



Class Size, Funding and Academic Performance

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ABSTRACT

Available data indicate that academic performance among students in the United States has in many cases remained unchanged or has been declining over several decades despite concerted efforts at the state and federal levels to improve performance. With regard to public schools, the decline is commonly attributed to large class size and insufficient funding.

Although numerous studies have examined funding and class size and their influence on student performance, many of these investigations did not consider the available longitudinal data.

Consequently, they fail to provide a clear examination of both funding and class size effects. Close examination of these data from the US Department of Education, however, shows no significant funding or class-size effect. The present study involved data mining the vast store of education research produced at the US Department of Education to examine the role of class size and funding on public education.

Keywords: Absenteeism; funding; class size; family income; curriculum.

1. ACADEMIC PERFORMANCE AND PUBLIC SCHOOLS

Various studies have shown that parents (approximately 74%) are generally satisfied with the quality of their children's schools [1,2].

Such studies have reported, however, that parents commonly complain that classes are too crowded and that schools are underfunded. These complaints are interesting for several reasons, but perhaps what makes them most interesting is that a majority of parents express

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these views even though they typically have: (1) little knowledge regarding school funding, (2) limited knowledge of average class size, and (3) no knowledge of the research on class size and student performance.

1.1 Funding

Historically, public schools in the United States were funded through local property taxes. This approach gave communities significant control over their schools and the education their children received. Parents were motivated to be active participants in public education, and they had more direct opportunities to hold their schools accountable. If we consider that communities and children have different needs and priorities, and if we consider that children have different abilities and aspirations, community control of education makes sense, for it thwarts attempts to impose a “one-size-fits-all” model of education that is based on the false perception that all children are alike.

A negative consequence of local property-tax funding was that schools in middle-class and upper-class neighborhoods received more funding than schools in poor neighborhoods, where property values were low. Politicians in poor communities had two choices: they could impose high property taxes on low-value property, or they could provide comparatively low funding for their schools. None opted for the first choice because it was not feasible in light of socioeconomic realities.

The civil rights movements of the 1960s, however, heightened awareness that school funding is a sociopolitical issue, not simply an educational one. Arguing that the existing funding system constituted de facto discrimination, plaintiffs in California filed suit [3], and the State Supreme Court ruled in their favor. The case had a nationwide effect, leading a majority of states to abandon community funding and to vest public-school funding in their state legislatures and their departments of education. The money was then distributed from a state’s general fund on the basis of full-time enrollment (FTE) and average daily attendance (ADA). The result was, in theory, funding equity.

The shift away from community-based funding is based on the argument that increased funding for schools results in improved academic performance across the board. The outcome is deemed especially important for schools with

high levels of minority students, for it would remedy the historically lower funding that schools serving subaltern minority children received, extending to them all the personal and social benefits that accrue from educational success. In such an instance, all schools would be able to provide students with, for example, computers, field trips, and improved school libraries while also increasing teacher salaries, enabling schools to hire highly qualified teachers.

When, in 1978, California residents objected strongly to *Serrano v. Priest* and the higher property taxes that it entailed, voters passed Proposition 13, which capped property tax increases at 2% per year. The state legislature, led by Senator Henry J. Mello and Assemblyman Mike Roos, responded immediately, passing legislation to circumvent the proposition. The legislation allowed politicians to impose an ad valorem tax of 1–2% on property, giving California one of the higher property tax rates in the nation, potentially close to 3% annually of a home’s assessed value. This value could be (and usually was) reassessed upward by 2% every year.

Although initially this tax was limited to 10 years per parcel, that term was deemed too brief and was subsequently extended to 45 years, which given the average length of homeownership is forever. Thus, over time, a homeowner’s property tax could exceed the mortgage payment. Even so, California today ranks 37th in the nation in public school funding, and its dropout rate is higher than every state except Nevada [4]. Worth noting in this context is that only about 30% of the tax increase actually goes to schools; the rest goes to development projects ranging from roads to public swimming pools and shopping centers. How did the increased funding affect California schools? In terms of quality, the state’s public education system is ranked 42nd out of 50 as of this writing, even though in the 1960s it was ranked #1.

1.2 Absenteeism

The emphasis on increasing education funding throughout the United States so as to improve students’ performance typically ignores the role parents and students themselves play in the educational enterprise. More specifically, both students and parents are responsible for attendance and completing assigned work. Although most states currently fund schools on

the basis of full-time enrollment (FTE) and average daily attendance (ADA), this shift in funding has had, at best, minimal effect on schools or minority student performance. A more critical assessment is that there has been no measurable effect. Chronic absenteeism has exacerbated the lack of a funding effect among minority-serving schools, significantly lowering FTE and ADA.

Numerous studies have investigated the effect of absenteeism on student performance, and all have reported that when students are not in class regularly, performance declines significantly, [5,6,7]. Consequently, vesting public school funding in the legislatures and state departments of education failed to improve academic performance among minority children.

1.3 Class Size and Academic Performance

When voices rise concerning high dropout rates and low student achievement, the political response has focused on increasing funding and reducing class size. The two issues cannot be separated, for smaller classes require schools to hire more teachers and simultaneously to expand the number of classrooms. Given the cost of constructing new buildings, the typical response has been to install portable classrooms, even though these units tend to be small and therefore cramped.

News reports on poor academic performance in American schools have historically led teachers and teacher organizations, such as the National Council of Teachers of English (NCTE), to argue that large class sizes are a driving factor in findings of low student performance.

Consequently, anecdotal reports indicate that many parents believe that our public-school classrooms are packed with 40–50 children. As Rockoff [8] reported, even among researchers class-size “measures . . . typically contain considerable measurement error” (p. 2).

The effect of class size on student performance has been researched thoroughly at all levels, with mixed results. Simple logic seems to support the claim that smaller classes must result in better learning because it would allow a teacher to devote more attention to each child. Some research supports this view. Blatchford, Bassett, and Brown (2008), for example, studied the effect of class size at both the elementary

and the secondary levels in the United Kingdom and found that with smaller classes the teachers were able to provide students more individual attention, which led to better student performance.

Beyond this fundamental truism, there is little in the available research to provide meaningful support for claims that smaller classes translate into better student performance. Hoxby [9], for example, found that “reductions in class size . . . have no effect on student achievement. The estimates are precise enough to identify improvements in math, reading, or writing achievement of just 3/100ths of a standard deviation.” (p. 1). Hoxby concluded that previous studies that reported a “significant” class-size effect suffered from “substantial bias” as well as methodological flaws. Among the latter, one of the more significant was failure to account for “male-female differences in test scores” in light of the fact that girls outperform boys in writing, reading, and math until 12th grade, making gender a significant but commonly ignored factor in any study of academic performance, including those on the effect of class size.

1.4 The Present Study

The question of whether educational funding and class size are significant factors in student achievement is central to overall social welfare, and it increasingly is a factor in politics and economics. As Williams [10] reported, over the last several decades education has come to be considered a central factor in national productivity and social wellbeing. On this account, gaining better understanding of the effect of funding and class size on students’ academic performance has significant economic and social implications.

The problem with a majority of the available research on these issues is that too often it is based on a snapshot bounded by the period of data collection rather than on long-term trends. In addition, much of the research focuses on individual schools, districts, or states and therefore does not consider nationwide data and has limited generalizability.

To address these concerns, the present study, based on a data-mining approach, examined longitudinal data collected and reported by the US Department of Education. These data provide a clear assessment of whether funding and class size are significant determiners of academic performance. The political view of

education as a significant factor in national productivity increases the importance of valid assessments of student performance, for it implicitly establishes a competitive dynamic between the US and the other nations of the world. From an economic perspective, productivity is central to socioeconomic wellbeing, putting American students and our schools in competition with those in other countries. On this account, the study also examined the Program for International Student Assessment (PISA) data from the Organization for Economic Cooperation and Development (OCED) to examine the global relation among funding, class size, and academic performance.

2. RESULTS

2.1 Class Size, Funding, and Absenteeism

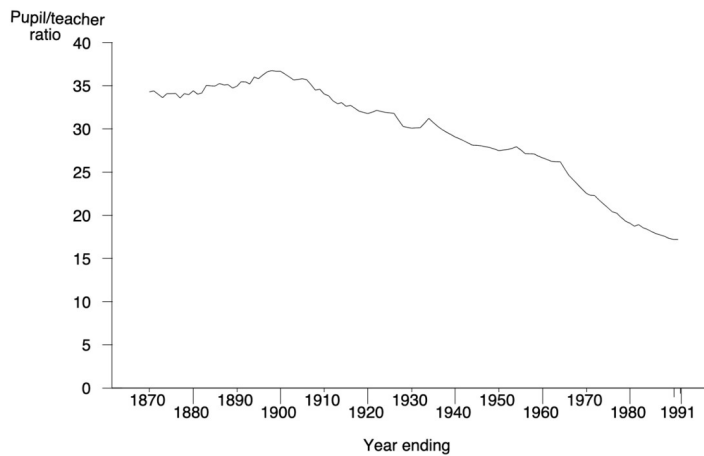
Data from the US Department of Education show that class size has dropped steadily since the 19th century. In 1950, the average was 30 students per class; today the average nationwide is 25 (see Fig. 1). Although there are difficulties associated with comparing academic performance of children across many decades, determining the effect of class size is straightforward.

The average class size in 2020 changed very little from the 1991 data, currently at 25 nationwide. How does this number compare with other nations? The PISA measures 15-year-olds' ability to use their reading, mathematics, and science knowledge to meet real-life

challenges. The OECD uses the test to tabulate performance, funding, and class size for public and private education among member nations. Fig. 2 shows that a majority of participating nations have an average of 25 students per class. With regard to academic performance, however, the test results clearly show that average class size is not correlated with performance.

With the exception of Australia, the nations with the largest class sizes are in Asia. Some of the nations with the lowest PISA scores have lower than average class sizes. More important is that even with a class size that is 72.7% higher than the average class size in the US, students in those countries with the highest PISA scores significantly outperform all other students who have lower class sizes and more funding. In 2020, China, for example, reported a literacy rate of 96.36%, whereas the US has, at best, a literacy rate of 79%. This figure is suspect, however, owing to the fact that the Department of Education segments literacy into different categories, such as "Advanced" and "Proficient," making it difficult, if not impossible, to determine the overall literacy rate accurately.

The US level of school funding is among the highest in the world. Worth noting is that China also has a high level of funding (\$542.6 billion in 2020), but because its student population is more than five times larger than America's, it is difficult to make a reasonable comparison. For fiscal year 2020, US federal funding was \$1.486 billion, whereas state funding was \$612.7 billion (US Department of Education, 2020).



Source: U.S. Department of Commerce, Bureau of the Census, *Historical Statistics of the United States, Colonial Times to 1970*; and U.S. Department of Education, National Center for Education Statistics, *Digest of Education Statistics*, various issues.

Fig. 1. Average class size, 1870–1991

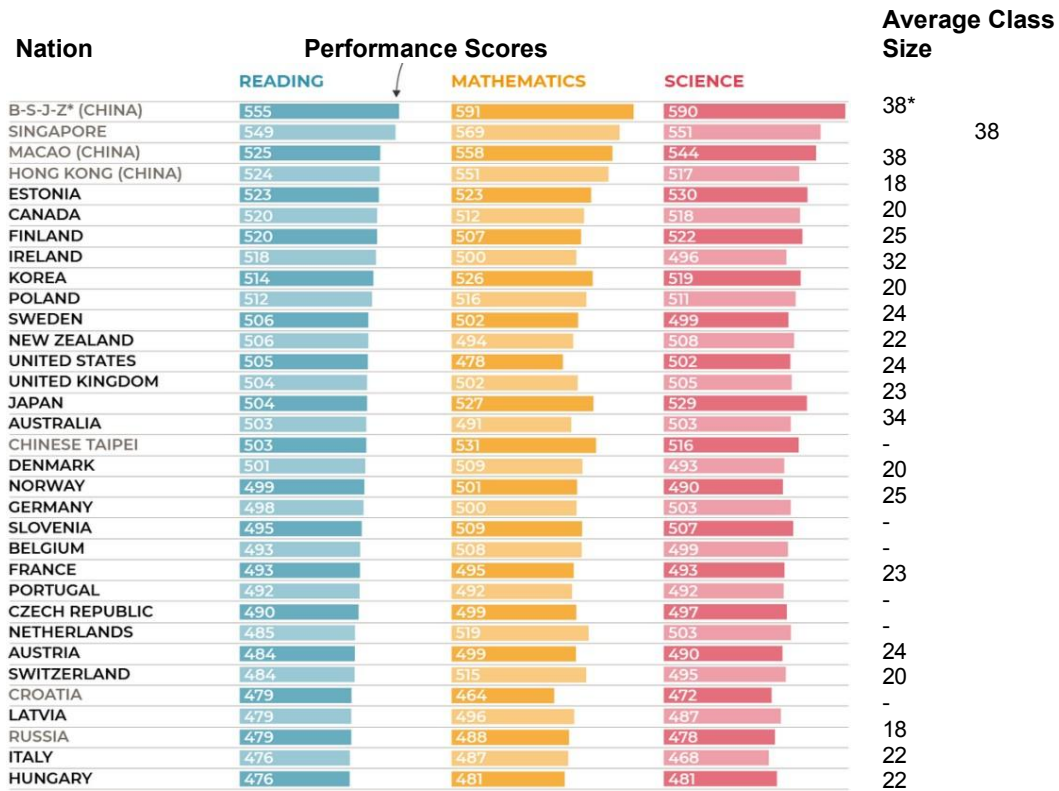


Fig. 2. PISA scores and class size rank

**This figure is questionable. Other data indicate that the average class size is 16.85*

Ironically, the 10th Amendment to the US Constitution provides that education funding is the responsibility of the states, not the federal government, but the federal government has been assuming greater responsibility for funding every year since the Johnson administration. Only three countries invest more per student than the US—Luxembourg, Switzerland, and Austria—yet American students score just slightly above the mean. With regard to class size, some countries, such as Estonia, Russia and Norway, have low class sizes and low PISA scores. China and Korea have large classes but high PISA scores. The United States has an average class size that is well within the global mean of 25. Such findings challenge the claim that low student achievement is linked to funding and class size and suggest that personal characteristics, such as determination, motivation, and dedication are more important.

In the absence of compelling evidence that class size is correlated with performance, we are compelled to return to the issue of attendance and absenteeism in American schools. On any given day, an average of 26% of African

American students, 24% of Hispanic students, and 31% of American Indian students are absent (National Center for Education Statistics, 2010), [11], affecting both ADA funding and academic performance among these groups. At some schools, the percentages are even higher. The absentee rate in predominantly African-American Detroit, for example, has hovered around 58% for years [12]. As Fig. 3 below illustrates, absenteeism is highly correlated with ethnicity:

As the percentage of ethnic minorities has risen nationwide, the issue of chronic absenteeism has become more pressing. A recent study from the Brookings Institute illustrates the rapid change in America’s population, with the Anglo population dropping by almost 20% in two decades owing to white mortality rates, low white birth rates, as well as Third-World immigration and associated concomitant high birthrates.

Equally troubling is that chronic absenteeism increases with age. Fig. 5 shows absenteeism by grade level and ethnicity. Because a high percentage of our subaltern minority students have been regularly absent throughout

elementary school, far too many enter high school lacking not only the discipline necessary to attend classes regularly but also the fundamental skills to succeed at that level. In December, 2015, for example, the Los Angeles School Board announced that 53% of high school seniors were ineligible to graduate owing

to low scores on statewide tests and low grades. The total was more than 300,000 students. Facing a public relations as well as an educational disaster, the district announced in February that all of those students would graduate after all. How was it possible? The board simply lowered the graduation standards.

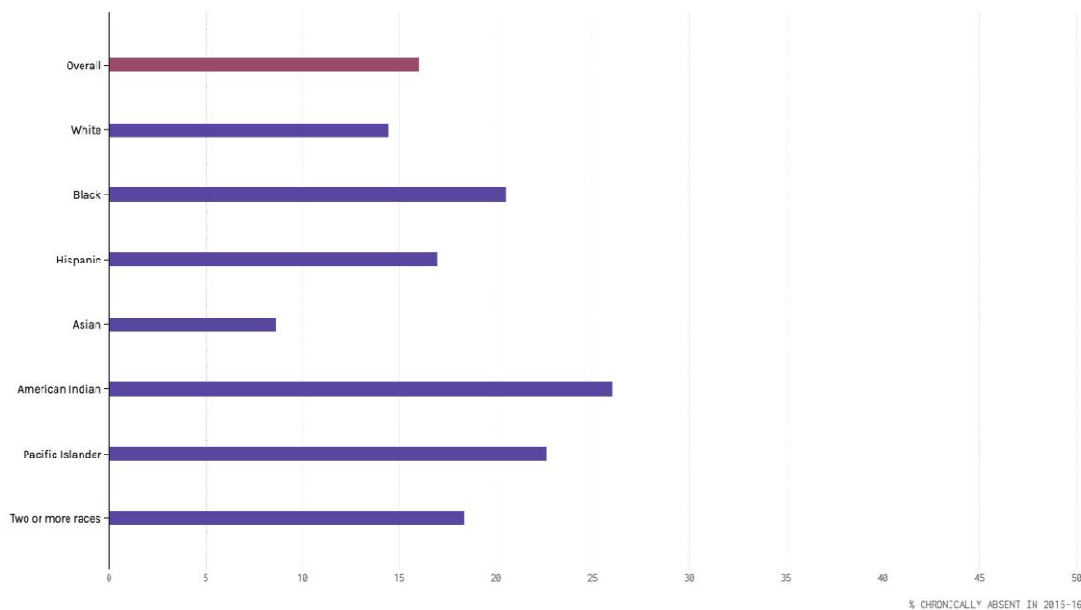
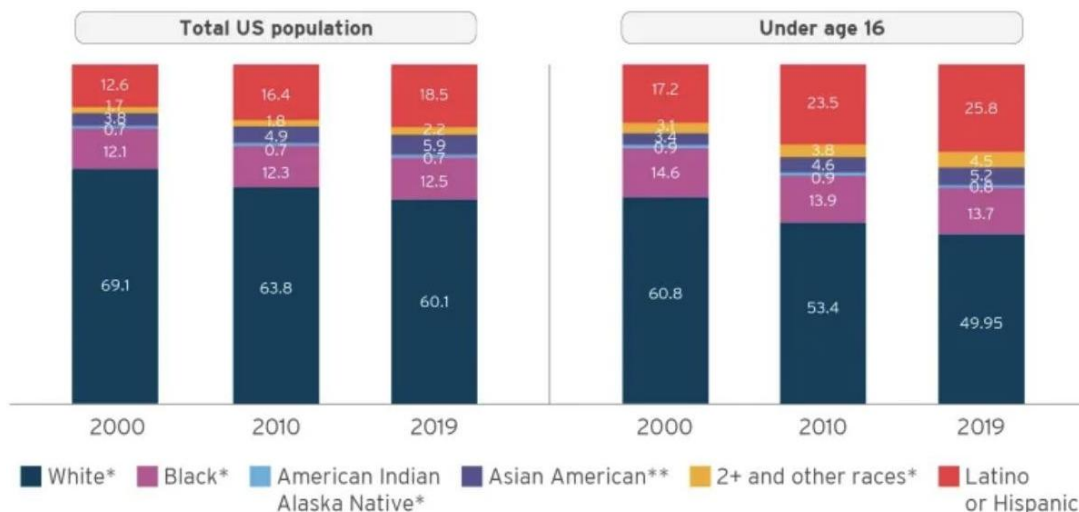


Fig. 3. Absenteeism by ethnicity
Source: US Department of Education, 2017



* members of race group who do not identify as Latino or Hispanic
* non-Latino or Hispanic Asians, Hawaiians and other Pacific Islanders

Source: William H Frey analysis of 2000 US Census and Census population estimates, released June 25, 2020

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Fig. 4. Racial profile of the US under age 16 populations

Chronic absenteeism spikes in high school for students of every race and ethnicity.

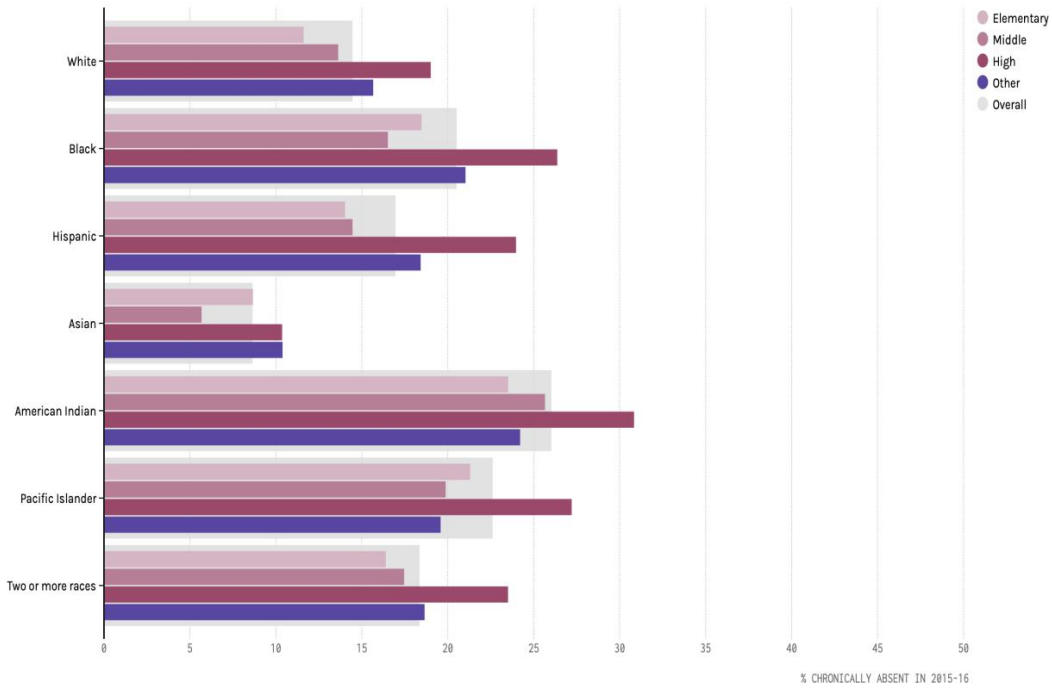


Fig. 5. Absenteeism by grade level and ethnicity

Source: US Department of Education, 2017

Most educators identify reading as a fundamental criterion for educational success, yet student proficiency—shown in Fig. 6 below—has remained static or declined even though class size dropped and massive federal intervention programs such as No Child Left Behind and Common Core were initiated specifically to improve student literacy:

Given the importance of writing ability in an interconnected world, our public schools

arguably devote more time to writing instruction than any other single subject. It begins in kindergarten, extends through high school, and is one of only a few subjects that almost every student is required to take as an undergraduate. The sheer amount of instruction would seem to ensure that our students graduate with superior writing ability, but that is not the case. As Fig. 7 shows, students' writing performance has remained unchanged for decades.

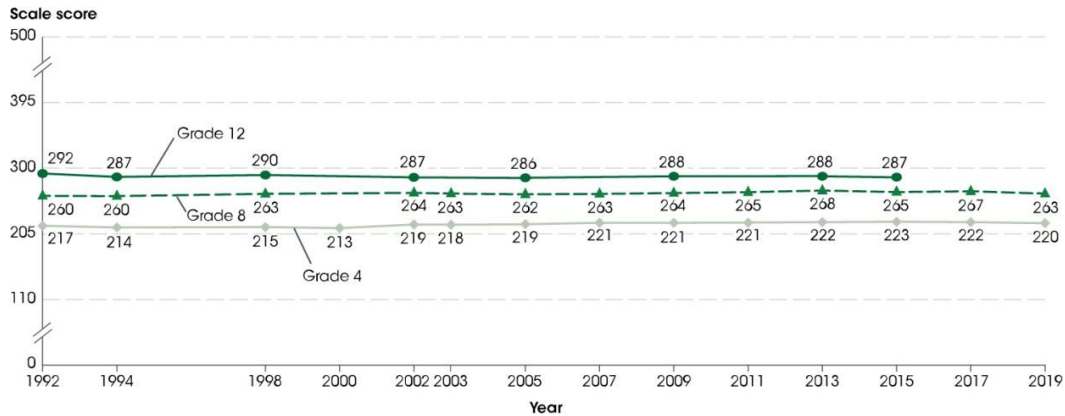


Fig. 6. Trend in reading scores for 4th, 8th, and 12th-grade students

Source: US Department of Education [13]

The consequences of our schools' failure to teach reading and writing is significant. Williams [10] reported that 40–80% of matriculating students test remedial in reading and writing (as well as in math). A majority of entering university students have never written an academic paper, and they have never read an academic text. When these students arrive at university, their teachers must accommodate them, which explains why the most commonly required books for undergraduates include titles such as those below, taken from common reading lists at Harvard, Princeton, and Yale, which overall have an average reading level of 7.6—that's halfway through 7th grade:

1. Letter from the Birmingham Jail (King)
2. The Prince (Machiavelli)
3. The Clash of Civilizations (Huntington)
4. Invisible Man (Ellison)
5. The Iliad (Homer)

The failure to ask high school students to read more varied and more challenging texts in a range of disciplines, such as science and economics—or at least to ask them to read at grade level + 1—has real consequences. A report from the Modern Language Association [14] found that 25% of 12th-grade students read below the basic level and are semi-literate.

Reading is foundational for writing, and the low reading levels of American students results in significant difficulties when they try to write. In an effort to increase motivation among teachers to provide more effective instruction and among students to work more diligently to improve their writing, the College Board added a writing

component to the SAT in 2005. Unfortunately, few students performed successfully on this component, which had a negative effect on their overall scores. Outrage and protests followed, prompting the College Board not only to make the writing portion “optional” but to change it from an assessment of writing ability to an exercise in *editing*. Students are provided a text that has various form errors (misplaced or missing punctuation, subject/verb agreement errors, and so on) and are instructed to correct them—essentially an editing exercise that has only marginal relevance to actually producing a text.

The failure of American students to produce effective writing has been examined from various perspectives, but most of the available evidence indicates that this failure is almost entirely the result of student illiteracy and faulty writing pedagogy. Eschewing the significant research on writing pedagogy from the 1980s, nearly all writing assignments students have received since the early 1990s consist of personal experience essays or thought pieces on the meaning of a work of literature [15,16]. None of these assignments has any relation to the writing required of students in their other courses, and they also have no correlation with what the students will be asked to produce when they enter the workforce. The reason is that such assignments are a form of what is known as *personal writing*—that is, writing for/to oneself, as in a diary. Professional writing is for others and it is agentive insofar as it is social, with the aim of affecting others, i.e., providing information, influencing decision-making, and so forth. Fig. 7 illustrates the lack of student progress.

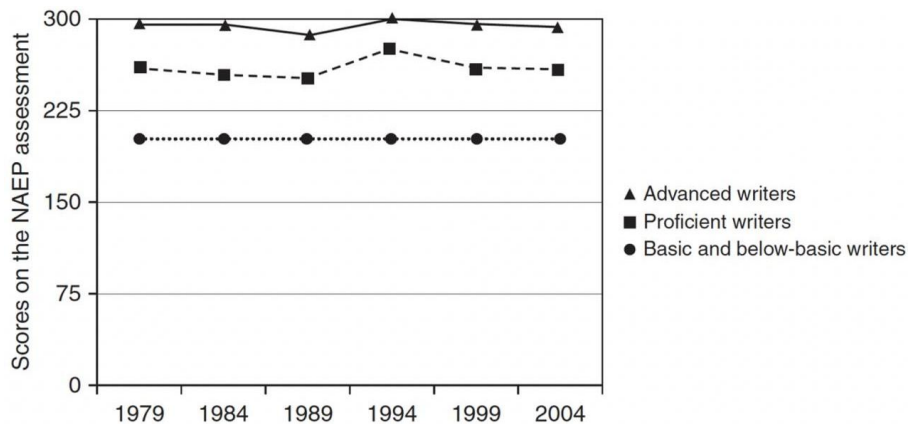


Fig. 7. Trend in 12th-grade writing performance
Source: US Department of Education [17]

The results of math instruction are equally troubling. The most recent data from the US Department of Education shows that although 4th-grade math scores improved 27 points between 1990 and 2009, between 2009 and 2019 they rose by only 1 point. With regard to 8th-grade math, it actually dropped 1 point between 2009 and 2019. More problematic is grade-12 performance, which shows no increase in math proficiency over nearly a 15-year period.

The US emphasis on science education began in the 1950s in response to the Soviet Union's launch of Sputnik, the world's first artificial satellite. Although this emphasis produced many highly productive scientists in the 1960s, science education has not kept pace with the increased demands for scientific training or the complexity of modern science. Fig. 9 below illustrates the problem, showing that our schools have not produced more scientifically knowledgeable students by 12th grade.

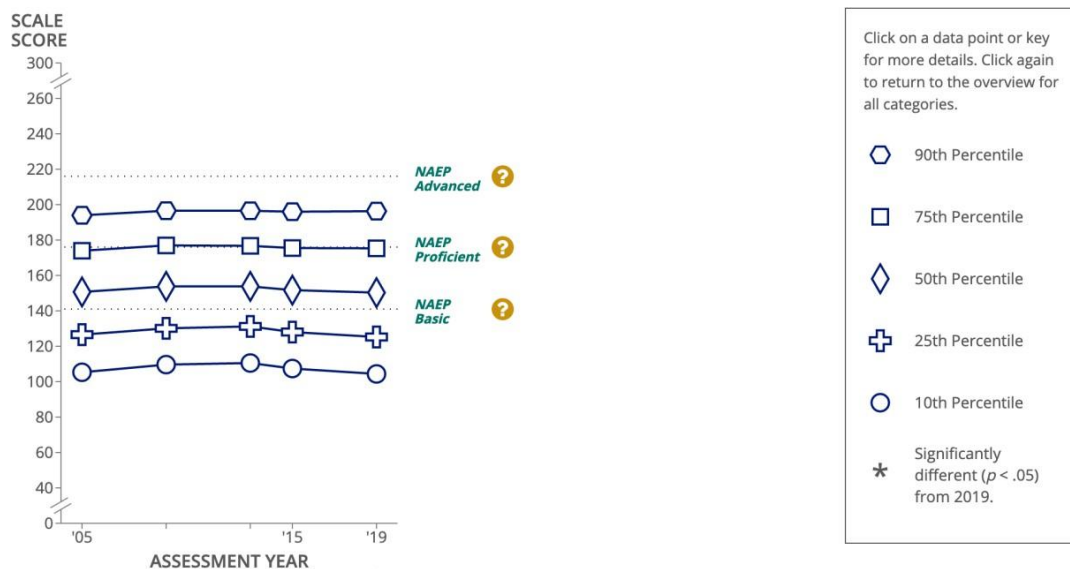


Fig. 8. Trend in 12th-grade math scores
 Source: US Department of Education [18]

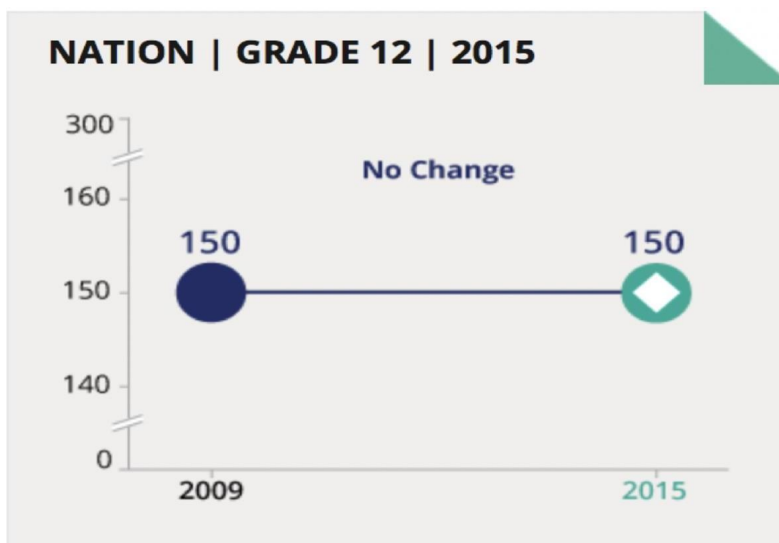
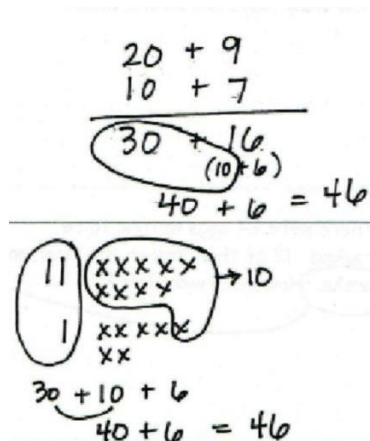


Fig. 9. 12th-Grade science report card
 Source: US Department of Education [19]

3. DISCUSSION

Although it is natural for students and parents to think of education in personal terms that commonly focus on admission to a college or university and finding sustainable employment, education is recognized at the national level as a significant factor in productivity. That is, education—or more properly educational achievement—is an important economic resource, or commodity, that sustains and ideally amplifies the nation’s productivity. For this reason, our students and the schools they attend are ultimately in competition with students and schools around the world. This reality adds yet another dimension to the issue of school funding, class size, and student performance.

Researchers are aware of these factors, but few parents are. What they see is that their children struggle to read and struggle to work through Common Core math, which has changed simple addition and subtraction into an incomprehensible jumble of Xs and arrows, as illustrated below for how 3rd graders are being taught to add 29 + 17:



When parents complain that their children are struggling with something as simple as addition, the response from our schools and politicians is always the same: schools need more money and smaller classes. They never mention the curriculum or pedagogy.

3.1 Inequality, Education, and Economics

Historically, education has been a central factor in upward mobility. The growing problem we have faced since the 1960s is greater awareness that education functions as a socioeconomic sorting mechanism, identifying

those who are good at certain types of tasks—remembering, analyzing, categorizing, and so forth—and who also have certain personality characteristics—patience, determination, self-motivated, able to think long-term. More than a hundred years of research and testing have demonstrated that a relatively small portion of the population has this combination of abilities and characteristics. Stated simply, a college education was never designed for everyone, certainly not for those who would fill the blue-collar jobs that have defined America’s middle class since the Industrial Revolution. Although efforts to change this elitist model have been effective, they came at a cost. Today, higher education does not prepare young people for much of anything other than disappointment.

This reality presents a significant problem to societies that not only embrace the idea of egalitarianism but strive to achieve it. As a nation, we have determined that the solution to the reality of inequality is to claim that it is the result of “social construction” rather than cultural and individual differences. That is, we are solely products of our environment, regardless of what the Human Genome Project has reported [20]. From this perspective, when a child fails at school or is unable to gain admission to a college, he or she is a victim of discriminatory social factors. There is no question that discriminatory social factors exist, but there also is no question that the characteristics listed above are not defined by those social factors.

Not everyone is capable of earning a college degree, and there are various reasons why this is so that have nothing to do with intelligence. The drive to lower standards, along with political proclamations that everyone should have a college degree, has resulted in overflowing college classrooms: it now takes a majority of undergraduates 5–6 years to finish owing to the fact that they cannot get the classes they need to finish in four. When they do graduate, they find that their degree has no exchange value and that in their chosen major, whether it be criminal justice or psychology or English literature, the unemployment rate is 75%.

Expressed in economic terms, the work-life benefits of education turned the associated costs of higher education into an investment rather than a fee, and this investment message has come to permeate America even as unemployment figures for recent graduates continue to rise.

The narrative of income differentials between those who have a high school diploma and those who have a college degree remains powerful beyond all reason, and it is delivered in every conceivable way—through movies, TV, books, teachers, and parents. Yet today an elementary school teacher with a master’s degree and at least six years of higher education is lucky to make \$60,000 per year. Meanwhile, a high school graduate who takes six months of training to become a BMW mechanic can make up to \$125,000.

Education is not exempt from the forces of commodification that began changing the US economy in the mid-1970s. In a few short years, the nation embraced the perception that education, unlike, say, a shirt or a rug, is linked to *potential income*. If debt-based consumerism could provide for life’s necessities, it could provide for higher education. The federal government became a “bank” for students and their parents who sought loans to pay for education. The democratization of higher education accelerated—but for the wrong reasons.

From 1980 to 2020, the number of college and university students in the US grew from 8.5 million to 18.5 million. Total student loan debt

rose from approximately \$10 billion in 1980 to \$1.6 trillion today. The average college graduate steps into the adult world with an average of \$35,000 in student-loan debt that may take 10 or 15 years to pay off.

Efforts to make the SAT easier have sought to increase scores so as to increase the number of students accepted into college. As enrollments rose, so did tuition, in many instances at much as 2,000 percent [10]. Even so, African Americans and Hispanics lag behind Asians and whites. The arguments against using the SAT as an admission tool shifted to socioeconomics: students with high scores must come from more affluent households, enjoying all the associated advantages (assumed to include access to walls of books, private tutoring, boating on yachts, and international travel) that minority families lack. The problem with this argument is that when researchers examined scores on the basis of family income and race, they found that even when socioeconomic factors were the same—family income, home life, neighborhood, etc.—race continued to differentiate SAT scores, as illustrated in Fig. 8.

With regard to the first-year writing classes that all students are required to take, there was an increase in personal experience assignments

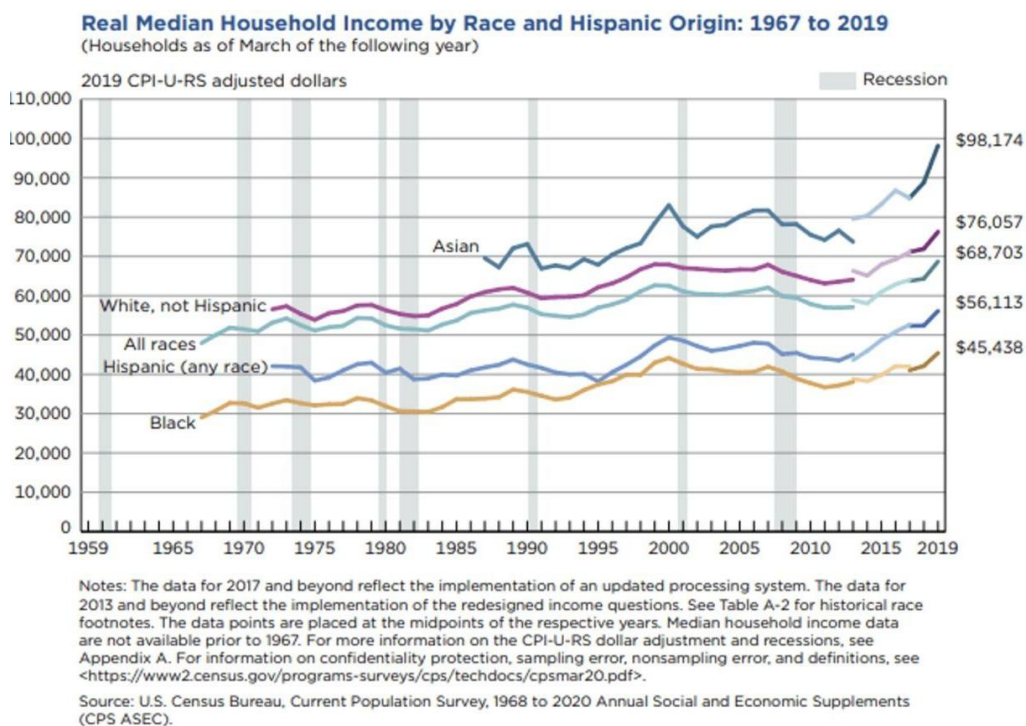


Fig. 10. Mean sat scores by race and family income*

(What did you do over your summer vacation?), a reduction in paper length from an average of 5 pages to an average of 3, and an increase in “feeling” assignments (“How did Lenny’s death at the end of Steinbeck’s *Of Mice and Men* make you feel?” [15]. History departments chose to ignore President Kennedy’s comment on history: “There is little that is more important for an American citizen to know than the history and traditions of his country. Without such knowledge, he stands uncertain and defenseless before the world, knowing neither where he has come from nor where he is going” (np). They began focusing on social issues, even though they are not sociologists.

One consequence of lowering admission standards is that the caliber of students admitted today is below what it was in the past. Nationwide, the number of students needing remediation (in reading, writing, and/or math) upon entering college varies widely, from a low 30% to a high of 70% [21,22]. The numbers are higher at community colleges—80% at some schools [23].

4. CONCLUSION

The remediation efforts are well-intended, although they obviously raise further questions about the efficacy of our public education system, but the data indicate that they are not very effective. The National Conference of State Legislatures [24] reported that, nationwide, only 17% of students enrolled in remedial reading and 27% of students enrolled in remedial math completed a degree—and that it took 6 years or more to do so. In our community colleges, the dropout rate for those requiring remedial courses can be as high as 80%. These students don’t receive a degree when they walk away, but they nevertheless carry considerable debt. For them, education was not an investment.

COMPETING INTERESTS

Author has declared that no competing interests exist.

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