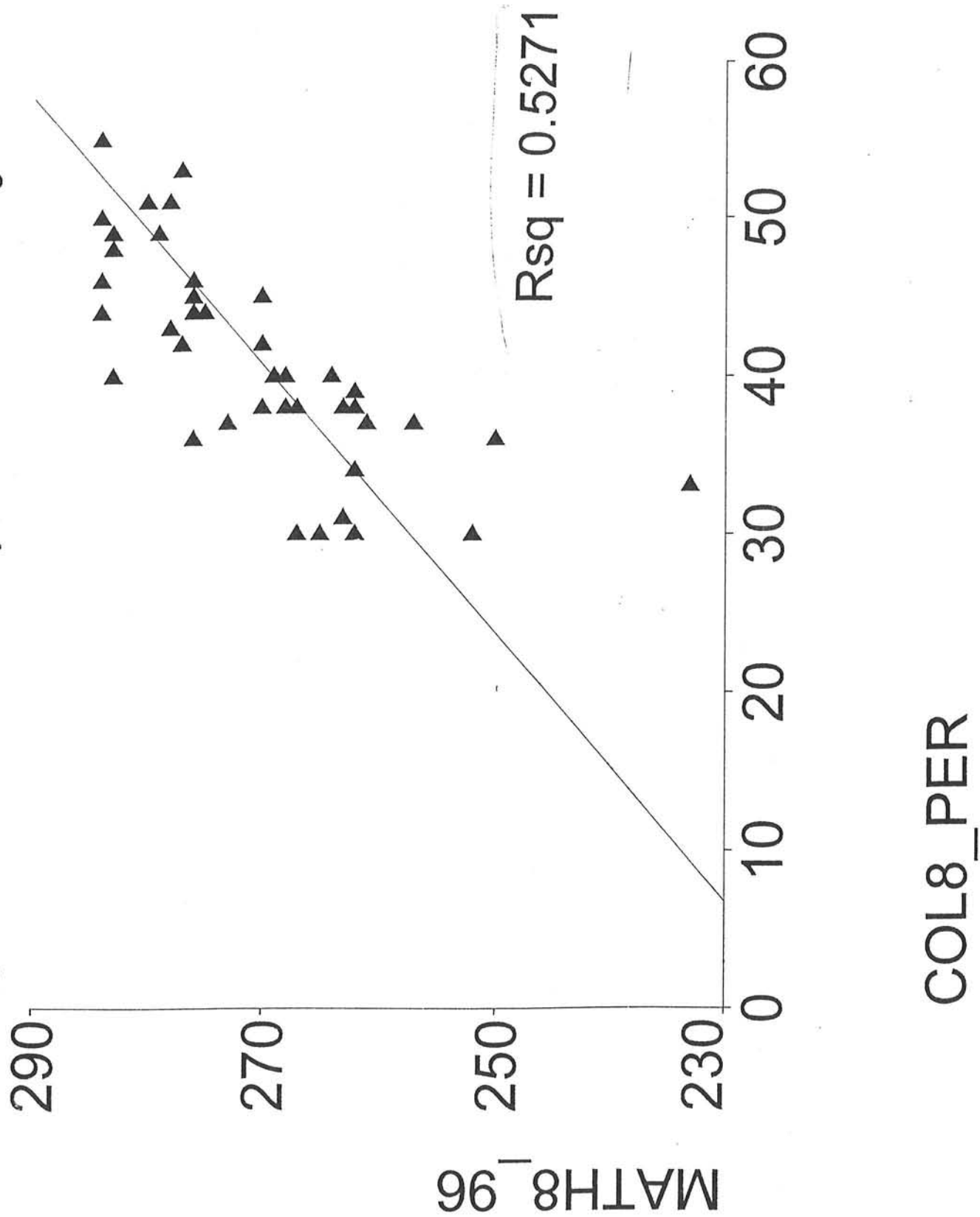


Fig. 2. 1996 8th Grade Math by % Parents w/ Coll. Degree



employing regression methods, and this paper moves past most of them to illustrate the potential of this sort of analysis.

For now, it is important to understand that parents education is generally positively related to NAEP state reading scores, so the greater the share of students whose parents hold college degrees, the higher the state averages. Second, it is important to understand that increased percentages of black students is generally negatively related to NAEP state reading scores, so the greater the share of students who are black, the lower the state averages. We have already seen the raw state averages, and which states scored highest. So the next question is: When we control for the shares of black students and parent education, which differ from one state to the next, which states will be scoring higher than predicted?

Results of the multiple regression procedure (Appendix A) reveal that race and parents education both account for significant portions of the variance in state NAEP reading scores. Together, the measures account for about 81 percent of the variance. When both variables are considered simultaneously, parents education remains positively associated with state NAEP scores while race (percentage of students who are black) remains negatively associated with state NAEP scores.

The spreadsheet printout show in Appendix B includes several pieces of information (Appendix B includes a key). In particular, note that the column labeled 2 “math8\_96” represents the unadjusted 1996 NAEP reading average scale scores for 8th grade students, for 40 states and the District of Columbia. Also note the last two right-hand columns -- lmc\_i\_999 and umc\_i\_999 -- represent the lower and upper boundaries of the confidence interval for the mean predicted value, at the 99.9 percent confidence interval. The 99.9 percent level was used to adjust for multiple comparisons. States with observed NAEP reading scores below this mark posted scores significantly lower than the predicted range. States with observed NAEP reading scores above this mark posted scores significantly higher than the predicted range.



Eight states -- Wisconsin, Indiana, Nebraska, Maine, Michigan, Iowa, Missouri and North Carolina -- scored higher than the upper boundary of the confidence interval. So these states were relative overachievers, controlling for percentage of black students and parents education.

At the other extreme, six states -- Rhode Island, Arizona, New Mexico, California, Utah and Hawaii -- scored below than the lower boundary of the confidence interval. So these states were relative underachievers, controlling for percentage of black students and parents education.

As noted earlier, this analysis was carried out in one afternoon and evening, as if on deadline, there are limitations to the interpretation of results. One thing jumps out right away: Controlling only for black students did not take into account the impact of minorities in general, notably Hispanic populations in the western states. The analysis could be re-run quickly using measures of non-white students are also including measures of Hispanic students. Also, the standard errors generated by the regression procedure were created based on assumptions that this model may not satisfy. Using the 99.9 percent confidence interval is one step that adjusts for multiple comparisons, so the assignment of over/underachiever labels would tend to err on the conservative side.

Once the impact of additional minority groups is considered, using this method to identify potential stories -- what are the eight overachieving states doing so well? -- is certainly appropriate, and the method has other uses as well. For instance, it would be appropriate to report the general predictive power of the two independent variables -- relative to the 1996 8th grade NAEP reading scores, only -- and to consider the adjusted rank order of the states and relationship to the confidence intervals. But it would not be appropriate to use this single example to make far-reaching conclusions about the absolute contribution of race to NAEP scores. That would require analysis of multiple

years of data, across multiple grades, and would require consideration of additional variables (gender, expectations in the home, etc.).

## Appendix A

### SPSS Regression Output

\* \* \* \* MULTIPLE REGRESSION \* \* \* \*

Listwise Deletion of Missing Data

Equation Number 1    Dependent Variable..    MATH8\_96

Block Number 1.    Method: Enter    COL8\_PER

Variable(s) Entered on Step Number  
1..    COL8\_PER

Multiple R            .72601  
R Square             .52708  
Adjusted R Square    .51496  
Standard Error       7.51557

Analysis of Variance			
	DF	Sum of Squares	Mean Square
Regression	1	2455.18291	2455.18291
Residual	39	2202.86587	56.48374

F =        43.46707        Signif F =    .0000

----- Variables in the Equation -----

Variable	B	SE B	Beta	T	Sig T
COL8_PER	1.175442	.178288	.726005	6.593	.0000
(Constant)	222.046503	7.407716		29.975	.0000

----- Variables not in the Equation -----

Variable	Beta In	Partial	Min Toler	T	Sig T
BLK8_PER	-.597006	-.784283	.816154	-7.793	.0000

End Block Number 1    All requested variables entered.

## \* \* \* \* M U L T I P L E R E G R E S S I O N \* \* \* \*

Equation Number 1    Dependent Variable..    MATH8\_96

Block Number 2.    Method: Enter    BLK8\_PER

Variable(s) Entered on Step Number  
2..    BLK8\_PERMultiple R            .90442  
R Square             .81797  
Adjusted R Square    .80839  
Standard Error       4.72364

## Analysis of Variance

	DF	Sum of Squares	Mean Square
Regression	2	3810.16418	1905.08209
Residual	38	847.88460	22.31275

F =        85.38086        Signif F = .0000

## ----- Variables in the Equation -----

Variable	B	SE B	Beta	T	Sig T
COL8_PER	.760997	.124037	.470026	6.135	.0000
BLK8_PER	-.383187	.049172	-.597006	-7.793	.0000
(Constant)	244.768606	5.493531		44.556	.0000

End Block Number 2    All requested variables entered.

## Appendix B

### Spreadsheet of 8th-Grade NAEP Reading Scores, Regression Variables and Range of Predicted Scores

#### Key

1. ST = Population group, 40 states and the District of Columbia.
2. Math8\_96 = 1996 NAEP reading average scale scores for 8th grade students, unadjusted.
3. Blk8\_per = Percentage of black students in each state's overall test-taking student population.
4. Col8\_per = Percentage of each state's test-taking population with parents who graduated from college.
5. Pre\_1 = Predicted values for NAEP reading average scale scores for 8th grade students, as generated by the SPSS regression procedure.
6. Res\_1 = Unstandardized residual values for each group, as generated by the SPSS regression procedure. The larger the value, the greater the distance each state's observed score is from the predicted value.
7. Zre\_1 = Standardized residual values for each group, as generated by the SPSS regression procedure. The larger the value, the greater the distance each state's observed score is from the predicted value.
8. Sep\_1 = The standard error of the predicted value.
9. Lmci\_999 = The lower boundary of the confidence interval for the mean predicted value, at the 99.9 percent confidence interval. The 99.9 percent level was used to adjust for multiple comparisons. States with observed NAEP reading scores below this mark posted scores significantly lower than the predicted range.
10. Umci\_999 = The upper boundary of the confidence interval for the mean predicted value, at the 99.9 percent confidence interval. The 99.9 percent level was used to adjust for multiple comparisons. States with observed NAEP reading scores above this mark posted scores significantly higher than the predicted range.

99.9 CI

	st	math8_96	blk8_per	col8_per	pre_1	res_1	zre_1	sep_1	lmci_999	umci_999
1	Wisconsin ✓	283	6.00	40.00	272.9094	10.0906	2.13620	.89491	269.71841	276.10035
2	Indiana ✓	276	10.00	36.00	268.3326	7.66736	1.62319	1.05866	264.55779	272.10749
3	Nebraska ✓	283	15.00	49.00	276.3097	6.69033	1.41635	1.23528	271.90505	280.71430
4	Maine ✓	284	1.00	44.00	277.8693	6.13069	1.29788	.96574	274.42578	281.31284
5	Michigan ✓	277	15.00	42.00	270.9827	6.01731	1.27387	.74783	268.31618	273.64920
6	Iowa ✓	284	3.00	46.00	278.6249	5.37507	1.13791	.97911	275.13373	282.11613
7	Missouri ✓	273	12.00	37.00	268.3273	4.67273	.98922	.93579	264.99054	271.66399
8	Maryland	270	33.00	45.00	266.3683	3.63169	.76883	1.39749	261.38532	271.35131
9	NorthCarolina ✓	268	28.00	40.00	264.4793	3.52074	.74534	.95056	261.08989	267.86864
10	SouthCarolina	261	40.00	37.00	257.5980	3.40198	.72020	1.33629	252.83323	262.36282
11	Kentucky	267	9.00	30.00	264.1498	2.85016	.60338	1.68545	258.14006	270.15963
12	Minnesota	284	4.00	50.00	281.2857	2.71427	.57461	1.24875	276.83308	285.73838
13	Delaware	267	24.00	38.00	264.4900	2.50998	.53137	.86050	261.42174	267.55829
14	Virginia	270	24.00	42.00	267.5340	2.46599	.52205	.89677	264.33640	270.73161
15	Arkansas	262	20.00	30.00	259.9348	2.06521	.43721	1.47776	254.66557	265.20401
16	Alaska	278	4.00	43.00	275.9587	2.04125	.43214	.88320	272.80954	279.10796
17	Montana	283	.00	48.00	281.2965	1.70352	.36064	1.13445	277.25140	285.34157
18	Tennessee	263	18.00	31.00	261.4622	1.53784	.32556	1.39712	256.48048	266.44383
19	Georgia	262	36.00	39.00	260.6528	1.34723	.28521	1.20743	256.34747	264.95807
20	Texas	270	12.00	38.00	269.0883	.91174	.19302	.86715	265.99628	272.18024
21	Louisiana	252	41.00	30.00	251.8879	.11215	.02374	1.59825	246.18902	257.58669

99.9 CI

	st	math8_96	blk8_per	col8_per	pre_1	res_1	zre_1	sep_1	lmci_999	umci_999
22	Connecticut	280	9.00	51.00	280.1308	-.13079	-.02769	1.36049	275.27973	284.98185
23	Colorado	276	5.00	45.00	277.0976	-1.0975	-.23235	.90511	273.87021	280.32490
24	Oregon	276	3.00	44.00	277.1029	-1.1029	-.23349	.91584	273.83734	280.36852
25	WestVirginia	265	3.00	30.00	266.4490	-1.4489	-.30675	1.85627	259.83011	273.06782
26	NorthDakota	284	1.00	55.00	286.2403	-2.2402	-.47427	1.73210	280.06418	292.41637
27	Washington	276	4.00	46.00	278.2417	-2.2417	-.47458	.96407	274.80419	281.67929
28	Vermont	279	1.00	49.00	281.6743	-2.6742	-.56615	1.18780	277.43897	285.90962
29	Florida	264	22.00	40.00	266.7784	-2.7783	-.58819	.80214	263.91821	269.63856
30	Wyoming	275	1.00	44.00	277.8693	-2.8693	-.60744	.96574	274.42578	281.31284
31	NewYork	270	16.00	45.00	272.8825	-2.8825	-.61023	.90138	269.66847	276.09652
32	Alabama	257	34.00	37.00	259.8971	-2.8971	-.61333	1.12762	255.87642	263.91787
33	Massachusetts	278	7.00	51.00	280.8972	-2.8971	-.61333	1.34669	276.09531	285.69902
34	Rhodelsland ✓	269	5.00	40.00	273.2926	-4.2925	-.90874	.92294	270.00167	276.58346
35	Arizona ✓	268	3.00	38.00	272.5369	-4.5369	-.96048	1.10343	268.60248	276.47141
36	Mississippi	250	45.00	36.00	254.9211	-4.9210	-1.0418	1.52613	249.47941	260.36277
37	D.C.	233	83.00	33.00	238.0770	-5.0769	-1.0748	3.14362	226.86783	249.28614
38	NewMexico ✓	262	3.00	34.00	269.4930	-7.4929	-1.5862	1.44412	264.34369	274.64222
39	California ✓	263	8.00	38.00	270.6210	-7.6210	-1.6133	.95421	267.21859	274.02343
40	Utah ✓	277	1.00	53.00	284.7183	-7.7182	-1.6339	1.53209	279.25533	290.18124
41	Hawaii ✓	262	3.00	38.00	272.5369	-10.536	-2.2306	1.10343	268.60248	276.47141