May 2000

Education Policy Analysis Archives 08/23

Arizona State University

University of South Florida

Education Policy Analysis Archives

Volume 8 Number 23 **May 12, 2000** **ISSN 1068-2341**

A peer-reviewed scholarly electronic journal
Editor: Gene V Glass, College of Education
Arizona State University

Articles appearing in **EPAA** are abstracted in the *Current Index to Journals in Education* by the ERIC Clearinghouse on Assessment and Evaluation and are permanently archived in *Resources in Education*.

School-based Standard Testing

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Abstract
School-based standard testing continues to evolve, yet in some ways it remains surprisingly close to its roots in the first two decades of the twentieth century. After use for many years as a diagnostic and as a filter for access to education, in the closing years of the century it has been pressed into service for state-run political accountability programs. In this role, it is generating vehement controversy that recalls protests over intelligence testing in the early 1920s. This background article explores primary characteristics and issues in the development of school-based standard testing, reviews its typical lack of qualification for political accountability programs, and suggests remedies to address major problems. In general, the attitude toward new techniques of assessment is skeptical, in light of the side-effects and unexpected problems that developed during the evolution of current techniques.

Survival of the Fittest

School-based standard testing began a dream decade in the early 1950s, driven by

waves of public anxiety over Soviet "dominos," nuclear weapons, Sputnik and the "missile gap." Now, so many years later, it can be hard to imagine the intensity of fears that the Russians were ahead of everybody else— not just in the size of their standing army but in scientific knowledge, inventions and industry. There was widespread agreement that the U. S. needed to identify talented people and train them for critical occupations. (Note 1)

Of course we know more of the dreary facts today— a Russia of gray poverty and workplace spies, burdened with heavy but narrow investment to produce arms, rockets and nuclear bombs. But in those times, who knew? We saw North Korea fortified with MiG-15s, the Hungarian revolt crushed with Russian tanks, and then the Berlin wall built. Russia had been four years behind the U. S. in testing an atomic bomb but only one year behind with its first thermonuclear blast. And although the U. S. employed the Nazi rocket designers from World War II, Soviet Russia had a space satellite first— winking at us and mocking "the American century."

And so it was, into the breach against Godless communism, (Note 2) that we launched our homespun Scholastic Aptitude and Iowa tests. Few questioned the methods or values. In the climate of those days, school-based standard testing was an engine of progress. (Note 3) It would promote technical expertise and fairly chosen leadership to right the balance and put America first again.

Background

School-based standard testing (Note 4) aims to provide uniform, rapid measurement of some kind of mental capability that is related to education. There are many other assessments related to responsibilities or occupations rather than schools. These include, for example, tests for motor vehicle drivers, aircraft pilots, divers, plumbers and power plant operators. Historical precedents for competence testing can be traced to the ancient civilizations of China (Note 5) and Rome. However, until relatively recently education operated mainly as a craft. Teachers and schools tested their students and applicants, sometimes intensely, but there was rarely interest in tests that would be applied uniformly and rapidly to large groups of students in diverse situations. Key educational credentials were instead the evaluations of students by individual teachers and schools.

It may have been public education, more than any other factor, that inspired interest in school-based standard testing. (Note 6) The U. S., with the strongest history of public schools, also had the strongest early interest in standard testing. Perhaps it should not be surprising that the country which implemented the concepts of standard machine parts and mass production should also be the country that most eagerly adopted standard testing in its rapidly growing education enterprises (see Cremin, 1962, pp. 185-192). The Yankee attitude can be perceived in the pursuit of uniformity and efficiency.

Standard Tests

The distinguishing features of a standard test are uniform administration and some form of calibration. Before routine use, standard tests or component items will be tried out with groups intended to represent populations of test- takers. These trials are used to measure distributions of scores and other properties of a test (Rogers, 1995, pp. 256-257 and 734-741). After calibration, test scores are typically reported by using a formula derived from the calibration (to percentile ranks, for example). Beginning in the 1910s, statistical metrics were developed to characterize test items and report scores (Rogers, 1995, pp. 197-208, 317-325 and 382-388). The IQ score and the SAT scaled score

ranging from 200 to 800 are among the well-known metrics.

A quantitative approach helped give standard tests the appearance of objectivity and encouraged a test format that is easily adapted to numerical scoring. Multiple choice and short answer questions quickly became the conventional format. Such questions are scored only as right or wrong. While in principle there is nothing to prevent a standard test from using essays, extended reasoning and scales of partial credit, reliable scoring of extended answers and essays requires careful training and monitoring of test evaluators and substantially more effort. Rushed and inept evaluation of extended answers can be at least as troublesome as restricting testing to multiple choice and short answer formats.

Standard tests have long been distinguished as having "speed" or "power" formats, meaning that they are strictly timed or that they are loosely timed or untimed (Rogers, 1995, p. 256, and Goslin, 1963, pp. 148-149). The distribution of scores is deliberately widened by strict timing. Many common school-based standard tests, including the Stanford, California and Iowa achievement tests, claim to measure knowledge and skill but are in fact "speed" tests. More recent distinctions are proposed between so-called "norm-referenced" and "criterion-referenced" tests (Rogers, 1995, pp. 653-666). Supposedly a "norm-referenced" test has a calibration relative to a population, while a "criterion-referenced" test has an absolute standard (for example, basic competence to drive a motor vehicle). However, for practical purposes nearly all school-based standard tests are "norm-referenced," because critical decisions about how to use the scores are made after score distributions have been measured. We used to call this "grading on the curve." In fact, wild attempts to produce "criterion-referenced" tests, without knowing how many people can actually pass them, generate some of the horror stories of testing.

Another recent and somewhat misleading distinction is so-called "high- stakes testing," meaning the use of test scores to make decisions that critically affect people. Supposedly this is a new practice. Actually it is quite old; parts of the Chinese civil service were closed to applicants who could not pass required examinations more than twenty centuries ago (Reischauer and Fairbank, 1958, p. 106). Beginning in the nineteenth century, standard tests were developed to place students in French schools according to ability. During World War I, U. S. Army recruits were assigned to combat or support missions on the basis of IQ scores.

According to current psychometric standards, it is improper to use a test for some purpose for which it was not "designed." Ninety years ago, however, intelligence tests were quickly appropriated to identify "morons," "imbeciles" and "idiots," who were then to be sexually restricted. Claims were advanced that experienced testers could readily identify "feeble-minded" people by observation (Gould, 1981, p. 165). We are not as far away from those days as some would like to think. Recent applicants who failed a new, uncalibrated teacher certification test were denounced as "idiots" by a prominent Massachusetts politician. (Note 7) Although some strong advocates of standard testing were once inspired by egalitarian views (such as Conant, 1940), standard tests have long been instruments for social manipulation and control. In an irony of the late twentieth century, tests like the former Scholastic Aptitude series, once praised as breaking the stranglehold of social elites on access to higher education, became barricades tending to isolate a new, test-conscious elite which, as we will see, largely tracks the social advantages of the old elite.

Aptitude, Achievement and Ability

School-based standard testing is largely a phenomenon of the twentieth century. An early product, the "intelligence scale" published by Alfred Binet and Théodore Simon in

1905, was intended to identify slow learners. By the 1920s, the testing movement had split into two camps which remain distinct today (see Goslin, 1963, pp. 24-33). The Binet-Simon scale and its offspring— such as the IQ test produced by Lewis M. Terman in 1916, the Army Alpha and Beta tests organized by Robert M. Yerkes during World War I, and the Scholastic Aptitude Test designed by Carl C. Brigham in 1925— all claimed to measure "aptitude." The essay exams of the College Entrance Examination Board, founded in 1900, the Stanford Achievement tests, first published in 1923, and Everett F. Lindquist's Iowa Every-Pupil tests, developed in the late 1920s and early 1930s, claimed instead to measure "achievement."

Tests of "aptitude" try to measure capacity for learning, while tests of "achievement" aim only to measure developed knowledge and skills. From their earliest days, standard aptitude tests have been clouded in controversy. It has never been clearly shown that "aptitude" can be measured separately from knowledge and skills acquired through experience (see Ceci, 1991; also see Neisser, 1998, and Holloway, 1999, on changes over time). Standard achievement tests, while nominally free of these snares, share assumptions about language and cultural proficiency. Performance on almost any test is strongly influenced by language skills. Likewise, all tests rely to some degree on trained and culturally influenced associations and styles of thinking. Despite longstanding claims of distinct purposes, standard aptitude and standard achievement tests may have more similarities than differences.

Standard achievement test scores tend to correlate with standard aptitude test scores, as shown by Cole (1995) and others. To some observers, such as Hunt (1995), this simply shows that bright people learn well, and vice-versa. To others, it suggests that much of what is being tested might be called test- taking ability (see Hayman, 1997, and Culbertson, 1995). Most content of the widely used school-based standard tests can be viewed as collections of small puzzles to be solved rapidly by choosing options or writing brief statements. Such a pattern of tasks is rarely encountered by most adults in everyday life.

By design, the times allowed to complete standard tests are typically too short for a sizeable fraction of test-takers, putting great stress on rapid work and leaving little opportunity for reflection. For some strictly timed tests favoring men it has been shown that the same tests conducted without time limits favor women (see Kessel and Linn, 1996). Standard test designers may assign high scoring weights to test items written to be ambiguous, so that they will encourage wrong answers (see Owen and Doerr, 1999, pp. 70-72). Right answers are guided in part by trained or culturally acquired associations— intuitions about a test designer's unstated viewpoint. When ambiguous questions are removed, differences in scores between ethnic groups may be reduced. Test designers sometimes say that ambiguous questions "stretch the scale," differentiating the more skilled from the less skilled. Owen and Doerr (1999, pp. 45 ff.) suggest instead that they raise the scores of test-takers who have the favored patterns of associations and thinking.

The stressful properties of a typical standard test make test-taking into a sort of mental gymnastics, an ability that may well have its uses but does not necessarily predict performance in other situations (see Sacks, 1999, pp. 60- 61). We recognize many special skills, such as remembering complex patterns in card games, multiplying numbers in one's head, or solving crossword puzzles. People who do these things deftly may also perform well in other pursuits, or they may not.

Predictive Strengths

Standard tests are promoted on the basis of claims to predict future performance. Their predictive strengths are measured by how well they do this. Despite heavy use of standard tests in circumstances that may critically affect people's lives, there have been remarkably few evaluations of these tests by organizations independent of the test vendors. The underlying substance of predictive evaluations is sometimes shallow. For example, it may be claimed that a standard test required for acceptance to a school program helps to predict the likelihood of graduation, when a key criterion for graduation is the score on a similarly organized standard test.

For a standard test to be useful, it cannot merely predict performance to some degree. It must significantly improve the accuracy of prediction over readily obtained information. Unless it does so, the effort of testing is wasted. (Note 8) During the last forty years, predictive strengths of the SAT, ACT, GRE and similar aptitude tests have been independently evaluated. Scores from these tests improve predictions of first year grades by at most a few percent of the statistical variance over predictions based solely on previous grades, family income and other personal factors. (Notye 9) For later and broader measures of performance, the predictive strengths of these tests evaporate. Sometimes negative correlations have been found— lower performance associated with higher scores. (Note 10) In response to the low predictive strengths of standard aptitude tests, growing numbers of colleges have stopped requiring them as part of applications. (Note 11)

Predictive strengths of standard tests are falsely enhanced when they are used to "track" or group students in schools, providing extra opportunities to some while denying them to others. The favored students stand to gain not only skills and knowledge but also self-esteem, which has been shown to correlate with higher test scores. (Note 12) Ability grouping based on standard tests is a form of "high-stakes testing" which has been practiced for at least 80 years in U. S. public schools. We can clearly distinguish between the selection procedures of public schools, which have a legal duty to treat every student fairly, and those of taxpaying private institutions, which may not. Of the public schools, we can surely ask, "Why not provide opportunity to everyone?"

Beyond the schoolhouse door, school-based standard tests show hardly any predictive strength for creativity, professional expertise, management ability or financial success. (Note 13) However, these tests stress either generalized test-taking abilities or subjects that are only occasionally relevant to adult life. Tests for competence in specific skills have been used successfully to predict whether workers can perform tasks that require those skills. For example, some temporary employment agencies now administer technical skills tests to new job-seekers before sending them out to interview with potential employers. This practice has increased employer satisfaction with job performance.

Errors of Testing

All measurements are subject to potential error. Compared with physical measurements, the errors in standard test scores are enormous. There are many sources of error. These include:

- Mechanical errors in transcribing short answers or multiple choice answers
- Consistency errors in scoring essays or extended answers
- Computer errors when calculating or reporting results
- Systematic errors from varying difficulty of different test versions
- Random errors arising from the physical or mental states of test-takers

- Bias errors: test designs that favor some groups of test-takers over others
- Content errors: test items that do not accurately cover the intended material

Vendors and promoters of standard tests do not often discuss errors of testing. When they do, they usually bury information in opaque language, tables and formulas found in "technical reports" that may be hard to obtain. Careful reading of such information often reveals defects in the error evaluation as well as large errors.

Test vendors typically present themselves as diligent in reducing or eliminating mechanical, consistency, computer and systematic errors. There are well developed methods for controlling these gross errors. However, such errors do occur. Advanced Systems, a company used by the Massachusetts Board of Education since 1986, was embarrassed by errors in score reporting in Kentucky and lost its Kentucky contract in 1997 (see Szechenyi, 1998, and "Problems," 1998). Gross errors seem to be more common with smaller and newer test vendors than with larger and longer established ones.

The most common error measurement for a standard test is its "reliability." By convention, this describes the range of scores which a test-taker would receive in taking repeated, comparable versions of a test (Rogers, 1995, pp. 61-62, 368-378 and 741-743). A narrow range means high reliability: a test-taker would be likely to receive about the same score on repeated tests. Because training effects occur when tests of a particular type are actually repeated, indirect methods must be used to estimate reliability, such as mathematical models. Details of these methods can be adjusted to change estimates of reliability.

When mechanical, consistency, computer and systematic errors have been well controlled, reliability mainly measures random errors arising from unpredictable, individual circumstances of test-takers. Such errors are often larger than is generally known. As cited by Owen and Doerr (1999, p. 72), the Educational Testing Service has estimated that, on average, individual differences of less than 70 points for its SAT Verbal scores and 80 points for its SAT Math scores are not significant. These margins increase for high scores. Massachusetts (1999a, p. 86, Table 14-4) has estimated there is only about a 56 percent chance that a fourth-grader who is advanced in English language arts, according to its standards, will receive an "advanced" rating on its MCAS fourth-grade English language arts test.

People who are unfamiliar with the large random errors of standard test scores often assume that the scores can be used reliably to rank-order test-takers according to ability. In fact, random errors of testing are so great that scores can be used at most to classify individuals in a few levels. Using only four levels to classify MCAS scores, Massachusetts (1999a, p. 86, Table 14-4) has estimated substantial likelihoods, ranging from 8 to 46 percent, that an MCAS test-taker will be misclassified.

Many types of bias errors have been discovered in standard tests. For example, if the format of a test is changed from multiple choice to essay, different groups of test-takers are favored. A study performed by the Educational Testing Service found that multiple choice questions on its advanced placement tests favored men and European-Americans, while essay questions favored women and African-Americans (cited by Sacks, 1999, p. 205). Grouping test-takers with high essay and low multiple choice scores and those with the reverse pattern, the study showed comparable college grades for the two groups but a sixty point difference in their average Educational Testing Service SAT scores, in favor of the group with high multiple choice scores (Sacks, 1999, p. 206).

People tested using a language in which they are not fluent are likely to do much worse than native speakers of the language. Tests that require reading, in the formats used for most standard testing, assume reading proficiency. Individuals with poor reading proficiency, whatever the cause, are at major disadvantage with respect to others who do not have such limitations. Bias caused by test timing and ambiguous questions has been previously mentioned. Most attempts to compensate for bias involve identifying substantially impaired individuals and providing them extra test time. There is little evidence that test bias is actually corrected with this approach (see Heubert and Hauser, 1999, p. 199).

Perhaps the greatest source of bias and content error in school-based standard testing is the conventional process of standard testing itself, as contrasted with rating actual performance. When an educational assessment should measure success at significant tasks, such as writing a research report or investigating a technical theory, it may be impossible to design a standard test with much accuracy or predictive strength. In the U. S., there has been a movement toward replacing standard testing with criterion-based "performance assessment" (see Appendix 6). A goal of this movement, also called "authentic assessment," is eventually to integrate educational testing with the ordinary processes of teaching and learning. There have been attempts to use performance assessment as part of state testing programs in Kentucky (1990-1997) and California (1991-1995), reviewed by McDonnell (1997, pp. 5-8 and 62-65).

School Accountability

The performance of public schools became an issue in the U. S. almost soon as support for public education began. In 1845 the Massachusetts Board of Education printed a voluntary written examination to measure eighth-grade achievement. Most students could not pass the test. Schoolmasters complained that knowledge tested did not match their curricula. After a few years the test was abandoned (see Appendix 2). In 1874 the Portland, Oregon, school superintendent distributed a curriculum for each of eight school grades. At the end of the school year, he administered written tests on the curriculum. Test scores were published in a newspaper. Based on test scores, less than half the students were promoted that year and the following year. An uprising by parents and teachers then led to dismissal of the superintendent and an end to the practices of publishing scores and denying promotion on the basis of a test score alone. (Note 14) Since those days similar initiatives and reactions have often occurred throughout the U. S..

The U. S. has sponsored a continuing expansion of public education for 350 years. Most people did not expect to graduate from eighth grade until late in the nineteenth century. High-school graduation became a normal expectation only in the 1930s. Today, we are still struggling with rising expectations that include college. At each stage of this growth, critics have condemned the lowering of educational standards and demanded accountability. However, each of these stages can also be seen as intrusion into a formerly elite province of education by large numbers of students who would previously have been excluded. For several years, levels of performance go down as the system adapts to less prepared students. Over a longer period, curricula change, often abandoning cultural traditions for more practical approaches.

School accountability became a public demand during the first two decades of the twentieth century. (Note 15) Over the ten years from 1905 through 1914 the U. S. accepted the largest flow of immigrants in its history, averaging more than a million per year. Immigration, coupled with stronger school attendance laws, raised school enrollments and increased the fraction of students for whom English was not a native

language. Declines in student achievement were noticed and became an object of public concern.

At first standard tests were used to document declining student achievement, but they did not provide a method to improve it. By 1920 many urban school systems had started to use the newly available intelligence tests to measure student aptitude; they grouped students in classes by IQ. (Note 16) Educators hoped to improve performance by providing instruction that was adjusted to student aptitudes. In 1925 a U. S. Bureau of Education survey (cited by Feuer et al., 1992, p. 122, footnote 91) showed that 90 percent of urban elementary schools and 65 percent of urban high schools had adopted this approach. As immigration declined and school attendance became more uniform, student achievement tended to stabilize, and public concern relaxed. Despite warnings from progressives such as John Dewey and Walter Lippmann about a "mechanical…civilization" run by "pseudo- aristocrats" (Dewey, 1922), IQ testing and the multiple choice test format had acquired prestige as techniques to improve public schools.

Strong U. S. demand for school accountability arose again in the 1970s through the 1990s. This time aptitude testing and finances played significant roles. Acceptance of Scholastic Aptitude Test scores as a measure of merit by highly selective colleges was regarded by many people as sanctioning a measure of merit for public schools. Average SAT scores for schools and communities began to circulate as tokens of prestige or shame. During the period from 1963 through 1982, the Educational Testing Service reported a continued decline in its national average SAT scores, followed by a slower recovery, as shown by the scores in Table 1.

Table 1
SAT National Average Scores

Test / Year	1963	1980	1995
SAT Verbal	478	424	431
SAT Math	502	466	482

Source of data: Ravitch, 1996.

These scores, scrutinized year after year, were used by the press, broadcast media and opportunist politicians to stir up a new sense of crisis. Once again, the public schools must be failing.

The charges were false. Accurate tracking of changes over time requires painstaking steps to assure that both the measurements and the groups being measured are comparable at each point. As shown by Crouse and Trusheim (1988, pp. 133-134) and by Feuer et al. (1992, pp. 185 ff.), the groups being measured by SAT scores changed drastically. Increases in scholarships and loans, affirmative action programs, and awareness of long-term financial rewards produced more applications to selective colleges. The number of colleges requiring SAT scores more than doubled. As a result, the number of students taking the SAT series for college applications grew from 560 thousand in 1960 to 1.4 million in 1980, an increase of 150 percent over a period in which public school enrollment grew only 16 percent. Students with lower high-school grades were taking these tests who would not have taken them in previous years. Spreads in scores increased significantly, reflecting more diversity in test-takers. Berliner (1993) shows that SAT scores of students with similar characteristics were

actually increasing.

Other school-based standard tests do show changes over this period, but they are not parallel trends. Beginning in 1969, reading, writing, science and mathematics skills have been measured by the National Assessment of Educational Progress (NAEP), a federal research program. Scores remained roughly steady through 1996, with typical average scores of 280-300 points at the high-school level and typical changes across this period of less than 10 points (see Appendix 1). NAEP reading comprehension scores would probably have fallen and then risen along with SAT Verbal scores if the SAT scores reflected real changes in education. Actually NAEP high-school reading scores were flat within a band of ± 1% over the entire 1971-1996 period. There may have been declines in science during the 1970s, but changes in NAEP procedures make them uncertain. During the past 20 years, at the high-school level there appear to have been modest gains in science and math and a slow but persistent decline in writing skills (while SAT Verbal scores were rising). Overall patterns of NAEP scores indicate little change in educational achievement. However, these research results do not generate flashy headlines or sound bites, and they are usually ignored.

The other major cause of concern during the last three decades of the twentieth century has been the increasing cost of public schools (see Appendix 1). Proportionately spending rose even faster from 1950 to 1970, but that was also a period of rapid growth in school enrollment, the "baby boom" generation, and a period of anxiety over the possibility of nuclear war. Annual, inflation-adjusted public school spending grew from about $1,570 per student in 1950 to $3,720 in 1970 and $7,140 projected for 2000 (all in 1998 dollars). Total public school spending climbed even during the 11 percent enrollment drop from 1970 to 1980. By demanding accountability the public has in part been seeking value in return for its reasonably generous support.

"School Reform"

Accountability is a political concept, not an educational one. The public figures who talk about it loudest today want "school reform," a familiar war cry in U. S. politics. (Note 17) The measures many current "school reformers" promote are:

- Frequent school-based standard testing with "high goals"
- Publication of scores for individual schools or districts
- Denial of school activities and diplomas to students with low scores
- Removal of principals and teachers in schools with low scores

Some politicians go further. (Note 18) In 1983, the Reagan administration embraced a system that would circulate test scores to colleges and employers, maintaining permanent national dossiers of people's test records. The Bush administration proposed legislation in 1991 including these concepts, but it was defeated in Congress. Just what such a program might do to people never seems to have been a concern for the "school reform" promoters.

In the name of "school reform," without any federal mandate, state legislatures and politically controlled state education boards have been increasing the use of standard tests in public schools and the punishments for low test scores. Typical of the state-run "school reform" programs are the following measures:

- Statewide standard achievement tests in several or all school grades
- Statewide standard tests for course credit, promotion and graduation

- "Curriculum frameworks," or required curricula, "aligned" to standard tests
- Access to advanced courses and special programs based on standard test scores
- Athletic team participation and student privileges based on standard test scores
- Special diplomas, honor programs and scholarships based on standard test scores
- Classification of school performance based on standard test scores
- Publication of test scores or classifications by school or by district
- Publicity about school testing requirements, changes and schedules
- Financial support for "test preparation" consultants and materials
- Financial incentives for administrators and teachers to achieve high test scores
- Removal of administrators and teachers in schools with low test scores
- State seizure or closure of schools with low test scores

Also associated with "school reform" are movements to support religious schools via "school choice" and financial "vouchers" and initiatives to create privately run "charter schools."

In 1980 eleven states required minimum scores on their standard tests to receive a high-school diploma. By 1997 seventeen states enforced such a requirement (National Center for Education Statistics, 1999, Table 155). During the years 2000-2005 several states, including Alaska, California, Delaware, Massachusetts, New York and Texas, are planning one or more of the following "school reform" initiatives:

- Add standard tests for course credit, promotion or graduation.
- Raise or begin enforcing required scores.
- Dismiss principals of low scoring schools.
- Place low scoring schools in receivership.

About two-thirds of the current states with high-school graduation tests are southern or southwestern states; they tend to have larger fractions of poverty and low-income households than the national averages. The students who are denied high-school diplomas typically come from the most disadvantaged households in those states.

Texas has a program often pointed to by "school reform" advocates as a model (see Appendix 4). The program is politically controlled by the governor and state legislature. It has changed several times since its inception in 1984. The key feature for the last ten years is a test system called TAAS, which includes high school graduation requirements. Under this system, there have been reports of weeks spent on test cramming and "TAAS rallies." School ratings are raised by "exempting" students. Schools are allowed to contract for "test preparation" consultants and materials, and some have spent tens of thousands of dollars. There have been reports of falsifying results. In April, 1999, the deputy superintendent of the Austin school district, which had shown dramatic score improvements, was indicted for tampering with government records. In Houston three teachers and a principal were dismissed for prompting students during test sessions ("TAAS scandal," 1999). Official Texas statistics claim reductions in school dropouts, but independent studies consistent with U. S. government data show persistent increases, with 42 percent of all students failing to receive a high school diploma as of 1998 ("Longitudinal Attrition Rates," 1999). Students identified by Texas as black or Hispanic are disproportionately affected. In some schools 100 percent of students with limited English proficiency drop out (IDRA, 1998). Illiteracy remains a major problem in Texas,

and it appears to be worsening.

New York has recently released part of the initial results from its new high- school graduation tests. Based on currently required scores, they show that diplomas are likely to be denied at about twice the statewide rate to students in New York City who complete high school (see Appendix 3). The city has the largest concentrations of poverty in the state. In five years New York will increase the required scores by abolishing so-called "local" diplomas. The probable result will be an even more severe impact on students from poverty and low-income households.

State-run "school reform" has operated largely on the basis of beliefs, not evidence. There is little evidence that these programs actually work as intended. Feuer et al. (1992), show that claims for improved achievement, as measured by test scores, are often hollow. They are commonly a result of training students to take the standard tests (also see Sacks, 1999, pp. 117-151). When a new series of tests is substituted, scores typically return to levels, measured against national norms, that are similar to scores when the previous series of tests began.

If "school reform" has caused substantial improvement in student achievements, measurements performed by the National Assessment of Educational Progress (NAEP) ought to reveal it. This longstanding federal research program has taken care to provide broad coverage of educational content, to maintain consistency in its testing over time, and to avoid test formats with sources of bias such as hectic pacing and heavy dependence on reading proficiency in tests other than reading (see Feuer et al., 1992, pp. 90-94). Test formats use multiple choice, short answer, extended answer and essay questions, with scales of partial credit. Since participating schools change, there is little opportunity or incentive for students to be taught the tests. From about 11,000 to 44,000 students participated in each of the test series given from 1982 through 1996.

Most of the geographically segmented data published for the NAEP are grouped by regions rather than by states. The Northeast region includes Connecticut, Delaware, District of Columbia, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island and Vermont. From 1982 through 1996 none had a major "school reform" program; only one of the twelve had a high-school graduation test (only New York; see National Center for Education Statistics, 1999, Table 155). The Southeast region includes Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, Virginia and West Virginia. From 1982 through 1996 all had major "school reform" programs and eleven of these twelve had high-school graduation tests (all except Kentucky; see National Center for Education Statistics, 1999, Table 155). Average NAEP scores reported for these two regions from 1982 through 1996 are shown in Table 2.

Table 2
NAEP Regional Average Scores, 1984 and 1996

Reading Scores	**Northeast**			**Southeast**		
	1984	**1996**	**Change**	**1984**	**1996**	**Change**
Grade 11	292	291	-1	285	279	-6
Grade 8	260	261	+1	256	252	-4
Grade 4	216	220	+4	204	206	+2

Writing Scores	**Northeast**	**Southeast**

	1984	1996	Change	1984	1996	Change
Grade 11	291	290	-1	287	273	-14
Grade 8	273	264	-9	267	260	-7
Grade 4	212	213	+1	204	200	-4

Math Scores	**Northeast**			**Southeast**		
	1982	**1996**	**Change**	**1982**	**1996**	**Change**
Age 17	304	309	+5	292	303	+11
Age 13	277	275	-2	258	270	+12
Age 9	226	236	+10	210	227	+17

Science Scores	**Northeast**			**Southeast**		
	1982	**1996**	**Change**	**1982**	**1996**	**Change**
Age 17	284	296	+12	276	288	+12
Age 13	254	255	+1	239	251	+12
Age 9	222	234	+12	214	224	+10

Source of data: National Center for Education Statistics, 1997.

If a case can be made for improvement that may have been caused by "school reform" it is in math and science, where both regions had score improvements but those of "school reform" states were better. However, "school reform" states had worse changes in reading and writing scores. The Northeast, without major "school reform," improved scores an average of 2.8 points, while the Southeast, under major "school reform," improved scores an average of 3.4 points. With the random errors in scores estimated for NAEP, the difference in these results has no statistical significance (National Center for Education Statistics, 1997, pp. iii-vi). At the high-school level, the changes measured in "school reform" states were somewhat better in math, the same in science, somewhat worse in reading and substantially worse in writing. Despite great hopes for "school reform," there is no general evidence of benefit.

"School reform" is strongly associated with high dropout rates and low rates of high-school graduation. Nationally about 32 percent of public school students aged 15 through 17 are enrolled below normal grade levels, a figure that climbed steadily during the years 1979 through 1992. (Note 19) Statistics on school dropout cannot be evaluated readily, since government reporting procedures have been changing, possibly to conceal unfavorable trends (see Appendix 4). Table 3 estimates normal high-school graduation rates for the class of 1996 as percentages of ninth-grade enrollments in the fall of 1992. (Note 20) It compares nine southern and southwestern states under major "school reform," requiring minimum scores on standard tests for graduation, with nine northeastern states that did not have major "school reform" programs:

Table 3
High-school graduation rates by state, 1996
(Percentage normal high-school graduation, class of 1996)

States under "school reform" **States without "school reform"**

Alabama	58%	Connecticut	74%
Florida	58%	Maine	72%
Georgia	55%	Massachusetts	76%
Louisiana	58%	New Hampshire	75%
Mississippi	57%	New Jersey	83%
North Carolina	62%	New York	62%
South Carolina	54%	Pennsylvania	76%
Texas	58%	Rhode Island	71%
Virginia	76%	Vermont	90%

Source of data: National Center for Education Statistics, 1996 and 1999.

Only one southern or southwestern state with major "school reform" had a normal graduation rate **above** two-thirds, while only one of the northeastern states had a rate **below** two-thirds. The worst northeastern state is New York, which has a longstanding Regents examination for high-school graduation but during the 1992-1996 period was also awarding "local" diplomas (see Appendix 3).

Reform Schools and Private Interests

By the early 1990s, with reform schools entrenched for ten years or more in several states, a perverse competition began, which might be called *Our Standards Are "Stiffer" Than Yours*:

- We make tests harder.
- We mandate more tests.
- We raise minimum scores.
- We enforce more punishments.

See Heubert and Hauser (1999, pp. 59-67) and Sacks (1999, pp. 98-99 and 114). As with most of "school reform," the process is political (see Appendix 4 and Appendix 5). Typically, it is known that test scores ramp up for a few years and then flatten out. Otherwise there is little organized review of whether the testing and punishment systems actually produce harm or benefit for anyone. Nevertheless, state governors and legislators vie for TV spots and news headlines with commitments to "raise standards." In states without major "school reform," politicians are prepared to exploit anxiety over somehow being left behind. (Note 21)

Many states are trying "school reforms" faster than their school systems can adapt. Seeking to change educational content and testing practices at the same time worsens these problems. It has become common first to impose a test and then to "align" the curriculum, obviously putting the cart before the horse. Even states with a relatively stable curriculum and incremental changes in testing, such as North Carolina, have fallen prey to this disease (McDonnell, 1997, pp. v and 8-11). Some "school reformers" like the Pioneer Institute in Boston utilize the resulting chaos in political karate, aiming to promote "charter schools" which are actually private business ventures fed by tax revenues. James A. Peyser, Executive Director of Pioneer Institute, is currently Chairman of the Massachusetts Board of Education. Charles D. Baker, Jr., a member of the Pioneer Institute Board of Directors, is also a member of the Massachusetts Board of

Education. Former and current directors of the Pioneer Institute founded Advantage Schools, Inc., of Boston, a for-profit business that has opened two Massachusetts charter schools and fourteen charter schools in other states.

These cross-interests and educational mistakes need to be made familiar to the public. They are usually ignored by the large newspapers and broadcast media unless a tragedy occurs. (Note 22) In contrast to the strong interest over test scores, our press, broadcast media and politicians show only sporadic interest in the education process. Effective innovations such as team teaching, "looping" and open classrooms are being neglected or forgotten (see Tyack and Cuban, 1995, pp. 86-107). Science and math have been emphasized, but long-term surveys of achievement suggest that progress in these areas has occurred partly at the expense of writing skills. Only computer technology gets much attention, but its limits are becoming apparent. While classroom computers are convenient for exploring the Internet and organizing assignments, they have otherwise taught students few skills.

By conventional standards of psychological testing, (Note 23) major test vendors have been earning revenue from highly questionable uses of their products. While technical manuals may advise that their achievement tests are not "validated" for uses such as school rating or promotion tests, they sell large volumes of these tests to jurisdictions using them for purposes other than individual counseling. For example, the Stanford Achievement Test series, published by Harcourt Brace Educational Measurement, is being used by the state of California to rate and compare school districts (see Appendix 5). The Iowa test series, from the Riverside Publishing division of Houghton Mifflin, is being used by the city of Chicago as promotion tests (see Roderick et al., 1999). When so used, these tests effectively set the curriculum and the standards of performance for public schools, without meaningful public input or control. Parents and taxpayers are poorly informed about test validation and about strong effects these tests have in setting educational standards.

Taking a cue from Horace Mann, who fought for school standards and then moved to Congress a century and a half ago (see Appendix 2), many modern politicians have sought to use "school reform" as a platform for advancement. The "school reform" movement has enough momentum that few state officeholders and candidates openly oppose it. Candidates for state offices often use "school reform" backgrounds to support their campaigns. In 1996 Governor Wilson of California attempted to mount a campaign for President; Governor Bush of Texas is doing the same this year. Wilson left office after the defeat of his 1998 plan (proposition 8) to create state-appointed "governing councils" for all California public schools, in charge of budgets. Taking a moderate approach, such as supporting smaller class sizes and improved facilities, has sometimes won out over "back to basics" appeals, as it did in the victory of Tom Vilsack over Jim Ross Lightfoot in the 1998 election for governor of Iowa.

The Social Context

School-based standard testing does not occur in a social vacuum. It has consequences, and the techniques it uses reflect interests and values. Insight and candor about these consequences, interests and values are rare today; they must often be inferred from behaviors. In previous times, the advocates of standard testing were less guarded about their intents.

It has become well known that early promoters of standard aptitude tests were profoundly racist and sexist. Goddard, Terman, Thorndike, Burt, Yerkes and Brigham all believed that these tests identified African-Americans, native Americans, immigrants from southern and eastern Europe, or women as typically less able than white men

whose ancestors came from northern and western Europe. (Note 24) Goddard, Terman and Brigham were advocates of the "eugenics" movement, (Note 25) favoring IQ tests followed by sexual restriction of the "feeble-minded." An echo of their attitudes can be heard in the enthusiasms for standard tests sometimes expressed in the U. S. today, reducing access by African-Americans and Hispanic-Americans to universities and professional schools. Few of the modern promoters of standard tests flaunt prejudices that were once openly displayed. Relative success on these tests by Jews and by the offspring of Asian immigrants has greatly tempered hubris over "Nordic superiority."

The myth of measuring innate talent has been exposed. Multifactor studies link high scores on aptitude tests with advantages in family income, language and cultural exposure, motivation, self-confidence and training (see, for example, Goslin, 1963, pp. 137-147, Duncan and Brooks-Gunn, 1997, pp. 132-189, and Brooks-Gunn et al., 1996). Key research on the inheritance of intelligence, once widely cited, has been probed and found to have been scientific fraud (Gould, 1981, pp. 234-239). After accounting for measurable influences of environment, studies of multiple factors do leave unexplained residues that might be called aptitudes, but they can only be inferred from comparisons across groups. There are no reliable techniques for measuring aptitudes in an individual which are independent of experience, nor has it been shown how many such aptitudes there might be.

Despite exposures of motive and mythology, use of standard testing continues to grow. A century after their origins, school-based standard testing and its scavenger, test preparation, have become industries sustained by powerful institutions and deeply felt personal interests. Their supporters are now often driven by secondary motives that result from widespread testing programs. At least two generations have been able to profit from test-taking success, entering professions and making connections during their college years that might otherwise have been closed to them. They know how to crack the tests; they make sure their children learn; and they can be angered to think that this useful wedge into income and influence might be removed.

Today's standard test enthusiasts range from right-wing extremists to hard-nosed business people to ambitious young professionals to church schools and home schoolers who are looking for validation of their work— in other words, some of our neighbors. Parents who want to keep young children out of the testing game are now beset with legal mandates in many states and with social pressure almost everywhere. Far too few people are asking whether the public schools are really broken and in need of this kind of a fix (see Berliner, 1993, and Berliner and Biddle, 1995).

Among the right-wing, there is a Libertarian perspective from which conventional standard tests are an intrinsic evil because they interfere with local control of schools. Also, it is worth noting that a number of the business enthusiasts for standard testing actually send their own children to private schools where such testing is not emphasized. Berliner and Biddle (1995) have extended such observations into an argument that some testing promoters have a different agenda: using the embarrassment of low test scores in public schools as a weapon to force governments toward corporate schools, which they will operate at a profit.

Much as in the 1920s, its first great decade, school-based standard testing is still sold as a key to discovering talent and measuring ability objectively. When possible its critics are ignored, or they are dismissed as extremists, dreamers or losers. Test development and scoring procedures are wrapped in mystification. "Validation" of tests is widely touted, but it usually means only that people who do well on one test do well on another. Public enlightenment has made progress, but it struggles upstream against a flow of laundry soap, liver pills and snake oil.

What have all the years of more than 100 million school-based standard tests a year (Note 26) brought us? The "one minute" people, perhaps, who judge anything that takes longer as not worth the bother. Try to make life into a rush of standard questions. The idiot-genius computer programmers, fast as lightning. The ones who saddled us with about $200 billion worth of "year 2000" problems, because they didn't think about a slightly bigger picture. The test prep industry, a scrounger that otherwise has no purpose. The product support staff who don't know what to do when they run to the end of their cheat sheets. The cutback from education to test cramming in the states with standard punishment systems. Don't take chances; teach and learn the test.

Remedies

School-based standard testing has seen more than a century of development in the U. S. (see Appendix 7). No quick or simple remedy can cure the many problems it has caused. Any remedy will require resolute public action. The following priorities are essential:

- Stop using standard test scores to deny promotion or graduation.
- Stop using standard test scores to create financial incentives or penalties.

These are the key weapons of the state punishment systems. The significance and accuracy of standard test scores do not justify these measures. They are viruses that transform schools from education to test cramming. They are all harm and no benefit. If we do not stop the damage being wrecked by these mistaken "school reforms," no other remedies will matter much.

If the catastrophes from "school reform" can be curtailed, we can tackle the worst problems of current school-based standard testing:

- **Conflict of purpose.** We are trying to use the same tests to measure basic competence as to measure high levels of skills and knowledge.
- **Conflict of method.** We say that we want to measure meaningful skills and knowledge, but our test methods stress empty tasks and fast answers.

The root of these conflicts is the same: choosing speed and price over effectiveness. If we want accurate and meaningful results, we must reverse these priorities. Good tests will not be quick or cheap. A test to measure basic competence in a skill or subject must cover a broad range of what we believe basic competence should mean. A test to measure high levels of skills and knowledge must include open-ended tasks that can be performed with many different strategies. We will need to weigh costs and benefits carefully. Even when they do not corrupt education, meaningful tests will take time and resources that could have been spent otherwise.

The "authentic assessment" and "performance assessment" movements seek to combine educational assessments with the learning process. Classic models are the "course project" and the "term paper." While the intents of these movements are understandable, Kentucky and California experiences in the 1990s suggested that such techniques were not mature enough to provide reliable comparisons among schools or school districts, much less to create promotion or graduation tests (Sanders and Horn, 1995). Moreover, we have no school-based achievement tests at all that have been proven to predict meaningful accomplishments by students in the world beyond the

schoolhouse door.

Schools probably test too much, yet at the same time they may fail to use tests when tests can help. A key example is poor and late diagnosis of reading disorders. A great fraction of adult activities require proficient reading; most school activities and standard tests do also. We know that some young students have much more difficulty reading than others, although they may otherwise have strong skills. Schools need to identify reading disorders as early as possible and help to remedy them before they become deeply ingrained.

Limited and conflict-ridden as it is, current standard testing shows systematic deficits for students from low-income and minority households. Better testing will give a better picture of how serious these problems are, but it will not cure them. We need plans and resources to address the problems which are already clearly understood:

- **Language.** We should teach standard spoken English as a second language to students from households where it not spoken. We should not disparage dialects or other languages, but we must equip students early with this essential skill.
- **Motivation.** Other than language, the key barrier for students from low-income and minority households is weak motivation. Home and school partnerships have shown how this problem can be overcome. We must create and strengthen them.

We do not understand all the problems. We do not know how to solve all the problems that we do understand. But we know enough to begin. If not now, then when?

Validity and Relevance

School-based aptitude testing is known to have low predictive strength. Studies have shown that it heavily reflects the income and education levels of students' households and that most of what it can predict is associated with social advantages and disadvantages. If tax-supported or tax-exempt schools use scores on intelligence or other aptitude tests to deny opportunities to some students while providing them to others, they violate the public trust.

For school-based achievement testing, we have few studies of predictive strength (as one example, see Allen, 1996, section IV-B, pp. 118-120). In most circumstances, we simply do not know whether these tests measure anything apart from social privilege that is useful outside a school setting. After adjustment for social factors, can their scores accurately predict future success in occupations, creative achievements, earning levels, family stability, civic responsibility or any of the other outcomes we mean to encourage with public education? Are there alternative assessments that can accomplish these goals? Given the heavy engagement in "school reforms" and the energy spent on their testing programs, it is amazing to see how little attention these matters receive (see related observations by Broadfoot, 1996, pp. 14-15). Academic and foundation-supported scholars specializing in psychometrics have the greatest opportunities to answer these questions, but they have largely ignored them.

Journalists, broadcasters, bureaucrats, politicians, educators and their critics— like most of the public— usually assume that a mathematics test, for example, actually measures some genuinely useful knowledge and skill. Who has shown this to be true, and for which tests? Is there actually a strong and consistent relation, for example, between top scores on a particular high school math achievement test and a successful career as a civil engineer? If there were not, then what does that test measure? Is there a strong and consistent relation between acceptable scores on a social studies test and

adult voting participation? If there were not, then how is such a test of use?

Unfortunately, it is far from proven that any method of assessment can escape the biases, the other errors, and the low or unknown predictive strengths outside the schools which plague the current tests. We should take this not as a signal of defeat but as an invitation to humility. The complexities of human behavior are immense, and our current approaches measure them poorly. Rather than try to stretch each student onto a Procrustean bed of so-called "achievement," taking pride in lengthening the beam a bit every few years, we need to promote core competence and recognize the diversity of other skills. If standard tests were to have any useful role, it would most likely be as an aid to help insure that students can exercise skills which have been clearly proven essential for ordinary occupations. Even such a limited objective as this requires both education and test validation well beyond current educational and psychometric practices.

As we question the validity of testing, we may also question the relevance of the education supposedly being tested. Are we using the irreplaceable years of youth to convey significant skills and knowledge, or are we cultivating fetishes and harping on hide-bound answers to yesterday's questions? Somehow, despite decades of claims that our schools are inferior, we in the U. S. have achieved a stronger economy than most other industrial countries. Yet we also have more crime than most of these countries. Is our education responsible for these situations? We have many such issues to address. They present truly difficult questions. None of them will be found on school-based standard tests.

Notes

Comments and suggestions from several reviewers are gratefully acknowledged. Mistakes or omissions remain, of course, the fault of the author.

1. For a viewpoint characteristic of the era, see Rickover, 1959.
2. Pope Pius XI, as spoken in "...the defenders of order against the spread of Godless communism," Christmas Allocution, The Holy See, Rome, 1936. "Godless communism" became a popular phrase among cold-war patriots of the era.
3. Lemann, 1995, recounts the history of draft-deferment testing.
4. Commonly called "standardized testing." The underlying purpose of such tests is to set a standard that is calibrated for a population.
5. Reischauer and Fairbank, 1958, pp. 106-107, describe Chinese origins in the Western (Earlier) Han Dynasty, c. 120 BCE.
6. Schultz, 1973, reviews the industrial model for public schooling.
7. Massachusetts House Speaker Thomas Finneran. See Lehigh, 1998.
8. Goslin, 1963, p. 82 (footnote 2), indicates that the relatively low predictive strengths of aptitude tests for college grades were well known by around 1960.
9. Crouse and Trusheim, 1988, pp. 124-127, review predictive strength for the SAT vs. family incomes and high school grades. Nairn and Associates, 1980, show that SAT scores tend to act as proxies for family income. Tyack, 1974, pp. 214-215, cites an equivalent claim for IQ scores made by the Chicago Federation of Labor in 1924.
10. Sacks, 1999, p. 183 (note 23), cites a negative correlation between GRE aptitude test scores and publishing records for academic historians.
11. Owen and Doerr, 1999, Appendix C, list 284 U. S. colleges and universities where SAT and ACT scores are optional for admission into bachelor's programs.
12. Merton, 1957, pp. 421-436, calls such a phenomenon a "self-fulfilling prophecy."

13. Sacks, 1999, pp. 182-185, cites and summarizes several relevant studies.
14. Tyack, 1974, pp. 35-36 and 47-48, recounts the two examples cited of nineteenth-century school testing.
15. Tyack, 1974, pp. 126-147, shows how demands for accountability were used to cement control of public schools by business leaders and school supervisors.
16. Tyack, 1974, pp. 194 and 206-216, recounts the rapid spread of standard testing in the 1920s.
17. Tyack, 1974, pp. 41-46, recounts the first major U. S. school reform, the system of graded classrooms, inspired by Prussian schools and introduced to the U. S. in the 1840s and 1850s. Tyack and Cuban, 1995, explore the history of twentieth-century school reform movements in the U. S.
18. A Nation at Risk, published by the National Commission on Excellence in Education, U. S. Department of Education, in April, 1983, is cited as inspiring many of these initiatives.
19. See Appendix 1. Precedents from the past are worse. In 1922, New York City reported that nearly half of all students were "above normal age for their school grade," as cited by Feuer, et al., 1992, p. 118.
20. Data from National Center for Education Statistics, 1996, and National Center for Education Statistics, 1999. See 1995 Table 41 for ninth-grade enrollments and 1998 Table 102 for high school graduates. No attempt is made to adjust for immigration, emigration, mortality or population movement between states.
21. An egregious example of these effects can be seen in California from 1994 through 1997, during the Wilson administration. See Appendix 5.
22. Albert L. Powers, "Questionable reform," Carlisle Mosquito, Carlisle, MA, October 29, 1999. Paul Dunphy, "Charter schools fail promises," Daily Hampshire Gazette, Amherst, MA, February 7, 2000. Beth Daley and Doreen I. Vigue, "Firm pulls out of school where boy died," Boston Globe, February 10, 2000.
23. Standards 6.12, 8.7 and 8.12 in Committee to Develop Standards for Educational and Psychological Testing, 1985, pp. 43 and 53-54. These standards, jointly developed by the American Psychological Association, American Educational Research Association and National Council on Measurement in Education, were also updated in 1999.
24. Brigham, 1923, pp. 87 ff., says "...the foreign born are intellectually inferior," then analyzes inferiority by races and origins.
25. For the proposition that "no feeble-minded person should ever be allowed to marry or to become a parent," Goddard, 1914, p. 561. On "curtailing the reproduction of feeble-mindedness," Terman, 1916, p. 7. On "prevention of the continued propagation of defective strains," Brigham, 1923, p. 210. All three men modified their views in later years.
26. Since at least 1961. See Goslin, 1963, pp. 53-54.

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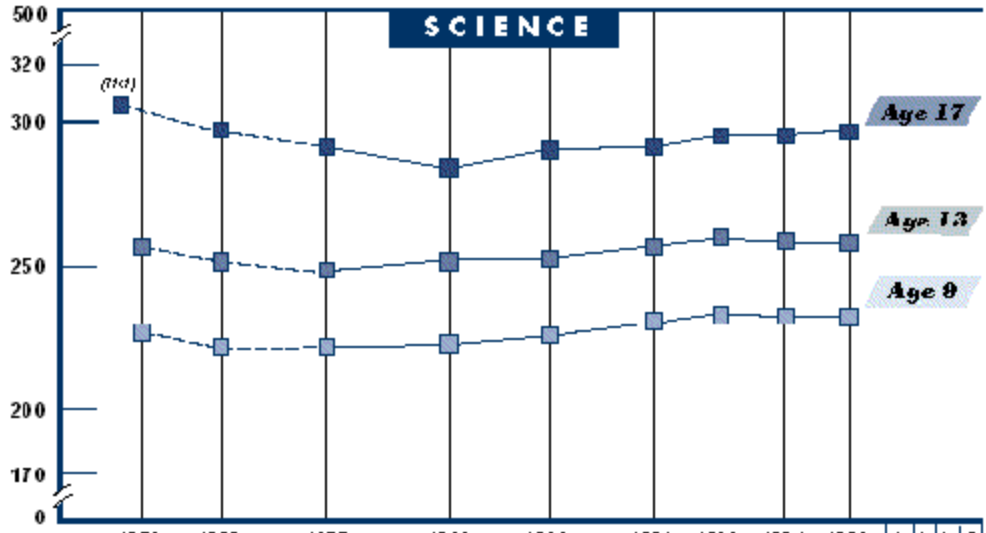
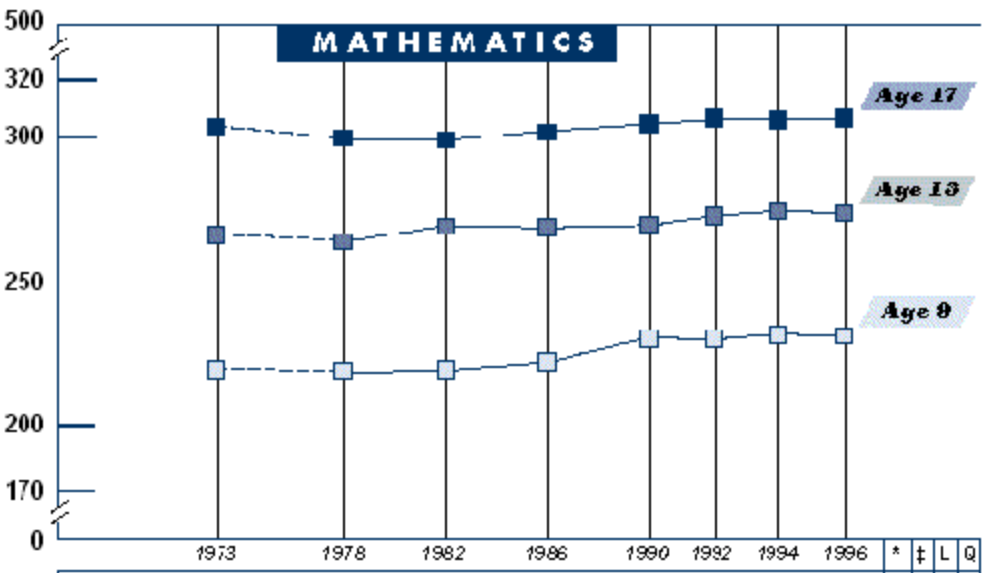
Appendix 1
Information: U. S. Public Education

Figure 1 (on two pages, U. S. Dept. of Education, 1997) shows NAEP national average scores from program inception through 1996.

Figure 1 **Trends in Average Scale Scores for the Nation**



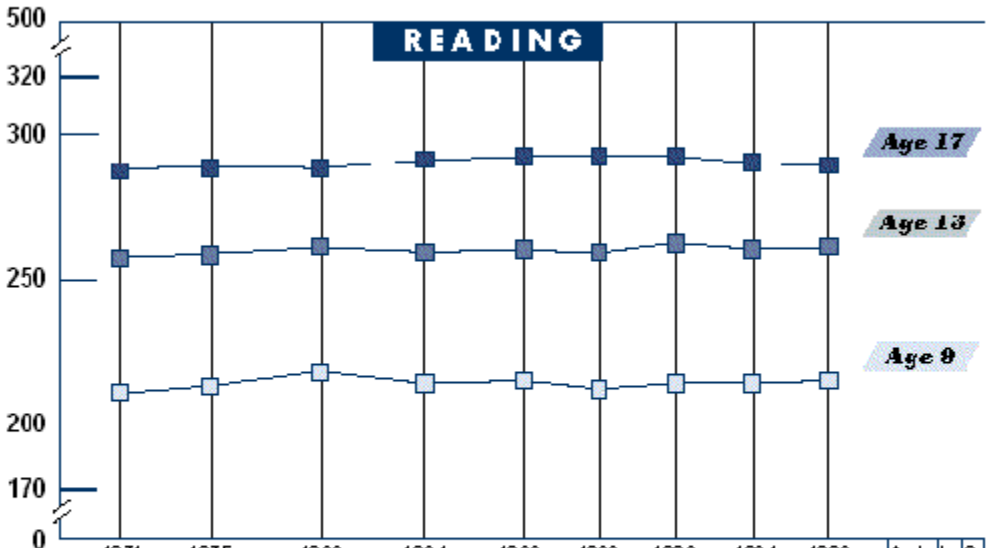
	1970	1973	1977	1982	1986	1990	1992	1994	1996	*	‡	L	Q
Age 17	305 (1.0)	296 (.0)	290 (1.0)	283 (1.2)	289 (1.4)	290 (1.1)	294 (1.3)	294 (1.6)	296 (1.2)	–		–	+
Age 13	255 (1.1)	250 (.1)	247 (1.1)	250 (1.3)	251 (1.4)	255 (0.9)	258 (0.8)	257 (1.0)	256 (1.3)			+	+
Age 9	225 (1.2)	220 (.2)	220 (1.2)	221 (1.8)	224 (1.2)	229 (0.8)	231 (1.0)	231 (1.2)	230 (1.2)	+		+	+



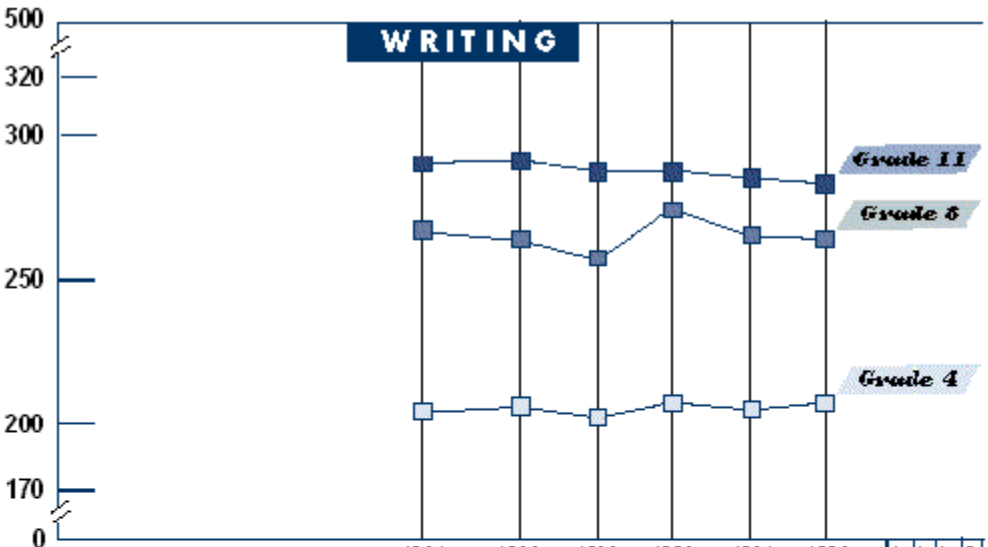
	1973	1978	1982	1986	1990	1992	1994	1996	*	‡	L	Q
Age 17	304(1.1)	300(1.0)	299(0.9)	302(0.9)	305(0.9)	307(0.9)	306(1.0)	307(1.2)			+	+
Age 13	266(1.1)	264(1.1)	269(1.1)	269(1.2)	270(0.9)	273(0.9)	274(1.0)	274(0.8)	+		+	
Age 9	219(0.8)	219(0.8)	219(1.1)	222(1.0)	230(0.8)	230(0.8)	231(0.8)	231(0.8)	+		+	+

Figure 1 (continued)

Trends in Average Scale Scores for the Nation



	1971	1975	1980	1984	1988	1990	1992	1994	1996	*	‡	L	Q
Age 17	285(1.2)	286(0.8)	286(1.2)	289(0.6)	290(1.0)	290(.1)	290(1.1)	288(1.3)	287(1.1)			+	–
Age 13	255(0.7)	256(0.8)	257(0.7)	257(0.5)	258(1.0)	257(0.8)	260(1.2)	258(0.7)	259(0.7)	+		+	
Age 9	208(1.3)	210(0.7)	215(1.0)	211(0.7)	212(1.1)	209(1.2)	211(0.7)	211(1.2)	212(1.0)	+			–



	1984	1988	1990	1992	1994	1996	*	‡	L	Q
Grade 11	290(1.4)	291(1.3)	287(1.0)	287(1.4)	285(1.2)	288(1.2)	–		–	
Grade 8	267(2.0)	264(1.3)	257(1.2)	274(1.3)	265(1.3)	264(1.0)				
Grade 4	204(1.5)	206(1.6)	202(1.5)	207(1.5)	205(1.6)	207(1.2)				

Standard errors of the estimated scale scores appear in parentheses. [– – –] Extrapolated from previous NAEP analyses.

* Indicates that the average scale score in 1996 is significantly larger (+) or smaller (–) than that in the first assessment year.

‡ Indicates that the average scale score in 1996 is significantly larger (+) or smaller (–) than that in 1994.

L Indicates that the positive (+) or negative (–) linear trend is significant.

Q Indicates that the positive (+) or negative (–) quadratic trend is significant.

SOURCE: National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 1996 Long-Term Trend Assessment.

The next chart, Figure 2, with data in Table 4, shows estimated U. S. public school enrollment and spending for the years 1850-2000. Enrollment is for elementary and secondary schools, including kindergarten, in millions. Spending includes local, state and federal outlays, in US$ billions, adjusted to 1998 dollar equivalence by the annualized Consumer Price Index. The last chart, Figure 3, shows U. S. public school enrollment aged 15-17 retained below modal grade, for the years 1971 through 1998. The increase in enrollment below modal grade is caused by increases in retention rates at all grades as well as by later ages of first school enrollment (Heubert and Hauser, 1999, pp. 136-158).

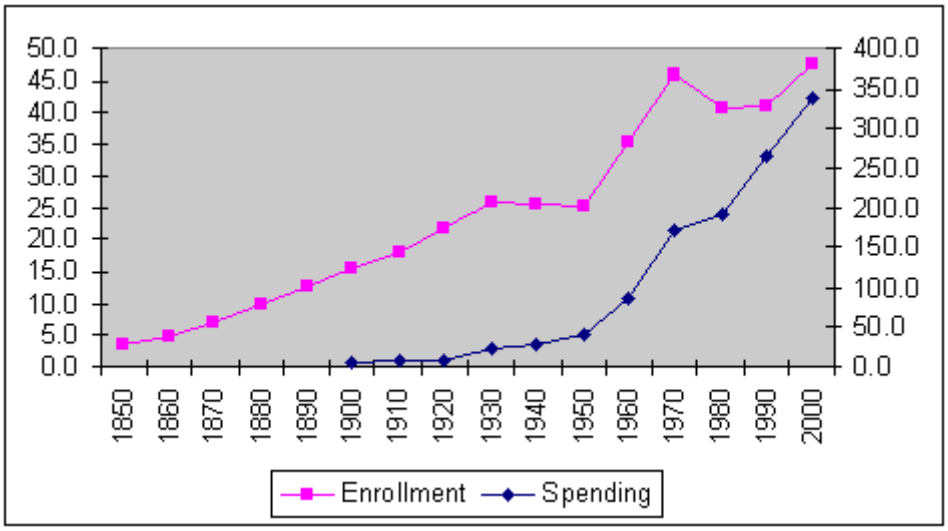


Figure 2. U. S. public school enrollment and spending.

Table 4
U. S. Public School Enrollment and Spending, for Figure 2

Year	Enrollment 1,000,000s	Spending $B (1998)	Spending per student
1850	3.4		
1860	4.8		
1870	6.9		
1880	9.9		
1890	12.7		
1900	15.5	4.2	270
1910	17.8	7.4	420
1920	21.6	8.4	390
1930	25.7	22.6	880
1940	25.4	27.3	1070
1950	25.1	39.5	1570
1960	35.2	86.0	2440
1970	45.9	170.8	3720

1980	40.9	189.9	4650
1990	41.2	265.4	6440
2000	47.4	338.6	7140

Sources: U. S. Department of Education, *Digest of Education Statistics,* 1998 (spending not available in this series before 1900); U. S. Census Bureau, *Census of 1850* and *Census of 1860;* U. S. Bureau of Labor Statistics, *Consumer Price Index: All Urban Consumers* (annual averages, estimated before 1913).

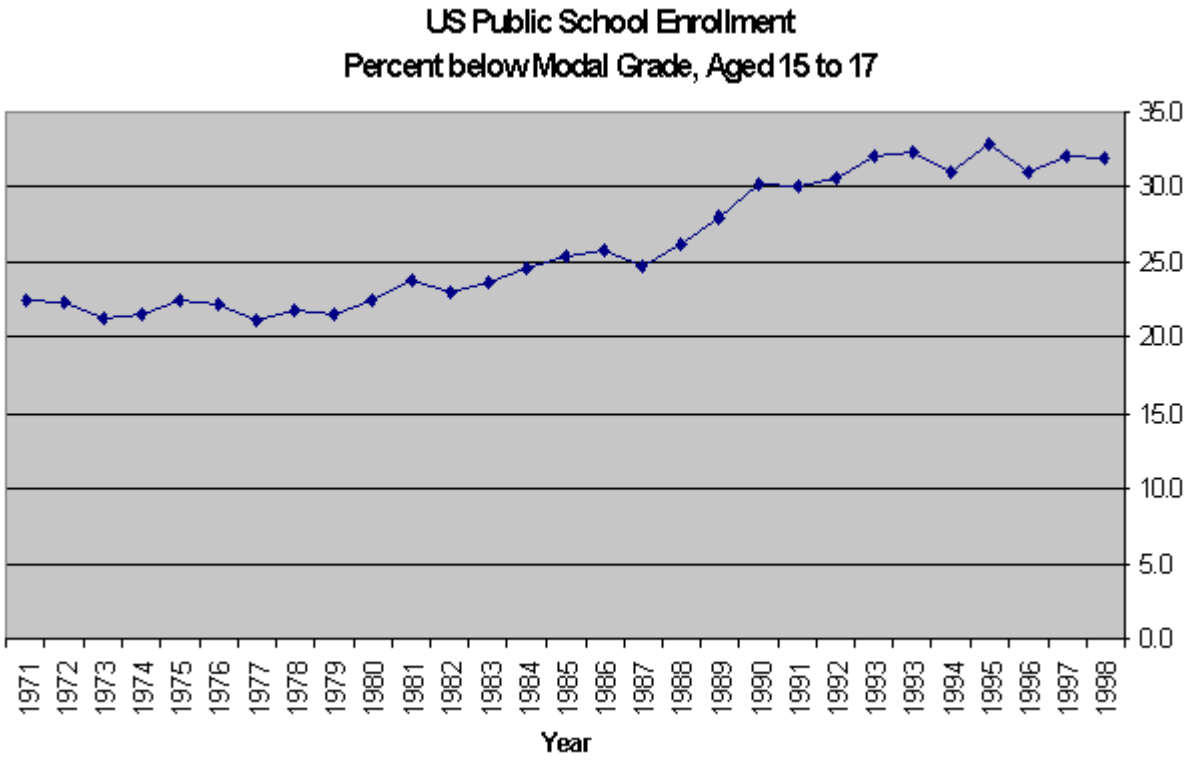


Figure 3. U.S. public school enrollment below modal grade.

Source: "The population 6 to 17 years old enrolled below modal grade: 1971 to 1998," *Current Population Survey Report – School Enrollment – Social and Economic Characteristics of Students,* U. S. Bureau of the Census, Washington, DC, Supplementary Table A-3, October, 1999.

Appendix 2
Information: Massachusetts

The Mather school, the first free public school in the U. S., was founded in Dorchester, Massachusetts, in 1639. In 1647 the Massachusetts General Court enacted a law requiring every town of 100 families or more to provide free public education through the eighth grade, but attendance was not required. In 1821 Boston opened English High School, the first free public

high school in the U. S.. It taught English, history, logic, mathematics and science but did not offer the traditional Latin curriculum. An 1827 Massachusetts law required every town with 500 or more families to support a free public high school, and an 1852 law required school attendance to the age of 14, the first such laws in the U. S.. Massachusetts took over 30 years to reach compliance with each.

Massachusetts created a state Board of Education in 1837 to set standards for public schools, then in disarray. Horace Mann, a state senator from Boston and former state representative from Dedham, became the first Secretary to the Board. In 1839, at Mann's urging, Massachusetts created its first state- supported teacher's college, located in Lexington (now in Framingham). In 1845, following disputes over the quality of instruction, the Board of Education issued a voluntary written examination for public school eighth-graders, consisting of 30 short-answer questions. In its first year, the average score was less than one-third correct answers. Scores were soon used to compare schools in the press. Schoolmasters complained that knowledge tested did not correspond to their curricula. After Mann entered Congress in 1848 the examination was discontinued. During the following 138 years the Board of Education did not require testing of students.

In 1986 the Board of Education began statewide student testing called the Massachusetts Educational Assessment Program (MEAP). Among its purposes was to provide comparisons between student achievements in the state and student achievements being measured since 1969 through NAEP, the National Assessment of Educational Progress. Fourth-grade and eighth-grade tests of reading, mathematics and science were given every two years from 1986 through 1996. These tests were designed and administered by Advanced Systems in Measurement and Evaluation, Inc., of Dover, NH. Questions were in multiple choice, short answer and extended answer formats. Only aggregate scores for the state were publicly reported. Scores for individual schools were not disclosed. While Massachusetts average scores were above national averages, from 26 to 32 percent of the 1992- 1996 scores were "below basic," the lowest of four classification levels.

The Massachusetts Education Reform Act of 1993 required revised educational standards and procedures. In January, 1998, the Board of Education began using a new Massachusetts Teacher Test as a part of teacher certification. A communication and literacy skills test and a subject test in one of 41 areas must be passed. These tests, recently renamed the Massachusetts Educator Certification Tests, are being prepared and administered by National Evaluation Systems, Inc., of Amherst, MA, designer of the California Basic Educational Skills tests and the Texas Academic Skills Program tests. They are strictly timed and include multiple choice reading comprehension questions, short answer vocabulary and grammar questions, and a written composition. Testing was initiated without a tryout period for the test and with relatively little advance notice about test content or consequences. In the first group of candidates, less than half passed both parts of the test. As one result, only white candidates were certified to teach in Massachusetts.

In 1995, the Board of Education released "curriculum frameworks," or required curricula, for mathematics and for science and technology. It later issued frameworks for English language arts and for history and social science. In the spring of 1998, after a tryout period in 1997, the Board began a new student testing program in the fourth, eighth and tenth grades called the Massachusetts Comprehensive Assessment System (MCAS). It includes tests in English language arts, mathematics, science and technology, and history and social science. They are loosely timed and include questions in multiple choice, short answer and extended answer formats. Through 1999, the test for history and social science has been administered only to eighth-grade students. Total testing time is about ten to fifteen hours, depending on the year and number of tests, with about half typically spent on English language arts. Scores are reported in a 200-280 point range; they are classified in four levels, equally spaced in the score

range, called "advanced," "proficient," "needs improvement" and "failing." Parents are not permitted to exempt their children from testing. There are alternative procedures, such as small group settings, for special needs students and for students for whom English is not a native language.

Beginning in 1999, aggregate scores for each school in the state were publicly reported. Individual scores are disclosed to schools and parents. Schools also receive an analysis of results for each test item. Both 1998 and 1999 test items have been released to the public. The 1999 tests were offered in Spanish as well as English. Statewide, the results for 1998 and 1999 were similar; combined results from these two years are shown in Table 5.

Table 5
Massachusetts MCAS Average Scores, 1998-1999.

MCAS English Language Arts, statewide, 1998-1999 combined

School Grade	Average Score	Percent Advanced	Percent Proficient	Percent Needs Improvement	Percent Failing
10	229	4	32	34	30
8	237	3	52	31	14
4	230	0	20	66	14

MCAS Mathematics, statewide, 1998-1999 combined

School Grade	Average Score	Percent Advanced	Percent Proficient	Percent Needs Improvement	Percent Failing
10	222	8	16	23	53
8	226	7	23	29	41
4	234	12	23	44	21

MCAS Science and Technology, statewide, 1998-1999 combined

School Grade	Average Score	Percent Advanced	Percent Proficient	Percent Needs Improvement	Percent Failing
10	225	2	21	40	37
8	224	4	24	29	43
4	239	8	44	38	10

MCAS History and Social Science, statewide, 1998-1999 combined

School Grade	Average Score	Percent Advanced	Percent Proficient	Percent Needs Improvement	Percent Failing
10					
8	221	1	10	40	49
4					

Source of data: Massachusetts Department of Education, 1999b.

The Board of Education has released a technical analysis of the 1998 MCAS which includes estimates that its classification levels are consistent (Massachusetts Department of Education, 1999a). These are phrased in terms of the probability that a student who might receive a particular classification level after many repeated tests of some type would be classified at the same level by any one of those tests. Estimated probabilities range from 56 to 92 percent; they are highest for the "failing" level, averaging 85 percent, and lowest for the "advanced" level, averaging 70 percent. This technical analysis considers "validity" only in the narrow sense of comparison with other test results. Strong correlations, from .6 to .8, were found with components of the Stanford Achievement Test series. Significant MCAS score differences between male and female students and large score differences between students of different ethnic backgrounds were found, a pattern that is commonly duplicated by aptitude tests. Neither the methodology for computing the reported scaled scores nor the basis for classifying scores into passing and failing levels has been disclosed to the public.

In 2003, passing scores on tenth-grade tests will be required for a high-school diploma. The Board of Education has also announced plans to remove principals of schools which receive low scores and do not improve. The Board has not reported the fraction of students failing at least one of the tenth-grade tests, but statewide it is obviously more than half. By 2003, Massachusetts may be denying a diploma to a majority of students who complete high school, based on their failure to achieve passing scores on its standard tests.

Like the MEAP tests, the 1998 and 1999 MCAS tests were designed and administered by Advanced Systems in Measurement and Evaluation, Inc., of Dover, NH. Advanced Systems won a 1995 contract estimated at $25 million over competitors Riverside Publishing, publisher of the Iowa Tests of Educational Development, and Harcourt Brace Educational Measurement, publisher of the Stanford Achievement Tests. Advanced Systems has been a target of state investigations for its work in Maine and New Hampshire. In 1997, it lost a contract in Kentucky after being accused of gross errors in test scoring ("Problems," 1998). Scoring errors by the firm have also been reported in Maine. Tests that use extended answer questions, as those in Massachusetts do, must be scored by individual test evaluators. There have been reports of hasty scoring by Advanced Systems test evaluators working under time pressures and of computer programming errors by the company (Szechenyi, 1998).

In the summer of 1999, the Board of Education opened competitive bidding for the MCAS program of 2000-2004. Bids were received from the same companies as in 1995. In January, 2000, Commissioner of Education David P. Driscoll announced that Harcourt Brace Educational Measurement had received preliminary selection, with final negotiations in progress (Daley and Zernike, 2000). Problems with this change in vendors can be expected. A new vendor lacks the time to repeat the review and tryout process of the first MCAS series before testing starts in April, 2000.

Appendix 3
Information: New York

The state of New York began to appropriate funds for support of public schools in 1795. In 1814, all New York municipalities were required to participate in a statewide system of public school districts. At the time, these schools charged tuition to cover differences between operating costs and state funding. In 1867, free public schooling became a requirement of law. The current school year of 180 days was set in 1913, and the current school-leaving age of 16 was set in 1936.

The New York Board of Regents, originally responsible for supervising higher education,

began high-school entrance examinations in 1865, later called "preliminary" examinations. In 1878 it began examinations for graduation from high schools. In the 1880s the Board began inspection visits to public schools. A 1904 reorganization put the Board of Regents in charge of standards for all public education. One response was gradual strengthening of secondary school attendance. Another was development of detailed curricula aimed at preparing students for higher education. Throughout the nineteenth and twentieth centuries, high-school students in New York have been able to obtain a "local" high-school diploma without meeting Regents examination requirements.

In the 1930s the New York City schools began administering the Metropolitan Achievement Test series, designed by The Psychological Corporation, for diagnosis and guidance. In the 1970s the New York Education Department began using this test series, now provided by Harcourt Brace Educational Measurement, for its statewide Pupil Evaluation Program. This program administered tests of reading and mathematics in grades 3 and 6, tests of writing in grade 5, and tests of social studies in grades 6 and 8. During the years 1993 to 1996, the Department gradually changed to the California Achievement Tests, provided by CTB/McGraw-Hill. Throughout these years, the Department also administered the Regents Preliminary Competency Tests of reading and writing in grades 8 and 9.

Beginning in 1999 the Education Department is replacing its elementary and secondary school tests with new Program Evaluation Tests, planned since 1994 and piloted during 1995 through 1998. These tests, developed by CTB/McGraw-Hill, are strictly timed and include questions in multiple choice, short answer, extended answer, essay and laboratory performance formats. Tests for English language arts, mathematics and science are to be administered in grades 4 and 8. Social studies tests are to be administered in grades 5 and 8. Test items are disclosed to the public. Only English language arts and mathematics tests are being given in 1999 and 2000. Tests are currently offered only in English.

The New York Regents high-school graduation examinations are by subject. Beginning with a few subjects, the examination catalog reached a peak of 68 subjects in 1925. After years of consolidation, by the 1960s the catalog was reduced to English, mathematics, science, social studies and certain foreign languages. Subsequent revisions introduced technical education subjects. In 1998 the Education Department announced a new series of statewide tests in English, mathematics, science, global history and geography, and U. S. history and government, starting in 1999. The new Regents examinations have been developed by CTB/McGraw-Hill. They are strictly timed and include questions in multiple choice, short answer, extended answer, essay and laboratory performance formats. Most tests are offered in English only; some have also been offered in Chinese, Hatian Creole, Korean, Russian and Spanish. Scores of 65 on all tests are now required for a Regents diploma, and scores of 55 are required for a "local" diploma. Beginning in 2005, there will be no more "local" diplomas.

A 1987 New York law requires an annual report from the Education Department covering enrollment, student achievement, graduation and dropout rates, and other topics. This is known as the School Report Card. Data tables accompanying these reports show numbers or percentages of students statewide and by school district receiving certain score levels on tests. School Report Card data tables are being released about 9 months after the end of a school year. Statewide percentages of grade enrollment receiving Regents examination scores in specified ranges are shown in Table 6.

Table 6
New York Regents Examination Scores, 1997 and 1998

1997			
Examination score	**55 or more**	**65 or more**	**85 or more**
Comprehensive English	63%	56%	17%
Mathematics I	66%	59%	29%
Biology	51%	44%	15%
US History	56%	48%	15%
Global Studies	57%	48%	14%
1998			
Examination score	**55 or more**	**65 or more**	**85 or more**
Comprehensive English	65%	57%	15%
Mathematics I	70%	62%	33%
Biology	51%	44%	16%
US History	60%	52%	17%
Global Studies	65%	56%	17%

Source of data: New York State Education Department, 1998 and 1999.

Although data tables for the 1999 Regents examinations are not yet available, a summary for the English language arts test has been released. It shows that statewide 78 percent of grade enrollment has received a score of 55 or more on this examination, much higher than the percentage on the previous Comprehensive English examination. However, in the New York City schools only 55 percent of grade enrollment has passed this examination, with 35 percent yet to attempt it.

Appendix 4. Information: Texas

The Republic of Texas enacted laws to support free public education in 1845, in anticipation of statehood later that year. It also created a state fund to provide part of the cost of the public school system. Through the rest of the century public education was limited to eight grades in many rural areas, although high schools were founded in cities. In 1911 Texas reorganized its state education system to provide public high schools in all rural areas.

In 1984 the Texas legislature passed House Bill 72, a public "school reform" law. This revised the state's financial support for education, providing more funds for low-income districts, and it directed the Texas Education Agency to establish school performance standards and administer a statewide high-school graduation test. Until 1990 Texas used a series of tests focused on minimum competence. In that year, as required by law, it began introducing over a four year period a testing program designed to raise the expected level of skills, using a new test series. The Texas Assessment of Academic Skills (TAAS) is a series of standard tests given in the third through tenth grades in reading, writing, mathematics and social studies. These tests are untimed and in multiple choice format except for essays in writing tests. They have been organized by National Computer Systems of Minneapolis, MN, as prime contractor. Harcourt Brace Educational Measurement performs test development; it has involved about 7,000 Texas educators in the process.

TASS tests are available in English and Spanish, and there is an alternate assessment process for students in special education. Satisfactory scores on the tenth-grade tests in reading, writing and mathematics are required for a high- school diploma. Texas also has standard tests on which passing scores are required to obtain credit for certain high-school courses, currently Algebra I, Biology I, English II and U. S. History. In 1999 passing three such tests in the tenth grade was made equivalent to passing the entire TASS series. Starting in 2005 a new Texas law will require high-school graduates to get passing scores on new standard tests of English language arts, mathematics, science and social studies, taken in the eleventh grade.

Since 1994 Texas has used an Accountability Rating System to report school and district performance. Schools are rated as "exemplary," "recognized," "acceptable" or "low performing." The key criteria are TASS scores, for which large racial and ethnic differences have been documented. For rating purposes, students are classified in four groups: white, African-American, Hispanic and economically disadvantaged. To achieve school ratings, the minimum rating scores are required for each group. There are also requirements for high attendance and low dropout rates. Ratings are published in newspapers. Schools with strong ratings or progress receive financial rewards, currently a total of $2.5 million per year statewide.

Texas public colleges and universities have a standard qualifying examination, the Texas Academic Skills Program test. It is an untimed test of reading, writing and mathematics in multiple choice format, plus an essay, all prepared and administered by National Evaluation Systems, Inc., of Amherst, MA. No one is denied admission based on TASP scores, but passing scores are required to graduate from two-year colleges and to take junior and senior courses at four- year colleges. The test is waived for students with high enough scores on certain other tests.

Racial differences in Texas test scores are well documented (Texas Education Agency, 1998). According to Texas statistics, the percentage of success for TASP is about the same for men and women, but the percentage of success for whites is more than twice that for African-Americans. The success rate on the tenth-grade TAAS series in 1998 was 85 percent for white students, 60 percent for Hispanic students, and 56 percent for African-American students. So far, however, all legal challenges to racial and ethnic differences in Texas standard test scores have failed. New arguments are being used by plaintiffs seeking to overcome the judicial barriers encountered in previous lawsuits. There is no objective evidence to sustain the passing scores set by Texas for the TAAS high-school graduation examinations, and the state provides no program to assure that the tests cover what is taught in the schools (Haney, 1999).

Texas is in denial about the dropout rates its program appears to be causing; official statements claim substantial decreases in dropout rates, to 10-15 percent. U. S. Department of Education enrollment data indicate much higher dropout rates. Haney (1999, p. 22) notes that Texas Education Agency definitions of "drop out" have changed several times in the last ten years. Longitudinal dropout rates in Texas have been surveyed by an independent organization over several years. Their estimates for the school years ending in 1986 through 1999 are shown in Figure 4.

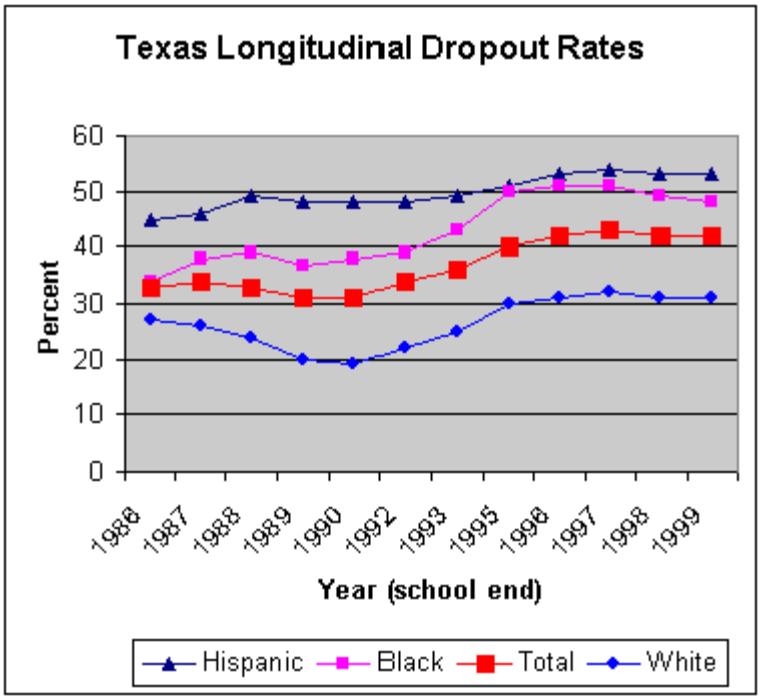


Figure 4. Texas dropout rates.

Source: *Longitudinal Attrition Rates in Texas Public High Schools, 1985-1986 to 1998-1999,* Intercultural Development Research Association, San Antonio, TX, 1999. By permission. Chart prepared by the author. Not shown are data for Asian/Pacific Islander and Native American students. No data were published for 1991 or 1994.

The estimates in Figure 4 are consistent with U. S. Department of Education data. They show that introduction of TAAS in 1990-1995 was associated with a significant increase in dropout rates which has been sustained in the years since. Although the impact of TASS has been heaviest on African-American students, in some schools 100 percent of students with limited English proficiency drop out (IDRA, 1998). While the impact of TASS on Hispanic students has been less than the impact on African-American students, Hispanic students remain the group with the highest dropout rates.

Some students who do not receive a diploma at normal high-school graduation age continue in school and obtain a conventional diploma later, or they return to school after having dropped out, or they earn a certificate by passing the GED or a similar test, or they arrange to begin higher education without high-school credentials. U. S. Census data suggest that by age 24 half or more of high- school dropouts may have extended their education up to or beyond high-school equivalence. However, there is no consistent source of statistical data on these educational outcomes in Texas, in most other states, or for the U. S. (Heubert and Hauser, 1999, pp. 136-137 and 172).

Under TAAS, there have been reports of weeks spent on test cramming and "TAAS rallies." School ratings are raised by "exempting" students (Associated Press, 1999). Schools are allowed to contract for "test preparation" consultants and materials, and some have spent tens of thousands of dollars. There have been reports of falsifying results. In 1998 the Austin Independent School District produced dramatic TAAS score improvements; then in April, 1999, Deputy Superintendent Kay Psencik and the school district were indicted for tampering with government records. In Houston three teachers and a principal were dismissed for prompting students during test sessions ("TAAS scandal," 1999).

Illiteracy remains a major problem in Texas. Over 80 percent of Texas prison inmates have been found functionally illiterate. The four largest cities— Dallas, Houston, San Antonio and El Paso— have adult illiteracy rates of 12 to 19 percent. Statewide, the Texas adult illiteracy rate is 12 percent, second worst of any state in the U. S. (Census Bureau, 1992). In communities near the Mexican border, where rates are highest, illiteracy among children has increased during the years under TAAS (*Regional Profile,* 1999).

Appendix 5
Information: California

In 1961 California began programs of achievement testing in its public schools, with testing procedures and standards under local school district control. A 1972 state law created the California Assessment Program, under which multiple choice tests for reading, writing and mathematics were administered in grades 2, 3, 6 and 12, with grade 8 added in 1983. By 1987 a writing sample and a test for U. S. history and economics had been added. In 1988 the Board began to offer Golden State Examinations, intended to identify and honor outstanding students in public schools. In 1998 about 2,700 high-school graduates received merit diplomas based on these test scores.

In 1978 California voters passed Proposition 13, radically restricting local funds for schools in most communities. Passage of Proposition 62 in 1986 hobbled the ability of state government to assist with funding for education. Proposition 98, approved in 1988, set a school funding floor at a relatively low level and has tended to prevent further erosion. Since 1978 California has fallen from among the top ten states in many national ratings of education to among the bottom ten. California education initiatives since the 1970s must be viewed in the context of the state's flamboyant and reactionary politics and its drastic change in financial support for public schools.

A 1991 state law authorized a new California Learning Assessment System, and the previous testing program was gradually discontinued. In 1994 the new program died after a veto of legislation by the governor, leaving the state with no statewide testing except the Golden State Examinations. In 1995 new state laws established a Pupil Testing Incentive Program and required statewide standards. The Board of Education began to establish "curriculum frameworks," or required curricula (see McDonnell, 1997). In 1997, before the new testing program had been fully implemented, another new state law replaced it with requirements for revised curriculum standards and nationally normed standard tests, to be designated by the Board of Education. In 1997 and 1998 the Board of Education specified new content standards for reading, writing, mathematics, science, and history and social science (see McDonnell and Weatherford, 1999). Curriculum frameworks and corresponding tests are being revised and developed to correspond.

As required by the 1997 California law, the Board of Education began a Standardized Testing and Reporting (STAR) Program in 1998. Its major component is annual administration of the Stanford Achievement Tests, published by Harcourt Brace Educational Measurement, to all students in grades 2 through 11. Grades 2 through 8 are tested in reading, writing, spelling and mathematics. Grades 9, 10 and 11 are tested in reading, writing, mathematics, science and social science. There are also "augmentation" tests in language arts and mathematics, intended to reflect the California curriculum, with additional tests in preparation.

By state law, STAR tests are provided only in English, although about forty percent of California's public school students come from Spanish-speaking households. These are strictly timed tests in multiple choice formats plus writing samples. Total testing time is about six

hours. Parents may exempt their children from testing. Test items are not being disclosed to the public. California public schools are forbidden by law to use test preparation materials specifically designed for these tests. Their use by parents who can afford them is not restricted.

In April, 1999, the California legislature passed and its governor signed a law called the Public Schools Accountability Act. It requires the state to publish an Academic Performance Index (API) annually for each public school. It also provides extra funding for low performing schools and a system of awards for high performing schools. A total of $100 million was appropriated for awards in 1999. The 1999 law also requires the Board of Education to develop and administer promotion and graduation tests, starting in 2001. After three years, passing scores will be required to enter high school and to obtain a high-school diploma.

For 1999 the Board of Education defined the API on the basis of Stanford Achievement Test scores (California, 1999). It reflects student score ranks, weighted by subject content. Weights for grades 2 through 8 are reading 30 percent, writing 15 percent, spelling 15 percent, and mathematics 40 percent. Weights for grades 9 through 11 are 20 percent each for reading, writing, mathematics, science and social science. A school with all students ranking in the top 20 percent of the distribution of scores will have an API of 1,000, while a school with all students ranking in the bottom 20 percent will have an API of 200. The 1999 API ratings for California public schools are summarized in the Figure 5:

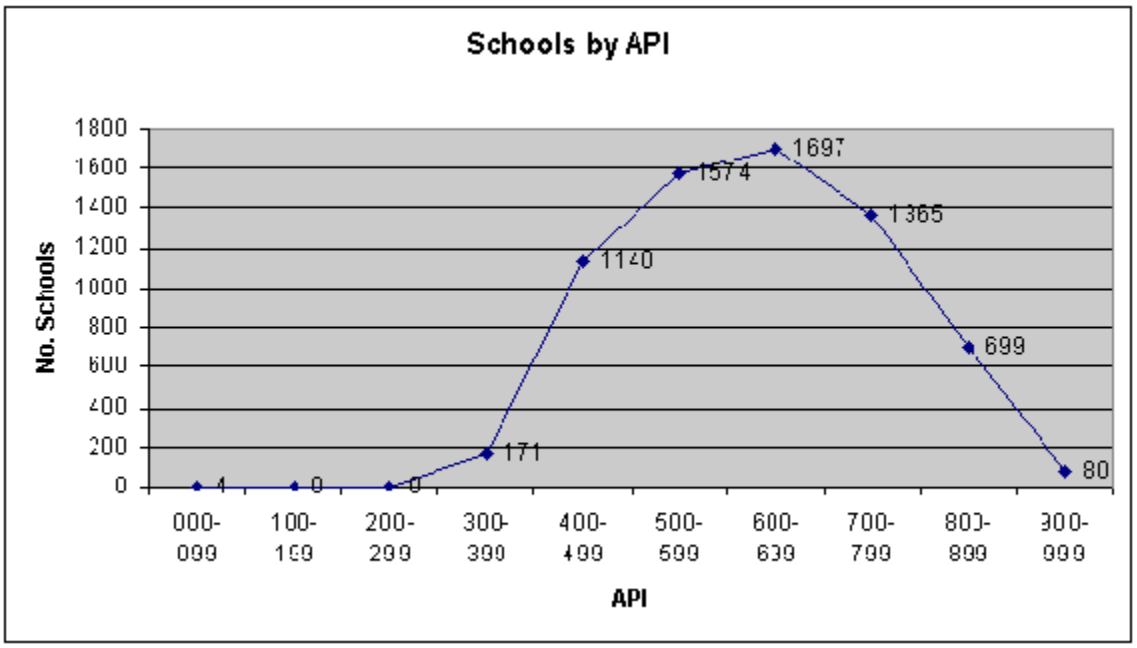


Figure 5. California school ratings.

Source: *Academic Performance Index School Rankings, 1999,* California Department of Education, Sacramento, CA, January, 2000. Chart prepared by the author. Data were grouped into the API ranges shown. Four schools were unrated.

The official goal is to raise all schools to an API of 800. Since the API is essentially comparing scores with averages, this is a "Lake Wobegon" goal, to make "all the kids above average."

Appendix 6
Performance Assessment

"Performance assessment is a broad term. It covers many different types of testing methods that require students to demonstrate their competencies or knowledge by creating an answer or product. It is best understood as a continuum of formats that range from the simplest student-constructed responses to comprehensive demonstrations or collections of large bodies of work over time. This [section] describes some common forms of performance assessment.

"**Constructed-response questions** require students to produce an answer to a question rather than to select from an array of possible answers (as multiple-choice items do). In constructed-response items, questions may have just one correct answer or may be more open ended, allowing a range of responses. The form can also vary: examples include answers supplied by filling in a blank; solving a mathematics problem; writing short answers; completing figural responses (drawing on a figure like a graph, illustration, or diagram); or writing out all the steps in a geometry proof.

"**Essays** have long been used to assess a student's understanding of a subject by having the student write a description, analysis, explanation, or summary in one or more paragraphs. Essays are used to demonstrate how well a student can use facts in context and structure a coherent discussion. Answering essay questions effectively requires analysis, synthesis, and critical thinking. Grading can be systematized by having subject matter specialists develop guidelines for responses and set quality standards. Scorers can then compare each student's essays against models that represent various levels of quality.

"Writing is the most common subject tested by performance assessment methods. Although multiple-choice tests can assess some of the components necessary for good writing (spelling, grammar, and word usage), having students write is considered a more comprehensive method of assessing composition skills. Writing enables students to demonstrate composition skills-inventing, revising, and clearly stating one's ideas to fit the purpose and the audience--as well as their knowledge of language, syntax, and grammar. There has been considerable research on the standardized and objective scoring of writing assessments.

"Oral discourse was the earliest form of performance assessment. Before paper and pencil, chalk, and slate became affordable, school children rehearsed their lessons, recited their sums, and rendered their poems and prose aloud. At the university level, rhetoric was interdisciplinary: reading, writing, and speaking were the media of public affairs. Today graduate students are tested at the master's and Ph.D. levels with an oral defense of dissertations. But oral interviews can also be used in assessments of young children, where written testing is inappropriate. An obvious example of oral assessment is in foreign languages: fluency can only be assessed by hearing the student speak. As video and audio make it possible to record performance, the use of oral presentations is likely to expand.

"Exhibitions are designed as comprehensive demonstrations of skills or competence. They often require students to produce a demonstration or live performance in class or before other audiences. Teachers or trained judges score performance against standards of excellence known to all participants ahead of time. Exhibitions require a broad range of competencies, are often interdisciplinary in focus, and require student initiative and creativity. They can take the form of competitions between individual students or groups, or may be collaborative projects that students work on over time.

"Experiments are used to test how well a student understands scientific concepts and can carry out scientific processes. As educators emphasize increased hands-on laboratory work in the science curriculum, they have advocated the development of assessments to test those skills more directly than conventional paper-and-pencil tests. A few states are developing standardized scientific tasks or experiments that all students must conduct to demonstrate understanding and skills. Developing hypotheses, planning and carrying out experiments, writing up findings, using the skills of measurement and estimation, and applying knowledge of

scientific facts and underlying concepts—in a word, 'doing science'—are at the heart of these assessment activities.

"Portfolios are usually files or folders that contain collections of a student's work. They furnish a broad portrait of individual performance, assembled overtime. As students assemble their portfolios, they must evaluate their own work, a key feature of performance assessment. Portfolios are most common in writing and language arts-showing drafts, revisions, and works in progress. A few states and districts use portfolios for science, mathematics, and the arts; others are planning to use them for demonstrations of workplace readiness."

Source: Michael J. Feuer et al., Eds., *Testing in American Schools: Asking the Right Questions,* OTA-SET-519, Office of Technology Assessment, U. S. Congress, Washington, DC, 1992, p. 19.

Appendix 7
Chronology of Standard Testing in the U. S.

[Listed in brackets are some developments in other countries which had rapid and substantial impacts in the U. S.]

1900 The College Entrance Examination Board is founded at Columbia College in New York.

1905 [Alfred Binet publishes the first intelligence test, to identify slow learners.]

1908 Edward L. Thorndike, a Columbia professor, begins writing a series of standard achievement tests for use in elementary and high schools, completed in 1916.

1916 First publication of the Stanford-Binet IQ test by Houghton Mifflin, developed by Lewis M. Terman, a Stanford professor.

1916 Arthur S. Otis, a student of Terman and later a test editor for the World Book Company, invents the multiple choice format. It is used in the Army Alpha test.

1917 Robert M. Yerkes, a Harvard professor, organizes the Army Alpha and Beta intelligence tests, given to 1.7 million World War I recruits.

1921 The Psychological Corporation is founded in New York by James M. Cattell, Robert S. Woodworth and Edward L. Thorndike.

1923 First publication of the Stanford Achievement Tests by the World Book Company, developed under the direction of Lewis M. Terman.

1925 Carl C. Brigham, a Princeton professor, develops the Scholastic Aptitude Test for the College Entrance Examination Board.

1927 The California Test Bureau is founded in Los Angeles by Ethel M. Clark and Willis W. Clark, a Los Angeles school teacher.

1928 Everett F. Lindquist, a professor at the University of Iowa, begins the Iowa

Testing Program in support of a scholarship competition.

1933 First publication of the Progressive Achievement Test series by the California Test Bureau, developed by Willis W. Clark and Ernest W. Tiegs.

1935 Louis L. Thurstone, a professor at the University of Chicago, publishes a theory of factor analysis as applied to psychometric testing.

1935 First publication of the Iowa Every-Pupil Test of Basic Skills by the University of Iowa Testing Bureau, developed under the direction of Everett F. Lindquist.

1936 IBM scores the New York Regents examination using a machine based on the Markograph soft pencil electrical technology invented by Reynold B. Johnson.

1938 The *Mental Measurements Yearbook* is first published by Oscar K. Buros, a Rutgers University professor.

1940 Houghton Mifflin acquires publishing rights to the Iowa Test of Basic Skills.

1941 The U. S. armed forces begin using the Army General Classification Test and other standardized tests, given to more than 10 million World War II recruits.

1942 First publication of the Iowa Tests of Educational Development by Houghton Mifflin, developed under the direction of Everett F. Lindquist.

1942 The College Entrance Examination Board replaces its traditional essay tests with multiple choice tests.

1943 Everett F. Lindquist first administers the Test of General Educational Development (GED).

[**1944** Great Britain's Parliament approves the Education Act of 1944, beginning the "eleven-plus" examination restricting admission to grammar schools and access to higher education.]

1947 The Educational Testing Service is founded by Henry Chauncey to prepare and administer the Scholastic Aptitude Test (SAT) for the College Entrance Examination Board.

1949 First publication of the Weschler Intelligence Scales by The Psychological Corporation, developed by David Weschler, a professor at NYU Medical College.

1956 Houghton Mifflin introduces electronic scanners developed by Everett F. Lindquist and Albert N. Hieronymous, scoring test sheets on both sides without requiring soft pencil markings.

1958 The Educational Testing Service begins disclosing its SAT scores to test-takers.

1959 The American College Testing (ACT) Program is founded by Everett F. Lindquist and Theodore McCarrel.

1960 Harcourt Brace and Co. acquires the World Book Publishing Co. and its Stanford Achievement Test series.

1968 McGraw-Hill acquires the California Testing Bureau and its CTB Achievement Test series.

1969 Michigan begins a statewide program of standard testing, later expanded to high-school graduation requirements.

1970 Harcourt Brace acquires The Psychological Corporation.

[**1976** Key research findings on the inheritance of intelligence by Cyril Burt, a former professor at University College, London, are exposed as scientific fraud.]

1979 Houghton Mifflin establishes a Riverside Publishing division to publish the Iowa achievement tests, Stanford-Binet IQ test and other school-based standard tests.

1979 New York's legislature passes and its governor signs the Educational Testing Act of 1979, a "truth in testing" law.

1983 The Reagan administration publishes *A Nation at Risk,* embracing a system of school-based standard tests and punitive sanctions for low scores.

1984 Texas begins a statewide program of standard testing, to be required in ten years for high-school graduation.

1985 The National Center for Fair and Open Testing is founded in Cambridge, MA.

1991 The Bush administration's proposed Excellence in Education Act, H.R. 2460, to create federal school and employment tests, is defeated in Congress.

1996 California begins a statewide program of standard testing, to be required in eight years for middle school and high-school graduation, with state receivership for schools with low scores.

1998 Massachusetts begins a statewide program of standard testing, to be required in five years for high-school graduation, with replacement of principals in schools with low scores.

Appendix 8
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