The 2002 Brown Center Report on American Education:

HOW WELL ARE AMERICAN STUDENTS LEARNING?

With sections on arithmetic, high school culture, and charter schools

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by:
TOM LOVELESS
Director, Brown Center on
Education Policy

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providing the ITBS data.
As in the past, the report is divided into three independent sections. The first section reports on current trends in test scores in reading and mathematics. Arithmetic receives special consideration. A troubling body of evidence is presented that suggests students’ computation skills have stagnated or even declined in recent years. Remarkably, the National Assessment of Educational Progress (NAEP), the nation’s report card, does not report how well elementary grade students are performing in arithmetic.

The second section of the report revisits last year’s study of high school culture. First, we replicate the 2001 survey of foreign exchange students with American students who have studied in high schools abroad, asking them also to compare U.S. high schools to high schools around the world. By compelling margins, American and foreign students agree that success at sports means much more to U.S. teenagers than to teens in other countries. Is this cause for concern? Does it interfere with the nation’s efforts to raise academic achievement?

If holding athletic accomplishments in high esteem creates problems, one would expect them to surface in high schools with highly successful athletic teams. We present a study of high schools that are sports powerhouses, schools that in recent years have been the best in the nation in football, baseball, and basketball. It is clear that these schools are excellent at sports. What about academics? Is dominance in team sports attained at a cost to excellence in reading and mathematics? After analyzing test score data from dozens of states, Brown Center researchers are...
confident that the answer is no, excellence is not zero sum when it comes to sports and academics. There is no evidence that schools suffer academically when they excel in athletics. On state tests, the sports powerhouses score about as one would expect, no better or worse than non-powerhouse schools serving similar populations. And there is evidence, though only suggestive, that some schools are capable of making excellence at sports and excellence at academics mutually reinforcing.

The third section of the report looks at charter schools. Charters have proliferated across the country since the first few opened in Minnesota nearly a decade ago. There are now about 2,400 charters serving 250,000 students. Very little is known about academic achievement in charter schools, so we examined the test scores of charters from 1999 to 2001 in ten states. In a nutshell, charter schools performed about one-quarter standard deviation below comparable regular public schools on these three years of state tests. We do not know why charters performed at this level. They may have attracted students who were already low achieving, which explains why parents sought an alternative to the local public school. Thus, readers are cautioned that these test scores may or may not reflect the quality of education students have received and are receiving at charters. And we offer a few suggestions on how achievement in charters can be evaluated as fairly and accurately as possible in the future, especially with state accountability systems beginning to take hold.
The Brown Center Report annually examines trends in reading and math test scores. One source of data is the federal government’s National Assessment of Educational Progress (NAEP), also known as “the nation’s report card.” No new NAEP scores were released in reading and math during the past year.

Data are also collected from state assessments. We obtained 2001 test scores for four different grades in forty-five states and analyzed whether scores had gone up, down, or remained the same from the previous school year. We then compared these year-to-year results to the year-to-year results of previous years.

The percentage of states reporting annual gains in reading from 1999 to 2001 is displayed in Figure 1. Compared to 2000, a few more states reported positive results for 2001 in eighth grade. But scores fell in grades 4, 5, and 10, extending declines already in place. In the past three years, the overall trend in reading is down. In all grades, fewer states reported higher reading scores in 2001 than in 1999.

A similar pattern is evident in math (see Figure 2). In 2000, state tests gave encouraging signals about math achievement in grades 8 and 10, but the gains dissipated in 2001. In grades 4 and 5, about 50% of states reported improved math scores in 2001. This is down from 60% in 2000 and about 80% in 1999. The eighth grade experienced the biggest decline in 2001, with fewer than 40% of states reporting gains. The trends in grades 4 through 8 warrant national attention and concern. The elementary grades are crucial for learning arithmetic and, in particular, computation skills.

**Turning our backs on arithmetic**

Dictionaries define arithmetic as the most elementary branch of mathematics. As such, it is the foundation on which the field of mathematics rests and a universal starting point for learning math. For young children, arithmetic is to mathematics as phonics is to reading or as learning about the colonies and the Civil War is to learning our nation’s history. Students who do not learn arithmetic are not prepared to learn algebra or calculus.
Why is it that the NAEP, the federal government’s primary tool for evaluating American education, cannot tell whether fourth graders know how to compute accurately?

Introduction to NAEP

The National Assessment of Educational Progress (NAEP) is commonly referred to as the “nation’s report card.” Since 1969, it has been the only nationally representative and continuing assessment of what America’s students know and can do in academic subject areas. The number of students selected for a NAEP national sample for any particular grade and subject is 7,000 or more. There are three NAEP test types: (1) the main NAEP gauges national achievement while also reflecting current practices in curriculum and assessment, (2) the long-term trend NAEP allows reliable measurement of change in national achievement over time, and (3) the state NAEP measures achievement of students in participating states. These assessments use distinct data collection procedures and separate samples of students. Since 1990, the main and state NAEP tests have been governed by frameworks reflecting recommendations of groups advocating curriculum reform. The long-term trend test has used the same test procedures since 1971.

They are less likely to attend college. When they enter the workforce, their chances of landing middle class jobs are severely diminished. Computation skills are central to arithmetic. The term “computation skills” refers to the ability to add, subtract, multiply, and divide whole numbers and to perform these same operations using fractions, decimals, and percentages. Their importance makes the following fact truly alarming: the NAEP test does not report student progress in computation. Not even at fourth grade. The NAEP reporting categories for fourth grade are Number Properties and Operations, Geometry, Data Analysis, Algebra and Functions, and Measurement. Computation skills are subsumed under the category Number Properties and Operations, not reported separately. And that category comprises only 40% of the fourth grade math test. Beginning in 2005, the category will shrink from the current 25% to 20% of the eighth grade test. Granted, items requiring computation are scattered across other categories of the NAEP—

“...no single instrument of youthful education has such mighty power, both as regards domestic economy and politics, and in the arts, as the study of arithmetic. Above all, arithmetic stirs up him who is by nature sleepy and dull, and makes him quick to learn, retentive, shrewd, and aided by art divine he makes progress quite beyond his natural powers.” Plato, Laws, Book V (360 B.C.)

As applied to elementary mathematics, the term “Number Properties and Operations” is classic educational jargon. It sounds sophisticated but is ambiguous. It is also of marginal importance. Most people, including parents, are justifiably concerned that children learn how to add, subtract, multiply, and divide whole numbers and accurately use fractions, decimals, and percentages. Number Properties and Operations? What parent is worried about that? Why is it that the NAEP, the federal government’s primary tool for evaluating American education, cannot tell whether fourth graders know how to compute accurately?

How did this happen?

In 1989, the National Council of Teachers of Mathematics (NCTM) released the Curriculum and Evaluation Standards for School Mathematics. The standards proposed that the K–12 math curriculum be organized into five strands. Federal officials at the National Assessment Governing Board (NAGB), the group in charge of the NAEP, agreed. The NAEP reporting categories listed above are the NCTM’s five strands. Arithmetic was relegated to a subcategory of number because the NCTM standards argued that “shippkeeper arithmetic” commanded too much time in elementary classrooms. For most of the twentieth century, arithmetic had dominated the K–8 math curriculum, especially the teaching of computation skills. The NCTM felt it was time for a change. Calculators would free students from the drudgery of memorizing multiplication tables and practicing long division. Rather than learning standard algorithms through direct instruction, arithmetic could be learned while solving “real world” problems that piqued children’s interest. The federal government—from NAGB to the National Science Foundation to the Department of Education—enthusiastically embraced this position. Unfortunately, official support preceded any practical experience with the NCTM standards or research on their effects. Potential consequences were unknown. So we arrived where we are today: a federally endorsed state of ignorance on the computation skills of American students.

Are computation skills improving or declining?

In order to assess student progress in computation, evidence must be pulled together from several disparate sources, including the NAEP. As noted in the quotation from the NAEP math framework, the long term trend NAEP can help. Indeed, as pointed out in previous editions of The Brown Center Report, the two NAEP tests have been signaling a potential problem for some time...
Part I The Nation’s Achievement

Scores on the main NAEP, a test reflecting the NCTM’s views, skyrocketed during the 1990s. Astonishingly, the gains reflected in Figure 3 are the equivalent of more than a full school year’s worth of learning. Scores on the trend NAEP, on the other hand, have bogged down. Granted, the divergence of the two tests could be due to a number of reasons. The main NAEP allows students to use calculators on one-third of the test and asks questions in which partial credit may be granted. One of the most plausible explanations, however, is the prominence of computation items on the trend test and their subordinate role on the main test.

NAEP officials release performance on individual items of the trend test. Examining the scores since 1982 on arithmetic items is quite revealing (see Figure 5). Bear in mind when studying Figure 5 that the performance of different age groups cannot be compared. Figure 5 is not suggesting that thirteen year olds scored higher than seventeen year olds. The different age groups take different tests, but for each group, test questions have remained essentially the same over time. The data are plotted on the same graph to identify points in time when achievement changed direction. Solid gains were registered in the 1980s for all three age groups. Then something happened around 1990. Scores were flat for nine and thirteen year olds after 1990, and they declined sharply for seventeen year olds. In 1999, a smaller proportion of seventeen year olds had mastered basic arithmetic than a decade earlier. The headline story here is that scores were up before 1990 and flat or down afterwards.

The decline of seventeen year olds’ performance is largely attributable to sharply falling scores on items involving fractions.
Proficiency in fractions fell.

Seventeen year olds’ ability to work with fractions plummeted in the 1990s.

- Age 13
- Age 17

Percent of students answering correctly


44 46 48 50 52 54 56 58 60 62

When it comes to computation skills, Iowa may be the canary in the coal mine, warning the nation that there are consequences to de-emphasizing computation skills in the elementary grades.

Iowa’s eighth grade math scores pose a national warning.

In 2001, computation scores hit a twenty-three year low.

The nation must not remain in the dark on whether students are learning arithmetic.

School districts in the state of Iowa have been giving the same achievement test for several decades—the Iowa Test of Basic Skills (ITBS). No other state has collected comparable achievement data over such an extended period of time. The math portion of the ITBS contains a computation subtest, allowing for separate scrutiny of the paper and pencil skills that came under attack by math reformers in the late 1980s. Figure 7 displays test scores for Iowa’s eighth graders from 1978 to 2001. Eighth grade is crucial in any discussion of arithmetic, for it is when most students begin the transition from arithmetic to algebra.

Iowa’s scores on computation and non-computation subtests rose together in the 1980s, increasing by about one-half grade level. Computation flattened out from 1988 to 1991, while non-computation scores continued rising. Then in 1992, computation scores went into a swan dive for several years, losing more than one-half grade level by 2001. All of the 1980s gains were erased, and computation skills hit low levels not seen in more than two decades. Although it is true that Iowa’s schools experienced demographic changes in the 1990s, there is no reason to think that these changes would affect computation skills differently than other math skills.7 When it comes to computation skills, Iowa may be the canary in the coal mine, warning the nation that there are consequences to de-emphasizing computation skills in the elementary grades.8

Conclusion

Let’s put the computation issue in perspective. The widespread math reforms of the 1990s may have forced a trade-off. Since 1990, U.S. students have registered gains in several math areas, especially problem solving, geometry, and data analysis. These gains have been documented in previous Brown Center reports.9 But computation skills have been flat at best, and there is some evidence that they have declined. In 1999 on the trend NAEP, a smaller percentage of thirteen and seventeen year olds answered items with fractions correctly than a decade earlier. Seventeen year olds’ scores on arithmetic items fell significantly from 1990 to 1999.

In 2001, eighth grade computation scores on the ITBS hit twenty-three year lows in the state of Iowa. This evidence is not conclusive, but it does suggest that continuing to ignore computation would be a mistake. Three policy recommendations flow from the analysis.

- The nation must not remain in the dark on whether students are learning arithmetic. It is especially important that arithmetic is assessed on the NAEP at the fourth and eighth grades. This score should be reported separately from other categories and should not include items on which calculators are used. If math reform involves a trade-off in students’
Part II
HIGH SCHOOL CULTURE

— Perceptions of U.S. Students Who Study Abroad
— The Impact of Team Sports

“Mathematics is the queen of the sciences and arithmetic the queen of mathematics. She often condescends to render service to astronomy and other natural sciences, but in all relations she is entitled to the first rank.”

Friedrich Gauss, quoted by R.E. Moritz, *Memorabilia Mathematica* (1914)

math skills, we must carefully measure what is being lost and gained. Only then can the wisdom of current practices be determined.

- The NAEP is only valuable to parents and teachers if it reports student progress on skills that are important to them. Subcomponents of arithmetic should be assessed and reported separately, including operations with whole numbers at the fourth grade and operations with fractions, decimals, and percentages at the eighth grade.

- The NAEP test should establish independence from the NCTM’s reform agenda in order to objectively gather the evidence on which NCTM’s reforms will be judged. The current framework and the frame-work going into effect in 2005 are based on NCTM doctrine.

- Arithmetic deserves the same attention that reading has received in federal education policy. The rising math scores on the main NAEP may have lulled the nation into thinking all is well in young people’s math skills. A national campaign emphasizing arithmetic and computation skills would help prepare all students for advanced math courses in high school.

Part I The Nation’s Achievement

“Mathematics is the queen of the sciences and arithmetic the queen of mathematics. She often condescends to render service to astronomy and other natural sciences, but in all relations she is entitled to the first rank.”

Friedrich Gauss, quoted by R.E. Moritz, *Memorabilia Mathematica* (1914)
INTERNATIONAL COMPARISONS OF LEARNING IN the elementary grades cast U.S. schools in a favorable light. In the fourth grade, American students rank among the top one-third of nations in mathematics. In reading, the U.S. performs even better, one of three or four countries with the highest test scores. High school comparisons, on the other hand, are a national embarrassment. In math and science, U.S. students score well below average.

Why do older students do so poorly? Last year’s Brown Center Report featured a survey of foreign exchange students who had recently attended U.S. high schools. We asked them to compare high schools in their home countries with American schools on several dimensions, including rigor of curriculum, frequency of homework, what motivates teens to attend school, and the value students place on success at sports and mathematics. The purpose was to see what teenagers from other countries think about important aspects of U.S. high schools and American teen culture.

In the summer and fall of 2001, we replicated the survey with what seems to be a natural comparison group, American students who have attended high schools abroad in the same exchange program. Surveys were mailed to the 562 students who had participated in the AFS Intercultural Exchange Program during the 2000–2001 academic year. We received responses from 328 students (58%) who had attended high schools in thirty-five host countries. Some of the results are discussed here, and responses to all of the survey’s questions can be found on our website (www.brookings/browncenter). Readers are cautioned that foreign exchange students—from the U.S. or any other country—are certainly not representative of all students in a particular country. The findings can only be generalized to students in the AFS program. Despite this limitation, the study is valuable in offering a glimpse into the life of high schools and the values of teen culture from the perspective of teens from all over the world. Rarely are Americans allowed to view their institutions through the eyes of others. Rarer still are cross-national comparisons of high schools by the students who attend them.

The American students reaffirm the key impressions of students from abroad.
especially on the question of academic rigor (see Figure 8, page 17). U.S. high schools are not very demanding. For example, 85% of students from abroad found classes in American high schools easier than classes at home (56% much easier, 29% a little easier). American students agree, although not as emphatically. More than half, 56%, say their regular classes in the U.S. are much easier or a little easier than the classes they attended in foreign countries. About 30% say U.S. classes are harder, almost three times the percentage of foreign students that felt that way.

American students also agree that students in the U.S. spend less time on schoolwork than students in other nations (see Figure 9, page 17). Students from other countries were divided about two to one on this question, with 57% stating that American students spend less time on schoolwork and 25% saying more time. Among U.S. students, 54% feel that American students spend less time on their studies and 34% say more time. American high schools are seen as less focused on academic learning than high schools of other nations, and this perception is shared by both American and foreign students.

American students encounter two distractions in high school that other nations minimize, part-time work and sports. The U.S. is unique in the world when it comes to employment during high school. Most countries discourage it. For American students, holding part-time jobs is the norm. In our survey, more than half of U.S. students were employed during the school year, but only about one-fourth of students from other countries (see Figure 10). About one-third of American students (35%) reported that they worked more than five hours per week, compared to only 9% of students from foreign countries. The survey question specifically

American students encounter two distractions in high school that other nations minimize, part-time work and sports.

American students highly value sports.

The survey asked: Compared to students in other countries, how important is it to your American friends to do well in sports?

Both groups agree that math is valued less by U.S. students.

Both groups resoundingly agree that the U.S. students highly value sports.
asked for the number of hours spent working before and after school. It appears that even on school days a significant portion of U.S. students’ out-of-school time is devoted to employment.

Part-time work may capture students’ time. Sports captures their hearts. One of the most striking results of last year’s survey was the contrast foreign exchange students perceived between how much American high school students value success at sports compared to success at mathematics. American students see a similar contrast. We asked the American exchange students to compare pursuits in which U.S. students and students abroad want to do well. Mathematics was the first topic. About 37% said American students value success at math much less than teens in other countries, 25% said or a little less than teens in other countries, 38% said about the same, and 25% said much more or a little more (see Figure 11, page 19). According to the U.S. students, their mathematical prowess is slightly more esteemed abroad, but not by much.

Sports is quite a different story. With both samples, the survey responses were overwhelming (see Figure 11, page 19). Two-thirds of both groups say that American students care much more about athletic accomplishments than students in other countries, swampng the 4% to 6% who say they matter more abroad. On first blush, this is not terribly surprising. For some time, sports have commanded a prominent place in American popular culture. From Babe Ruth to Muhammad Ali to Michael Jordan, America’s most beloved national heroes have included athletes. But the U.S. is not unique in that regard. Soccer is practically a national religion in some countries. Baseball is revered in Japan. And teens around the world are just as sports crazy as teens in the U.S.

A significant difference is that the U.S. permits sports a place in the life of high schools that other countries avoid. Team sports abroad are often organized by clubs outside the school. Community pride in its local team may be just as great, but teams represent the communities themselves, not local high schools. Primarily American phenomena are the massive, costly high school stadiums and arenas in which sports are played, extensive press coverage of inter-scholastic competition, school wide rallies during the school day, extensive travel by student athletes, and high school coaches signing big dollar shoe contracts. Sports have a unique role in U.S. schools. What do we know about the effect of sports on American education?

In the 1950s, the eminent sociologist James Coleman described the unparalleled position student athletes command in the social status of high schools. Athletes are revered. Good students, on the other hand, are frequently the outcasts of teenage society. Coleman argued that unless adults pay close attention to the values of teens—and do not shrink from guiding them—sports may adversely affect school culture by undermining the pursuit of academic goals.

In the extreme, teens are capable of transforming personal qualities that adults admire into character weaknesses, cruelly so when detected in peers. Respect for authority, working hard, and intellectual brilliance are the defining characteristics of “suck-ups,” “grinds,” and “brains.” Not much has changed in this regard since the 1950s. Cornell economist John Bishop has documented the same phenomena in recent studies of high school “nerds.” The cautionary advice of these studies deserves attention. Schools function like mini-societies. A high school’s culture represents the shared values of the institution, and it shapes student behaviors as much as it reflects them.

What about the athletes themselves? Do sports help or hinder their learning? In general, the research is strongly positive on participating in high school sports. Herbert W. Marsh analyzed survey data collected from a large random sample of high school students in the 1980s. He found participating in sports has a positive influence on fourteen of twenty-two student outcomes, including enrollment in academic coursework, homework, and reduced absenteeism. Other well-designed studies show benefits too. Studies of high school students in the early 1990s found a positive effect of participating in athletics on both grades and test scores. Studies also document the positive impact of sports on several aspects of students’ psychological and social development, such as boosting students’ self-concepts, reducing delinquency and discipline problems, and diminishing the chances of teen pregnancy in female athletes.

High school athletes appear to reap benefits after graduation. Students who participate in sports hold higher educational aspirations while in high school, and, subsequently, they are more likely to attend college. Economists have shown that high school athletes have an earnings advantage over
Part II: High School Culture

Kids who go out for a team sport may be intrinsically different than others—more ambitious, harder working, more confident in themselves.

don-athletes ten to fifteen years after graduation. In particular, the adult wages of black males are higher if they participate in sports. Bradley T. Ewing estimates that African American adults who participated in high school sports earn 8% to 11% more than those who did not. There are several theories as to how and why the positive effects of sports occur. Some explanations focus on the development of what is known as “human capital.” For a moment, think of young people as small business firms. New businesses need capital investments to grow and mature—labor, financing, equipment. Children need the knowledge, habits, and skills that allow them to become productive adults. Start-up companies acquire capital from investors. Children acquire human capital from schools, but also through education in the broadest sense of the term: in the home, from peers, and in the community. From the human capital perspective, high school sports enhance an individual’s stock of productive resources. Athletes may learn self-discipline, how to follow directions, perseverance, and how to set goals, a valuable set of skills for success in college and the workplace.

Another explanation focuses on social capital. High school sports promote strong ties between athletes and schools, bringing parents of athletes into close contact, and creating dense social networks among youngsters. A social network is a fancy term for something simple. Small towns possess dense social networks. The adults in an adolescent’s life know each other. If an athlete decides to do something stupid, it is likely that an adult will hear about it and have a chance to intervene. Non-athletes, especially at high schools with two or three thousand students, often pass through schools anonymously. Another facet of social capital relates to establishing valuable social connections. Athletes learn teamwork, and by being around other motivated students, may make solid friendships that last long into adulthood.

A third explanation involves signaling. Teachers, colleges, and employers believe that successful athletes possess attributes that are also common to good students and good employees. Kids who go out for a team sport may be intrinsically different than others—more ambitious, harder working, more confident in themselves. Signal is the likelihood that a person possesses these traits, educators and employers reward athletes with good grades, admission to college, good jobs, and high wages. Notice the difference between the human capital and social capital explanations, on the one hand, and the signaling explanation, on the other. The human and social capital stories are that athletes benefit from participation in sports because playing sports adds value, producing better students and better employees. The signaling story is that educators and employers believe anyone who self-selects into sports—whether the participation adds value or not—probably possesses valuable characteristics.

There are apparent limits to the pay-off from sports. In a large study of high schools, Laurence Steinberg discovered that students who devote more than twenty hours per week to extracurricular activities, including sports, suffer academic losses. Spending anordinate amount of time on sports or allowing athletes to circumvent studying can turn the benefit of athletic participation into a loss. In addition, the positive effects of high school sports may not be uniform for all sports or all students. A recent study, for example, found that participation in basketball or football had a negative effect on test scores, but was neutral on grades. Other sports, primarily baseball and track, had a positive effect on white students’ grades, but a negative effect on the grades of African Americans. Race differences have also been discovered in how participation in high school sports is related to adult earnings. A 2001 study uncovered a positive impact on blacks’ earnings, but a negative impact on whites. Only recently have researchers accessed databases large enough to dig down to analysis at this level, so more research is needed to reach any substantive conclusions.

Returning to Coleman’s work highlights an additional limitation. Most of the research cited above focuses on student athletes. What about other students? What about school culture as a whole? The starting five basketball players in a school with 1,500 students constitute only one-third of one percent of all students at the school. The literature is fairly convincing that they derive benefits from being athletes. But if a focus on excellence in sports has an adverse effect on school culture, then many more students might be negatively affected. Does this happen? A recent study in Massachusetts found that districts spending more on sports tend to score lower on the state’s achievement test. But there is sparse research on the question, and the set goals, available sports can undermine a school’s academic performance remains largely theoretical.

Standouts and powerhouses in high school sports

How seriously do sports distort American high schools from their academic mission? We looked for an answer to this question by focusing on a sparsely researched segment of U.S. schools—high schools that are nationally recognized as top schools in major sports, so-called “standout” or “powerhouse” schools. If sports impede academic success, it should be noticeable in these schools. Identifying standouts took some work. We used Parade Magazine’s All-America teams and USA Today’s national and regional rankings to identify the top high schools in three team sports—football, baseball, and basketball. Rankings at the end of each sport’s season since the 1997–98 school year were collected and coded. In football, we were able to gather data back to the 1990–1991 academic year.

Bear in mind that this is only the first cut at identifying dominant schools. Indeed, the Parade list of all-star players is probably not an appropriate tool to screen for team dominance. The intention here, however, was first to conduct a sweep of high schools that were good enough to be noticed by national press, even if they had only one star player. So although the standout pool includes some schools that are not powerhouses, the approach identifies a large enough sample, so that national patterns of athletic excellence might be revealed.

Where are the standout high schools located? Table 1 shows the top ten states in the three sports. The top ten states are defined by “over-representation” of standouts, that is, the amount that a state’s portion of standouts exceeds the amount one would expect, which is simply the state’s portion of the U.S. population. In other words, values in the last column of Table 1 were found by computing the difference between the two previous columns (with a few discrepancies due to rounding). In football, for example, Texas has forty-eight standout high schools, representing 10.9% of the national total. Given that Texas holds about 7.5% of the nation’s population, its percentage of standout schools is 3.4% points more than expected. The most notable aspect of Table 1 is the geographical distribution of schools in the three sports. Indeed, regional stereotypes from popular books and films are reinforced. Football is dominated by southern states. The top eight states are located in the South. This is not at all surprising if one reads Friday...
Night Lights, the compelling story of the west Texas town of Odessa and its 1988 champion-ship football team from Permian High School. In basketball, three out of the top five states are in the Midwest. The passion for basketball in the Midwest, most notably Indiana, is movingly documented in William Gildea’s Where the Game Matters Most. The basketball standouts also seem to be states with notable state universities. In the top five states, the universities of Illinois, Michigan, Maryland, Indiana, and North Carolina possess legendary basketball programs. The correlation is not perfect—Kentucky and Kansas are noticeably absent from the top states—but it’s certainly plausible that strong college sports programs influence the quality of high school athletics. Basketball has no clear pattern. The top three states—California, Florida, and Arizona—have obvious climate advantages for baseball. Gifted athletes may be attracted to private schools, especially the lack of test prep that might hinder their performance on standardized tests. We limited the analysis to public schools because of the spotty data available on private schools.25 The powerhouse (see Table 2) large schools have a deep pool of talent from which to assemble athletic teams. Competition in baseball and football is strongly influenced by school size, as over half of the dominant high schools in these two sports are populated by at least 2,000 students. Perhaps because of its smaller squads, basketball is not as driven by school size, but even it favors large schools.24 Small schools are at a marked disadvantage in team sports. In the U.S., 60% of high schools are attended by 1,920 students, or less than 2,000 students. Among the standouts, 10% of powerhouse schools are private schools.

Powerhouses: The best of the best

In the second cut of the data, we identified 163 powerhouse schools, schools ranked in the top twenty-five nationally in USA Today’s end-of-season rankings since 1997. These are America’s dominant high schools in team sports. We limited the analysis to public schools because of the spotty data available on private schools, especially the lack of test scores. We were able to collect the following data on 141 schools (88% of powerhouse): enrollment, community (urban, suburban, rural), racial composition, and poverty (percentage of students eligible for free lunch).23 The powerhouse schools are located in twenty-four states. They have several characteristics that make them different from the average high school.

Powerhouses are huge. The median powerhouse serves 1,920 students, more than twice as many students as the median high school in the U.S. Only 10% of American high schools serve more than 2,000 students, compared to 46% of the powerhouse schools (see Table 2). Large schools have a deep pool of talent from which to assemble athletic teams. Competition in baseball and football is strongly influenced by school size, as over half of the dominant high schools in these two sports are populated by at least 2,000 students. Perhaps because of its smaller squads, basketball is not as driven by school size, but even it favors large schools. Small schools are at a marked disadvantage in team sports. In the U.S., 60% of high schools are attended by 1,920 students, or less than 2,000 students. Among the standouts, 10% of powerhouse schools are private schools.

Different sports flourish in different kinds of communities. Basketball is an urban sport (see Table 3). More than half of the nation’s dominant basketball teams hail from urban high schools. Football and baseball are dominated by suburban schools. The availability of open space for the large playing fields of baseball and football is probably one reason for the discrepancy. But the relative wealth of suburbs also might be a factor. Rural schools constitute about one-half of the nation’s high schools, but only 10% of the powerhouse schools in the three sports. Basketball’s appeal seems
to diminish as it gets farther from the city. Dominance in basketball is exceedingly rare for a rural high school, with only 6% of the powerhouse schools in that sport coming from rural areas.

The South is the dominant region in high school sports. We used the categories of the National Assessment of Educational Progress to sort the powerhouse schools by geographical region (see Table 1). The South is extraordinary in high school sports. The region holds 43% of the powerhouse schools, more than double its 21% share of U.S. high schools. The South is especially strong in football and baseball. The Northeast is the most underrepresented region, with 11% of the powerhouse schools. The Midwest’s strongest sport is basketball. The West’s strongest sport is baseball, and as noted above, dominance in baseball is greatest in the sunbelt states of the South and West.

Powerhouse schools are attended by a large African American population. Student enrollment in the average high school in the U.S. is 72% white, 13% African American, 10% Hispanic, and 3% Asian. The powerhouse high schools are attended by 28% of African American students, about twice the percentage of the average high school (see Table 2). Dominant schools in basketball and football serve substantial black populations. The dominant basketball schools are 42% African American and 40% white, and in football, 64% white and 26% African American. Baseball powerhouse schools are similar to national averages, with 73% white enrollment. The figures square with racial and socioeconomic backgrounds. African American, 10% Hispanic, and 3% Asian.

In What Regions of the Country
Are Powerhouse High Schools Located?
(N=141)

<table>
<thead>
<tr>
<th>Region</th>
<th>Northeast</th>
<th>South</th>
<th>Midwest</th>
<th>West</th>
</tr>
</thead>
<tbody>
<tr>
<td>U.S. High Schools</td>
<td>31%</td>
<td>24%</td>
<td>32%</td>
<td>31%</td>
</tr>
<tr>
<td>Powerhouses High Schools</td>
<td>41%</td>
<td>45%</td>
<td>21%</td>
<td>26%</td>
</tr>
<tr>
<td>Football</td>
<td>10%</td>
<td>51%</td>
<td>18%</td>
<td>20%</td>
</tr>
<tr>
<td>Basketball</td>
<td>11%</td>
<td>32%</td>
<td>30%</td>
<td>26%</td>
</tr>
<tr>
<td>Baseball</td>
<td>10%</td>
<td>45%</td>
<td>12%</td>
<td>33%</td>
</tr>
</tbody>
</table>

The powerhouse high schools are attended by a large African American population. Student enrollment in the average high school in the U.S. is 72% white, 13% African American, 10% Hispanic, and 3% Asian. The powerhouse high schools are attended by 28% of African American students, about twice the percentage of the average high school (see Table 2). Dominant schools in basketball and football serve substantial black populations. The dominant basketball schools are 42% African American and 40% white, and in football, 64% white and 26% African American. Baseball powerhouse schools are similar to national averages, with 73% white enrollment. The figures square with racial and socioeconomic backgrounds.

Who Attends Powerhouse High Schools?
(N=141)

<table>
<thead>
<tr>
<th>School</th>
<th>% Poverty</th>
<th>Black</th>
<th>White</th>
<th>Hispanic</th>
<th>Asian</th>
</tr>
</thead>
<tbody>
<tr>
<td>U.S. High Schools</td>
<td>20%</td>
<td>13%</td>
<td>72%</td>
<td>10%</td>
<td>3%</td>
</tr>
<tr>
<td>Powerhouses High Schools</td>
<td>21%</td>
<td>28%</td>
<td>58%</td>
<td>5%</td>
<td>5%</td>
</tr>
<tr>
<td>Football</td>
<td>18%</td>
<td>26%</td>
<td>64%</td>
<td>6%</td>
<td>3%</td>
</tr>
<tr>
<td>Basketball</td>
<td>30%</td>
<td>42%</td>
<td>40%</td>
<td>11%</td>
<td>6%</td>
</tr>
<tr>
<td>Baseball</td>
<td>13%</td>
<td>12%</td>
<td>73%</td>
<td>16%</td>
<td>5%</td>
</tr>
</tbody>
</table>

African American, 10% Hispanic, and 3% Asian.

Part II High School Culture

Achievement of Powerhouse High Schools by Demographic Characteristics
(Means and standard errors of z-scores, N=141)

<table>
<thead>
<tr>
<th>Category</th>
<th>Q1 (Low)</th>
<th>Q2</th>
<th>Q3</th>
<th>Q4 (High)</th>
</tr>
</thead>
<tbody>
<tr>
<td>% Poverty</td>
<td>+0.46*</td>
<td>+0.06</td>
<td>+0.11</td>
<td>-0.24</td>
</tr>
<tr>
<td>% Nonwhite</td>
<td>+0.34*</td>
<td>+0.10</td>
<td>+0.02</td>
<td>-0.24</td>
</tr>
</tbody>
</table>

* p < .05, two-tailed test of z-score = 0

NOTE: Data report national means of z-scores adjusted for poverty and racial composition at the state level.

Achievement of Powerhouse High Schools
by Community
(Means and standard errors of z-scores, N=141)

<table>
<thead>
<tr>
<th>Community</th>
<th>Q1 (Low)</th>
<th>Q2</th>
<th>Q3</th>
<th>Q4 (High)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urban</td>
<td>-0.03</td>
<td>+0.14*</td>
<td>+0.20</td>
<td>-0.25</td>
</tr>
<tr>
<td>Rural</td>
<td>+0.02</td>
<td>-0.25</td>
<td>-0.25</td>
<td>+0.25</td>
</tr>
</tbody>
</table>

* p < .05, two-tailed test of z-score = 0

NOTE: Data report national means of z-scores adjusted for poverty and racial composition at the state level.

Achievement of powerhouse schools is not related to the socio-economic status of the community. As displayed in Table 6, the test data do not support the idea that dominance in sports diminishes a school’s academic achievement. The powerhouse schools’ average z-score is 0.5, the equivalent of the 52nd percentile. Put simply, powerhouse high schools score about the same as non-powerhouses. Indeed, in all three sports, the powerhouse high schools score slightly above—but not statistically significantly different from—state averages in reading and math. The range of school scores is quite large, however, from –1.80 to 2.45. It is possible to explain why some powerhouse schools get an academic boost from their extraordinary accomplishments in sports while other schools that are equally accomplished in sports do not.

It doesn’t hurt to be a powerhouse. As displayed in Table 6, the test data do not support the idea that dominance in sports diminishes a school’s academic achievement. The powerhouse schools’ average z-score is 0.5, the equivalent of the 52nd percentile. Put simply, powerhouse high schools score about the same as non-powerhouses. Indeed, in all three sports, the powerhouse high schools score slightly above—but not statistically significantly different from—state averages in reading and math. The range of school scores is quite large, however, from –1.80 to 2.45. It is possible to explain why some powerhouse schools get an academic boost from their extraordinary accomplishments in sports while other schools that are equally accomplished in sports do not.
Comparing the Academic Performance of Powerhouses and Non-Powerhouses in 24 states

<table>
<thead>
<tr>
<th>Who scores better?</th>
<th>Urban</th>
<th>Suburban</th>
<th>Rural</th>
</tr>
</thead>
<tbody>
<tr>
<td>Powerhouses</td>
<td>12 (60%)</td>
<td>15 (75%)</td>
<td>4 (44%)</td>
</tr>
<tr>
<td>Non-Powerhouses</td>
<td>8 (40%)</td>
<td>5 (28%)</td>
<td>5 (56%)</td>
</tr>
<tr>
<td>NA</td>
<td>4</td>
<td>4</td>
<td>15</td>
</tr>
</tbody>
</table>

NOTE: NA (not applicable) refers to states that do not have powerhouses in the category.

for schools in less favorable socioeconomic circumstances. It is not that the study discovered evidence that athletic success detracts from academics, but schools in disadvantaged communities do not experience the same boost in test scores that schools in wealthier areas get from fielding powerhouse teams. Compared to their suburban peers, promising young athletes in rural areas must overcome two handicaps. First, they are much less likely to attend a school large enough to become dominant in team sports. Second, if they are fortunate enough to attend a sports powerhouse, the school is less likely to be academically successful. More research is needed to explain the strategies that allow some schools to harness excellence in sports and carry it over into classrooms.

Sports are an integral part of high schools. Competition in football, basketball, and baseball is vitally important to high school athletes, their parents, and communities across the country. The surveys of foreign exchange students and of American students who have studied abroad demonstrate that the value placed on athletic excellence is deeply ingrained in U.S. teen culture. Moreover, participating in sports seems to provide numerous benefits to student-athletes: elevated status in the eyes of peers, closer ties to school, a social network of watchful, caring adults, greater motivation for academic learning, greater likelihood of attending college, and higher wages as an adult. These are not trivial rewards. They underscore the need for schools to offer sports as part of an education that stresses excellence in all of its dimensions.
CHARTER SCHOOLS ARE PUBLIC SCHOOLS OF CHOICE. Parents enroll their children in a charter school because they want their kids to attend that particular school, not, as in the case of regular public schools, because the family’s home sits within the school’s enrollment boundaries. In exchange for meeting educational outcomes, charter schools are freed from most regulations. The outcomes are promised in a renewable license to operate a “charter,” which is reviewed periodically. In the typical state, a review is conducted every five years. Schools that meet their goals are granted a fresh charter.

Those that don’t may be closed down.

The nation’s first charter school legislation was passed in Minnesota in 1991, and a few schools opened their doors the following fall. California followed in 1992, and six more states in 1993. Then the charter movement spread like wildfire. In 1995, eighteen states had passed charter laws. By 1999, the number of charter states reached thirty-seven. Supported with so many charter schools being relatively new, much more research into charter school achievement must be conducted to arrive at any definitive conclusions about their academic performance.

A study of charter schools

Brown Center researchers selected a sample of charter schools for the purpose of examining their academic achievement. The specific research objective was to compare charters’ performance on state tests from 1999 to 2001 with the performance of regular public schools. Did they score better, worse, or about the same? In addition to test scores, information was collected on the number of students enrolled in charter schools and the schools’ racial and socioeconomic composition. Demographic data were used to compare charters to regular public schools serving students with similar background characteristics.

A limitation of the study is important to note. With the data at hand, it is impossible to tell whether charter schools’ test scores reflect the quality of education at the schools. This is because charters’ test scores may be influenced by what statisticians call “selection effects.” Students attend charters because their parents have decided to send them there. They select the school. If charter students or their families are fundamentally different from kids attending regular public schools, these differences—not differences in the quality of schools—may produce differences in school test scores. Selection effects can be negative or positive. Charter students may have struggled academically before parents placed them at the school. But they also are probably blessed with parents who take an active interest in their children’s education.

Despite this caveat, examining the test scores of charter schools is useful. States are currently testing charter school students, releasing the test scores, and issuing watch lists comprised of schools, including charters, that are failing. This study aggregates charter schools’ scores across ten states and looks for patterns in their performance. Explaining why these patterns occur will require more specific information on the children attending charters and more rigorous statistical techniques than employed here.

We focused on ten states with the following qualifications: they had at least thirty charter schools open in 1999, testing students in grades 4, 8, and 10 (allowing for substitution of adjacent grade levels), and used the same achievement test in 1999, 2000, and 2001. The ten states had a total of 638 charter schools operating in 1999. Of these schools, we were able to assemble a complete panel of data on 376 charters. We did not add charters opening in 2000 or 2001 to the sample so that the number of schools remains fixed during the three-year time frame. Test data were collected—on charters and regular public schools—from state departments of education and from websites maintained by state assessment programs. Demographic and enrollment statistics were taken from the National Center of Educational Statistics’ Common Core of Data.

Table 10 contains summary statistics on the study’s sample of 376 charter schools. The average charter in the study is noticeably smaller than regular public schools in the U.S. (the national average is 520 students for a regular public school). Median enrollment in the charters is 252. About 38% of students in the charters are poor, close to the national average for regular public schools. Approximately 13% of the charters are specially designed to serve at-risk students. The charters serve a higher proportion of black students (23% vs. 17% nationally) and Hispanic students (18% vs. 15% nationally) than the average public school. About 25% of the charters in the study were new in 1999.
Estimating charter school performance

To estimate the charters’ academic performance, we employed a strategy similar to that used with the sports powerhouses in Part II. We collected test score data from the ten states, combined reading and math achievement from 1999 through 2001 into a composite score, and computed z-scores for all schools—regular and charter—in each state. The z-scores in Table 11 have been statistically adjusted for student background (socioeconomic status and racial composition) and weighted for enrollment. This allows us to compare charter schools to regular public schools with similar demographic characteristics. Within each state, an average z-score is 0.00.

Computing a weighted mean allows larger schools to count for more than smaller schools. Why is this done? Imagine that you want to compute an overall test score for the schools in a small town. The town has two schools. How should the town’s average achievement be reported? Pretty simple, one might answer, add the two schools’ scores together and divide by two. But what if one of the schools has 300 students and the other only 30? Treating the schools the same would be misleading. Giving the first school ten times more weight in computing the average score provides a better indication of how students are doing in the town as a whole. It is also a statistical property of test scores that those from large schools are more reliable than those from small schools, another reason for weighting averages by enrollment. Recall that many of the charter schools in the current study are quite small.

Charter schools score significantly below regular public schools on achievement tests, about 24 z-scores below average. As mentioned above, care must be exercised in interpreting the charter school test score deficit. The study does not possess evidence and therefore cannot shed light on why charters score below average. One possible explanation is that charter schools are not doing a very good job. But an equally plausible explanation is that charters attract large numbers of students who are struggling academically in public schools before ever setting foot on a charter school campus. The charters, in fact, may be doing an excellent job, bringing these low achievers up to a level that, although still below average, is not as low as when the students attended public schools.

Data on students’ achievement before and after they enrolled in charters would help determine which of these explanations is true. Computing the academic gains that students make as they move through grade levels is better at isolating a school’s contribution to learning than simply analyzing the level at which a school is performing. In addition, an analysis of how students perform after being randomly assigned to charter and regular schools would be valuable. Comparing the achievement gains of randomized samples, for example, has significantly advanced the research on vouchers. Many charter schools are oversubscribed, with more people seeking entry than space allows. Charter school administrators usually decide who gets to attend by a random draw, making such experimental research possible.

By itself, a simple test score is not the best tool for explaining a school’s contribution to its students’ learning. But it remains the best indicator for assessing what students at any particular school know and can do in academic subjects—whether they can read, compute accurately, grasp the fundamental principles of science, or understand the importance of famous events in history. As Table 11 shows, charter schools in four states (Massachusetts, Michigan, Minnesota, Texas) achieved significantly below state averages for similar schools. Charter achievement in the other six states is indistinguishable from average. Colorado charters’ raw scores are significantly above average (+.44); however, once school composition has been controlled, the Colorado charters’ performance is not significantly different from the performance of schools serving similar populations (+.18). It is important to note that, compared to other states, Colorado’s charters are uniquely suburban.

Urban charters score higher than suburban or rural charters. When charters in the study are grouped together by common characteristics and compared across states, several interesting patterns emerge. For example, urban charter schools exhibit higher achievement than suburban or rural charters (see Table 12). Urban charters’ test scores are just slightly below state averages (−.13). Rural and suburban charters, on the other hand, score significantly below schools with similar racial and socioeconomic profiles. This is important when thinking about charters as somewhat risky educational options for parents. Charters may be housed in old strip malls, church basements, or long-abandoned schools. They often hire teachers without official teaching certificates or extensive experience in the classrooms. And, as pointed out above, research on charters’ effectiveness is inconclusive. The results in Table 12 suggest that parents in urban schools are assuming less risk—at least when it comes to a prospective school’s academic standing—when transferring children to charters than parents who do the same in rural and suburban areas. This is good news since urban parents may be leaving relatively bad schools and therefore be willing to consider riskier alternatives.

Large charters score higher than small charters. Table 13 examines achievement in charters of different sizes. Large charters achieve at higher levels than smaller charters. This is somewhat counter-intuitive considering the popular “small school” movement, which advocates breaking down large schools into smaller organizational units. Small school advocates are concerned that students get overworked in large institutions and are more likely to bond with an adult in smaller settings. But the largest charters in this study, those serving 481 students or more, are achieving significantly higher on state tests (−19) than charters with 155 or fewer students (−44).

What could explain the discrepancy? One potential reason is related to school administration. Many large charters are run by educational management organizations, or EMOs. Professionals might have the know-how to produce higher achievement compared to the typical mom and pop administration of small charter schools. Economies of scale may also play a part. Even the most devoted school advocates recognize that schools might have to grow to a certain size to be viable as institutions. Extremely small schools may have trouble raising funding or securing loans, receiving favorable treatment from vendors when purchasing textbooks and other instructional materials, or attracting star teachers. Some charters may be too small to operate efficiently.

New charters have depressed scores for the first two years. In 1999, about one-fourth of the study’s charter schools were new. Their test scores fluctuate in an interesting way. In their first and second years, the new schools scored significantly below schools that were already open in 1999 (see Figure 13). In the third year, 2001, the new charter schools caught
up with the older ones. Previous state evaluations of charter schools have noted that test scores are depressed the first year that a new charter is open. The current study is indicating that the negative new school effect extends for two years.

What is behind the two year fall in new charters' test scores? Speculation is necessary here. The stress and strain of opening a new school may be partially to blame. Founders of charter schools face a mountain of difficult tasks—finding adequate facilities, hiring teachers, preparing curriculum. Moreover, students are moving from their previous schools. Prior research has shown quite convincingly that student mobility depresses test scores. The new school effect could be partially to blame. Founders of charter schools until 2001.

New charter schools take two years to catch up with existing charters.

Charters that opened in 1999 scored below existing charters until 2001.

A final word on charter schools. There are many types of charter schooling influences achievement. Charters are nothing more than an institutional vessel into which several elements are poured—a founder's inspiration, a new principal and teaching staff, a new curriculum, and perhaps several innovative ideas. Charters are incredibly diverse. There are Montessori charters, Waldorf charters, back-to-basics charters, Afrocentric charters, and Core Knowledge charters. Some charter schools serve gifted students, and others serve adolescents recently released from the criminal justice system.

Charters share two characteristics: they serve students whose families have chosen for them to be there, and they commit to attaining certain outcomes within a stipulated period of time. These are elements of governance. And they are process variables. If future research shows that charters produce a universal educational gain or loss from such a diverse group of schools, then how schools are governed will be proven more influential than all but a few people have ever imagined. The greater likelihood is that charters will be found to produce a wide range of outcomes. Some charters will be terrific places for educating children and others will be failures. Identifying the characteristics of excellent charter schools and encouraging their adoption should be the main objectives of the next wave of charter school research and policy.

New charter schools are scoring below average on tests of academic achievement, but why do they do so remains a question.

Summary and recommendations

This section of the report presented a study of charter schools test scores from 1999 to 2001. In the study's ten states, charters scored about .24 z-scores below regular public schools of similar composition. Urban charters scored higher than suburban or rural charters, larger charters scored higher than smaller charters, and charters already in existence in 1999 scored higher than charters opening their doors for the first time that year. New charters' test scores lagged existing charters for two years, but in 2001, the new charters' scores jumped, and the test scores from new and old charter schools were statistically indistinguishable.

Two recommendations are appropriate.

First, additional study of charter schools is needed, especially research that controls for selection effects. It is clear that charter schools are scoring below average on tests of academic achievement, but why they do so remains a question. It could be because charters offer an inferior education, or it could be because charters attract students who are low achieving in the first place.

The second recommendation addresses the new school effect. If charter schools are at a systemic disadvantage for the first two years that they are open, policymakers should consider special treatment for them in accountability programs. States frequently place schools with three years of poor test scores on watch lists or warning lists. Sanctions are threatened if achievement does not improve. A grace period might be appropriate for new charters— and for new regular public schools if they experience the same phenomenon—so that they are given a fair chance to produce learning. States should consider delaying the "accountability clock" on new schools until the third year.

If future research shows that charters produce a universal educational gain or loss from such a diverse group of schools, then how schools are governed will be proven more influential than all but a few people have ever imagined. The greater likelihood is that charters will be found to produce a wide range of outcomes. Some charters will be terrific places for educating children and others will be failures. Identifying the characteristics of excellent charter schools and encouraging their adoption should be the main objectives of the next wave of charter school research and policy.
### ENDOOTES


6. Age 9 arithmetic cluster consists of 21 items measuring addition, subtraction, multiplication, and division of single numbers. Age 10 arithmetic consists of 31 items measuring addition, subtraction, multiplication, and division of two numbers, fractions, and decimals. Age 11 arithmetic consists of 31 items measuring addition, subtraction, multiplication, and division of three numbers, fractions, decimals, and converting decimals into fractions. Age 12 arithmetic consists of 31 items measuring addition, subtraction, multiplication, and division of four numbers, fractions, decimals, and converting decimals into fractions.

7. Students who are “not popular” or “not part of the leading crowd.”

8. “Black-31%, white-41%.

9. Other aspects of the data and methods are detailed in Tom Loveless, Charter School Achievement and Accountability, (Paper presented at the Take-Away Conference on Accountability, Program on Educational Policy and Governance (PEPG), Harvard University, Cambridge, MA, June 10, 2002).


12. The pattern displayed in Figure 7 was found by Robert L. Amstutz, 360° in 90° to 1.7%, 90° to 1.7% in 2001 and white-student from 0% to 6% in 1999. Computed from data on Iowa Department of Education website: www.state.ia.us/educate/reports.html

13. Chicago's scores on ITBS computation rose from the 9.8% in 2001. Computed from data on Iowa Department of Education website: www.state.ia.us/educate/reports.html


15. The pattern displayed in Figure 7 was first noted by Robert L. Amstutz, 360° in 90° to 1.7%, 90° to 1.7% in 2001 and white-student from 0% to 6% in 1999. Computed from data on Iowa Department of Education website: www.state.ia.us/educate/reports.html


17. The pattern displayed in Figure 7 was first noted by Robert L. Amstutz, 360° in 90° to 1.7%, 90° to 1.7% in 2001 and white-student from 0% to 6% in 1999. Computed from data on Iowa Department of Education website: www.state.ia.us/educate/reports.html

18. We dropped the four states without any standout charter schools, or schools where an inadequate percentage of total enrollment took the test. We dropped those schools from the analysis, as well as those schools on which we didn't have ITBS data.

19. The natural sciences could be biased, for example, if an effect is linear in some states and non-linear in others.

20. Information on charter schools are from the Center for Education Reform: www.centerforreform.org


24. Magnet schools may also have a recruiting advantage, identifying fifteen of the powerhouse sample, about 10%,

25. We dropped the four states without any standout charter schools, or schools where an inadequate percentage of total enrollment took the test. We dropped those schools from the analysis, as well as those schools on which we didn't have ITBS data.


28. Magnet schools may also have a recruiting advantage even though they are public schools. We were able to identify schools of the powerhouse sample. About 20% of public school magnets.


