

Student, Staff, and Employer Incentives for Improved Student Achievement and Work Readiness

John H. Bishop

Ninety-three percent of 17-year-olds do not have "the capacity to apply mathematical operations in a variety of problem settings" [National Assessment of Educational Progress (NAEP), 1988, p. 42].

The 18 percent of the Canadian 18-year-olds who are studying chemistry in their final year of high school know as much chemistry as the top 2 percent of American high school graduates taking their second year of chemistry, many of whom are in Advanced Placement classes [International Association for the Evaluation of Educational Achievement (IAEEA), 1988].

The Problem. The poor performance of American students is sometimes blamed on the nation's "diversity." It is true that secondary schools do a particularly poor job educating African Americans, Hispanics, and children from low-income backgrounds generally. But the affluent, nonminority parents who believe that their children are doing acceptably by international standards are sadly misinformed. In Stevenson, Lee, and Stigler's (1986) study of fifth-grade math achievement, the best of the 20 classrooms sampled in Minneapolis was outstripped by every single classroom studied in Sendai, Japan, and by 19 of the 20 classrooms studied in Taipeh, Taiwan. The nation's top high school students rank far behind much less elite samples of students in other countries. Substantially larger shares of 17-18-year-old Belgians, Finns, Hungarians, Scots, Swedes, and Canadians are studying advanced algebra, precalculus, and calculus; and their achievement levels are significantly higher than those of American high school seniors in such classes. The gap between American high school seniors in middle-class suburbs and their counterparts in most European nations is as large or larger than the two to three grade-level-equivalent gap between whites and blacks in the United States (IAEEA, 1987; NAEP, 1988). The learning deficit is pervasive.

We are justly proud of our high participation in postsecondary education; however, most college freshmen and sophomores are studying material that Europeans study in secondary school. Moreover, dropout rates in the United States are extremely high due in part to the poor preparation received in high school. Participation in postsecondary education is expanding rapidly in other industrialized nations. For males, the ratio of higher education graduates to the population 24 years old is 33 percent for Japan, 25 percent for the United States, 20.6 percent for Canada, and 14-16 percent for England, France, and Germany [National Center for Education Statistics (NCES), 1990, Indicator 2.8]. If secondary education does not do a better job of preparing our youth for postsecondary education, college completion rates in Canada and continental Europe will surpass our level by the year 2010.

The Consequences. The low level of academic achievement in American secondary schools has been a disaster for our youth and our economy. A high school diploma no longer signifies functional literacy. Most schools do not help their graduates obtain employment, and many do not even send transcripts to employers when their graduates sign the necessary waivers while applying for a job. In consequence, *for the past six years, an average of 28 percent of noncollege-bound white high school graduates and 55 percent of the black graduates had no job four months after graduating from high school (Bureau of Labor Statistics, 1989). Inflation-adjusted wages fell 17.3 percent for young male high school graduates and 10 percent for young female graduates between 1971 and 1988 (Katz & Murphy, 1990).*

Export-oriented capitalist growth strategies are being adopted throughout the world. These countries have billions of hard-working, poorly educated work-

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ers who are currently paid less than 50 cents an hour. Manufacturing operations that make heavy use of unskilled labor have been moving abroad and will continue to do so. By the year 2010, only a few manufacturing jobs for poorly educated, unskilled workers will remain in the United States—and these jobs will be poorly paid.

The deteriorating achievement levels of those completing high school in the late 1970s did not generate a significant decline in the proportion enrolling in college the following October, but it did cause a major decrease in college completion rates. College graduation rates rose dramatically in the 1950s and 1960s; but the share of high school graduates 25–29 years old who had completed four years of college peaked at 28 percent in 1976–77, fell to 25 percent in 1981–82, and has since crept back to 27.3 percent in 1989–90 (NCES, 1990, Indicator 2:7). Demand for highly educated workers has grown rapidly during the past 30 years, and wage premiums for professionals and managers are now at postwar highs. The very high payoff for completing a college degree, however, has stimulated only a modest increase in rates of college completion. For the high school graduating class of 1980, only 18.8 percent had obtained a bachelor's degree by February 1986. If the academic preparation of those completing high school does not improve, college dropout rates will remain high and the future supply of highly educated workers will fall short of the forecasted rapidly growing demand; and the wage gap between educational "haves" and educational "have nots" will continue to grow (Bishop & Carter, 1991).

The high school graduates of 1980 knew about 1.25 grade-level-equivalents less math, science, history, and English than the graduates of 1967. This decline in the academic achievement lowered the nation's productivity by \$86 billion in 1987 and will lower it by more than \$200 billion annually in the year 2010 (Bishop, 1989).

Business leaders are complaining about the declining quality of entry-level workers in the United States. They and others argue correctly that the competitiveness of American companies is threatened by the poor educational background of our frontline workers. Some have responded to these complaints by saying that business should solve its own problems by improving management and beefing up training. Public education should not, it is argued, give business needs much consideration; student and public needs should come first.

Indeed, there is a grain of truth in the first response: the survival of a business is almost entirely determined by factors that schools, even excellent schools, cannot change. If schools do not improve, businesses must

and will adapt to the capabilities of the workers that are available. Because functionally illiterate workers are less productive, domestic companies will survive by paying lower wages. Multinational companies will survive by transferring assets and activities overseas. There is no amount of union power or government regulation that can stop this from happening. When the pie shrinks, the slices shrink as well. The losers will be American workers and all who depend on their productivity, including the least fortunate among us. Yes, public and student needs must come first. It is their need for higher wages and a better standard of living that drives the need for higher standards in secondary school. Like Cassandra, employers are warning the nation that its mediocre secondary education system is a Trojan Horse, which, if not repaired, will eventually bring the city down. The warning needs to be heeded not because employers are the daughters of a king, but because their forecast is correct and none of us can escape the city.

This article proposes a strategy for banishing mediocrity and building in its place an excellent American system of secondary education. Before a cure can be prescribed, however, a diagnosis must be made.

LOW EFFORT: THE PROXIMATE CAUSE OF THE LEARNING DEFICIT

This poor record of U.S. achievement is caused by the limited amount of time, money, and, above all, psychic energy devoted to academic learning in American high schools. Students, parents, and the public are all responsible.

STUDENT EFFORT

Learning is not a passive act; it requires the time and active involvement of the learner. In a classroom with one teacher and 18 students, there are 18 learning hours spent to every 1 hour of teaching time. Student time is, therefore, the critical resource; how intensely that time is used affects learning significantly.

Studies of time allocation using the reliable time-diary method have found that the average number of hours per week in school is 25.2 hours for primary school pupils, 28.7 hours for junior high students, and 26.2 hours for senior high students. The comparable numbers for Japan are 38.2 hours for primary school, 46.6 hours for junior high school, and 41.5 hours for senior high school (Juster & Stafford, 1990).

Studies show that American students actively engage in a learning activity for only about half the time they are scheduled to be in school. A study of schools in Chicago found that public schools with high-achieving students averaged about 75 percent of class time for actual instruction; for schools with low-achieving students, the average was 51 percent of class time (Frederick, 1977). Overall, Frederick, Walberg, and Rasher (1979) estimated that 46.5 percent of the potential learning time is lost due to absence, lateness, and inattention.

In the *High School and Beyond* survey, students reported spending an average of 3.5 hours per week on homework in 1980 [National Opinion Research Center (NORC), 1983]. *Time diaries yield similar estimates: 3.2 hours for junior high school and 3.8 hours for senior high school.* Time diaries for Japanese students reveal that they spend 16.2 hours per week studying in junior high school and 19 hours per week studying in senior high school. When homework is added to engaged time at school, the total time devoted to study, instruction, and practice in the United States is only 18–20 hours per week—between 15 and 20 percent of the student’s waking hours during the school year. By way of comparison, the typical senior spent nearly 10 hours per week in a part-time job (NORC, 1983) and 19.6 hours per week watching television. Thus, TV occupies as much time as learning. Table 1 shows that secondary school students in other industrialized nations watch much less television: 55 percent less in Finland, 70 percent less in Norway, and 44 percent less in Canada [Organization of Economic Cooperation and Development (OECD), 1986, Table 18.1]. In other countries, high school students watch less TV than adults; in the United States they watch more. Reading takes up 6 hours of a Finnish student’s nonschool time per week, 4.8 hours of Swiss and Austrian student’s time—but only 1.4 hours of an American student’s time (OECD, 1986, Table 18.3).

Science and mathematics deficits are particularly severe because most students do not take rigorous college preparatory courses in these subjects. The high school graduating class of 1982 took an average of only .43 credits of Algebra 2, .31 credits of more advanced mathematics courses, .40 credits of chemistry, and .19 credits of physics (Meyer, 1989, Table A.2).

Even more important than the time devoted to learning is the intensity of the student’s involvement in the process. At the completion of his study of American high schools, Theodore Sizer (1984) characterized students as “*all too often docile, compliant, and without initiative*” (p. 54). John Goodlad (1983) described “*a general picture of considerable passivity among students*” (p. 113). The high school teachers surveyed by Goodlad ranked “*lack of student interest*” as the most important problem in education.

The students’ lack of interest makes it difficult for teachers to be demanding. Sizer’s description of Ms. Shiffe’s biology class illustrates what sometimes happens:

She wanted the students to know these names. They did not want to know them and were not going to learn them. Apparently no outside threat—flunking, for example—affected the students. Shiffe did her thing, the students chattered on, even in the presence of a visitor. . . . Their common front of uninterest probably made examinations moot. Shiffe could not flunk them all, and, if their performance was uniformly shoddy, she would have to pass them all. Her desperation was as obvious as the students’ cruelty toward her (1984, pp. 157–158).

Some teachers can overcome the obstacles and induce their students to undertake tough learning tasks. But for most, the students’ lassitude is demoralizing. Teachers are assigned responsibility for setting high standards, but we do not give them any of the tools that might be effective for inducing student observance of the academic goals of the classroom. They finally must rely on the force of their own personalities. All too often, teachers compromise academic demands because the bulk of the class sees no need to accept them as reasonable and legitimate.

Nevertheless, American students do not appear to realize how poor their performance is. *Even though American 13-year-olds were one-fourth as likely as Korean students to “understand measurement and geometry concepts and [to be able to] solve more complex problems,” Americans were three times more likely to agree with the statement, “I am good at mathematics”* (Lapointe, Mead, & Phillips, 1989).

Proposed reforms of secondary education include stricter graduation requirements, more homework, increases in the amount and difficulty of course mate-

Table 1
Time Use by Secondary School Students

Country	TV Time (hours)	Reading Time (hours)	
	Students	All Adults	Students
United States	19.6	15.9	1.4
Austria	6.3	10.6	4.9
Canada	10.9	13.3	1.5
Finland	9.0	9.0	6.0
Netherlands	10.6	13.4	4.3
Norway	5.9	7.2	4.3
Switzerland	7.7	9.0	4.8

Source: OECD, 1988, Tables 18.1 & 18.3.

rial, greater emphasis on the basics (English, math, science, social science, computer science), and improvements in the quality of teaching through higher salaries, career ladders, and competency tests for teachers. Although desirable, these reforms are limited in that they emphasize changes in the content and quality of what is offered by schools and require the student to work harder. These reforms have ignored the problem of *motivating students to take rigorous courses and to study harder*. New York State, for example, tried to increase the rigor of high school curricula by upgrading the requirements for the Regents diploma; but the result was a drop in the number of students getting the Regents diploma and an increase in the number of students receiving local diplomas.

PARENTAL EFFORT

The second major reason for the low levels of achievement by American students is parental apathy. High school teachers rank "lack of parental interest" as the second most important problem in education (Goodlad, 1983). A National Science Foundation (NSF) survey of 2,222 parents of 10th graders found that 25 percent thought their child should take only 1 or 2 science classes in high school [Longitudinal Survey of American Youth (LSAY), 1988, Q. BH165]. When 2,829 high school sophomores were asked whether "My parents . . . think that math (science) is a very important subject," 40 percent said *no* for mathematics and 57 percent said *no* for science (LSAY, Q. AA19Q-AA19R). Only 30 percent of 10th graders reported their parents "want me to learn about computers" (LSAY, Q. AA19D).

Despite the poor performance of Minneapolis fifth graders in mathematics, their mothers were much more pleased with the performance of their local schools than the Taiwanese and Japanese mothers. When asked "How good a job would you say the student's school is doing this year educating _____," 91 percent of American mothers responded "excellent" or "good"; but only 42 percent of Taiwanese and 39 percent of Japanese parents were this positive (Stevenson et al., 1986). Table 2 presents data from this study. Despite the small size of Japanese and Taiwanese homes, 95-98 percent of the fifth graders in these two countries had a desk of their own specifically for studying, while only 63 percent of the Minneapolis children had a desk. Mathematics workbooks had been purchased for their children by 56-58 percent of Taiwanese and Japanese parents but by only 28 percent of American parents. Science workbooks had been purchased by 51 percent of Taiwanese parents, 29 percent of Japanese parents, and by only 1 percent of American parents (Stevenson et al., 1986). This is not because they love their children any less, but because they have different priorities such as teaching

responsibility and work habits by requiring that they do chores around the house.

Table 2
Learning Is a Low Priority of Parents (Percent)

Survey Items	Minneapolis	Sendai, Japan	Taipei, Taiwan
Mothers attended college	58	98	95
5th grader has study desk	63	22	13
Parents purchased workbook for additional homework:			
in mathematics	28	58	56
in science	1	29	51
5th grader assigned chores	95	76	28
Parents believe their school is doing an "excellent or good job"	91	39	42

Source: Stevenson, Lee, & Stigler, 1986, pp. 693-699.

Clearly, American parents hold their children and their schools to lower academic standards than do Japanese and Taiwanese parents.

If American parents were truly dissatisfied with the academic standards of their local public schools, they would send their children to private schools offering an enriched and rigorous curriculum, as many parents do in Australia; and tutoring after school would be as common as it is in Japan. Japanese families allocate 10 percent of the family's after-tax income to educational expenses; American families only 2 percent. Most parents who send their children to private day schools appear to be attracted by their stricter discipline and religious education, not by more rigorous academics and better qualified teachers. At the great majority of private day schools, students do not learn at an appreciably faster rate than public school students (Cain & Goldberger, 1983).

PUBLIC EFFORT: EDUCATIONAL EXPENDITURE—A DECEPTIVE INDICATOR

The ratio of per-pupil expenditure in kindergarten through 12th grade to per-capita GNP is lower in the United States than in 10 of 11 other advanced Western nations (Mishel & Rasell, 1990). This statistic suggests that elementary education receives lower priority in the United States than in other nations. People who disagree with this implication point to another statis-

tic, per-pupil expenditure deflated by a cost-of-living index on which the United States ranks 2nd among the same group of 12 nations (NCES, 1990). This second form of comparison is not very useful, however, because the costs of recruiting competent teachers are much higher in the United States than abroad. Labor compensation accounts for the great bulk of education costs; and, clearly, the wage that must be paid to recruit qualified teachers is substantially higher in countries with higher standards of living. Expenditure per pupil remains a deceptive indicator of a nation's investment in education because different countries budget school costs differently and assign public schools different functions. Mishel and Rasell's (1990) study included the costs of preschool education in their expenditure figure. Preschool education is funded through public education budgets in many European countries, but not in the United States. This inflates European expenditure-per-pupil figures relative to those in the United States. On the other hand, costs of transportation usually are not included in school budgets in Japan and Europe, where many students use the public transportation system to go to school. In many European countries, after-school sports are sponsored and organized by local government, not the school. This removes the capital costs of extensive school-based sports facilities and the salaries of coaches and maintenance personnel from the school budget.

Vocational education is more expensive than traditional academic courses. The fact that the United States, Sweden, and France have their schools provide occupational training to large numbers of 16-18-year-olds raises costs per student relative to the costs in Germany, Switzerland, and Austria, where employers are responsible for most of these costs. In 1980, German employers invested an average of \$6,000 per year in the training of each apprentice they took on as part of the dual system of vocational training (Noll, Beicht, Boll, Malcher, & Wiederhold-Fritz, 1984). American schools perform functions such as after-school sports, after-school day care, hot lunches, and driver education that other countries often assign to other institutions. When data are carefully adjusted for all of these factors and deflated by a cost-of-education index reflecting compensation levels in alternative college level occupations, American spending per pupil may well be lower than in many European nations.

The primary reason for low real expenditure on education in the United States is the low levels of teacher compensation. When college-graduate earnings are compared, education majors come out at the very bottom. In 1967, males with an undergraduate degree in engineering earned 67 percent more and those with a bachelors degree in business administra-

tion earned 36 percent more than males with education degrees (U.S. Bureau of the Census, 1970, p. 23). Despite recent increases in teacher salaries, the gap between teachers and other college graduates has grown even larger. Data on relative salaries is shown in the first column of Table 3. In 1984, physical science majors earned 105 percent more, engineers earned 128 percent more, economics majors 124 percent more, and business majors 116 percent more than education majors. Social science majors earned 35 percent more; and liberal arts, humanities, and English majors earned 6-8 percent more than education majors. An MBA was worth 88 percent more, a master's in engineering 70 percent more, and a law degree 114 percent more than a master's or doctorate in education (U.S. Bureau of the Census, 1987).

Table 3
Relative Salaries by College Major

U.S. Adults College Major	U.S. Previous Year Graduates		Australia Previous Year Graduates	
	1984	1985	1979	1989
<i>[percentage, related to a base of education salaries]</i>				
Education	100	100	100	100
Humanities	106	101	86	92
Physical science		205	127	97
102				
Engineering	228	175	102	110
Economics	224	—	91	100
Business (BA)	216	136	—	—
(MBA)	317	—	—	—

Source: U.S. Bureau of the Census, 1988; National Center for Education Statistics, 1987; Guthrie, 1990.

It is not an immutable law of nature that teachers should be paid substantially less than college graduates in other occupations. Australian university graduates with education degrees start at the same salary as graduates in economics/business, 8 percent ahead of those who majored in humanities and only 2 percent below those who majored in physical science. In the United States, starting salaries of mathematics and physical science majors who entered teaching were 42 percent below the salaries of those who obtained computer programming or system analyst jobs, and 35 percent below the starting salaries of those obtaining a job in mathematics or physical science (Cahalan et al., 1993). No wonder it is so difficult to attract the best and brightest into the teaching profession. The Stan-

dard Achievement Test (SAT) scores of entering freshman expressing an interest in majoring in education are lower than for any other major. No wonder it is particularly difficult to recruit science and mathematics teachers.

Comparisons with other industrialized societies tell the same story. Because many countries fund pensions and medical insurance through mandated social security taxes, it is essential to include both voluntary and compulsory contributions for these purposes in the calculation of teacher compensation. Estimates of total compensation per teacher, deflated for cost-of-living differences between countries, are shown in the first column of Table 4. In 1982–1984, total compensation was 24 percent higher in Canada and Sweden, 6–7 percent higher in Germany and Holland, 20 percent higher in Belgium, and 28 percent higher in France than in the United States. Despite lower overall standards of living, these six countries paid their teachers more than we did. Compensation was 37 percent lower in the United Kingdom, 40 percent lower in Italy, and 26 percent lower in Japan. Relative to output per hour worked, however, Japan paid its teachers 25 percent more than we did. The relative compensation of teachers was thus lower in only two countries, Britain and Italy.

The questions that tend to be raised by statistics such as these are: *Why do American voters choose to pay teachers so little? Why do voters not demand higher standards of academic achievement at local high schools? Why do school boards allocate scarce education dollars to interscholastic athletics and the band, rather than better mathematics teachers and science laboratories?* It is to questions such as these that we now turn.

VOTER APATHY REGARDING ACADEMIC ACHIEVEMENT

In the American education system—unlike those of other countries—all the really important decisions (budget allocations, hiring selections, salary levels, homework assignments, teaching strategies, grading standards, course offerings, pupil assignments to courses and programs, disciplinary policies, and so forth) are made by classroom teachers and school administrators who are responding to local political pressures. Federal and state officials are far removed from the classroom, and the instruments available to them for inducing improvements in quality and standards are limited. They have no effective control of the standards and expectations that prevail in the classroom. They do not control the allocation of school funds between academics and athletics.

State aid can be increased; but econometric studies suggest that increases in state aid reduce local property tax collections by a significant amount (Carroll, 1982; Ehrenberg & Chaykowski, 1988). For every extra dollar of noncategorical state aid to local school districts, only about 50 cents is spent on education by the locality: the rest either lowers tax rates or enables the community to spend more on other public functions. For categorical programs like Title I, the increase in local education spending is larger; but some leakage appears to be inevitable (Monk, 1990; Tsang & Levin, 1983).

School boards are the primary mechanism by which the voters exercise authority over local schools. In most parts of the United States, only bond issues need go to the voters for approval. The board determines the budget and sets the property tax rates necessary to fund that budget. Parents are typically a minority of voting-age adults in the community, but only about 10 percent of the nonparents in a community typically vote in school board elections. Parents are more likely to vote in these elections, so they have effective control of the school board in many communities. In other communities, they could gain control of the board, if they voted in concert. Parents pay less than a third of school taxes in most communities, so voting for school board members who promise to support increased

Table 4
Relative Teacher Compensation

	Teacher Compensation* 1982	GDP Per Hour Worked** 1977-1981	Ratio Teacher Index/ GDP/ hour
<i>[percentage, relative to a base of U.S. compensation]</i>			
United States	100	100	1.0
Belgium	120	94	1.28
Canada	124	88	1.41
France	128	95	1.35
Germany	107	95	1.13
Italy	60	68	.88
Japan	74	59	1.25
Netherlands	106	97	1.09
Sweden	124	79	1.57
United Kingdom	63	78	.81

Sources:

*Total compensation including compulsory health and pension contributions deflated by cost of living (index with U.S. = 100) (UNESCO, 1983).

**Total domestic output divided by total hours worked, deflated by cost of living (index with U.S. = 100) (Maddison, 1982).

educational spending and higher standards is, for them, a low-cost way of improving the school attended by their child. *Why hasn't this potential power been exercised to raise academic standards and teacher salaries? Why are less than a third of parents voting in most school board elections? Why do so many parents vote against increases in school taxes? When additional money is available, why is so much of it spent on upgrading the sports program and the band?*

If, as indicated previously, the parents of a community are satisfied with academic outcomes that leave their children years behind students of other nations in mathematics and science, federal and state efforts to raise standards will have no lasting effect.

THE ABSENCE OF REWARDS FOR EXCELLENCE: THE ROOT CAUSE OF THE LEARNING DEFICIT

The fundamental cause of the low effort level of American students, parents, and voters in school elections is the absence of good signals of effort and learning in high school and a consequent lack of rewards for effort and learning. In the United States, the only signals of learning that generate substantial rewards are diplomas and years of schooling. In other advanced countries, mastery of the curriculum taught in high school is assessed by essay examinations that are set and graded at the national or regional level. Grades on these exams signal the student's achievement to colleges and employers and influence the jobs that graduates get and the universities and programs to which they are admitted. How well the graduating seniors do on these exams influences the reputation of the school and, in some countries, the number of students applying for admission to the school. In the United States, by contrast, students take aptitude tests that are not intended to assess the learning that has occurred in most of the classes taken in high school. The primary signals of academic achievement are grades and rank in class—criteria that assess achievement relative to other students in the school or classroom, not relative to an external standard.

THE ABSENCE OF REWARDS FOR LEARNING IN HIGH SCHOOL

Consequently, the students who do not aspire to attend highly selective colleges benefit very little from working hard while in high school, and parents have little incentive to vote the tax increases necessary to upgrade the academic quality of

local schools. This absence of rewards is a consequence of eight phenomena:

All Students

1. *Because their student bodies are so diverse, American high schools offer an incredible variety of courses at vastly different levels of rigor.* Most students choose courses that have the reputation of being fun and not requiring much work to get a good grade. The rigor of the courses taken is not efficiently signaled to colleges and employers, so taking rigorous courses is seldom rewarded. Teachers know this and adjust their style of teaching and their homework assignments with an eye to maintaining enrollment levels.

2. *Most youth are in peer groups that discourage academic effort.* No adolescent wants to be considered a “nerd, brain, geek, grade grubber, or brown noser”; yet that is what happens to students who study hard and are seen to study hard. Peers have a personal interest in persuading each other not to study, because the school's signals of achievement assess performance relative to fellow students through grades and class rank not relative to an external standard.¹

3. *Setting higher academic standards or hiring better teachers does not on average improve the signals of academic performance—rank in class, grade-point average (GPA), and SAT scores—that selective colleges use for making admission decisions and a few employers use to make hiring decisions.* Higher standards for graduating are not likely to be supported by the parents of children not planning to go to college, because they would put at risk what is most important, the diploma. Higher standards do not benefit students as a group, so parents as a group have little incentive to lobby strongly for higher teachers salaries, higher standards, and higher school taxes.

4. *There is no effective way of holding most high school and middle school teachers individually accountable for the learning of their students.* Unionization is not the critical barrier, because unionized European and Japanese secondary school teachers and most American primary school teachers feel accountable for the learning of their students. The lack of accountability in the United States stems from (a) the rarity of high-stakes examinations assessing student achievement in particular subjects relative to an external standard and (b) the fact that most secondary school students receive instruction in English, mathematics, history, and science from many different teachers. The exceptions to this norm are

the coaches of the athletic teams, the band conductor, teachers of advanced placement (AP) classes, and vocational teachers (who are often evaluated for their success in placing students in good jobs). In Europe, students who are preparing to take a particular exam at the end of their secondary education typically remain together in one class and are taught by the same teacher in successive years. In Japanese junior high schools, a team of teachers, each responsible for a different subject, teach all the seventh graders one year, the eighth graders the next year, and the ninth graders the third year. Examinations taken during ninth grade determine admission to competitive high schools; therefore, teachers feel responsible for how well their students do on these examinations.

5. *In most American communities, students and parents cannot choose which local public high school to attend.* In Europe and Japan, by contrast, the family can, within the constraints of competitive admissions policies, often select which secondary school a student attends. Barriers to attending a school other than the closest one are lower in these countries because public transportation is available; opportunities to participate in sports and music are often organized by the community, not the school; and centralized funding of schools means that money follows the student even when a nonpublic school is selected. The centralization of funding and the free choice of schools results in stronger competitive pressure on schools to excel and smaller quality differentials between schools of the same type than in the United States.

College-Bound Students

6. *Most American colleges and universities do not set rigorous standards for admission.* Most financial aid to undergraduates is awarded solely on the basis of need, not the student's past academic achievements. High school students know that taking undemanding high school courses and goofing off in these courses will not prevent them from going to college. In the United States, access to higher education is rationed primarily by ability and willingness to pay. In Europe, universities are free, and most governments provide college students with a stipend to cover living costs. Places in higher education are rationed not by price nor aptitude, but by achievement in the core subjects studied in secondary school.

7. *Where admission to college in the United States depends on high school performance, it is not based on an absolute or external standard of achievement in high*

school subjects. Rather, it is based, in part, on aptitude tests that do not assess the high school curriculum, as well as on measures of student performance such as class rank and GPA, which are defined relative to classmates' performances.

Non-College-Bound Students

8. *The labor market fails to reward effort and achievement in high school.* Analysis of the Youth Cohort of the National Longitudinal Survey indicates that during the first 8 years after leaving high school, greater competence in science, language arts, and mathematical reasoning lowers wages and increases the unemployment of young men. Figures 1 and 2 show estimates of the percentage increase in wage rates that results from a five-grade-level-equivalent improvement on tests assessing competence in mathematical reasoning, English, science, technology, and computational speed (Bishop, 1987a). *For young women, verbal and scientific competencies have no effect on wage rates; and a one-grade-level increase in mathematical reasoning competence raises wage rates by only one-half of 1 percent.* As a result, students who plan to look for a job immediately after high school see very little connection between how much they learn and their future success in the labor market. Less than a quarter of 10th graders believe that geometry, trigonometry, biology, chemistry, and physics are needed to qualify for their first-choice occupation (LSAY, 1988, BA24B-BA25D).

Figure 1
Effect of Competencies on Wage Rates of Males
(Per 5 Grade Level Equivalent Increase in Test Score)

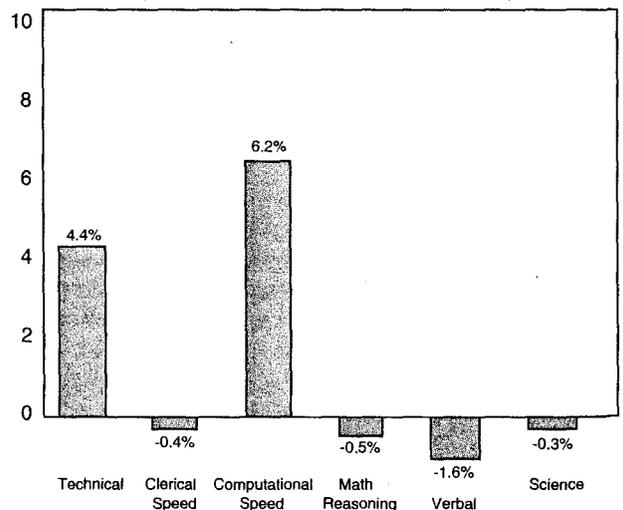


Figure 2
Effect of Competencies on Wage Rates of Females
 (Per 5 Grade Level Equivalent Increase in Test Score)

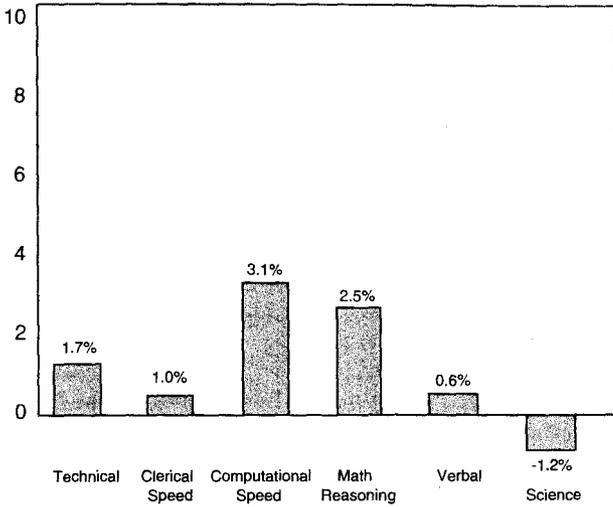
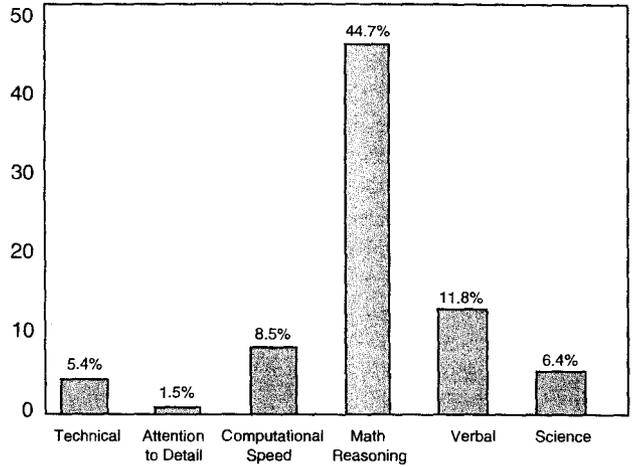


Figure 3
Effect of Competencies on Work Sample Job Performance Measure for Clerical Jobs
 (N=830)
 (Per 5 Grade Level Equivalent Increase in Test Score)



Although the economic benefits of higher achievement to the workers are modest and do not appear until long after graduation, the benefits to the employer (and, therefore, to national production) are immediately realized in higher productivity. Over the past 80 years, industrial psychologists have conducted hundreds of studies, involving hundreds of thousands of workers, on the relationship between productivity in particular jobs and various predictors of that productivity. They have found that competence in reading, mathematics, science and problem solving are strongly related to productivity in almost all of the civilian and military jobs studied (Ghiselli, 1973; Hunter, Crosson, & Friedman, 1985). Figures 3–6 show the results of one study predicting a hands-on measure of job performance in the military. Technical competence had no effect on job performance in clerical jobs, but very substantial effects on performance in skilled technical, general maintenance, and skilled electronics jobs. A five-grade-level-equivalent improvement in mathematical-reasoning ability raised performance by .447 standard deviations (SDs) in clerical jobs, .34 SDs in general maintenance jobs (e.g., truck driving and construction), and .18–.24 SDs in skilled technical and skilled electronics jobs. The proportionate change in productivity that results is somewhere between 25 and 40 percent of these numbers.² Science and word knowledge also have substantial effects on job performance in skilled technical, general maintenance, and clerical jobs (Bishop, 1990a).

Figure 4
Effect of Competencies on Work Sample Job Performance Measure for General Maintenance Jobs
 (N=379)
 (Per 5 Grade Level Equivalent Increase in Test Score)

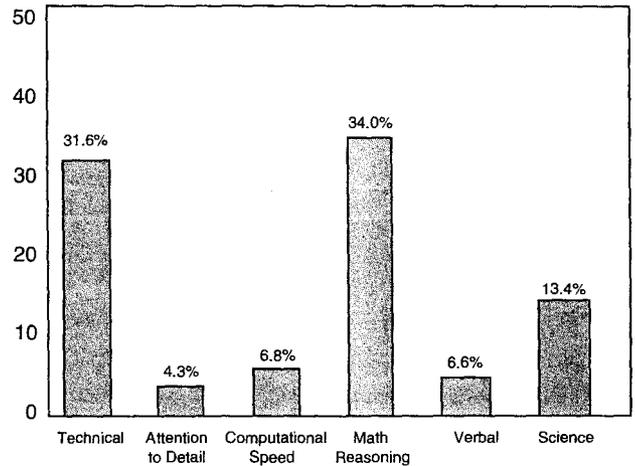


Figure 5
Effect of Competencies on Work Sample Job Performance Measure for Skilled Electronic Jobs (N=349)
 (Per 5 Grade Level Equivalent Increase in Test Score)

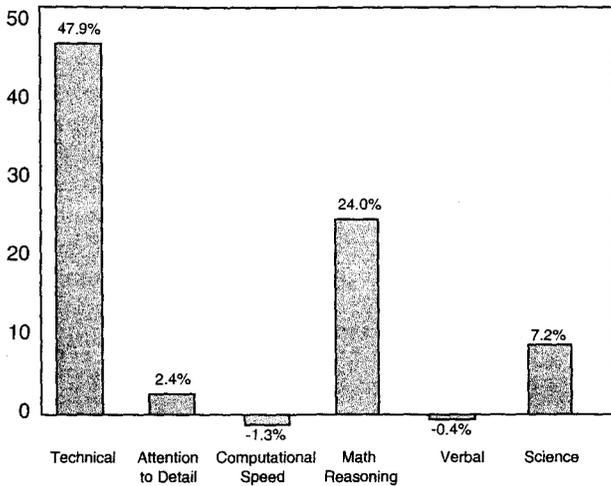
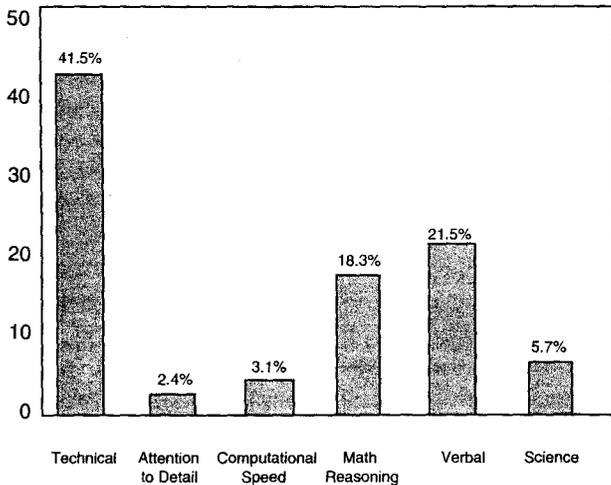


Figure 6
Effect of Competencies on Work Sample Job Performance Measure for Skilled Technical Jobs (N=1324)
 (Per 5 Grade Level Equivalent Increase in Test Score)



Despite their significantly higher productivity, *young workers who have achieved in high school have not been receiving appreciably higher wage rates after high school.* Apparently, when a non-college-bound student works hard in school and improves his or her competence in language arts, science, and mathematical reasoning, the youth's employer reaps much of the benefit.³

Employers believe that school performance is a good predictor of job performance. Studies of how employers rate job-applicant resumes that contain

information on grades in high school have found that employers give significantly higher ratings to job applicants with high GPAs (Hollenbeck & Smith, 1984). However, employers have great difficulty getting information on school performance. If a student or graduate has given written permission for a transcript to be sent to an employer, the Family Educational Rights and Privacy Act of 1974 obligates the school to respond. Many high schools, however, are not responding to such requests. In Columbus, Ohio, for example, *Nationwide Insurance sent more than 1,200 requests for transcripts signed by job applicants to high schools in 1982 and received only 93 responses.*

An additional barrier to the use of high school transcripts in selecting new employees is that when high schools do respond, it takes a great deal of time. In most high schools, the system for responding to transcript requests has been designed to meet the needs of college-bound students, rather than the students who seek jobs immediately after graduating. The result is that a 1987 survey of a stratified random sample of small and medium-sized employers who were members of the National Federation of Independent Business (Bishop, 1987b) found that transcripts had been obtained before the selection decision for only 14.2 percent of the high school graduates hired.⁴ Only 15 percent of the employers had asked high school graduates to report their GPA. The absence of questions about grades on most job-application forms reflects the low reliability of self-reported data, the difficulties of verifying it and the fear of Equal Employment Opportunity Commission (EEOC) challenges to such questions.

Hiring on the basis of recommendations by high school teachers is also uncommon. In the NFIB (1987) survey, when a high school graduate was hired, the new hire had been referred or recommended by vocational teachers in only 5.2 percent of the cases and referred by someone else in the high school in only 2.7 percent. Tests are available for measuring competency in reading, writing, mathematics, science, and problem solving; but after the 1971 U.S. Supreme Court *Griggs* decision, almost all firms were forced to stop employment testing by EEOC guidelines, which made it prohibitively costly to demonstrate test validity (Gold, 1985, pp. 459-460).⁵ The 1987 NFIB survey found that basic skills tests had been given in only 2.9 percent of the hiring decisions studied. Other countries handle the signaling of high school accomplishments to colleges and to prospective employers very differently.

INCENTIVES TO LEARN IN OTHER NATIONS

The tendency not to reward effort and learning in high school appears to be a peculiarly American phenomenon. Marks in school are the major determinant of who gets the most preferred apprenticeships in Germany. In Canada, Japan, and Europe, educational systems administer achievement exams that are tied to the curriculum. Whereas the Japanese use a multiple-choice exam, other nations use examinations in which students write essays and show their work for mathematics problems. Generally, regional or national boards set the exams and oversee the blind grading of the exams by committees of teachers. These are not minimum-competency exams. In some cases, the student may choose to take exams at two different levels of difficulty. Excellence is recognized, as well as competence (Noah & Eckstein, 1988).

Performance on these exams is the primary determinant of admission to a university and to particular fields of study, such as medicine and law. Good grades on the toughest exams—physics, chemistry, advanced mathematics—carry particularly heavy weight. Exam grades are included in resumés and are asked for on job applications.

In Japan, clerical, service, and blue-collar jobs at the best firms are available only to those who are recommended by their high school. The most prestigious firms have long term arrangements with particular high schools to which they delegate the responsibility of selecting new hires for the firm. The criteria by which the high school is to make its selection are, by mutual agreement, grades and exam results. In addition, most employers administer their own battery of selection tests before hiring. The number of graduates that a high school is able to place in this way depends on its reputation and the company's past experience with graduates from the school. Schools know that they must be forthright in their recommendations because if they fail just once to make an honest recommendation, the relationship will be lost, and their students will no longer be able to get jobs at that firm (Rosenbaum & Kariya, 1989).

This system has the consequences one might expect. Rosenbaum's (1990) study of the transition from high school to work in Japan finds that good grades, no discipline problems, and participation in extracurricular activities all have significant positive effects on obtaining jobs at large firms and entering a white-collar occupation. In the United States, by contrast, the job outcomes of males are not improved by good grades, fewer absences from school, a lack of discipline problems, or participation in extracurricular activities. For female high school graduates, obtaining

a white-collar job is associated with high grades, but it is also positively associated with being a discipline problem in school.

Parents in Japan, Canada, and Europe know that a child's future critically depends on how much is learned in secondary school. In many countries, the options for upper secondary schooling depend primarily on the child's performance in lower secondary school, not on where the parents can afford to live, as in the United States. Because the quality and reputation of the high school are so important, the competitive pressure often reaches down into lower secondary school. National exams are the yardstick; thus, achievement tends to be measured relative to everyone else's in the nation, not just that of the child's classmates. As a result, parents in most other Western nations demand more and get more from their local schools than we do; nevertheless, they are more dissatisfied with their schools than American parents.

Japanese teenagers work extremely hard in high school; but once they enter college, many stop working. For students in nontechnical fields, a country-club atmosphere prevails. The reason for the change in behavior is that when employers hire graduates with nontechnical majors, they base their selections on the reputation of the university and a long series of interviews—not on teacher recommendations or other measures of academic achievement at the university. Students in engineering and other technical programs work much harder than their liberal arts counterparts largely because job opportunities depend entirely on the recommendation of their major professor. *Studying hard is not a national character trait; it is a response to the way Japanese society rewards academic achievement.*

American students, in contrast, work much harder in college than in high school—partly because academic achievement in college has important effects on labor market success. When higher level jobs requiring a bachelor's or associate's degree are being filled, employers pay more attention to grades and teacher recommendations than when they hire high school graduates. The 1987 NFIB survey found that when college graduates were hired, 26 percent of the employers had reviewed the college transcript before making the selection, 7.8 percent had obtained a recommendation from a major professor, and 6.3 percent had obtained a recommendation from a professor outside of the graduate's major or from the college's placement office.

TEACHERS AS COACHES RATHER THAN JUDGES

Schools must be not only challenging, but also supportive places. High school is a stressful experience, and students need emotional support from fellow students and teachers. Yet most students do not develop strong personal ties with any teacher, and those relationships that develop typically expire at the end of the academic year. This, in my view, is one of the primary reasons why, despite minimal graduation standards, dropout rates remain very high. When a mentoring relationship develops, it is usually with a coach, band conductor, dramatics teacher, debate team sponsor, yearbook advisor, vocational teacher or AP teacher. There are reasons why these important but infrequent relationships usually develop with these specific staff. The intensive multiyear interaction with a small, stable group of students helps create a supportive atmosphere. *More important still are the effects of a coaching relationship in which the teacher is helping the student prepare for a "performance" (a play, concert, or AP exam) or a competition with students from another school (basketball game, debate, or vocational club contest). These teachers are not the high-stakes judges of the student's performance and achievement. They give guidance and feedback while the student prepares for the game or exhibition, but summary evaluations are made by others. As a result, the mentor/coach is able to set high-performance standards without losing the crucial role of advocate, confidant, and friend.*

External assessment of accomplishment is thus crucial to the development of mentoring relationships between teachers and students. Without it, the effort to become friends with one's students and their parents tends to deteriorate into extravagant praise for mediocre accomplishment. *In courts of law, judges must disqualify themselves when a friend comes before the bar. Yet American teachers are placed in this double bind every day. Often the role conflict is resolved by lowering expectations or hiding failure with charitable phrases such as "does good work when he chooses to participate." Other times, the choice of high standards means that close supportive relationships are sacrificed.*

These considerations account for the strong support that teachers in European secondary schools often give to externally graded exams and external reviews of a student's completed projects and practical work. When a change in this system was proposed in Ireland, the Association of Secondary Teachers of Ireland (1990) wrote:

Major strengths of the Irish educational system have been:

(i) the pastoral contribution of teachers in relation to their pupils [and]

(ii) the perception of the teacher by the pupil as an advocate in terms of nationally certified examinations rather than as a judge.

The introduction of school-based assessment by the pupil's own teacher for certification purposes would undermine those two roles, to the detriment of all concerned. . . .

The role of the teacher as judge rather than advocate may lead to legal accountability in terms of marks awarded for certification purposes. This would automatically result in a distancing between the teacher, the pupil and the parent. It also opens the door to possible distortion of the results in response to either parental pressure or to pressure emanating from competition among local schools for pupils.

A STRATEGY FOR TRANSFORMING SECONDARY EDUCATION

The key to motivating students to learn is recognizing and rewarding learning effort and achievement. Some students are attracted to serious study of a subject by an intrinsic fascination with the subject. They must pay a heavy price, however, in the scorn of their peers and lost free time. Society offers them little reward for their effort. Most students are not motivated to study by a love of the subject. Sixty-two percent of 10th graders agree with the statement, "I don't like to do any more schoolwork than I have to" (LSAY, 1988, Q. AA37N). As a result, far too few high school students put serious time and energy into learning; and society suffers.

If this situation is to be turned around, the peer pressure against studying must be greatly reduced, and rewards for learning must be increased. The full diversity of types and levels of accomplishment needs to be signaled so that everyone—no matter how advanced or far behind—faces a reward for greater time and energy devoted to learning. Learning accomplishments need to be described on an absolute scale so that improvements in the quality and rigor of the teaching and greater effort by all students in a school make everybody better off. Colleges need to be induced to select students on the basis of externally validated achievements, not by "aptitude" test scores or rank in class.

Increasing numbers of employers need workers who are competent in mathematics, science, technology, and communication. If these employers know who is well educated in these fields, they will provide the rewards needed to motivate study. Ninety-two percent of 10th graders say they "often think about what type of job I will be doing after I finish school"

(LSAY, 1988, Q. AA13C). If the labor market were to begin rewarding learning in school, high school students would respond by studying harder; and local voters would be more willing to pay higher taxes so as to have better local schools. The Secretary of Labor's Commission on Workforce Quality and Labor Market Efficiency advocates such a change:

The business community should . . . show through their hiring and promotion decisions that academic achievements will be rewarded (Commission on Workforce Quality, 1989, p. 9).

High-school students who excel in science and mathematics should be rewarded with business internships or grants for further study (Commission on Workforce Quality, 1989, p. 11).

Some might respond to this strategy for achieving excellence by stating a preference for intrinsic over extrinsic motivation of learning. This, however, is a false dichotomy. Nowhere else in our society do we expect people to devote thousands of hours to a difficult task while receiving *only* intrinsic rewards. Public recognition of achievement and the symbolic and material rewards received by achievers are important generators of intrinsic motivation. They are, in fact, one of the central ways a culture symbolically transmits and promotes its values.⁶

Recommendations for policy initiatives by the state government have been grouped into four categories:

- Better signals of learning accomplishment
- Inducing students to pursue a more rigorous curriculum
- Creating new opportunities for learning in schools
- Generating additional recognition and rewards for learning

BETTER SIGNALS OF LEARNING ACCOMPLISHMENT

Without a better system of signaling student accomplishments in high school to parents, colleges, employers, and the public, it is unlikely that there will be sustained improvements in the academic achievement of American high school students. The Commission on the Skills of the American Workforce (1990) proposed the development of just such a system in *America's Choice*.

Instituting Statewide Achievement Examinations. Statewide assessments of competency and knowledge that are keyed to the state's core curriculum (e.g., New York State's Regents Examinations and

California's Golden State Examinations) should be made a graduation requirement. All students would be assessed in core subjects such as English, mathematics, history, and science; but students should also be able to select additional subjects, such as foreign languages, art, economics, psychology, auto repair, electronics, and computer programming, for assessment. *Results of these assessments should replace SAT and ACT test scores in the admission and selection process and determine the award of state merit-based scholarships.*⁷ *Students should be given a credential certifying performance on these exams, and employers should be encouraged to factor examination results into their hiring decisions.* An exam system such as this maximizes incentives to study. The connection between effort in school and college admissions and job placement would become clearly visible to all.

This approach to signaling academic achievement to employers is preferable to extensive use of employment testing of job applicants. By retaining control of exam content, educators and the public influence the kinds of academic achievement that are rewarded by the labor market. Societal decisions regarding the curriculum (e.g., all students should read Shakespeare's plays and understand the Constitution) tend to be reinforced by employer hiring decisions. Tests developed solely for employee selection purposes do not ask questions about Shakespeare and the Constitution. Because it is centralized and students undertake the assessments over the course of their final few years in high school, job applicants do not have to take a different exam at each firm they apply to; and the quality and comprehensiveness of the assessment can be much greater. There is no need for multiple versions of the same exam, and it is much easier to keep it secure.

It would also be desirable for colleges to use the results of state-sponsored assessments for making admissions decisions. Important pedagogical benefits will result from shifting emphasis away from teacher assessment toward external assessment. It transforms the relationship between teachers, students and parents into a more cooperative one in which they work jointly to prepare the students for the external assessment.

Using Externally Assessed Achievement to Determine College Admissions. Albert Shanker, President of the American Federation of Teachers (AFT), and Robert Samuelson, editorial writer for *Newsweek*, have argued that college admission and financial aid should go only to those who have demonstrated some minimum level of achievement on an external assessment. Such a policy would, indeed, dramatically strengthen incentives to study in high school, but undoing the open admissions policies of most com-

munity colleges in America would engender intense political opposition. If some form of it were implemented, the minimum standard would probably be set at a very low level; and it would not improve the incentives faced by most youth.

A more modest proposal, however, is consistent with open admissions at community colleges and vocational/technical institutions. This proposal would have stronger and more widespread incentive effects. *The proposal is simply to use externally assessed achievement as the basis for deciding who is admitted to particular colleges, to particular programs (e.g., an electronics technician program might admit only those with a minimum level of competence in algebra and physics) and into degree-credit programs generally.* Entering students who did not meet these requirements would be able to fulfill them at community colleges, but the credits received in remedial courses would not count toward an associate's or bachelor's degree.

This is not really a radical proposal because most colleges already offer remedial courses that students with deficiencies in their background must take without getting degree credit. The proposal is simply to raise what we expect of students *before* they are admitted into bachelor or associate programs, and to require poorly prepared students to spend additional time getting a degree.

Colleges and universities are already stratified in their rigor and prestige, and the economic rewards for graduating from the finest colleges are substantial (Solmon, 1973; Symonette, 1981). Thus, strong incentives to compete for admission to the best colleges already exist. The problem is not a lack of competition, but the basis of that competition—teacher assessments of achievement relative to others in your high school and aptitude tests that do not assess what has been learned in most high school courses. If college admissions decisions were made on the basis of external assessments of achievement in the subjects studied in high school, student incentives to study in high school and parental incentives to press for higher standards would dramatically improve.

If, however, external assessments of achievement are to be used in the college admissions decision, the results of these assessments must become available in time to affect these decisions. *Assessments of achievement will have to be completed and graded by the end of April, and announcements of admission to college will have to wait until late May.* AP exams, for example, will have to be taken a month earlier than they are now and must be graded in the space of a couple of weeks. Colleges will have to be forced to stop competing for students by offering early guarantees of admission. These changes would have a number of salutary effects. Ask any teacher

about second—semester seniors and you will hear complaints about their unwillingness to work hard. This would end. They would, in fact, become the hardest workers in the high school, thereby providing a positive role model for the younger students. More significantly, the whole structure of incentives to study would be strengthened.

Developing Better Assessment Mechanisms. If student recognition and rewards depend on the results of assessments of competency made by the education system, we must assess all the competencies that we believe students should be developing. Because curriculum objectives differ somewhat from state to state, we will need a diversity of assessment mechanisms. We need to place priority on developing methods of assessing higher-order thinking skills and hands-on performance through simulations, portfolios of the student's work, and demonstrations of skills conducted in front of judges. Written exams might include some multiple-choice items; but other types of questions—essays, short explanations, showing your work in multistep math problems—should predominate. Foreign language exams should test conversational skills, as well as reading and writing. Science exams would involve conducting experiments and demonstrating the use of lab equipment.

Certifying Competencies and Releasing Student Records.

Schools should develop easily understood transcripts that, at the request of students, are readily available to employers. These transcripts should contain documentable measures of achievement in a variety of fields as well as attendance records. State governments should provide assistance to facilitate the standardization of transcripts so that they will be more easily understood (Commission on Workforce Quality, 1989, p. 12).

Schools should provide graduates with certificates or diplomas that certify the students' knowledge and competencies, rather than just their attendance. Competency should be defined by an absolute standard in the way Scout merit badges are. Different types and levels of competency need to be certified. Minimum-competency tests for receiving a high school diploma do not satisfy the need for better signals of achievement in high school. Some students arrive in high school so far behind, and the consequences of not getting a diploma are so severe, we have not been willing to set the minimum-competency standard very high. Once they satisfy the minimum, many students stop putting effort into their academic courses. We need a more informative credential that signals the

full range of student achievement (e.g., statewide achievement exam scores, competency checklists).

One of the saddest consequences of the lack of signals of achievement in high school is that employers with good jobs offering training and job security are unwilling to take the risk of hiring a recent high school graduate. They prefer to hire workers with many years of work experience. One important reason for this policy is that the applicant's work record serves as a signal of competence and reliability that helps the employer identify who is most qualified. In the United States, recent high school graduates have no such record; and information on high school performance is unavailable, therefore, the entire graduating class appears to employers as one undifferentiated mass of unskilled and undisciplined workers. A common employer view of 18-year-olds was expressed by a supervisor at New York Life Insurance, who commented on television, "*When kids come out of high school, they think the world owes them a living*" [Washington Educational Television Association (WETA), 1989]. Surely this generalization does not apply to every graduate, but the students who are disciplined and academically well prepared currently have no way of signaling this fact to employers.

The school can help students get good jobs by developing an equitable and efficient policy for releasing student records. School officials have the dual responsibility of protecting the student's right to privacy and helping them find good, suitable jobs. The student and his or her parents should receive copies (encased in plastic) of transcripts and other records that might be released, so that they may make them available to anyone they choose. Schools might also develop a sheet explaining to parents and students their rights, as well as the pros and cons of disclosing information.

According to the Family Educational Rights and Privacy Act of 1974, all that a student/graduate must do to have school records sent to a prospective employer is sign a form specifying the purpose of disclosure, which records are to be released and who is to receive the records. The waiver and record-request forms used by employers contain this information, so when such a request is received, the school is obliged to respond. Requiring that graduates fill out a school-devised form—as one high school I visited did—results in the employer's not getting the transcript requested and the graduate's not getting the job. There are probably millions of high school graduates who do not realize that they failed to get a job they were hoping for because their high school did not send the transcript that was requested. Schools can best serve students by handling all inquiries expeditiously and without charge.

Developing a Credential Data Bank and Employee Locator Service. It may be unrealistic, however, to expect 22,902 high schools to develop efficient systems of maintaining student records and responding quickly to requests for transcripts. An alternative approach would be to centralize the recordkeeping and dissemination function in a trusted third-party organization. This organization would be easy to regulate; thus everyone could be assured that privacy mandates are being observed. The student would determine which competencies are to be assessed and what types of information are to be included in his or her competency portfolio. Competency assessments would be offered for a variety of scientific, mathematical, and technological subjects; languages; writing; business and economics; and occupational skills. Tests with many alternate forms (or administered by computer using a large test-item bank) would be used so that students could retake the test a month later, if desired. Only the highest score would remain in the system. Students would be encouraged to include descriptions of their extracurricular activities, their jobs, and any other accomplishments they feel are relevant, and to submit samples of their work, such as a research paper, artwork, or pictures of a project made in metal shop. Files could be updated after students leave high school.

Students would have three different ways of transmitting their competency profile to potential employers. First, they would receive certified copies of their portfolio, which they could carry to job interviews or mail to employers. Second, they would be able to call a 900 number and request that their portfolio be sent to specific employers. Third, they could ask to put themselves in an employee-locator data bank similar to the student-locator services operated by the Educational Testing Service and American College Testing. A student seeking a summer or postgraduation job would specify the type of work sought and dates of availability. Employers seeking workers could ask for a printout of the portfolios of all the individuals living near a particular establishment who have expressed interest in that type of job and who pass the employer's competency screens. Student-locator services have been heavily used by colleges seeking to recruit minority students, and an employee-locator service would almost certainly be used in the same way. This system will significantly increase the rewards for hard study because the employee-locator service is likely to result in a bidding war for the qualified minority students (or others) whose portfolios are in the system.

The National Alliance of Business, the American Business Conference, the Educational Testing Ser-

vice, and the California Department of Education are currently involved in developing systems like the one just described. Pilot programs are underway in Hillsborough County, Florida; Orange County, California; Fort Worth, Texas; New Jersey, and a number of other locations. A state-sponsored system of subject-matter exams taken at the end of high school would speed the development of a credential data bank and would be desirable for other reasons. State governments should consider becoming sponsors of such systems.

INDUCING STUDENTS TO PURSUE A MORE RIGOROUS CURRICULUM

The analysis of the causes of the American apathy regarding teaching and learning has important implications for the curriculum. Many of the weaknesses of math and science curricula—the constant review and repetition of old material, the slow pace and minimal expectations—are adaptations to the low level of effort most students are willing to devote to these subjects. When considering proposed revisions of the curriculum, *one must remember that motivating students to take tough courses and to study hard must be a central concern.*

This problem would remain even if parents and students were allowed to choose their school. Even though American high schools differ greatly in standards and quality, employers do not appear to be using high school reputation as a signal when making hiring selections (Hollenbeck & Smith, 1984). About 200 competitive colleges take high school quality into account when evaluating a student's GPA, but most colleges do not. In such an environment, it is unclear what will impel parents to send their children to a school that promises a rigorous academic program involving a great deal of homework, rather than to a school with a reputation for excellence in hockey.

A second constraint that must be recognized is the great diversity of the learning goals and capabilities of high school students. The following reflect some of this diversity:

- On the NAEP mathematics scale, 15 percent of 13-year-olds have better mathematics skills than the average 17-year-old student, and 7 percent of 13-year-olds score below the average 9-year-old (NAEP, 1988).
- On the NAEP reading scale, 16.5 percent of 13-year-olds have better reading skills than the average 17-year-old student; and 9 percent of 13-year-olds score below the average 9-year-old (NAEP, 1986).

Consequently, it is neither feasible nor desirable for all senior high school students to pursue the same curriculum. Although some nations have a common curriculum with no tracking in elementary school and lower secondary schools, no advanced country has been foolish enough to force all senior high students to take the same courses. Some students will want to pursue subjects like mathematics and science in greater depth and rigor than others. Some students will want to concentrate on technology, not pure science. *Some courses will be easier than others, and students will inevitably be able to choose between rigorous and less demanding courses.*

State requirements that students take more math and science courses to graduate will have little effect on learning if students meet the requirement by taking undemanding courses. Holding background characteristics and the rigor of the math and science courses constant, an additional three courses in math and science during high school increased the gain in math competency between 10th and 12th grade by only .19 of a grade-level equivalent and *reduced* science gains by .09 of a grade-level equivalent and English and social studies gains by .17–.18 of a grade-level equivalent. Holding background characteristics and the total number of courses taken in specific fields constant, taking five college preparatory math and science courses—chemistry, physics, Algebra 2, trigonometry, and calculus—increased the gain on math and science tests by .75 of a grade-level equivalent and increased the gain in English and social studies by .34–.44 of a grade-level equivalent.⁸ These results imply that learning rates are determined by the rigor, not the number, of courses taken in a subject.

How then do we convince students to study hard? How do we induce them to select courses that require a lot of work just to be an average achiever in the class? *The answer is by (1) developing rigorous courses that teach students concepts and material that they will use after leaving high school; (2) convincing students that the material being taught is useful by presenting it as solutions to practical, real-world problems; (3) defining accomplishment in a way that students who work hard will perceive themselves as successful; and then (4) recognizing and rewarding accomplishment.*

Usefulness is an absolutely central criterion for selecting the topics to be included in a curriculum, for three reasons. First, the social benefits of learning derive from the use of the knowledge and skills, not from the fact they are in someone's repertoire. Second, skills and knowledge that are not used deteriorate rapidly. In one set of studies, students tested two years after taking a course had forgotten half of the college psychology and zoology, one-third of the high school chemistry, and three-fourths of the college botany that they had learned (Pressey & Robinson,

1944). Skills and knowledge that are used are remembered. Consequently, if learning is to produce long-term benefits, the competencies developed must continue to be used after the final exam (either in college, the labor market or somewhere else). Finally, usefulness is essential because students are not going to put energy into learning things they perceive to be useless. Furthermore, the labor market is not in the long run going to reward skills and competencies that have no use. Indeed, selecting workers on the basis of competencies that are not useful in the company's jobs is in most circumstances a violation of Title VII of the Civil Rights Act of 1964.

Differentiating the Senior High Curriculum. By 10th grade, most students have a pretty good idea of what kinds of jobs they want after finishing their education. Ninety-seven percent can select a particular occupation they expect to be doing at age 40; and 77 percent agree with the statement: "I am quite certain about what kinds of jobs I would enjoy doing when I am older" (LSAY, 1988, Q. AA13C & AA22A). Students who are planning careers in science and engineering need to be able to take college-preparatory biology, chemistry, and physics courses that prepare them for the core courses they will face in college. The students not planning on scientific careers, however, quite often fail to see how these courses will be useful to them. Less than a quarter of 10th graders believe that geometry, trigonometry, biology, chemistry, and physics are needed to qualify for their first-choice occupation (LSAY, 1988, Q. BA24B-BA25D 1988).

One approach to this problem, of course, is to point out to students how the material in standard college-prep courses is useful in nonscientific jobs and everyday life. Presumably, teachers already try to do this. Another approach is to modify the standard curriculum. That is the approach of the new math and science curriculums proposed by the National Council of Teachers of Mathematics (1989) and the American Association for the Advancement of Science (1989). This makes sense in the first eight or nine years of schooling. There is, however, no standard curriculum in 10th, 11th, and 12th grade, and it is not realistic to propose that everyone take the same courses. At these grade levels, the most effective way to motivate students to take demanding courses and to study hard is to tailor courses to the student's career interest and to ensure that prospective employers are aware that the student took challenging, rigorous courses.

Teaching Science and Math by Infusing It into Technology Courses. Analyses of labor-market success of young men and of job performance in the military indicate that young people who expect to have jobs in which they use or maintain complicated

pieces of equipment should receive a thorough technology education (Bishop, 1990b; Hunter et al., 1985; Maier & Grafton, 1981). Computer classes are one example of the kinds of courses needed. High school sophomores described their computer classes as "very useful" for their career 53 percent of the time and as of "no use" only 6 percent of the time (LSAY, 1988, Q. AACOMF).

The Principles of Technology (PT) course developed by a consortium of vocational education agencies in 47 states and Canadian provinces, in association with the Agency for Instructional Technology and the Center for Occupational Research and Development, is another example of a course that meets this need well. This two-year, applied physics course is both academically rigorous and practical. Each six-day subunit deals with the unit's major technical principle (e.g., resistance) as it applies to one of the four energy systems—mechanical (both rotational and linear), fluid, electrical, and thermal. A subunit usually consists of two days of lectures and discussion, a math skills lab, two days of hands-on physics application labs, and a subunit review. This approach appears to be quite effective at teaching basic physics. When students enrolled in regular physics and Principles of Technology courses were tested on basic physics concepts at the beginning and end of their junior and senior year in high school, the PT students started out behind the regular physics students, but obtained an average score of 81 at completion, as compared to an average of 66 for those completing a physics course (Perry, 1989). Another study by John Roper (1989) obtained similar results. Comparable courses have been developed for other fields of technology. This is an area of study that needs much more attention from educational reformers and curriculum developers.

Massively Expanding Advanced Placement Courses. The AP program is a cooperative educational endeavor that offers course descriptions, examinations, and sets of curricular materials in 28 different academic subjects. Students who take these courses and pass the examinations receive college credit for high school work. Unlike the SAT, the ACT, and all other standardized aptitude and achievement tests, which employ the multiple-choice answer format exclusively, students are expected to write essays and to work out complicated science and mathematics problems. Hence, AP examinations are similar in format and roughly comparable in difficulty to French Baccalaureates, English A Levels, and other exams taken by European secondary school students.

Expanding the AP program should be a centerpiece of any effort to promote excellence in American high schools. It clearly meets a felt need, for it is

growing rapidly. The numbers of students taking AP exams more than doubled between 1983 and 1988. Nevertheless, only 8,022 of the 22,902 U.S. high schools participate in the AP program; and only 52 AP exams are taken, on average, in each participating high school. In the class of 1990, only 3.8 percent took the AP English literature and composition exam, 3.6 percent took the AP American history exam, 3.0 percent took the AP calculus exam, 1.3 percent took the AP biology exam, .8 percent took the AP chemistry exam, and .7 percent took the AP physics exam (College Board, 1988).

The President and the nation's governors have proclaimed the goal of surpassing all other countries in mathematics and science by the year 2000. This is a worthy goal. But it will not be easy to achieve. In the Second International Science Study, for example, the 24 percent of Norwegian youth who take physics in their 12th year of school were better prepared than the less than 1 percent of American high school seniors who were taking the second year of mostly AP physics course. Twenty-five percent of Canadians pursue a rigorous chemistry sequence in high school and perform at the same level as the 2 percent of American seniors who are taking their second year of chemistry (IAEEA, 1988). To achieve the goal of catching up with Canada, Norway, Finland, Germany, and France, about 25 percent of the nation's high school graduates will have to take mathematics and science courses of AP rigor. In other words, the number of students taking calculus will have to increase by a factor of 4 and the number of students taking courses of AP rigor in biology, chemistry, and physics will have to increase by a factor of 25.

The nation should set a goal of doubling every two years the number of AP courses taken and AP exams passed. New exams should be established in principles of technology, electronics, algebra, geometry and trigonometry, probability and statistics, psychology, and business mathematics so that larger numbers of 10th and 11th graders and students planning to attend two-year technical colleges may demonstrate their accomplishments by taking an external exam. Acting in concert, the college presidents of a large group of selective two-year and four-year colleges should send a letter to every high school principal in the country (with copies to the school board and local newspaper) urging them to establish additional AP courses and encourage more students to take them. They should also announce that starting in 1998, students seeking admission to their school should have taken and passed at least one AP course in their junior year and be taking more than one AP course their senior year.⁹

Federal and state governments can facilitate the growth of the AP program by underwriting the devel-

opment of exams for new subjects, by financing summer institutes for the teachers of AP courses, by subsidizing the fees charged for taking the exam, and by offering AP Excellence Awards to students who achieve passing scores on the exam.

To ensure that attending a summer institute is considered a plum, compensation should be generous. In 1988, about 40,000 teachers taught AP courses. Rapid expansion of the program will require a yearly increase of 10,000 in the stock of teachers teaching AP courses; and if 60 percent of the increment to the stock were to experience summer institute training for six weeks, the cost would be only \$42 million for the entire nation.

The amount of the scholarship award should depend both on the level the student's pass and the eligibility of the student for Pell grants. If the award schedule for those not eligible for Pell grants was \$300 for a 5 (the top score), \$200 for a 4, and \$100 for a 3, and twice that for students eligible for Pell grants, the average award would probably be \$250. In 1990, 326,025 students would have been eligible for an AP excellence award, so a national scholarship program would have cost \$82 million. If a good deal of publicity were attached to these awards, they would induce a major expansion of the program and stimulate an upgrading of standards throughout middle school and high school.

Establishing Statewide Networks of Science, Math, History, Literature, and Technology Clubs.

At present, only 3.2 percent of high school sophomores are members of a science club, only 2.5 percent are members of a math club, and only 1.6 percent are members of a computer club (LSAY, 1988, Q. BA10K-BA10M). Only 19,000 students (less than 0.2 percent of all high school students) participate in the annual Westinghouse Science Talent Search.

Memberships in these clubs and participation in the Westinghouse Science Talent Search should be greatly expanded. The clubs should be stitched together into state and national networks. The student organizations should sponsor interschool competitions, visits to science museums, and science and technology project competitions that would feed into statewide and national competitions like the Westinghouse Science Talent Search awards. The state and national organizations would function like the state and national offices of Boy Scouts, Future Farmers of America, and Vocational and Industrial Clubs of America (VICA). They would provide training to teachers and student leaders and develop program activity packets to help local science and math teachers devise activities for their clubs. The federal government can help stimulate the formation of national club net-

works in academic fields by offering to pay travel costs for the first few national conventions and by contributing to national programming costs. The state club organizations could also be conduits for reimbursing local schools for some of the expenses of local club activities. One of the reasons for the very low participation rates in the Westinghouse Talent Search is the paltry size, only \$140,000, of its national scholarship budget. State and federal money needs to be pumped into this program to a point where states the size of Maryland are awarding more than \$200,000 a year in science scholarships.

CREATING NEW OPPORTUNITIES FOR LEARNING IN SCHOOL

Assigning Two Hours of Homework a Night for All Secondary School Students. States and school districts should have a policy that all high school students are assigned at least two hours of homework on weeknights and four hours on weekends. In many American high school classes, homework is not even assigned. Arthur Powell and his colleagues describe one school he visited:

Students were given class time to read *The Scarlet Letter*, *The Red Badge of Courage*, *Huckleberry Finn*, and *The Great Gatsby* because many would not read the books if they were assigned as homework. Parents had complained that such homework was excessive. Pressure from them might even bring the teaching of the books to a halt. . . . [As one teacher put it] "If you can't get them to read at home, you do the next best thing. It has to be done. . . . I'm trying to be optimistic and say we're building up their expectations in school" (1985, p. 81).

It's not just reading that teachers feel they cannot require. A high school history teacher who had previewed PBS's 11-hour series on the Civil War and who had participated in developing teaching materials associated with the series was asked by a reporter whether he was assigning it to his class. The teacher replied that unfortunately he could not because 11 hours was way beyond what most high school students were willing to commit to an assignment.

Careful time-budget studies conducted in the early 1980s found that American high school students spent an average of only 3.8 hours a week on homework, compared to an average of 19.6 hours per week in Japan (Juster & Stafford, 1990). If American high schools assigned and American students did a great deal more homework, achievement would be substantially higher. That is the conclusion of Harris Cooper's (1989) meta-analysis of the literature on homework.

Experimental studies find that when high school students are assigned homework, they score about half a standard deviation higher on the posttest than the control group. The impact of homework on the rate at which middle school students learn is also significant, though somewhat smaller. There is no evidence of diminishing returns as the amount of homework is increased. Nonexperimental studies tend to find that the relationship between homework and learning is linear.

Turning Schools into All-Day Learning Centers. The length of the school day should be extended from 6 to 7 hours. A full range of remedial and enrichment programs and extracurricular activities and intramural sports should be offered during the extra hour. Students making normal progress might choose whatever alternative they desire. Because many students do not have a quiet place to study at home, the library, the computer lab, and a number of classrooms should remain open and supervised during this period. Extra help should be available for students having difficulty with the core curriculum. Volunteers to provide tutoring and to offer special-interest courses could be recruited from the community. Private teachers of music, art, and other subjects might also be allowed to use school facilities during these hours. The benefits of this reform are that (1) the regular school day would be freed up for more intensive study of the core curriculum; (2) more homework could be assigned, and all students would have a quiet place to study; (3) slower students would be given the extra instruction they need; (4) enrichment programs could be expanded; and (5) the phenomenon of the latch-key child would be significantly reduced.

Increasing the School Year from 180 to 200 Days. Longitudinal studies of learning have found that during the summer, students appear to forget a portion (up to 1 to 2 months' worth) of the mathematics they learned during the previous school year. Rates of gain in reading ability slow dramatically during the summer (see Appendix). The learning loss is particularly large for disadvantaged students and for minority students (Heyns, 1987). As a result, much of September is devoted to review and practice of the material taught the previous year. *The Underachieving Curriculum* (IAEEA, 1987), the report that presented and analyzed the reasons for poor American performance in the Second International Mathematics Study (see McKnight et al., 1985), severely criticized this practice of allocating so much time to review of old topics rather than to the presentation of new material. These findings clearly suggest that school attendance is essential if math and reading skills are to improve and that a longer school year would not only increase learning time but also reduce forgetting time. Adding

a month to the school year could very well produce a more than proportionate increase in learning.

Studies of the effect of summer school confirm the educational impact of additional instruction time. The best study of this issue used a random-assignment, control-group methodology to evaluate the Summer Training and Employment Program (STEP), a program for disadvantaged youth that combines a part-time summer job with about 90 hours of remedial instruction. It found that adding the instruction to the summer job raised academic achievement by .5 grade-level equivalents above that of youth receiving only a part-time job. (Sipe, Grossman, & Milliner, 1988). The documented success of the STEP intervention has resulted in its replication (with federal support) in 33 different school systems.

This evidence indicates that extending the school year would not only raise educational standards generally, it would also help children from educationally and economically disadvantaged backgrounds keep up with their more advantaged peers.

Accelerating the Pace of Instruction. Increasing the time devoted to learning by one-ninth or more has major implications for the curriculum. The learning objectives specified for each year would need to be changed. In subjects that follow a sequence, such as mathematics, reading, and spelling, material taught at the beginning of third grade might be moved to the end of second grade, eighth-grade topics might be taught in seventh grade, and so forth. In mathematics, for example, coverage of probability and statistics (which is necessary for implementing statistical process control) might be greatly increased. For students headed for college, the final two years would be given over to AP courses. College freshmen would arrive much better prepared than they are now. A decision would have to be made whether (1) the bachelor's degree should become a three-year degree, (2) the number of credits for graduation should be increased, or (3) college courses should be made more rigorous with a corresponding reduction in the number of credits that students can carry per semester.

The Costs and Benefits of Lengthening the School Year. The most significant barrier to this reform is the cost. If teachers are to spend 11 percent more time teaching, yearly salaries must be increased by a comparable percentage. In 1988, public expenditures for elementary and secondary education were \$156 billion for the nation as a whole (U.S. Bureau of the Census, 1989, Table 229). Some of these expenditures would not have to be increased (e.g., central office staff already have 11-month contracts). Thus the taxpayer cost would be about \$15 billion more than

current expenses. This is not really as big a number as one might think. For comparison, between 1985 and 1988, total compensation of employees rose \$73 billion in state and local government as a whole and rose \$50 billion in the health care industry. Because more than half of the mothers of schoolchildren work, the savings in day care costs would be substantial. If one-fifth of the 45 million schoolchildren attending school an extra 20 days would have required day care costing \$3.00 an hour for 6 hours a day, the savings would be \$3.24 billion. Because most teachers and students do not work in the summer, the increase in learning time would come primarily out of leisure, not work, time. GNP would immediately increase because the rise in teacher pay and labor released by the reduced demand for child care would be larger than the induced decline in summer job earnings of teachers and students. If GNP rises, taxes will rise as well, so the change would be partially self-financing.

The long-term benefits would be very large. Because a longer school year reduces summer forgetting as well as increasing learning time, it is quite possible that a more than proportionate learning response (on a grade-level-equivalent scale) would result. Let us, however, make the conservative assumption that the 11-percent increase in learning time increases 12th-grade achievement scaled in grade-level equivalents by 11 percent, or 1.33 U.S. grade-level equivalents. Student cohorts experiencing the longer school year for 13 years would have their compensation increased by about 5.2 percent, or \$830 a year.¹⁰

The productivity effects of test score increases are 50 percent larger than wage-rate effects (Bishop 1987a, 1987c). Consequently, increasing the school year by 20 days is estimated to raise the productivity of the average adult by \$1,248 per year (7.7 percent of mean compensation). Because a one-year age cohort contains 3.7 million people, the benefit is about \$4.62 billion per year. The yearly real rate of return is 30.7 percent on the taxpayer contribution to the additional learning investment.¹¹ Only investments in R&D have real rates of social return this high. If the real rate of social discount is 6 percent and the growth of labor productivity is projected at 2 percent per year, the ratio of present discounted benefits to costs is 4.9 to 1.¹² Even if the additional month of school produces only a third- or a half-month of learning gains, the investment has a higher payoff than most other uses of taxpayer dollars.

Instituting Voluntary Summer School. A variety of remedial, enrichment, and special interest short courses should be offered during the rest of the summer. Though many of the teachers would be regular school staff, an education degree and state

certification would not be required. Private teachers of music, art, athletics, and academic subjects could also offer their own courses at the school. Where appropriate, academic credit would be given for the summer school courses. The school district would provide transportation.

GENERATING ADDITIONAL RECOGNITION AND REWARDS FOR LEARNING

A Massive Dose of Mastery Learning. Students who are not learning at the desired rate should be expected to commit additional time to the task after school and during the summer. At the beginning of the school year, school personnel would meet with the student and his or her parents to set goals. Students who are not performing at grade level in core subjects and who do not make normal progress during the school year should be kept after school for tutoring and remedial instruction and required to attend summer school. Assessments of progress should be made at appropriate points during the school year to inform students of their progress and to enable those who are participating in remedial programs after school to demonstrate they are now progressing satisfactorily. Course grades and teacher evaluations would be a central part of the assessment process, but there should be an external yardstick as well. The external yardstick might be a competency checklist, a mastery test keyed to the textbook, or an exam specified by the state, the school, or collectively by the teachers in that grade level or department. The assessment tools would be established at the beginning of the school year. The reason for the external yardstick is that it helps ensure that students perceive the standard to be absolute rather than relative to others in the class, and it helps create a communality of interest between teacher and student. Teachers need to be perceived as helping the student achieve the student's goals, not as judges meting out punishment. Final decisions regarding who would be required to attend summer school could be made by committees of teachers, possibly with some administrative representation. Since students will want to avoid being required to get remedial instruction after school and during the summer, this will be a powerful incentive for them to devote themselves to their studies.

Acting as a Source of Informal Contacts. School personnel can be a reference and a source of job contacts for their students. Some students may feel that they do not have and cannot develop good employment contacts. School personnel can help out by building and maintaining trusting relationships with local employers and then helping to match employer and student needs. Students from disadvantaged back-

grounds have a special need for this kind of help, because their relatives and neighbors typically lack the employment contacts of middle-class families.

Many schools provide job placement and referral services for their students and graduates. Three and a half million people found their current job through a referral by a teacher, school, or college (Rosenfeld, 1975). This function of schools is a lot more important than is generally thought.

Whenever possible, there should be a one-on-one relationship between a specific teacher or administrator and an employer. A study by McKinney et al. (1982) found that *when schools formalize this relationship by creating a placement office, fewer vocational students found jobs*. The best example of an informal contact system is the one that exists for many vocational students. Vocational teachers often know local employers in related fields; they also know their students well enough to recommend them. This kind of informal system could be expanded to include all students not planning to attend college.

Developing a Job-Search Portfolio. Schools should provide students with a job-search portfolio or competency profile that records all their accomplishments in one place. Students attempting to market themselves to employers will have greater success if all their school achievements are summarized in one compact, standardized document. Compactness and standardization make it easier for employers to use information in their hiring decisions, and this facilitates information flow.

The coverage and format of the document are probably best worked out cooperatively by a committee that includes school administrators, employers, and other interested parties. Developing and using such a document might be a part of a campaign to enlist commitments from major local employers to hire the school's graduates. Developing the information system cooperatively is a good way to ensure that the finished form will be beneficial to schools, employers, and students.

Students have many talents and skills that can be highlighted in such a document. The job-search portfolio should emphasize accomplishments and performance indicators that are most useful in identifying a good match between a job and a youth. Students and parents should receive copies of it, and students should be encouraged to bring copies with them when they apply for jobs. Employers should be encouraged to ask to see the portfolio and keep a copy when a job application is filed.

Using Cooperative Learning. One effective way of inducing peers to value learning and support effort

in school is to reward the group for the individual learning of its members. This is the approach taken in cooperative learning. Research results (Slavin, 1987) suggest that the two key ingredients for successful cooperative learning are as follows:

- A cooperative incentive structure—awards based on group performance—seems to be essential for students working in groups to get really involved in tutoring and encouraging each other to study.
- A system of individual accountability in which everyone's maximum effort must be essential to the group's success and the effort and performance of each group member must be clearly visible to his or her group mates (p. 3).

For example, students might be grouped into evenly matched teams of four or five members that are heterogeneous in ability. After the teacher presents new material, the team works together on work sheets to prepare each other for periodic quizzes. The team's score is an average of the scores of team members, and high team scores are recognized on a class bulletin board or through group certificates of achievement.

What seems to happen in cooperative learning is that the team develops an identity of its own, and group norms arise that are different from the norms that hold sway in the student's other classes. The group's identity arises from the extensive personal interaction among group members in the context of working toward a shared goal. Because the group is small and the interaction intense, the effort and success of each team member is known to other teammates. Such knowledge allows the group to reward each team member for his or her contribution to the team goal, and this is what seems to happen.

Honoring Academic Achievement. Schools should strengthen their awards and honors systems for academic and nonacademic accomplishments. The medals, trophies, and school letters awarded in interscholastic athletics are a powerful motivator of achievement on the playing field. Academic pursuits need a similar system of reinforcement. Awards and honors systems should be designed so that almost every student can receive at least one award or honor before graduation if he or she makes the effort. Outstanding academic performance (e.g., high grades or high test scores) would not have to be the only way of defining excellence. Awards could be given for significant improvements in academic performance since the previous year or since the beginning of the school year, for public service in or out of school, for perfect attendance records, and for student of the week (criteria could vary weekly). The standard for making an award

should be criterion referenced: if greater numbers achieve the standard of excellence, more awards should be given.

A prominent place in the school should be reserved for bulletin boards where pictures of the most recent winners and reasons for their receiving recognition could be posted. Another form of recognition could be displays of student work: art, science, social studies, vocational education projects, and so forth. Periodically, the parents of the most recent award winners and sponsoring teachers should be invited to an evening assembly, at which time the principal would award the students the certificate or plaque recognizing their accomplishments.

Awarding Scholarships on the Basis of Past Academic Achievement, as Well as Need. At present, almost all grant aid for attending college is awarded on the basis of financial need. Athletic achievement also results in generous scholarships for attending state universities. Academic achievement does not. A balance needs to be restored. States should either start or expand existing scholarship programs that award grants on the basis of academic achievements assessed by criteria that are external to the school such as the Advanced Placement exams, Westinghouse Science Competitions and statewide Vocational-Industrial Club Competitions, New York State Regents Exams, or the national examination proposed by President Bush. These scholarships should not be awarded on the basis of rank in class or GPA for this pits students from the same school against each other and results in peer norms that scorn the student who spends his or her time studying. Aptitude test scores should also not be used to make scholarship awards. The purpose of scholarships is to reward effort and accomplishment not "talent" or IQ.

Encouraging League Competitions Between Schools in the Academic Arena. Band and athletic programs receive very generous support from the community because the band and the team are viewed as representing the entire high school to neighboring communities and the rest of the state and because their accomplishments are highly visible. A similar spirit of competition between communities needs to be developed in the academic arena. States should establish a system of highly visible competitions for each academic subject and for extracurricular activities like debate, inventions club, Junior Achievement, school newspaper, and the stock market game. As many students as possible should participate. This can be accomplished by arranging separate competitions for each grade, requiring (where possible) the school to field a team that includes all students taking a particular course and having the share of the student

body that is on the team be one of the criteria by which schools are judged. As in sports, fair competition can be ensured by placing small schools and schools serving disadvantaged populations in a separate league or by establishing a handicapping system.

The competitions should not be a glorified "Trivial Pursuits" game. Although cable TV broadcasts of High School Bowl-type contests might be a component of the program, most of the points obtained by a school's team should come from assessments of the performance of the entire team on authentic tasks like writing an essay, giving a speech, determining the chemical composition of a compound, working out long mathematics problems, writing a computer program, or fixing a car. As much as possible, the tasks should be aligned with the state curriculum for that subject. Teams should consist of entire classrooms of students, and everyone on the team should receive gaudy T-shirts proclaiming membership on the school's team.

Winning schools and departments should receive a silver cup symbolizing their victory and a sum equal to \$100 per team member that can be used the following year for materials and travel. A celebration dance for the entire school might be organized and paid for by a special prize fund. Members of teams placing in the top 10 percent of their league would be recognized at an evening assembly, receive school sweaters or jackets proclaiming their victory, and receive a \$100 scholarship. These competitions could also serve as a basis for individual recognition and scholarships.

EFFECTS OF PROPOSED REFORMS ON UNDERREPRESENTED MINORITIES

The two blue-ribbon commissions that have recommended improvements in the signaling of academic achievement to colleges and employers included substantial representation from the minority community.¹³ Nevertheless, the reader may be wondering about the likely impacts of the reform proposals just described on the occupational achievement of minority youth. Because minority students receive lower scores on achievement tests, it might appear at first glance that greater emphasis on academic achievement will inevitably reduce their access to good colleges and to good jobs. This is not the case, however, for four reasons.

If academic achievement becomes a more important basis for selecting students and workers, something else becomes less important. The consequences for minorities of greater emphasis on academic achievement depends on the nature of the criterion that becomes deemphasized. Substituting academic

achievement tests for aptitude tests in college admissions *improves minority access* because minority-majority differentials tend to be smaller (in standard deviation units) on achievement tests (e.g., the NAEP reading and math tests) than on aptitude tests (e.g., the SAT). Greater emphasis on academic achievement *improves the access of women* to high-level professional, technical, craft, and managerial jobs because it substitutes a criterion on which women do well, for criteria—sex stereotyped beliefs about which jobs are appropriate for women—that have excluded women in the past.

For the same reason, greater emphasis on academic achievement when selecting young workers will not reduce minority access to jobs if it substitutes for other criteria that also place minority youth at a serious disadvantage. The current system, in which there is almost no use of employment tests and little signaling of high school achievements to the labor market, clearly has not generated jobs for minority youth. In October 1985, 1986, 1987, 1988, and 1989, an average of only 46 percent of the previous June's black high school graduates not attending college were employed (Bureau of Labor Statistics, 1989). One reason why minority youth do poorly in the labor market is that most of the criteria now used to make selections—previous work experience, recommendations from previous employers, having family friends or relatives at the firm, proximity of one's residence to stores that hire youth, performance in interviews, and prejudices and stereotypes—work against them. These criteria will diminish in importance as academic achievement becomes more important. There is no way of knowing whether the net result of these shifts will help or hinder minority youth seeking employment. In some models of the labor market, the relative position of minority workers improves when academic achievement is better signaled (Aigner & Cain, 1977).

The second way in which minority youth may benefit from improved signaling of school achievements is that it will give recent high school graduates, both black and white, the first real chance to compete for high-wage, high-training content jobs. At present, all youth are frozen out of these jobs because primary labor market employers seldom consider job applicants who lack considerable work experience. Experience is considered essential, partly because it contributes to productivity, but also because it produces signals of competence and reliability that employers use to identify who is most qualified. Recent high school graduates have no such record; and because information on the student's high school performance is unavailable, the entire graduating class appears to employers as one undifferentiated mass of unskilled and undisciplined workers. A black personnel director interviewed for a CBS special on the educational

reform proudly stated, "We don't hire high school graduates any more; we need *skilled workers*" (CBS, 1990). Surely this generalization does not apply to every graduate, but those who are disciplined and have skills currently have no way of signaling this fact to employers. State exams, competency portfolios, and informative graduation credentials would change this unfair situation and give students a way of demonstrating that the stereotype does not apply to them. Young people from minority backgrounds must overcome even more virulent stereotypes, and they often lack a network of adult contacts who can provide job leads and references. By helping them overcome these barriers to employment, competency portfolios are of particular help to minority youth.

The third way in which these proposals will assist minority students is by encouraging greater numbers of firms to undertake affirmative action recruitment. The creation of a competency portfolio data bank that can be used by employers seeking qualified minority job candidates would greatly reduce the costs and increase the effectiveness of affirmative action programs. Affirmative action has significantly improved minority representation in managerial and professional occupations and contributed to a substantial increase in the payoff to schooling for blacks (Freeman, 1981). One of the reasons why it has been particularly effective in this labor market is that college reputations, transcripts, and placement offices provide brokering and prescreening services that significantly lower the costs of recruiting minority job candidates. The competency portfolio data bank would extend low-cost brokering and prescreening services to the labor market for high school graduates. The creation of such a data bank would almost certainly generate a great deal of competition for the more qualified minority youth in the portfolio bank.

The final and most important way in which these reforms will benefit minority youth is by bringing about improvements in academic achievement and productivity on the job. Student incentives to study hard, parental incentives to demand a better education, and teacher incentives to both give more and expect more from students will all be strengthened. Because of the way affirmative action is likely to interact with a competency-profile data bank, the rewards for learning will become particularly strong for minority students. Learning will improve, and the gap between minority and majority achievement will diminish. Society has been making considerable progress in closing achievement gaps between minority and majority students. In the early National Assessment of Educational Progress (NAEP) assessments, black high school seniors born between 1952 and 1957 were 6.7 grade-level equivalents behind their white counter-

parts in science proficiency, 4 grade-level equivalents behind in mathematics, and 5.3 grade-level equivalents behind in reading. The most recent National Assessment data for 1986 reveal that for blacks born in 1969, the gap has been cut to 5.6 grade-level equivalents in science, 2.9 grade-level equivalents in math, and 2.6 grade-level equivalents in reading (NAEP, 1986, 1988). Koretz's (1986, Appendix E) analysis of data from state testing programs supports the NAEP findings. Hispanic students are also closing the achievement gap. These positive trends suggest that despite their limited funding, Head Start, Title I, and other compensatory interventions have had an impact. The schools attended by most minority students are still clearly inferior to those attended by white students, so further reductions in the school quality differentials can be expected to produce further reductions in academic achievement differentials.

The students of James A. Garfield's Advanced Placement calculus classes have demonstrated to the nation what minority students from economically disadvantaged backgrounds can accomplish. The student body is predominantly disadvantaged minorities; yet in 1987 only three high schools in the nation (Alhambra High School in California and Bronx Science and Stuyvesant High School in New York City) had a larger number of students taking the AP calculus exam. This high school and its two very talented calculus teachers, Jaime Escalante and Ben Jimenez, are responsible for 17 percent of all Mexican Americans taking the AP calculus exam and 32 percent of all Mexican Americans who pass the more difficult BC form of the test (Matthews, 1988). There is no secret about how they did it; they worked extremely hard. Students signed a contract committing themselves to extra homework and extra time in school, and they lived up to the commitment. What this success establishes is that minority youngsters can be persuaded to study just as hard as the academic track students in Europe and that if they do they will achieve at world-class levels. The success at Garfield High is replicable.

Institutional arrangements of schools and the labor market have profound effects on the incentives faced by students, teachers, parents, and school administrators. The passivity and inattention of students, the low morale of teachers, the defeat of so many school levies, and low rankings on international measures of achievement are all logical outcomes of institutional arrangements that weaken student incentives to study and parental incentives to fund a high-quality education. Only with an effective system of rewards within schools and in the labor market can we hope to overcome the pervasive apathy and achieve excellence.

APPENDIX SUMMER DROP-OFF IN STUDENT PERFORMANCE

Studies that have administered mathematics tests to students both in the spring and the fall of a calendar year find that mathematics competence declines during the summer months (Heyns, 1986, 1987). Entwisle and Alexander's (1989, table 1) study of first and second graders in Baltimore, for example, found no gain in mathematics skills between the April test administration and the October test administration, even though that period contained two full months of classroom study of arithmetic.

In the Sustaining Effects Study, the beginning-of-the-year test was administered during the third week of school, and the end-of-year test was administered five weeks before the end of the term. Consequently, the school-year testing period was only seven months long, and the five-month "summer gap" between spring and fall testing contained two months of school learning time. As one can see in Figure A-1, gains in reading slow considerably during the five-month summer-gap period and math competence hardly rises at all (Klibanoff & Haggart, 1981). If children were learning during the two months of classes included in the summer-gap period at anything like the rate they learn during the rest of the school year, their reading and math skills must have declined during the summer

Figure A-1

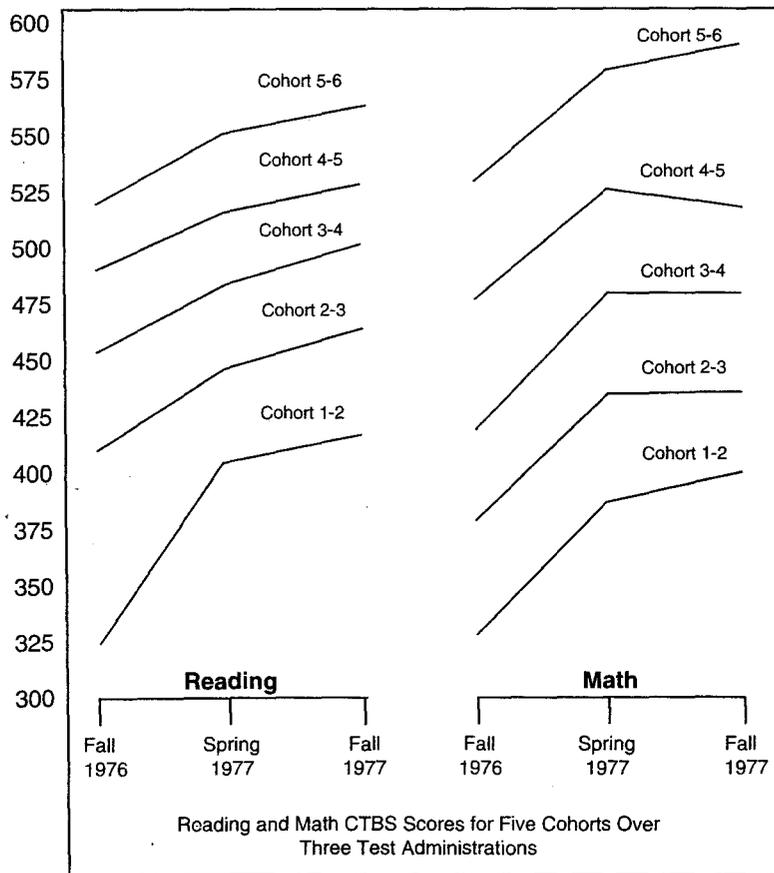


Figure A-2

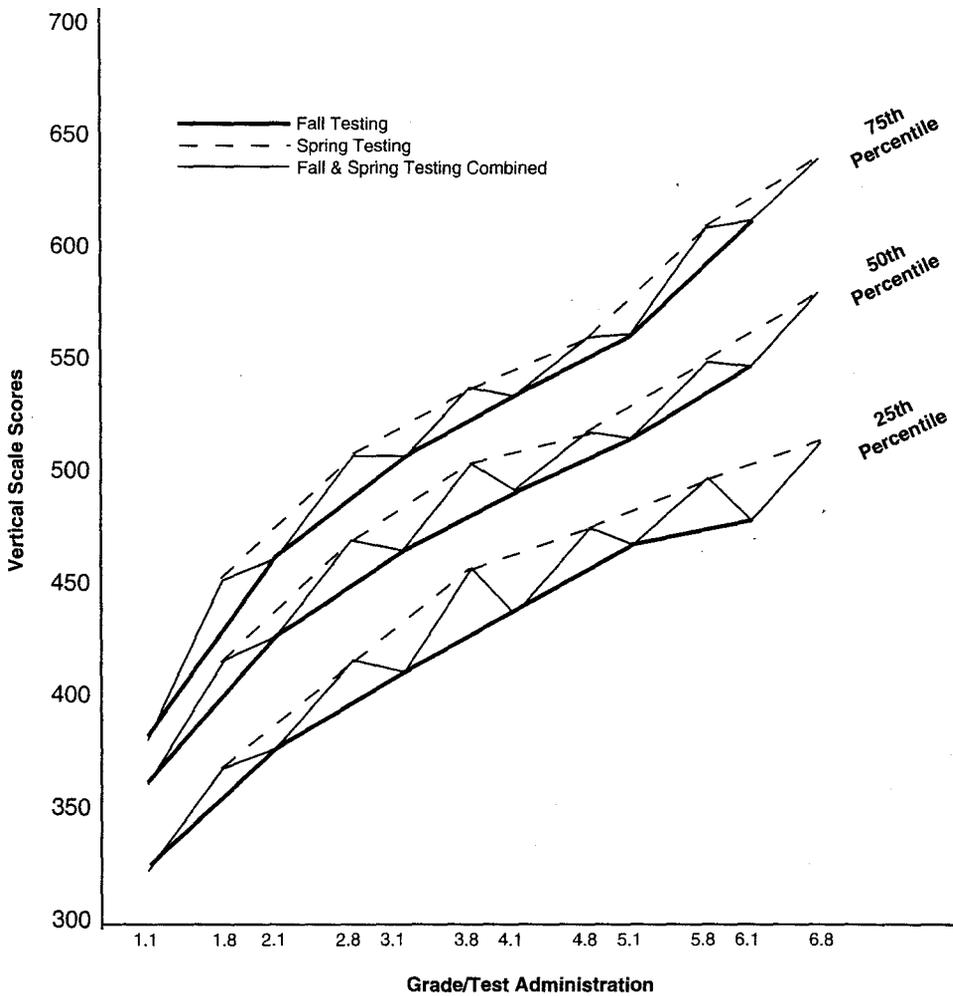


Figure A-2. Vertical Scale Scores as a Function of Grade Level by Quartiles for the Debiased CTBS Reading Test. Note: The spring-to-fall differences are always associated with cross-sectional changes in samples and are frequently also associated with differences in test levels. Negative "growth", when it occurs, may be attributed to sample differences and test-level differences. When raw scores are compared for the same test levels, the differences are either positive or small when negative. Therefore, the zig-zag nature of the curves above should not be carelessly attributed to "summer drop-off".

Source: Hemenway et al. (1978), Figure 1-1, p. 29.

months. In most classrooms, the first few weeks are spent reviewing and practicing skills taught in previous years. Old material can probably be relearned at a more rapid rate than new material is learned, so this is likely to be a period of particularly rapid rise in test scores. The most reasonable assumption is that learning rates during school time are constant. Figures A-2 and A-3 (taken from Hemenway et al., 1978) present the results of calculating learning trajectories and the three-month summer drop-off under the assumption

of constant learning rates during the school year.

Direct evidence on this issue can be found in the evaluation of STEP. In this study, the initial test was administered after the end of school in June, and the end-of-summer administration was prior to the beginning of school in the fall. In this study, the control group, which received no instruction during the summer, experienced very large declines in mathematics and substantial declines in reading.

Figure A-3

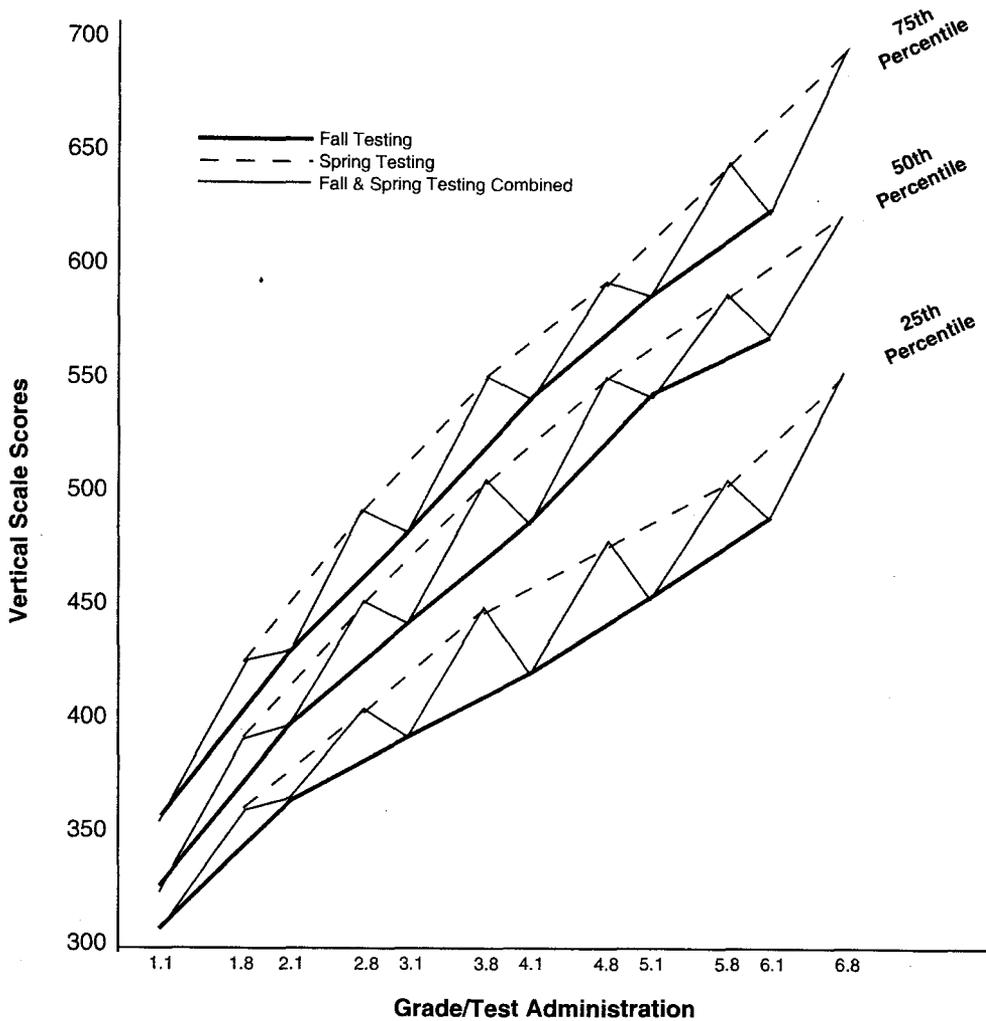


Figure A-3. Vertical Scale Scores as a Function of Grade Level by Quartiles for the Debiased CTBS MathTest.
 Note: The spring-to-fall differences are always associated with cross-sectional changes in samples and are frequently also associated with differences in test levels. Negative "growth", when it occurs, may be attributed to sample differences and test-level differences. When raw scores are compared for the same test levels, the differences are either positive or small when negative. Therefore, the zig-zag nature of the curves above should not be carelessly attributed to "summer drop-off".

Source: Hemenway et al. (1978), Figure 1-2, p. 30.

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- .28 in craft jobs, .34 in technician jobs, .164 in routine clerical jobs, and .278 in clerical jobs with decision-making responsibilities (Hunter, Schmidt, & Judiesch, 1988). Because there are fixed costs to employing an individual (facilities, equipment, light, heat, and overhead functions such as hiring and payroll), the coefficient of variation of marginal products of individuals is assumed to be 1.5 times the coefficient of variation of productivity. Because about two-thirds of clerical jobs can be classified as routine, the coefficient of variation of marginal productivity for clerical jobs is 30 percent [$1.5 \cdot (.33 \cdot .278 + .67 \cdot .164)$]. Averaging operative jobs in with craft and technical jobs produces a similar 30-percent figure for blue-collar jobs. The details and rationale of these calculations are explained in Bishop (1990a).
- ³After a worker has been at a firm a while, the employer presumably learns more about the individual's capabilities and is able to observe performance on the job. Workers assigned to the same job often produce very different levels of output (Hunter, Schmidt and Judiesch, 1988). Why, one might ask, are the most productive workers (those with just the right mix of specific competencies) not given large wage increases reflecting their higher productivity? The reason appears to be that workers and employers prefer employment contracts that offer only modest adjustments of relative wages in response to perceived differences in relative productivity. There are a number of good reasons for this preference: the unreliability of the feasible measures of individual productivity (Hashimoto & Yu, 1980), risk aversion on the part of workers (Stiglitz, 1974), productivity differentials that are specific to the firm (Bishop, 1987c), the desire to encourage cooperation among coworkers (Lazear, 1989), and union preferences for pay structures that limit the power of supervisors.
- In addition, compensation for differences in job performance may be nonpecuniary—praise from one's supervisor, more relaxed supervision, or a high rank in the firm's social hierarchy (Frank, 1984). A study of how individual wage rates varied with initial job performance found that when people hired for the same or very similar jobs are compared, someone who is 20 percent more productive than average is typically paid only 1.6 percent more. After a year at a firm, better producers received only a 4 percent higher wage at nonunion firms with about 20 employees, and they had no wage advantage at unionized establishments with more than 100 employees or at nonunion establishments with more than 400 employees (Bishop, 1987c). If relative wage rates only partially compensate the most capable workers in a job for their greater productivity, why don't they obtain promotions or switch to better paying firms? To some degree they do, particularly in managerial and professional occupations. This explains why workers who score high on tests and/or get good grades are less likely to be unemployed and more likely to be promoted, and why, many years after graduation, they eventually obtain higher wage rates (Wise, 1975; Bishop, 1988). Since, however, worker productivity cannot be measured accurately and cannot be signaled reliably to other employers, this sorting process is slow and only partially effective. Consequently, when men and women under the age of 30 are studied, the wage-rate effects of specific competencies may not correspond to their true effects on productivity

ENDNOTES

¹In game-theory language, we have here a repeated game in which players may make side payments using the currency of friendship. Parents and college admissions officers (but not employers) offer prizes to those who do best in the academic game, but if everyone improves together the total amount of prize money does not rise. Some players are offered larger prizes than others. For most players, the offered prizes are small by comparison to the costs of hard study and the side payments available from peers. The result is that only a few students (those facing the biggest prizes and the smallest costs of study) choose the noncooperative solution, and the great majority of students choose the cooperative, let's all take it easy, solution.

²Studies that measure output for different workers in the same job at the same firm, using physical output as a criterion, can be manipulated to produce estimates of the standard deviation of nontransitory output variation across individuals. It averages about .14 in operative jobs,

and, therefore, direct evidence on productivity effects of specific competencies is required before conclusions may be drawn.

⁴The survey was of a stratified random sample of the NFIB membership. Larger firms had a significantly higher probability of being selected for the study. The response rate to the mail survey was 20 percent and the number of usable responses was 2,014.

⁵Before a basic skills test could be used, the firm had to conduct an expensive validity study of the proposed test and alternative tests at their own work sites. Separate studies had to be done for men and women, blacks, Hispanics, and whites. Most firms did not have enough workers in each category to do a reliable study (Friedman and Williams, 1982). Litigation costs are substantial, so companies became extremely cautious about testing and the use of basic skills tests for employee selection declined substantially.

⁶Another possible argument against policies designed to induce employers to reward high school students who study is that poor students will not be considered if an employer learns of this fact. What those who make this argument do not realize is that the policy of providing no information to employers about performance in high school results in no recent graduates (whether good or poor student) getting a job that pays well and offers opportunities for training and promotions. In effect, it is being proposed that the interests of the students who do not study and are discipline problems should take precedence over the interests of the students who lived by the school's rules and studied hard. There is nothing unfair about letting high school GPAs influence the allocation of young people to the best jobs. The GPAs are an average that reflects performance on hundreds of tests, and the evaluations of more than 20 teachers, each of which is based on 180 days of interaction. Selection decisions must be made somehow. If measures of performance in school are not available, the hiring selection will be determined by the chemistry of a job interview and idiosyncratic recommendations of a single previous employer. Since many employers will not request the information, providing information on student performance does not prevent the poorer student from getting a job; it only influences the quality of the job that the student is able to get.

⁷The SAT suffers from two very serious limitations: the limited range of the achievements that are evaluated and its multiple choice format. The test was designed to be curriculum free. To the extent that it evaluates the students' understanding of material taught in schools, the material it covers is vocabulary and mathematics. Most of the college preparatory subjects studied in high school—science, social studies, technology, art, literature, music, computers, trigonometry, and statistics—are absent from the test. As a result, it fails to generate incentives to take the more demanding courses or to study hard. The newly revised SAT is not a major improvement over the old test. The new version of the ACT test is a definite improvement, for it tests science and social science knowledge and attempts to measure problem solving in science. Both tests suffer from the common problems that arise from their multiple choice format. National and provincial exams in Europe are predominantly essay and extended-answer examinations. The absence of essays on the SAT and ACT tests contributes

to the poor writing skills of American students. The tests advertise themselves as an ability test, but are in fact an achievement test measuring a very limited range of achievements (Jencks & Crouse, 1982). Jencks and Crouse have recommended that either the SAT evaluate a much broader range of achievements or be dropped in favor of Advanced Placement examinations.

⁸A study was conducted of the cohort of *High School and Beyond* (NORC, 1982) students projected to graduate in 1982. The dependent variables were the change between sophomore and senior years in test scores and grades. The model included extensive controls for variables that may influence both curriculum and the outcomes. Chemistry, physics, Algebra 2, trigonometry, and calculus were selected from a more complete list of courses to represent rigorous math and science course work generally taken during or after the sophomore year in high school (Bishop, 1985). The specific model estimated was:

$$Y_{it} - Y_{it-1} = BX_{it-1} + oC + OY_{j=i', 1-1} \quad i = 1 \dots 11$$

where

Y_{it} = the "i"th outcome variable measured at the end of senior year. (e.g., math test score)

Y_{it-1} = the sophomore year measure of the "i"th outcome variable

$Y_{j=i', 1-1}$ = a vector of sophomore year measures of outcome variables other than the "i"th

X_{it-1} = a vector of variables characterizing background and curriculum coursework variables measured in the sophomore year

C = a vector of variables describing the courses taken in junior and senior year

o = a vector of coefficients measuring the impact of coursework on learning and career aspirations

⁹This proposal sounds radical but, in fact, is only a modest change from current practice at these selective colleges. A survey of college placement officials conducted by *USA Today* and interviews of officials at Cornell and the State University of New York-

Binghamton conducted for this report found that students were expected to take AP courses if they are offered, and grade-point averages were adjusted for the difficulty level of the courses taken. High school students and parents are generally unaware of this policy, however; and many have not factored it into their high school course selections. The announcement, therefore, has two effects: it informs students and parents of existing admissions policies and warns that come 1993 those seeking admission to selective colleges will not necessarily be held harmless if a local high school does not offer AP courses. This announcement will generate strong political pressure on principals and school boards to expand their AP program and allow additional students to take AP courses. Students at schools not offering AP might be offered other ways of demonstrating college-level proficiency, such as an AP independent study option, taking courses during the summer at a local college, or high scores on the afternoon, subject-matter SAT exams or New York State Regents exams. Exceptions would have to be made for students from underrepresented minorities, foreign students, and in

other individual cases, but exceptions should not become the rule.

¹⁰A one-population standard deviation increase in test scores raises an adult's wage rate by 21 percent (Bishop, 1989, p. 181, derived by taking the antilog of .19). A population standard deviation is equivalent to about 5 grade-level equivalents, so the wage effect is 5.2 percent = $(1.33/5) * 21$ percent. The mean yearly compensation of adults 18 to 65 years old is about \$16,000 when the nonemployed are included in the denominator, so the dollar impact is $\$830 = .052 * \$16,000$.

¹¹Our estimate of the productivity benefit of a 1.33 grade-level-equivalent increase in achievement is conservative. College graduation raises wages of males by 50 percent or by 12.5 percent per year of college. If one were to assume, instead that 13 months of additional time in elementary and secondary school is equivalent to a year in college, the estimated productivity benefit becomes 12.5 percent. In addition the social costs of adding 20 days to the school calendar are probably smaller than \$15 billion, for child care costs will be substantially reduced. Students over 16 years old will be earning less during the summer, but this effect is smaller than the savings in child care costs. It should be noted that student leisure time is significantly reduced and that, except for the lost work time of teenagers, this is not counted as a cost. This is standard operating procedure when doing benefit cost studies of educational interventions.

¹²The present value of the benefits in year 0 of \$4.62 billion a year, starting in year 13 and running to year 60, or $\$4.62(25)(.853)(.588) = \57.94 billion. The present value of costs is $(\$15/13)25(1 - .588) = \11.88 billion.

¹³The Commission on Workforce Quality and Labor Market Efficiency included in its membership Constance E. Clayton, Superintendent of Schools of Philadelphia; Jose I. Lozano, Publisher of *La Opinion*; and William J. Wilson, author of *The Truly Disadvantaged*. The Commission on the Skills of the American Workforce included in its membership Eleanor Holmes Norton, former Chair of the Equal Employment Opportunity Commission; John E. Jacob, President of the National Urban League; Badi Foster, President of AETna Institute for Corporate Education; Thomas Gonzales, Chancellor of Seattle Community College District VI; and Anthony J. Trujillo, Superintendent of Sweetwater Union High School District.