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# Secondary Education in the United States: What Can Others Learn from Our Mistakes?

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**Abstract**

Secondary schools are the least successful component of the U.S. education system. Students learn considerably less than in other industrialized nations and dropout rates are significantly higher. This paper provides an explanation for this failure, describes the standards based reforms strategies that many states are implementing to attack these problems, and evaluates the success of these efforts.

Learning is sub par because students are not engaged and teaching is often poor. Time on task and engagement are low. Peers stigmatize and ostracize the studious and give silent support to those who joke around in class or try to get the teacher off track. Poor teaching derives from: (1) the low standards for entry into secondary school teaching, (2) the common practice of assigning teachers to teach subjects they did not study in college, (3) the low salaries and poor working conditions of secondary school teachers, (4) pressures on teachers to entertain at the expense of rigor and to pass students who have not mastered the material.

Why do students study so little? Why do teachers demand so little? Why are wages set so low that sufficient numbers of qualified teachers cannot be recruited? Policy makers have concluded that these problems are due in large measure to the lack of student, staff and school accountability for learning. The education departments of the 50 states have responded by developing content standards for core academic subjects, administering tests assessing this content to students, publishing individual school results and holding students and schools accountable for student achievement.

Is this strategy working? Yes. Nations and provinces where Education Ministries have established a national curriculum and externally assess achievement at the end of secondary school pay their teachers more, have better prepared teachers and expect more of their students. Student achievement is also considerably higher. The U.S. states—New York and North Carolina--that have established a curriculum-based external exam systems also have higher than expected achievement levels. The states that hold schools accountable have also obtained smaller but significant increases in student achievement. Requiring students to take more courses to graduate does not increase achievement and induces some students to drop out. Requiring students to pass a test to graduate from high school raises wages, earnings and college attendance but does not produce significant increases in test scores.

**Secondary Education in the United States:**
**What Can Others Learn from Our Mistakes?**

There is much to be proud of in American education. Most of the world's best universities are in the United States. Their graduates are responsible for many of the technological breakthroughs of the last quarter century. Top students from all over the world come here for graduate education. The high quality of the research universities has not meant accessibility was sacrificed elsewhere in the system. Financial aid is available for the needy and colleges with open-door admissions policies are within commuting distance of just about every citizen. Institutions compete for funding and students and are quite responsive to student interests and concerns. Nearly 30 percent of the nation's youth now obtain a four-year college degree.

Primary education is also quite successful. In recent international assessments elementary school children in the U.S. placed number two in reading literacy and number three in science. In the Third International Mathematics and Science Study (TIMSS) their worst subject was mathematics where they placed 12$^{th}$ among the 26 nations assessing 4$^{th}$ grade students.

Secondary education, however, is a different story. In the 1960s U.S. participation rates in secondary education were the highest in the world. This is no longer true. According to the OECD data presented in Table 1, enrollment rates of 16 and 17 year olds in Australia, Belgium, Canada, Denmark, Finland, France, Germany, Japan, Korea, the Netherlands, Norway and Sweden all exceed U.S enrollment rates by 10 percentage points or more.[1] Graduation rates are also higher in these countries.

**The rate at which U.S. students learn new skills clearly decelerates during secondary school.** Math and science achievement gains between seventh and eighth grade were smaller for U.S. students than for just about every other country participating in TIMSS. Comparisons of the TIMSS 8$^{th}$ grade results with the 4$^{th}$ grade results yield a similar conclusion. "Of the 25 countries that participate at both grade levels, all perform as well or better relative to the U.S. at eighth grade than at fourth grade. That is, no country that compares less favorably to the U.S. in eighth grade than it does in fourth grade when age is held constant, and most compare more favorably."[2] The IEA Study of Reading Literacy had similar findings. U.S. ninth graders ranked 14$^{th}$ amongst 24 rich industrialized countries. This represents a substantial slide from the number two ranking that U.S. students had in 4$^{th}$ grade.[3] TIMSS estimates of achievement gains are presented in columns 5 and 6 of Table 1. An index of relative gains in reading is in column 7.[4] Clearly students in the Canada, Denmark, England, Hungary, Japan, Korea, Netherlands, Norway and Singapore make dramatic progress during lower secondary school. American students do not.

The most telling indicator of the poor quality of American secondary schools is the TIMSS results for students at the end of secondary school (see column 9 and 10 of Table 1). In mathematics seniors in U.S. high schools ranked 19th out of 21 nations, ahead of only Cyprus and South Africa. In science U.S. seniors ranked 16th out of 21, ahead of Cyprus, Italy, Hungary, Lithuania and South Africa. Our very best students—those taking AP courses--also lagged behind their counterparts abroad. Only about 1 or 2 percent of U.S. students take AP physics. These elite students came in 13th out of the 16 nations that gave the TIMSS tests to students studying physics at the advanced level.

**How do students who lead the world in 4th grade get transformed into celler dwellers at the end of upper secondary school?** The paper attempts to answer that question and then to describe and evaluate efforts to remedy the problems identified by reforming secondary education in the U.S. Section 1 of the paper examines nine proposed proximate causes of the poor performance of U.S. secondary schools. We conclude that the poor performance is not caused by insufficient resources or too little time devoted to student instruction. Rather the causes appear to be the quality of teachers, the academic standards set by teachers and administrators and the culture of secondary schools. In section 2 we propose an institutional mechanism for raising standards and improving student engagement and motivation: curriculum-based external exit examinations (CBEEES). Studies of the impacts of CBEEES have found that they improve teaching and increase learning. Section 3 describes the strategies that state governments in the U.S. have devised to reform secondary education. Section 4 presents a summary of our research evaluating the effects of these strategies. We conclude that curriculum-based external exit exams are the most effective of the strategies being tried. Stakes for schools--rewarding schools that improve student performance and sanctioning schools that fail to meet targets for student achievement--are also effective. High school graduation tests (minimum competency exams that must be passed to receive a high school diploma) do not appear to have big effects on test scores when other standards-based reforms are controlled. They do, however, have big effects on employer perceptions of the competence of recent high school graduates and on the wages and earnings of these graduates.

## I. The Proximate Causes of the Poor Performance of American Secondary Schools: TEACHER QUALITY, STUDENT ENGAGEMENT and SCHOOL CULTURE

We begin by examining the proximate causes of low achievement at the end of secondary school. The discussion is organized around nine topics--each of them a proposed explanation for the poor performance of U.S. students:

1) Teacher quality
2) Teacher Compensation
3) Expenditure per pupil
4) Time devoted to instruction and study
5) Engagement--Effort per unit of scheduled time
6) Nerd Harassment—Peer Pressure against Studiousness
7) Students Avoiding Rigorous Courses
8) Pressures on Teachers to Lower Standards
9) Lack of Rewards for Learning from Employers

### 1.1 Teacher Quality

Teacher quality has big effects on student learning. The teacher's general academic ability and subject knowledge are the characteristics that most consistently predict student learning (Hanushek 1971, Strauss and Sawyer 1986, Ferguson 1990, Ehrenberg and Brewer 1993, Monk 1992).

Teaching secondary school does not attract the kind of talent that is attracted into the profession in Europe and East Asia. Since university admission standards are higher in Europe and East Asia, the university graduate pool from which secondary school teachers are recruited is better educated on average than the college graduate pool out of which American teachers are recruited. Furthermore, American teachers are generally not the most talented members of the pool of college graduates. In 1977-78 the Math Scholastic Aptitude Test (SAT) score of intended education majors was .38 standard deviations (SDs) below the overall average, one SD below engineering majors and 1.2 SDs below majors in the physical sciences. The Verbal SAT of intended education majors was .30 SDs below the overall average (NCES 1992, Table 124).

School administrators are also remarkably willing to hire and assign staff to teach subjects that are outside their field of expertise and training. More than half of secondary school history classes are taught by teachers who neither majored nor minored in history in college. More than half of chemistry and physics students are taught by teachers who did not major or minor in a physical science or engineering in college.[5]

In France, by contrast, secondary school teachers must pass rigorous subject matter examinations in the two subjects they are being hired to teach before getting their first teaching

job. In 1991 only 31.3 percent of those who took the written exams for the *Certificat d'Aptitude au Professorat de l'Enseignement du Secondaire* (the most common of these examinations) passed. The best teaching jobs go to those who pass even more rigorous examinations, the *Agregation Externe,* which had a pass rate of 17.7 percent in 1991.[6] European and East Asian secondary school teachers tend to be recruited from the middle (not the bottom half) of a pool of university graduates that is in turn a highly selected sample of the nation's population. Upper secondary school teachers are not allowed to teach outside of their field of expertise and certification.

The standards for getting into secondary school teaching are quite low in the U.S.. Most states using the National Teachers Examination/Praxis test have set remarkably low minimum passing scores.[7] Despite the low cut scores, failing these tests is not an absolute bar to entering the profession. Principals routinely hire uncertified teachers when they cannot find certified teachers willing to work for the salary being offered. As a result, U.S. teachers are often not very expert in the fields they teach. Recent college graduates recruited into math or science teaching jobs spent only 30 percent of their college career taking science and mathematics courses. Since 46 percent had not taken a single calculus course, the prerequisite for most advanced mathematics courses, it appears that most of the math taken in college was reviewing high school mathematics. Forty-four percent had not taken any computer science courses and 21 percent had not taken any physical science courses (NCES 1993b, p. 428-429). The graduates of the best American universities typically do not enter secondary school teaching because the pay and conditions of work are relatively poor.

### 1.2 Teacher Compensation

Despite the fact that wage rates and standards of living in the U.S. are higher than in any other OECD nation, there are six countries—Australia, Germany, Japan, Korea, Switzerland and the United Kingdom—that have higher annual salaries for secondary school teachers than the U.S. (see column 11 of Table 1). Comparisons of secondary school teacher salaries with per capita GDP are presented in column 12. American upper secondary teachers with 15 years of experience are paid only 10 percent more than the nation's per capita GDP. In Europe and East Asia by contrast salaries for teachers with 15 years of experience are on average 65 percent higher than percapita GDP. In Korea teachers are paid 2.7 times per capita GDP (OECD, 2000, p. 215) .

The lower pay in the United States is not a tradeoff for more attractive conditions of work. Indeed the working conditions of U.S. secondary school teachers are considerably less attractive. Their contracted teaching hours are 954 hours per year on average; 50 percent more

then the mean for the other OECD nations in the table--635 hours (OECD, 2000, p. 229). When you divide their annual salaries by the contracted number of teaching hours, lower secondary school teachers with 15 years of experience are paid only $34.00 per hour. The average for the other OECD countries is $47.66, 40 percent more (OECD, 2000, p. 16). **Given that all other wage rates are higher in the US than in the OECD comparison sample, it is truly amazing that American teachers are paid so little for each hour they spend in front of a classroom of students.**

When the salaries of college graduates are compared, education majors in the U.S. come out at the very bottom. Despite recent increases in teacher salaries the gap between teachers and other college graduates has remained large. University graduates who majored in physical science earned 78 percent more and economics majors earned 92 percent more than education majors over the course of their working lifetime. Majors in social sciences other than economics earned 27 percent more than education majors and humanities majors earned 5 percent mores. Relative to individuals with graduate degrees in education, those with MBAs earned 65 percent more, those with law degrees earned 104 percent more, and those with advanced degrees in physical science earned 75 percent more (Kominski 1990, 1992).

European and East Asian nations pay their teachers better. In the United Kingdom, for example, 1981 starting salaries of university graduates entering teaching were 30 percent higher than for graduates entering accounting, equal to those obtaining systems analyst jobs and only 3 percent below starting salaries of physical scientists (Dalton and Makepeace 1990, p. 241). By comparison, starting salaries of U.S. mathematics and physical science majors who entered teaching were 42 percent below the salaries of those who obtained computer programming and system analyst jobs and 35 percent below the starting salaries of those obtaining jobs in mathematics or physical science (NCES 1993b, p. 26).

The low status and low salaries of American teachers are part of the reason for low achievement in American schools. **Why does the U.S. pay its secondary school teachers so little?** This question will be taken up later in the paper.

### 1.3 School Expenditures

When expenditures per secondary school student are deflated by a purchasing power parity price index, the U.S. spends more than other countries with sole exception of Switzerland. However, teachers of constant quality are more expensive in America than in Europe, East Asia and Latin America because college graduates (the pool of workers from which teachers must be drawn) are better paid in the U.S. Since labor compensation is the bulk of education costs, the proper deflator for schooling expenditure is not a general cost of living index, but a wage index

that reflects among other things the cost of recruiting competent teachers. Lacking such an index, deflation by GDP per capita is the next best thing. OECD's latest estimates of the ratio of per pupil spending for secondary schools to per capita GDP are given in column 15 of Table 1. By this indicator most countries are pretty similar. The U.S. secondary school spending ratio is 7.4 percent below the average for the other nations in the table (OECD, 2000, p. 95) .

How is it possible for the U.S. to pay its teachers so little and yet end up spending so much on secondary education? Japan and Korea keep per pupil costs down by increasing class size substantially above U.S. levels. Europe, however, does not. Pupil teacher ratios in Europe and the U.S. are very similar. Where, then, is the money saved by paying U.S. teachers low hourly wages going? Apparently, it is being used to provide a variety of non instructional services. American schools perform functions such as after-school sports, bus transportation, psychological counseling, medical check ups, after-school day care, hot meals, and driver education that other countries often assign to other institutions. Costs of transportation are generally not included in school budgets in Japan and Europe where students use public transportation to commute to school. In many European countries, local governments, not schools, sponsor after-school sports programs. These additional functions of American schools require extra non teaching staff.[8] Non teachers account for 22 percent of current expenditure on K-12 education in the US; only 14 percent of current expenditure in other OECD nations (see column 16 of Table 1).[9] If adjustments were made for service mix and a cost-of-education index reflecting compensation levels in alternative college-level occupations were used to deflate expenditure, the U.S. advantage in instructional spending per pupil would drop. The necessary recalculation has not been done, so we cannot say how big the change would be.

### 1.4 Time Devoted to Instruction

Many studies have found learning to be strongly related to time on task (Wiley 1986, Walberg 1992). OECD estimates of annual hours of instruction for 14 year old students are presented in column 9 of Table 1. These numbers contradict the widely held belief that U.S. students do poorly because of shorter school days and shorter school years. Only 5 of the OECD countries in the table assign their students to attend classes for more hours per year than the United States. Twelve countries have their 14 year olds in school for less time. Indeed, when we focus on math and science instruction, the U.S. along with Mexico are at the top in terms of time students spend receiving instruction. Heavy European time commitments to foreign language study tend to crowd out mathematics and science instruction. In lower secondary school, all British students study at least one foreign language and Scandinavian, Belgian, Dutch and French students generally study two. In America, by contrast, few lower

secondary school students study a foreign language and, by the end of high school, graduates have taken an average of only 1.46 years of foreign language (NCES 1992, p. 131).

European students learn mathematics and science more thoroughly than American students even when they spend less time on it. For example, in the IAEP study, mathematics instruction time was the same in France and the U.S., yet French students knew about 1.47 U.S. grade level equivalents more mathematics than American students. In science, by contrast, instruction time was one hour per week less in France, yet Americans still lagged about one-third of a U.S. grade level equivalent behind French students. **Why does an hour of instruction in European and East Asian classrooms produce more learning than in American classrooms?**

### 1.5 Engagement--Effort per Unit of Scheduled Time

Classroom observation studies reveal that American students actively engage in learning activities for only about half the time they are scheduled to be in a classroom. 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 46.5 percent of the potential learning time is lost due to absence, lateness, and inattention.

Just as important as the amount of time participating in a learning activity 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.

Formal studies comparing ratios of on-task time to scheduled time are not available. Nevertheless, people who have visited classrooms in Northern Europe and East Asia and the U.S. report that European and Asian teachers are less likely to be talking about extraneous matters and European students are more likely to be paying attention and doing what they have been assigned. My school visits in France and the Netherlands generated similar impressions. **Why is time on task higher in Europe and East Asia? Why are there fewer inattentive and disruptive students?**

### 1.6 Nerd Harassment

Probably the most important reason for lack of student engagement in the U.S. is a peer culture that is hostile to studiousness and public displays of enthusiasm for academic learning. Interviews I conducted of middle school boys in Ithaca New York in 1996 and 1997 revealed that most of them internalized a norm against "sucking up" to the teacher. How does a boy avoid being thought a "Suck up?" He:

- Avoids giving the teacher eye contact
- Does not hand in homework early for extra credit,
- Does not raise his hand in class too frequently, and
- Talks or passes notes to friends during class (this signals that you value friends more than your rep with the teacher).

Similarly, Steinberg, Brown and Dornbusch's recent study of nine high schools in California and Wisconsin concluded that:

> ...less than 5 percent of all students are members of a high-achieving crowd that defines itself mainly on the basis of academic excellence... Of all the crowds the 'brains' were the least happy with who they are--nearly half wished they were in a different crowd.[10]

Why are the studious called ***suck ups***, ***dorks*** and ***nerds*** or accused of "***acting white***"? Why are students who disrupt the class or try to get the class off track, not sanctioned by their class mates. In part, it is because many teachers grade on a curve and this means trying hard to do well in a class is making it more difficult for others to get top grades. When exams are graded on a curve or college admissions are based on rank in class, joint welfare is maximized if no one puts in extra effort. In the repeated game that results, side payments--friendship and respect--and punishments—ridicule, harassment and ostracism--enforce the cooperative "don't study much, hang out instead" solution. If, by contrast, students were evaluated relative to an outside standard, they would no longer have a personal interest in getting teachers off track or persuading each other to refrain from studying. Peer pressure demeaning studiousness might diminish. We will return to this issue later in the paper.

### 1.7 The Student Preference for Easy Courses

Although research has shown that learning gains are substantially larger when students take more demanding courses,[11] only a minority of students enroll in these courses. There are several reasons for this. Guidance counselors in many schools allow only a select few into the most challenging courses. While most schools give students and parents the authority to overturn counselor recommendations, many families are unaware they have that power or are intimidated by the counselor's prediction of failure in the tougher class.

In part the problem is ignorance. Students appear to be unaware of just how important courses like algebra and geometry are for getting into and completing college. Even though 80

percent of 10th graders in 1988 expected to go to college, and 53 percent aspired to a professional or technical job, only 20 percent of 8th graders in 1989 thought they would need geometry and only 24 percent said they would need algebra "to qualify for [their] first choice job." [12]

A third source of the problem is that most students prefer courses that have the reputation of being fun and not requiring much work to get a good grade. In the 1987 survey, 62 percent of 10th graders agreed with the statement***, "I don't like to do any more school work than I have to."*** [13] Many parents support their children's preference for easier courses. Even in wealthy communities, they often demand that their child switch to easier courses where good grades are easier to get. As one guidance counselor described:

> ***A lot of... parents were in a 'feel good' mode. "If my kids are not happy, I'm not happy." …Probably…25 percent …were going for top colleges. They were pushing their kids hard. The rest---75 percent (I'm guessing at the numbers)---said "No, that's too hard, they don't have to do that."…If they [ the students] felt it was too tough, they would back off. I had to hold people in classes, hold the parents back. [I would say] "Let the kid get C's. It's OK. Then they'll get C+'s and then B's." [But they would demand,] "No! I want my kid out of that class!"*** [14]

Teachers are aware of student preferences and adjust their style of teaching and their homework assignments with an eye to maintaining enrollment levels. Guidance counselors, students and parents avoid rigorous courses largely because the rewards for the extra work are small for most students. While selective colleges evaluate grades in the light of course demands, many colleges have, historically, not factored the rigor of high school courses into their admissions decisions. Trying to counteract this problem, college admissions officers have been telling students that they are expected to take the most rigorous courses offered by their school. This effort has been partly successful. More students are taking chemistry and physics and advanced mathematics. But apparently many students have not gotten the message and still think taking easy courses is a good strategy. One student told a reporter:

> ***My counselor wanted me to take Regents history and I did for a while. But it was pretty hard and the teacher moved fast. I switched to the other history and I'm getting better grades. So my average will be better for college.*** [15]

Consequently, the bulk of students who do not aspire to attend selective colleges quite rationally avoid rigorous courses and demanding teachers.

### 1.8 Pressure on Teachers to Lower Standards

When teachers try to set high standards, they often get pressured to go easy. The following story is from southern Texas in the early 1980s.

> ***"In the first grading period I boldly flunked a number of students, including the daughter of an administrator of a local elementary school and a star fullback who was also the nephew of a school board member. Shortly thereafter I was called in to meet with my principal and the aggrieved parents. Such was my naivete that I actually bothered to bring evidence. I showed the elementary administrator her daughter's plagiarized book report and the book from which it had been copied, and I showed the fullback's father homework bearing his son's name but written in another person's hand writing. The parents offered weak apologies but maintained that I had not treated their children fairly.***
>
> ***My principal suddenly discovered a number of problems with my teaching. For the next few weeks he was in my class almost daily. Every spitball, every chattering student, every bit of graffiti was noted. When there were discipline problems my superiors sided with the offending students. Teaching became impossible.***
>
> ***So I learned to turn a blind eye to cheating and plagiarism and to give students, especially athletes, extra credit for everything from reading orally in class to remembering to bring their pencils. In this way I gained the cooperation of my students and the respect and support of my superiors."***[16]

This story is not an isolated example. Thirty percent of American teachers say they "feel pressure to give higher grades than students' work deserves." Thirty percent also feel pressured "to reduce the difficulty and amount of work you assign."[17]

Students also pressure teachers to go easy. 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 p. 157-158)

Theodore Sizer's (1984) description of Mr. Brody's class provides an example of how teachers benefit from setting modest goals.

> He signaled to the students what the minima, the few questions for a test, were; all tenth and eleventh-graders could master these with absurdly little difficulty. The youngsters picked up the signal and kept their part of the bargain by being friendly and orderly. They did not push Brody, and he did not push them....Brody's room was quiet, and his students liked him. No wonder he had the esteem of the principal who valued orderliness and good rapport between students and staff. Brody and his class had agreement, all right, agreement that reduced the efforts of both students and teacher to an irreducible and pathetic minimum.(p. 156)

Some exceptional teachers are able, through the force of their personalities, to induce their students to undertake tough learning tasks. But for all too many, academic demands are compromised because the bulk of the class sees no need to accept them as reasonable and legitimate. Why are students more interested in getting the high school diploma than in learning math and science?

### 1.9 The Absence of Rewards for Learning from Employers

One reason students care more about credentials than learning is the absence of immediate rewards in the labor market for learning. American employers hire on the basis of credentials. They seldom consider the rigor of high school courses or externally assessed student achievement because it is difficult to get this information. Some high schools do not respond to requests by graduates to send transcripts to employers. When they do respond, it takes a long time. 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 (NFIB) found that transcripts had been obtained prior to the selection decision for only 14.2 percent of the high school graduates hired.[18] Only 15 percent of the employers had asked high school graduates to report their grade point average. Tests are available for measuring competency in reading, writing, mathematics, science, and problem solving; but, after the 1971 Griggs decision, most firms stopped employment testing because EEOC guidelines made it very costly to demonstrate test validity.[19] The 1987 NFIB survey found that basic skills tests had been given in only 2.9 percent of the hiring decisions studied.

As a result, young workers with strong basic skills do not earn appreciably more than those with weak basic skills.[20] Over time, however, those who do a good job are more likely to get further training, promotions and good recommendations when they move on. Poor performers are encouraged to leave. Since academic achievement in high school is correlated with job performance,[21] the sorting process results in basic skills assessed during high school having a much larger effect on the labor market success of 30 year olds than of 19 year olds even when contemporaneous measures of completed schooling are held constant.[22]

The long delays before the benefits of academic achievement in high school start accruing send students the wrong signal. Teenagers know that college educated adults have good jobs and live in large attractive houses. They do not know whether the successful adults they see in their community took rigorous courses and studied hard in high school. As we saw above they will observe almost no relationship between academic achievement of their older siblings/friends and the quality of their jobs. So it would be reasonable for youngsters to conclude that while credentials are rewarded by employers, learning is not. If that is the conclusion they draw, the best strategy for the bulk of students is to study just hard enough to get the diploma and be admitted to college, but no harder.

**Why do employers in Europe and East Asia pay closer attention to student achievement in high school when making hiring decisions? Why don't principals in these countries pressure their teachers to go easy the way principals do in the United States? Why are people who studied psychology or physical education in university not allowed to teach history like they are in the U.S.? Why aren't students pressuring teachers to steer clear of difficult material?**

## II. SIGNALING and REWARDS FOR LEARNING as ULTIMATE CAUSE
## External Examinations as Standard Setters

If citizens of Japan, Korea, Britain, Denmark, France, Germany, the Netherlands and a host of other countries were asked these questions, they would point to their nation's system of curriculum-based external exit examinations (CBEEES). High stakes are attached to how students do on these exams. Exam grades appear on resumes and are requested on job applications. Exam grades influence (and in some nations completely determine) whether a student can enter a university and which university and what field of study they are admitted to. In the United States, by contrast, admission to the best colleges depends on teacher assessments of **relative** performance--rank in class and grades--and **multiple choice format aptitude tests** that are **not** keyed to the courses taken in secondary school. Employers pay

little attention to achievement in high school when making hiring decisions. Clearly CBEEES strengthen student incentives to study. Students are no longer competing with each other for a limited number or As and Bs. Everyone can get a 90 or better on the external exam, so students will be less supportive of those who disrupt the class and more supportive of those who take learning seriously. It no longer makes sense for students to avoid the more rigorous courses and the more demanding teachers.

CBEEES fundamentally change how student achievement is signaled. By doing so they transform the incentives for everyone: parents, teachers and school administrators as well as students. In the U.S. locally elected school boards and administrators make the thousands of decisions that determine academic expectations and program quality. When there is no external assessment of academic achievement, students and their parents benefit little from administrative decisions that opt for higher standards, more qualified teachers or a heavier student work load. The immediate consequences of such decisions are all negative: higher local property taxes, more homework, having to repeat courses, lower GPA's, complaining parents, a greater risk of being denied a diploma.

College admission decisions are based on rank in class, GPA and aptitude tests, not externally assessed achievement in secondary school courses, so upgraded standards will not improve the college admission prospects of next year's graduates. Graduates will probably do better in difficult college courses and will be more likely to get a degree, but that benefit is uncertain, far in the future and not visible to voters in school board elections. In this environment, administrators will seek teachers who keep their class orderly and entertained (like Mr. Brophy), who have roots in the community and who are willing to coach. If this is all one expects of teachers, sufficient numbers can be found at current salary levels. If, however, administrators were to demand that newly hired teachers have a deep knowledge of their subject and the ability to teach it to teenagers, they would find that there are not enough qualified teachers to go around. The shortage would not disappear until much higher salaries were offered. School tax levies would have to rise. External exams make stake holders care about how well high school subjects are taught. Hiring better teachers and improving the school's science laboratories now yields a visible payoff--more students passing the external exams and being admitted to top colleges. This should induce school districts to compete for talent by offering higher salaries and better working conditions.

When external assessment is absent, school reputations are determined largely by things that teachers and administrators have little control over: the socio-economic status of the student body and the proportion of graduates going to college. Consequently, higher standards

do not benefit students as a group, so parents as a group have little incentive to lobby strongly for higher teacher salaries, higher standards and higher school taxes.

Under a system of external exams, teachers and local school administrators lose the option of lowering standards to reduce failure rates and raise self-esteem. The only response open to them is to demand more of their students so as to maximize their chances of being successful on the external exams.

A further benefit of CBEEES is the professional development that teachers receive when they are brought to centralized locations to grade the extended answer portions of examinations. In May 1996 I interviewed a number of teachers union activists about the examination system in the Canadian province of Alberta. Even though the union and these teachers opposed the exams, they universally reported that serving on grading committees was "…a wonderful professional development activity (Bob, 1996)." Having to agree on what constituted excellent, good, poor, and failing responses to essay questions or open ended math problems resulted in a sharing of perspectives and teaching tips that most found very helpful.

CBEEES are, consequently, hypothesized to influence the resources made available to schools and the priorities of school administrators, teacher pedagogy, parental encouragement and student effort.

Careful empirical analysis of data from the 40 nation Third International Mathematics and Science Study (TIMSS) has found that teaching is more rigorous and students learn more in nations with CBEEES.[23] Analysis of data from TIMSS found that students from countries with medium and high stakes CBEEE systems outperform students from other countries at a comparable level of economic development by **1.3** U.S. grade level equivalents in science and by **1.0** U.S. grade level equivalent in mathematics. A similar analysis of International Assessment of Educational Progress data on achievement in 1991 of 13 year olds in 15 nations found that students from countries with CBEEES outperformed their counterparts in countries without CBEEES by about 2 U.S. grade level equivalents in math and about two-thirds of a US grade level equivalent in science and geography. Analysis of data from the International Association for the Evaluation of Educational Achievement's study of reading literacy of 14 year olds in 24 countries found that students in countries with CBEEES were about **1.0** U.S. grade level equivalent ahead of students in nations at comparable levels of development that lacked a CBEEES.[24] The final study of the effects of CBEEES compared students living in different Canadian provinces. Students attending school in provinces with CBEEES were a statistically significant one-half of a U.S grade level equivalent ahead in math and science of comparable students living in provinces without CBEEES.

The impact of CBEEES on school policies and instructional practices was studied in the TIMSS data and in the Canadian IAEP data. CBEEES are not associated with higher teacher-pupil ratios nor greater spending on K-12 education. They are, however, associated with higher minimum standards for entry into the teaching profession, higher teacher salaries (30-34 percent higher for secondary school teachers), a greater likelihood of having teachers specialize in teaching one subject in middle school and a greater likelihood of hiring teachers who have majored in the subject they will teach. Teacher satisfaction with their job appears to be lower, possibly because of the increased pressure for accountability that results from the existence of good signals of individual student achievement. Schools in CBEEES jurisdictions devote more hours to math and science instruction and build and equip better science labs. The number of computers and library books per student are unaffected by CBEEES.[25]

Fears that CBEEES have caused the quality of instruction to deteriorate appear to be unfounded. Students in CBEEES jurisdictions were less likely to say that memorization is the way to learn the subject and more likely to do experiments in science class. Apparently, teachers subject to the subtle pressure of an external exam four years in the future adopted strategies that are conventionally viewed as "best practice," not strategies designed to maximize scores on multiple choice tests. Quizzes and tests were more common, but in other respects a variety of indicators of pedagogy were no different in CBEEES jurisdictions. Students were also more likely to get tutoring assistance from teachers after school. They were not less likely to like the subject and they were more likely to agree with the statement that science is useful in every day life. Students also talked with their parents more about school work and reported their parents had more positive attitudes about the subject.

## III. STATE POLICY RESPONSES TO LOW STANDARDS AND STUDENT'S "DOING THE MINIMUM"

State level political and educational leaders have been concerned about the low standards and weak incentives for hard study for decades. The low expectations that prevail in American secondary schools result, they believe, in watered down curricula and a tolerance of mediocre teaching and inappropriate student behavior. The result is that the prophecy of low achievement becomes self-fulfilling. The traditional policy instruments—budgetary support for schools and school construction, teacher certification rules, etc.—did not address learning standards, so other instruments were sought. Four different strategies have been pursued.

### 3.1 Increased Graduation Requirements.

While most school districts have local graduation requirements that exceed state set minimums, the subject specific nature of the state mandates appear to be binding for many

students. During the past two decades many states have increased the number of core academic courses that students must take to graduate from public high schools in the state. Possibly as a result, enrollment in college preparatory mathematics and science classes has been rising as well. The increase in graduation requirements may, however, have the unintended consequence of inducing some students to drop out of high school altogether. The next three strategies will be collectively referred to as Standards-Based Reform strategies.

### 3.2 Achievement Tests, School Report Cards and Stakes for Teachers and Administrators.

Another approach has been to develop content standards for required core academic courses, administer tests assessing that content to **all** students across the entire state and then publish the results--district by district and school by school. Thirty-seven states now publish school report cards for all or almost all of their schools.[26] The hope is that publicly identifying low performing schools will spur administrators and school boards to take remedial action. Nineteen states have special assistance programs to help failing schools turn themselves around. If improvements are not forthcoming, eleven states have the power to either close down, take over or reconstitute failing schools. Positive reinforcements are also being tried. Nineteen states have a formal mechanism for rewarding schools either for year-to-year gains in achievement test scores or for exceeding student achievement targets.[27]

### 3.3 Minimum Competency Exam Graduation Requirements.

A growing number of states are applying stakes to students as well as to teachers. In 1996, seventeen states and a number of urban districts were awarding high school diplomas only to students who had passed a minimum competency exam. MCE graduation requirements were often established in response to a popular perception that the state or district's K-12 education system had failed. Generally speaking it has been southern states and states and districts with large urban populations that have established MCEs. In 1992 about 40 percent of the nation's public school students lived in states that imposed a MCE graduation requirement at public high schools. Another 20 percent of the nations public high school students live in districts that have established their own MCE and set their own passing standard.

MCEs raise standards, but probably not for everyone.[28] The standards set by the teachers of honors classes and advanced college prep classes are not changed by an MCE. Students in these classes pass the MCE on the first try without special preparation. Typically high school transcripts report only who has passed the MCE, not how far above the passing standard the student got. The higher standards are experienced by the students who are in the school's least challenging courses. Students pursuing the "Do the Minimum" strategy are told

"you must work harder" if you are to get the diploma and go to college. School administrators do not want to be embarrassed by high failure rates, so they are likely to focus additional energy and resources on raising standards in the early grades and improving the instruction received by struggling students. In most states science, history and civics/government are not covered by the MCE, so their impact on achievement in these subjects is indirect. Presumably they raise achievement in reading, writing and mathematics and this then helps students do better in history and science classes and on tests covering these subjects.

MCEs typically set a pretty low minimum standard. In 1996 only 4 of the 17 states with MCEs targeted their graduation exams at a 10th grade proficiency level or higher. Failure rates for students taking the test for the first time varied a great deal: from a high of 46% in Texas, 34 % in Virginia, 30% in Tennessee and 27% in New Jersey to a low of 7% for Mississippi. However, since students can take the tests multiple times, eventual pass rates for the Class of 1995 were much higher: 98% in Louisiana, Maryland, New York, North Carolina and Ohio; 96 % in Nevada and New Jersey, 91% in Texas and 83% in Georgia.[29] Since the tests are designed to determine who falls below a pretty low standard, they typically do not assess material that college bound students study in 10th and 11th grade (e.g. Algebra II and geometry proofs).

### 3.4 Curriculum-Based External Exit Examinations—Advanced Placement and End-of Course Exams in New York, North Carolina and California:

Curriculum-Based External Exit Exams (CBEEEs) are different from MCEs in the following three ways:

- **Are collections of End-of-Course Exams (EOCEs).** Since they assess the content of specific courses, the teacher/s of that course (or course sequence) will inevitably feel responsible for how well their students do on the exam. Alignment between instruction and assessment is maximized and accountability is enhanced. Teachers will not only want to set higher standards, they will find their students more attentive in class and more likely to complete demanding homework assignments. They become coaches helping their team do battle with the state exam. Grades on the external exam will typically be part of the overall course grade further integrating the external exam into the classroom culture.

- **Signal multiple levels of achievement in the subject.** If only a pass-fail signal is generated by an exam, the standard will, for political reasons, have to be set low enough to allow almost everyone to pass. This will not stimulate the great bulk of students to greater effort.[30] EOCEs signal the student's achievement level in the subject, not just

whether the student exceeds or falls below a specific cut point that all high school graduates are required to surpass. Consequently all students, not just those at the bottom of the class, have an incentive to study hard to do well on the exam and, consequently, an EOCE is more likely to improve classroom culture than a MCE. [31]

- **Assess more difficult material**: Since EOCEs are supposed to measure and signal the full range of achievement in the subject, they contain more difficult questions and problems. This induces teachers to spend more time on cognitively demanding skills and topics. MCEs, by contrast, are designed to identify which students have failed to surpass a rather low minimum standard, so they do not to ask questions or set problems that students near that borderline are unlikely to be able to answer or solve. This may result in too much class time being devoted to practicing low level skills.

End-of-course exams are very much like the final exams that teachers give at the end of the year.[32] The stakes are also frequently different, as well. For voluntary EOCEs, the stakes are typically getting an A rather than a B in a course or getting college credit for a high school course. For MCEs, the stakes are getting a high school diploma. EOCEs in the U.S. may influence which college one is admitted to but failing them does not prevent from going to college at all as MCEs do and as CBEEES do in many European and East Asian nations. To summarize, compared to MCEs, the standards are higher with EOCEs and the stakes are lower but they apply pretty much equally to all students in a particular class, though sometimes not to all students in a school.

**Advanced Placement Courses and Exams:** The number of students taking Advanced Placement (AP) examinations has been growing at a compound annual rate of 9 percent per year. In 1999 686,000 students, about 11 percent of the nation's juniors and seniors, took one or more AP exams.[33] Despite this success, however, 44 percent of the high schools do not offer even one AP course and many others allow only a tiny minority of their students to take these courses.

**North Carolina End-of-Course Tests:** The Elementary and Secondary Reform Act of 1984 authorized the State Department of Education to develop end-of-course tests for ten core high school subjects. EOC tests were introduced for Algebra 1 and 2, Geometry, Biology, Chemistry, Physics, Physical Science, US History, Social Science and English 1 between 1988 and 1991. Except for a four year interlude in which some tests were made a local option, all students taking these courses were required to take the state tests. Easier versions of these courses not assessed by a state test do not exist, so virtually all North Carolina high school students take at least six of these exams. Test scores are reported separately on the student's

transcript. Most teachers have been incorporating EOC exam scores into their course grades and a state law now mandates that, starting in the year 2000, the EOCE test scores must have at least a 25% weight in the final course grade.

**California's Golden States Exams:** California introduced voluntary EOCEs in Algebra I and Geometry in 1987, U.S. History and Economics in 1990, Biology and Chemistry in 1991, Written Composition in 1996, Government in 1997, Reading/Literature in 1998 and Physics and Spanish in 1999. By 1993 about 31 percent of California high school students were taking the Algebra exam, 20 percent were taking the geometry exam and 14 percent were taking the U.S. History and Biology exams.[34] Outstanding achievement on each exam is recognized by the state and appears on the student's transcript but is not part of the grade that the student receives from her teacher. Students who earn high honors, honors or recognition designations on 6 Golden State Exams (GSEs) get a special Golden State Diploma from the state. In 1998 about one percent of the states graduates received such a designation.

**Regents Courses and Exams:** Begun in the 1860s, New York State's curriculum-based Regents Examination System is the oldest American example of end–of-course examinations. Sherman Tinkelman, Assistant Commissioner for Examinations and Scholarships described the system in a 1966 report:

> The Regents examinations are closely related to the curriculum in New York State. They are, as you can see, inseparably intertwined..... These instruments presuppose and define standards.... They are a strong supervisory and instructional tool--and deliberately so. They are effective in stimulating good teaching and good learning practices.[35]

They are taken throughout one's high school career. A college bound student taking a full schedule of Regents courses would typically take Regents exams in mathematics and earth science at the end of 9th grade; mathematics, biology and global studies exams at the end of 10th grade; mathematics, chemistry, American history, English and foreign language exams at the end of 11th grade and a physics exam at the end of 12th grade. To accommodate summer school students and courses ending in January, the exams are given three times a year.

These external exams have substantial effects on teachers. Since they grade the Regents exams of the students in their own classes, they can see the kinds of mistakes their students are making and use that information to improve their coverage of the material the following year. Essays are generally graded by more than one teacher and this results in feedback and discussions among colleagues that are an excellent professional development experience for most participants. The exams also provide a benchmark against which the teacher, her departmental colleagues and administrators may judge teaching effectiveness. On

occasion, examinations have been deliberately revised to induce changes in curriculum and teaching.

> For years our foreign language specialists went up and down the State beating the drums for curriculum reform in modern language teaching, for change in emphasis from formal grammar to conversation skills and reading skills. There was not very great impact until we introduced, after notice and with numerous sample exercises, oral comprehension and reading comprehension into our Regents examinations. Promptly thereafter, most schools adopted the new curricular objectives.[36]

Publication of school level results puts administrators under pressure to hire teachers who have deep knowledge of their subject and to introduce whole school reform programs that upgrade instruction in the early grades.

For students the stakes attached to Regents exams were pretty modest. Each district decides whether Regents exam grades are to be a part of the course grade and how much weight to assign to them. While almost all districts count Regents exam results as a final exam grade, teachers or departments generally give their own final as well so when grades on finals are averaged in with quarterly marking period grades, Regents exam scores seldom account for more than an eighth of the student's final grade in a course. Eligibility for a "Regents" as opposed to a local diploma depends on passing the Regents exams but the benefits of getting a "Regents" diploma are small. While Regents exam grades appear on high school transcripts, college admissions decisions depend primarily on grades and SAT scores, not Regents exam scores or Regents diplomas.[37] Many students saw an advantage in taking easier "local" classes to enhance their GPAs.

AP and Regents exams raise standards through a variety of mechanisms. First, in the classes in which they are used, they push up teaching standards and help motivate students to study and to cooperate with each other. Students are no longer competing for a limited number of As and Bs. Now it is possible for everyone in the class to be recognized for excellence in the subject. Secondly, the external exam creates a signal of competence that colleges use in making admissions and placement decisions and this increases the rewards for learning and makes them more visible and immediate. This also increases student motivation. Thirdly, the honors and college credits that are awarded to those who demonstrate and signal their achievement attract students into the more challenging and demanding courses that prepare them for these examinations. In many districts, this effect operates as far back as sixth grade where decisions about whether to accelerate in mathematics effectively determine whether a student can take AP calculus in his senior year. Fourthly, the share of students taking the externally examined courses and the results of those exams effect the community's perception of school quality and of the performance of the school district's teachers and administrators.

Property values respond to these perceptions. School administrators will thus face strong incentives to focus on the school's core academic mission.

The power of these incentives depends, of course, on the share of students taking externally examined courses. Unfortunately, during the 1980s and early 1990s many students were not taking Regents courses and exams. In 1992 the most popular exam, Course I Mathematics, was taken by 62 percent of students, the Global Studies exam was taken by 57 percent of students and the English and Biology exams were taken by 50 percent of students. Only 38 percent of graduates earned Regent's diplomas signifying completion of a sequence of Regents courses in 1992/3.[38] New York State dealt with this problem by creating and expanding a system of Regents Competency Tests (RCTs) in reading, writing, math, science, global studies and U.S. history that set a minimum standard for those not taking Regents courses.

The RCTs were pretty low level tests, however. The mathematics RCT, for example, assumed no exposure to algebra or geometry. Concern grew that large numbers of students were wasting their time in watered down courses. This led the New York City Board of Education to decide in 1994 that starting with those entering 9$^{th}$ grade that, all students would have to take 3 Regents level math and 3 Regents level science courses before graduating. Two years later the State Board of Regents decided to phase in a requirement that all public school students take Regents courses and pass exams assessing the content of these courses. While passing cut scores were lowered by 10 points, the content of the exams was not watered down.[39]

While New York State has the most comprehensive CBEEES, a number of other states appear to be moving in their direction. North Carolina has had compulsory end-of-course exams since the early 1990s. California, Maryland, Mississippi, Oklahoma, Arkansas, Tennessee and Virginia are phasing in compulsory end-of-course exams in key subjects. In Maryland, Tennessee and Virginia there are plans for the EOCEs to eventually replace the state's MCE.

## IV. THE EFFECTS OF STANDARD-BASED REFORM and COURSE GRADUATION REQUIREMENTS

What have been the effects of the standards based reforms and increased high school graduation standards on student learning and on post high school outcomes? Our review of the comparative international evidence on the effects of CBEEESs suggests that increasing the rewards for student achievement can have positive effects on learning.[40] However, the most popular school and student stakes policies in the United States—school stakes, minimum competency exams and higher course graduation requirements—are very different from CBEEES so their effects are likely to be different as well. States have introduced different packages of standards based reform initiatives, so their impacts can be assessed by comparing

outcomes in different states. We present below a summary of the main findings of a study of these effects that is being published in the Brookings Papers on Education Policy.[41] The study examined two independent data sets: aggregate state data from the National Assessment of Educational Progress and the Census Bureau and six years of longitudinal data on 14,000 students who were 8th graders in 1988.

Family background is the single most powerful predictor of student achievement, so the models included controls for the following demographic characteristics of the students attending school in the state: the share of children living in poverty, parental education, percent in two-parent families, the share of public school students who are African-American, the share who are Hispanic and the share who are Asian-American. States that have minimum competency exams tend to have also been early adopters of school accountability systems that reward high achieving schools or sanction failing schools that do not improve. This means that unbiased estimates of the effect of MCEs and CBEEES are possible only when the presence or absence of other standards-based reform (SBR) initiatives is taken into account. We, therefore, studied the impact of five different SBR policies:

1. School by school reporting of the results of statewide testing
2. Rewards for schools that improve on statewide tests or exceed targets set for them
3. Sanctions for failing schools—closure, reconstitution, loss of accreditation etc.
4. Minimum competency exams
5. Curriculum-Based External Exit Exam System combining EOCEs and MCEs—i.e. the New York/North Carolina stakes for students policy mix during the 1990s.

Impacts on Test Scores: Results for models predicting student achievement are summarized in Table 2 and in Figures 1 and 2. The policy that clearly has the biggest effects on test scores was Curriculum-Based External Exit Examinations—the combination of EOCEs and MCEs that has been in place in New York State since the early 1980s and in North Carolina since about 1991. In comparison to students in states without MCEs or EOCEs, 8th graders in New York and North Carolina were about 45 percent of a grade level equivalent (GLE) ahead in math and science and 65 percent of a GLE ahead in reading. In addition, test score gains from 8th to 12th grade were nearly 40 percent of a grade level equivalent greater in New York State. This confirms and extends earlier findings that New York State did significantly better on SAT tests and the 1992 8th grade NAEP math tests than other states with demographically similar populations.[42]

The next most powerful intervention appears to be state imposed stakes for teachers and schools particularly when rewards for successful schools were combined with sanctions for failing schools. Students in states that both rewarded schools for success and threatened to

sanction failing schools were 20 percent of a GLE ahead in math and science and 24 percent of a GLE ahead in reading. Public reporting is necessary for the implementation of these other policies but on its own it had no discernable effect on student achievement.

When other SBR policies are held constant, the positive effects of state imposed MCEs on achievement in 4th and 8th grade are quite small and are statistically insignificant. While state imposed MCEs had no significant effects on learning gains during high school of students with average or above average grades, students with low GPAs in 8th grade learned more math and science.

The policy having the smallest effects was state imposed course graduation requirements. They had no effects on test score gains.

Impacts of Graduation Requirements on Enrollment and Graduation Rates: Figure 3 summarizes the analysis of 1990 state cross-section data. We found that state mandated minimum course graduation requirements were associated with significantly lower school enrollment rates but had no relationship with the number of students getting high school diplomas. State mandated MCEs and CBEEES had no effects on enrollment rates or high school completion rates in 1990.

Figure 4 summarizes the analysis of 1994-97 data on the mean high school retention rate [ie. 1 minus the dropout rate] for each state. MCEs and higher course graduation requirements lowered retention rates and increased dropout rates.

When we analyzed longitudinal data that controlled for the grades and test scores of students in 8th grade, we found that students with C- grades in 8th grade were not more likely to drop out when they lived in MCE states. They were, however, 7.7 percentage points less likely to get a high school diploma or a GED within 6 years and 3.6 percentage points more likely to get their diploma late when they lived in a MCE state (see figure 5, 6 and 7). MCEs had no significant effect on graduation rates of students with average or above average grades. New York students were not significantly more likely to fail to get a diploma or GED before 1994 but they were significantly more likely to drop out and to be delayed in getting their diploma and to get a GED rather than a high school diploma. These effects were larger for students with low GPAs in 8th grade.

Impacts of Stakes for Schools Policies on Dropout Rates: We also examined the effect of SBR policies that hold schools accountable for the performance of their students. We found that retention rates were significantly higher when the criteria by which schools were judged and made accountable included dropout rates or graduation rates (see right hand side of Figure 4). We also found that holding schools accountable for student test scores was not associated with higher dropout rates and indeed tended to be associated with lower dropout rates. These effects

are additive, so the regression predicts that state programs that reward and sanction schools based on both test scores and dropout rates lower dropout rates by 3.1 percentage points. If our estimates are correct, well designed 'stakes for schools' systems that include dropout rates in the accountability system can more than offset the tendency of MCEs and CBEEES to increase dropout rates. We cannot be sure, however, that these findings are not caused by school administrators gaming the system that reports dropout rates so more research is needed on the topic.

Effects of Graduation Requirements on College Attendance: Estimates of effects on college attendance are presented in the fourth panel of Table 2 and Figure 8. State imposed course graduation requirements significantly lowered college attendance in the two years following high school graduation. CBEEES and high school graduation tests, by contrast, significantly increased college attendance rates 15 months after the student's scheduled date of high school graduation.

Effects of Graduation Requirements on Labor Market Outcomes: Estimates of effects on labor market outcomes are presented in figures 9, 10 and 11 and in the bottom panel of Table 1. State imposed course graduation requirements had no significant relationship with employment and earnings but were negatively associated with wage rates. In contrast, students who attended school in states with MCEs earned significantly more in the years immediately after graduating. Students with average grades who lived in states with MCE graduation requirements earned about **7 percent more per month and 9 percent more per year** than students in states without MCEs.

Because Regents exam scores are part of student grades and appear on high school transcripts (thus signaling who is taking a more rigorous curriculum), we hypothesized the rewards for academic achievement would be greater in New York State than elsewhere in the nation. This hypothesis was confirmed. However, the existence of the Regents exam system did not improve the labor market success of all students equally the way MCEs appear to have. Recent graduates from New York were not better paid than graduates from other Northeastern states and indeed those with low GPAs were paid less.

**Policy Implications for the U.S**. Let us now bring the empirical findings together and draw implications for policy. State imposed minimum course graduation requirements have little to recommend them. Students from states that required an additional 4 courses to graduate were more likely to dropout of high school, more likely to get a GED and less likely to attend college and were paid 1.6 percent less per hour on average.

State MCE graduation requirements, by contrast, had both positive and negative effects on students. Students with low grades in 8$^{th}$ grade were not more likely to dropout when they

lived in MCE states. They were, however, more likely to have to spend a fifth year in high school to get their degree, more likely to get a GED and more likely to have failed to get a diploma or GED before spring of 1994. The effects of MCEs on achievement in 8th grade and test scores gains during high school were rather small and often not statistically significant. The good news is that all types of students in MCE states earned a good deal (7 percent per month) more and were significantly (about 2 to 4 percentage points) more likely to be in college in 1993/94.

The curriculum-based external exit exam system of New York and North Carolina had by far the largest impacts on achievement in 8th grade and test score gains during high school. By the end of high school achievement was roughly one grade level equivalent ahead of other comparable states. Low GPA students were more likely to go to college when they lived in New York. On the negative side, New York students were more likely to get GEDs and tended to take longer to get their diploma. They were not, however, less likely to get a diploma or GED.

Stakes for schools is a new policy but there is already considerable evidence that it is working. We find that states that have reward schools for success and sanction schools that are failing have higher achievement levels and lower dropout rates. Grissmer et al (2000) found that states that have implemented the most comprehensive set of school accountability provisions—North Carolina and Texas—have achieved big improvements in their NAEP test scores.

## V.---LESSONS FOR LATIN AMERICA AND THE CARIBBEAN

Achievement levels of students in many Latin American countries are extremely low. Columbia was the only Latin American participant in TIMSS. In mathematics Columbia's 13 year olds were 4 U.S. grade level equivalents (GLEs) behind Spain and more than 9 grade level equivalents behind Japan and Korea. In science Columbia's 13 year olds were 4.5 U.S. grade level equivalents (GLEs) behind Spain and 7 grade level equivalents behind Japan and Korea.

Two Brazilian cities—Sao Paulo and Forteleza--participated in the International Assessment of Educational Progress in 1991. Here too students lagged far behind European and Asian students. In mathematics Forteleza and Sao Paulo's 13 year olds were about 3 GLEs behind students in Spain and about 5 GLEs behind students in East Asia. In science Forteleza's students were 5 GLEs behind Spain and 7 GLEs behind students in East Asia (IAEP 1992).

In the 1990-91 IEA Reading Literacy Study, Venezuela's 9th graders were 100 points behind their counterparts in Spain and 130 points behind students in the U.S. The only countries with lower literacy levels were in Africa: Nigeria, Zimbabwe and Botswana. Trinidad and Tobago did much better. It's students were only 16 points behind Spain.

Improving student achievement should receive highest priority. Econometric studies by Barro and by Hanushek and Kim have found that achievement levels on 8th grade math and science tests are much stronger predictors of economic growth than the proportion of the high school age cohort that is in school.[43] Expanded enrollment in secondary schools and higher completion rates should not be obtained by lowering standards. The economic tradeoff is such that a policy change that increases average achievement at the expense of a modest decline in secondary school graduation rates accelerates economic growth. The comment of Ramon Cortines, the Chancellor of New York City School System when the city decided to require all students to take more difficult math and science classes, applies just as forcefully to Latin American and Caribbean education systems,:

> ***The easy way out is the road to nowhere. If achievement in our schools is to improve, we must raise our expectations for students and staff. Our system will fail in its obligation to this community unless we equalize educational opportunity and raise standards in all of our schools.***[44]

. **Recommendations for Improving Secondary Education**

- **Pay your secondary school teachers enough to attract talented people with deep knowledge of the subject they teach.**
- **Require prospective secondary school teachers to pass rigorous tests assessing their knowledge of their field before they get their first teaching job.**
- **If your nation has a Curriculum-Based External Exit Exam System, keep it.**
- **The standards-based reform strategies being employed by many states in the U.S. are working.** Achievement is rising and our analysis implies that the reforms are contributing to gains in student achievement. Nations dissatisfied with their students' achievement should consider adopting a standards-based reform strategy. This would require that Ministries of Education have a means of assessing the progress of students towards meeting the nation's education goals. First agreement must be reached on what all students should know and be able to do at each stage of their schooling. Then tests would be developed assessing those skills and given to all students in the country on a regular basis. The results would be reported annually for each school and school administrators would be held accountable for improving their schools performance.
  - **The performance indicator system for schools needs to employ a variety of indicators of student achievement and to incorporate indicators that**

**measure student persistence in school—**eg. proportions promoted to the next grade, dropout rates and high school graduation rates.

- **Teachers must be offered professional development opportunities to learn how to best teach the skills being assessed.**

- **Schools should be rewarded for improving student achievement and for increases in retention and graduation rates.**

- **A system for identifying failing schools needs to be developed. When a school is so identified, a team of turn around experts should be sent to the school and school should be required to develop and implement a plan for improving achievement.**

- **If your nation does not have a curriculum-based external exit exam system, create one.** Make the external exams count by incorporating exam grades in the student's course grade, by putting exam grades on the transcript and by awarding honors diplomas. Do not make passing the end-of-course exams a graduation requirement. Try to create modest stakes for all students, not high stakes for a few.

  - **Involve classroom teachers in developing the external assessments.** Phase the development process so that the Ministry of Education staff who work on the national assessments are not overburdened. The Ministry might contract some of the work to testing organizations, but high levels of expertise must be developed by MOE staff to supervise the work and to explain it to political superiors and the nation's educators. Consider forming a consortium with other countries to share costs as some Caribbean nations have. The Inter-American Development Bank might play an important role in initiating and funding such a consortium.

  - **Have your teachers grade the exams in centralized locations.** Each paper should get at least two reads. Involve as many teachers in grading as possible. The teachers I interviewed in Alberta and Manitoba said that grading the exams with their colleagues was the best professional development experience they had since entering the profession. Once the system has been operating a few years, classroom teachers who have done centralized grading might be allowed to do the first read/grade of their own student's papers. Pay teachers an honorarium for their grading work.

  - **Grade the Exams quickly.** Scores on the exam should be part of the student's course grade.

  - **Multiple opportunities to take a course and its external exam.** Give students who do poorly on the exam an opportunity to retake the course (or attend summer school) to try to bring up their grade in a retest..

  - **Use multiple measures of student achievement to make important decisions.** Teacher grades should be considered when deciding on admission to university and when evaluating a recent graduate for a job. Teachers should

continue to have the authority to fail students, even students who get a passing grade on the external exam.

### Appendix on Analysis of State Cross Section data on Dropout rates

State level data on enrollment rates and high school graduation rates for the early 1990s were analyzed. The dependent variables were:

(a) the enrollment rate of 17 year olds (taken from the 1990 Census and from NCES, Education in States and Nations, 1991),

(b) the high school graduation ratio in 1991 and 1993 (the ratio of the number of high school diplomas awarded in the state to the number of 17 year olds)[1] and

(c) the event drop out rate in 1994/5, 1995/6 and 1996/7 for $9^{th}$ to $12^{th}$ graders reported by state departments of education to NCES {# of students dropping out in a year (as reported by schools) divided by enrollment in grades 9 to 12}.

Data on each state's compulsory education laws and high school graduation requirements—minimum competency exams and the number of Carnegie units required to graduate--were taken from the 1993 issue of the Digest of Educational Statistics and by contacting accountability staff in states with ambiguous data. The control variables characterizing the demographic background of the state's high school age youth were as follows:

- a parents' education index equal to the average of the percent of parents with a high school diploma and the percent of parents with a university degree,
- incidence of poverty for children under 18.
- percent population foreign born.
- percent of public school students African American.
- percent of public school students Hispanic.[2]

The other policy variables included:

- A dummy variable for curriculum-based external exit exams {New York had End-of-Course Exams (EOCE) throughout the period. North Carolina completed its phase in of EOCEs in 1991}
- A dummy variable for whether 17 year olds are required to be in school by the state's compulsory attendance law.
- An index of state rewards or sanctions for schools that depend in part on dropout rates or graduation rates (available only for the period since 1995). The index is a sum of two zero-one dummy variables. The first 0-1 variable equals one when the state bases ratings of districts in part on drop out rates. The second variable equals one when the state rewards districts in part on the basis of dropout rates.

[1] The population of 17 year olds was used as the base rather than 18 year olds because the number of 18 year olds may be inflated by in-migration of college students and military personnel.

[2] . The sample included 49 states plus the District of Columbia. Hawaii was not included because we could not control for the effects of Pacific Islander ethnicity. The majority of Hawaiian students report Pacific Islander ethnicity and these students are significantly more likely to drop out than local Whites and Asians.

- An index of state rewards or sanctions for schools that depend on test scores of students (available only for the period since 1995). The index is a sum of two zero-one dummy variables. The first 0-1 variable equals one when the state sanctions schools/districts with low scores on state tests that fail to improve. The second 0-1 variable equals one when the state rewards districts that significantly improve their scores on state tests.

The results of the regression analysis are presented in Table A1. The estimated effects of each of the state policies are graphed in Figure 4. The statistical significance of the coefficients is indicated by the number of asterisks (***s) to the right of the coefficient and above or below the bar.

**Carnegie Unit Graduation Requirements:** The number of courses required to graduate has significant negative relationships with enrollment rates and with event drop out rates. Effects appear to be small, however, for enrollment rates. A differential between states of four Carnegie units is associated with enrollment rates being 1.2 percentage points lower (ceterus paribus) in one regression and .72 percentage points lower in the other. The impacts of graduation requirements on event dropout rates for 1994 through 1996 are larger. Holding other influences constant, states that required four additional Carnegie units to graduate had annual drop out rates between 1994 and 1997 that were about 1.24 percentage point higher. The average dropout rate was 5.26 percent so this is an increase of about 25 percent.

**Minimum Competency Exams:** Estimates of the impact of Minimum Competency Exams are not stable. The models analyzing enrollment rates in the 1990 Census indicate MCEs have no effects. Indeed, point estimates of the effect are, contrary to conventional wisdom, positive. For high school graduation ratios, point estimates have the predicted negative sign but they are not even close to being statistically significant. When, however, one analyzes the event drop rates reported by school officials for 1994 through 1996, MCEs are associated with significantly higher dropout rates. Dropout rates were a significant [at the 10 percent level on a one tail test] 1.6 points higher in states with MCEs in 1994-5 and 2.1 points higher in 1995-96. Its not clear how much weight one should give to these results because the estimate of the MCE effect dropped to 0.5 percentage points when nine additional states provided dropout data in 1996-97. Our conclusion is that while 1990 enrollment rates were not influenced by MCEs, that dropout rates in the middle of the 1990's may have been affected. More data and better quality data are necessary before definitive conclusions can be drawn regarding effects of MCEs on state aggregate dropout rates during the later half of the 1990s.[3]

[3] NCES gets the data it publishes on dropout rates and high school diplomas awarded from state education agencies and surveys of private schools. They are trying to standardize the definitions and data collection methods but many problems remain. The number of diplomas awarded in particular states sometimes varies a great deal from one year to the next. In one case we found a large discrepancy between the number of diplomas awarded by Tennessee high schools reported by NCES and the number reported on

The hybrid MCE/End-of-Course Exams of New York and North Carolina had no significant effects on dropout rates or graduation rates. Four of the point estimates imply decreased dropout rates and four imply increased drop out rates.

**Policies hypothesized to lower dropout rates:** School attendance laws requiring 17 year olds to be in school may be having an effect, but the effect seems to be small. Point estimates of the effect have the predicted sign in seven of eight regressions and are significant (at the 10 percent level on a one-tail test) in two of the eight regressions. Averaged over all eight models, school attendance laws are associated with a 0.5 percentage point decrease in dropout rates.

Our tests of the effect of making dropout rates and graduation rates one of the criteria for evaluating school districts for sanctions or rewards suggests that dropout rates are lowered by such a policy. States that both rate schools on their ability to retain students and reward them for success in lowering dropout rates had event dropout rates between 1994 and 1997 that were a statistically significant 2.2 percentage points lower than states that did neither. Note that this finding comes from a model that controls for 'stakes for schools' policies that base sanctions and rewards on state test scores. Indeed our point estimates of the effect of test based rewards and sanctions policies imply that states that did both had event dropout rates that were 1 percentage point lower than states that did neither. These effects are additive, so the regression predicts that state programs that reward and sanction schools based on both test scores and dropout rates lower dropout rates by 3.2 percentage points. If our estimates are correct, well designed 'stakes for schools' systems that include dropout rates in the accountability system can more than offset the tendency of minimum competency exams to increase dropout rates. Here again one should be cautious about these findings. School administrators are the source of the information on dropout rates. State accountability systems that include dropout rates in school ratings give local administrators an incentive to manipulate the data they report to the state departments of education. We might be looking here at a reporting effect, not a real effect. High school graduation rates and census based enrollment rates are not as subject to manipulation by administrators, so these outcomes need to be studied.

the Tennessee Department of Education's web site. The NCES figure was clearly wrong. NCES's figure for diplomas exceeded the number of high school seniors by a large margin.

## Table 1: Characteristics of Secondary Education Systems

| | Enrollment Rate | | Upper Sec. S. | Learning Index 4th to 8th grade | | | Math Age 13 | End of Secondary | | Lower Sec. Teacher | Up.SS Salary | Teach Hours | Salary Per | Expend perstud/ | Teach Comp | Stud. Hrs | % Absent |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Age 16 | Age 17 | Grad. Rate | Math | Science | Read-ing | | Math | Science | Salary In $ | /GDP percap | per Year | Teach Hours | GDP Percap | % of total | Per Year | 8th Grade |
| Australia | 97 | 81 | --- | 121 | 127 | --- | 499 | 522 | 527 | $36,175 | 1.6 | 802 | 45 | 25 | 63 | 1027 | 7.1 |
| Belgium | 94 | 93 | 84 | --- | --- | -14 | 539 | --- | --- | $27,932 | 1.55 | 685 | 40 | 29 | 78 | 1057 | 4.1 |
| Canada | 99 | 83 | 72 | 133 | 130 | +26 | 498 | 519 | 532 | --- | --- | --- | --- | --- | 64 | --- | 5.4 |
| Denmark | 93 | 82 | --- | --- | --- | +50 | 514 | 547 | 509 | $31,000 | 1.6 | 572 | 48 | 28 | 53 | 930 | 3.6 |
| Finland | 89 | 93 | 89 | --- | --- | -10 | *520* | --- | --- | $27,942 | 1.3 | 457 | 58 | 25 | 60 | 855 | --- |
| France | 95 | 88 | 87 | --- | --- | +7 | 498 | 523 | 487 | $29,615 | 1.3 | 620 | 47 | 31 | --- | 975 | 3.7 |
| Germany | 96 | 91 | 93 | --- | --- | +21 | 476 | 495 | 497 | $38,640 | 1.9 | 710 | 53 | 28 | --- | 921 | 4.1 |
| Hungary | 97 | 85 | 90 | 127 | 175 | +44 | 504 | 483 | 471 | $11,066 | 1.0 | 555 | 20 | 21 | --- | 902 | 4.4 |
| Italy | 78 | 73 | --- | --- | --- | +3 | *479* | 476 | 475 | $25,773 | 1.2 | 612 | 42 | 29 | 73 | 1105 | --- |
| Japan | 96 | 94 | 96 | 148 | 140 | --- | 572 | --- | --- | $41,201 | 1.7 | --- | --- | 24 | --- | 875 | 2.1 |
| Korea | 96 | 90 | 90 | 137 | 105 | --- | 591 | --- | --- | $39,921 | 2.7 | 494 | 80 | 24 | --- | 867 | 0.9 |
| Netherlands | 96 | 85 | 93 | 103 | 150 | +29 | 519 | 560 | 558 | $31,380 | 1.9 | 910 | 34 | 23 | --- | 1067 | 3.0 |
| Norway | 94 | 93 | --- | 138 | 150 | -9 | 483 | 528 | 544 | $23,879 | … | 558 | 39 | 26 | --- | 855 | 3.4 |
| Portugal | 84 | 81 | 56 | 115 | 165 | +35 | 416 | --- | --- | $26,288 | 1.7 | 571 | 42 | 29 | --- | 878 | 5.0 |
| Spain | 85 | 73 | 67 | --- | --- | +2 | 452 | --- | --- | $32,144 | 2.0 | 545 | 59 | 27 | 75 | 957 | 3.2 |
| Sweden | 98 | 97 | 79 | --- | --- | +7 | 497 | 559 | 552 | $23,896 | 1.2 | --- | --- | 27 | 44 | 741 | 4.4 |
| Switzerland | 90 | 85 | 84 | --- | --- | +21 | 519 | 540 | 523 | $51,361 | 2.1 | 768 | 60 | 42 | 72 | --- | --- |
| U. K. | 81 | 66 | --- | 130 | 149 | --- | 482 | --- | --- | $38,010 | 1.7 | 798 | 48 | 23 | 51 | 720 | 6.0 |
| **United States** | **84** | **74** | **74** | **93** | **113** | **-15** | **472** | **461** | **480** | **$32,713** | **1.1** | **954** | **34** | **25** | **57** | **980** | **5.4** |
| **Latin America** | | | | | | | | | | | | | | | | | |
| Argentina | 64 | 54 | 37 | | | --- | --- | | | $15,773 | 1.5 | --- | --- | 15 | 52 | | |
| Brazil | 68 | 61 | 38 | | | --- | --- | | | $10,998 | 1.7 | --- | --- | 16 | 82 | | |
| Chile | 84 | 74 | 52 | | | --- | *392* | | | $15,233 | 1.3 | --- | --- | 18 | | | |
| Columbia | --- | --- | --- | --- | --- | --- | 353 | | | --- | --- | --- | --- | --- | | | |
| Mexico | 42 | 32 | 30 | | | --- | --- | | | $14,708 | 1.7 | 832 | 18 | --- | 77 | 1167 | |
| Trinidad & Tob. | --- | --- | --- | | | +32 | --- | | | --- | --- | --- | --- | --- | | | |
| Venezuela | --- | --- | --- | | | +31 | --- | | | --- | --- | --- | --- | --- | | | |

Sources: OECD, Education at a Glance , 2000, pp. 95, 103, 136, 147, 215, 237. Warwick Elley, How in the World do Students Read? 1972, p 108-9; Beaton, Albert et al. (1996) Mathematics [Science] Achievement in the Middle School Years: IEA's Third International Mathematics and Science Study. CSTEEP, Boston College, Boston MA. //:http/wwwcsteep.bc.edu/TIMSS. Scores in italics are for 8th graders in TIMSS-R.

## Table 2: Effects of Standard-Based Reform Initiatives on Test Scores, Dropout Rates, College Attendance and Labor Market Success

| **Anal. State Cross Sections** | 4 extra Courses Req. to Graduate | Minimum Comp. Exam | **CBEEES** End-of-Course + MCEs | School Report Cards | Sanction Failing Schools | Reward School success | Dropout Part of Account-ability | 17 yr old Required to attend |
|---|---|---|---|---|---|---|---|---|
| Enrollment at age 17 in 1990 | **-.010**** | .003 | .013 | --- | --- | --- | --- | **.006+** |
| High School Graduation-1990 | -.007 | -.005 | .003 | --- | --- | --- | --- | .001 |
| Event Dropout Rate in 1994-7 | **.0096*** | .0078 | -.0051 | 0 | -.006 | -.006 | **-.012**** | **-.010+** |
| 4th grade Reading-1998 | t=0 | .00 | **.51*** | 0 | **.33***** | **.33***** | --- | --- |
| 8th grade Reading-1998 | t=0 | .07 | **.65***** | 0 | **.12+** | **.12+** | --- | --- |
| 4th grade Math-1996 | t=0 | .19 | **.71***** | 0 | **.16**** | **.16**** | --- | --- |
| 8th grade Math-1996 | t=0 | .03 | **.43*** | 0 | .10 | .10 | --- | --- |
| 8th grade Science-1996 | t=0 | .10 | **.46**** | 0 | **.10+** | **.10+** | --- | --- |
| **Longitudinal Anal. for 8th Graders in** | | | | | | | | |
| Test Gain 88 to 92--GPA is **C-** | .006 | .155 | .28 | --- | --- | --- | --- | --- |
| Test Gain 88 to 92--GPA **B/B-** | .006 | .116 | **.39**** | --- | --- | --- | --- | --- |
| Test Gain 88 to 92--GPA is **A** | .006 | .081 | **.49**** | --- | --- | --- | --- | --- |
| Ever Dropped Out--GPA is **C-** | **.025**** | .014 | **.084+** | --- | --- | --- | --- | --- |
| Ever Dropped Out--GPA **B/B-** | **.013**** | .005 | **.051**** | --- | --- | --- | --- | --- |
| Ever Dropped Out--GPA is **A** | **.004**** | .001 | **.023*** | --- | --- | --- | --- | --- |
| Neither Diploma/GED--GPA **C-** | .000 | **.071***** | .051 | --- | --- | --- | --- | --- |
| Neither Diploma/GED--GPA **B/B-** | .000 | .005 | .013 | --- | --- | --- | --- | --- |
| Neither Diploma/GED--GPA is **A** | .000 | -.002 | .003 | --- | --- | --- | --- | --- |
| Late Diploma--GPA is **C-** | .010 | **.111***** | **.200***** | --- | --- | --- | --- | --- |
| Late Diploma--GPA is **B/B-** | .004 | **.027*** | **.091***** | --- | --- | --- | --- | --- |
| Late Diploma--GPA is **A** | .002 | .003 | **.036**** | --- | --- | --- | --- | --- |
| Got GED—GPA is C- | **.016*** | **.025+** | **.092***** | --- | --- | --- | --- | --- |
| Got GED--GPA is B/B- | **.009*** | **.014*** | **.048***** | --- | --- | --- | | |
| Got GED--GPA is A | **.005*** | **.008+** | **.025*** | --- | --- | --- | --- | --- |
| | | | | | | | | |
| College in Fall 1992—GPA is C- | **-.013**** | -.027 | .047 | | | | | |
| College--Fall 1992—GPA B/B- | **-.021**** | .007 | .008 | | | | | |
| College in Fall 1992—GPA is A | **-.012**** | **.028+** | -.026 | | | | | |
| College in Fall 1993—GPA is C- | **-.016**** | .023 | **.061+** | | | | | |
| College--Fall 1993—GPA B/B- | **-.020**** | **.044**** | .030 | | | | | |
| College in Fall 1993—GPA is A | **-.014**** | **.033*** | -.010 | | | | | |
| | | | | | | | | |
| Earnings in 1993: GPA is **C-** | -1.0 % | **11.2%**** | -10.5% | --- | --- | --- | --- | --- |
| Earnings in 1993: GPA is **B/B-** | -1.0 % | **9.3%***** | -3.6 % | --- | --- | --- | --- | --- |
| Earnings in 1993: GPA is **A** | -1.0 % | **7.5%*** | 3.1 % | --- | --- | --- | --- | --- |
| Avg. Earnings/mo: GPA is **C-** | 0.0% | **9.0 %*** | **-13%+** | --- | --- | --- | --- | --- |
| Avg. Earnings/mo: GPA is **B/B-** | 0.0% | **7.1%**** | -4 % | --- | --- | --- | --- | --- |
| Avg. Earnings/mo: GPA is **A** | 0.0% | **5.6%+** | 5 % | --- | --- | --- | --- | --- |
| Hourly Wage Rate: GPA is **C-** | -1.6%** | 1.3 % | -4.9% | --- | --- | --- | --- | --- |
| Hourly Wage Rate: GPA is **B/B-** | -1.6%** | 0.3 % | -1.9% | --- | --- | --- | --- | --- |
| Hourly Wage Rate: GPA is **A** | -1.6%** | -0.6% | 0.6% | --- | --- | --- | --- | --- |
| # of Months Employed--93-94 | -1.0% | 2 % | 1 % | | | | | |

+ Statistically significant at the 10% level one a one tail test * Statistically significant at 5% level on a one tail test

** Statistically significant at 5% level on a two tail test *** Statistically significant at 1 % level on a two tail test

----- means data were not available for testing this hypothesis t=0 indicates the relationship was assumed to be zero a priori

## Appendix Table A:
## Determinants of School Enrollment and High School Graduation Rates

| | Percent of 17 yr olds Enrolled in High School | | HS Dipl. per 100 17 yr olds | HS Dipl. per 100 17 yr olds | Event Dropout Rate | Event Dropout Rate | Event Dropout Rate | Event Dropout Rate |
|---|---|---|---|---|---|---|---|---|
| | 1990 Census | 1991 NCES | 1991 NCES | 1993 NCES | Average 1994-97 | NCES 1994-95 | NCES 1995-96 | NCES 1996-97 |
| State Minimum Competency Test[5] | .11<br>( .81) | .47<br>(.53) | -2.13<br>(1.98) | -2.25<br>(2.01) | 1.0<br>(.94) | 1.62+<br>(1.02) | 2.05+<br>(1.21) | .52<br>(1.05) |
| MCE/End-of-Course Exams | 2.08<br>(1.90) | .60<br>(1.24) | 1.57<br>(5.07) | -2.37<br>(3.45) | - .25<br>(2.27) | .38<br>(2.04) | -1.78<br>(2.53) | -2.74<br>(2.57) |
| Test Scores in State School Eval./Rewards | | | | | -.50<br>(.46) | -.69<br>(.57) | -.64<br>(.59) | -.65<br>(.47) |
| Dropout Rate part of State Evaluation | | | | | -1.11*<br>(.57) | -1.73**<br>(.71) | -.34<br>(.77) | -.64<br>(.59) |
| # of Carnegie Units Required to Graduate by state | -.30***<br>(.11) | -.183**<br>(.069) | -.167<br>(.303) | -.19<br>( .30) | .31**<br>(.15) | .51**<br>(.17) | .55***<br>(185) | .19<br>(.16) |
| No State Carnegie Unit Graduation Requirement | -5.13**<br>(2.14) | -3.46**<br>(1.40) | .52<br>(6.45) | 1.28<br>(6.34) | 5.04<br>(3.03) | 7.95**<br>(3.50) | 9.26**<br>(3.68) | 2.95<br>(3.11) |
| Attendance Required at age 17 | .92+<br>( .52) | .36<br>(.34) | .12<br>(1.44) | - .40<br>(1.44) | -.74<br>(75) | -1.12+<br>(.83) | -.11<br>(.85) | -.50<br>(.83) |
| Parents Education Index[1] | .33***<br>(.105) | .128*<br>(.069) | .71**<br>(.27) | .60**<br>( .26) | .012<br>(.124) | -.021<br>(.120) | .199<br>(.151) | -.002<br>(.138) |
| % in Poverty - under 19 yrs old [2] | .052<br>( .076) | -.022<br>(.049) | -.141<br>(.210) | -.31+<br>( .20) | .182+<br>(.128) | .106<br>(.154) | .250+<br>(.150) | .205+<br>(.136) |
| % Foreign Born[3] | -.192**<br>(.081) | -.207***<br>(.053) | -.70***<br>(.26) | -.68***<br>( .24) | -.085<br>( .132) | -.007<br>(.149) | -.080<br>(.289) | -.015<br>(.153) |
| % Public School Students Black[4.] | -.052*<br>(.028) | -.052***<br>(.019) | -.073<br>(.063) | -.150**<br>(.060) | -.009<br>(.028) | -.018<br>(.030) | -.001<br>(.038) | .032<br>(.034) |
| % Public School Students Hispanic[4] | -.044<br>( .037) | -.012<br>(.024) | .045<br>(.115) | .024<br>(.109) | -.068<br>(.051) | .061<br>(.065) | .130<br>(.150) | .097*<br>(.049) |
| Adj R Squared | .5047 | .5528 | .5668 | .6954 | .1796 | .354 | .4002 | .3296 |
| RMSE | 1.64 | 1.07 | 4.42 | 4.40 | 1.84 | 1.52 | 1.64 | 1.69 |
| # of Observations | 50 | 50 | 50 | 50 | 42 | 27 | 27 | 36 |
| Mean: Dep. Variable | 88.9 | 84.2 | 75.7 | 75.9 | 5.26 | 5.25 | 5.11 | 5.34 |

\+ Statistically significant at the 10% level one a one tail test * Statistically significant at 5% level on a one tail test

** Statistically significant at 5% level on a 2 tail test *** Statistically significant at 1 % level on a 2 tail test

[1] Average of the percent of parents obtaining a secondary high school diploma and the percent of parents obtaining a university degree. Education in States and Nations. National Center for Education Statistics. 1991. Pg. 139.

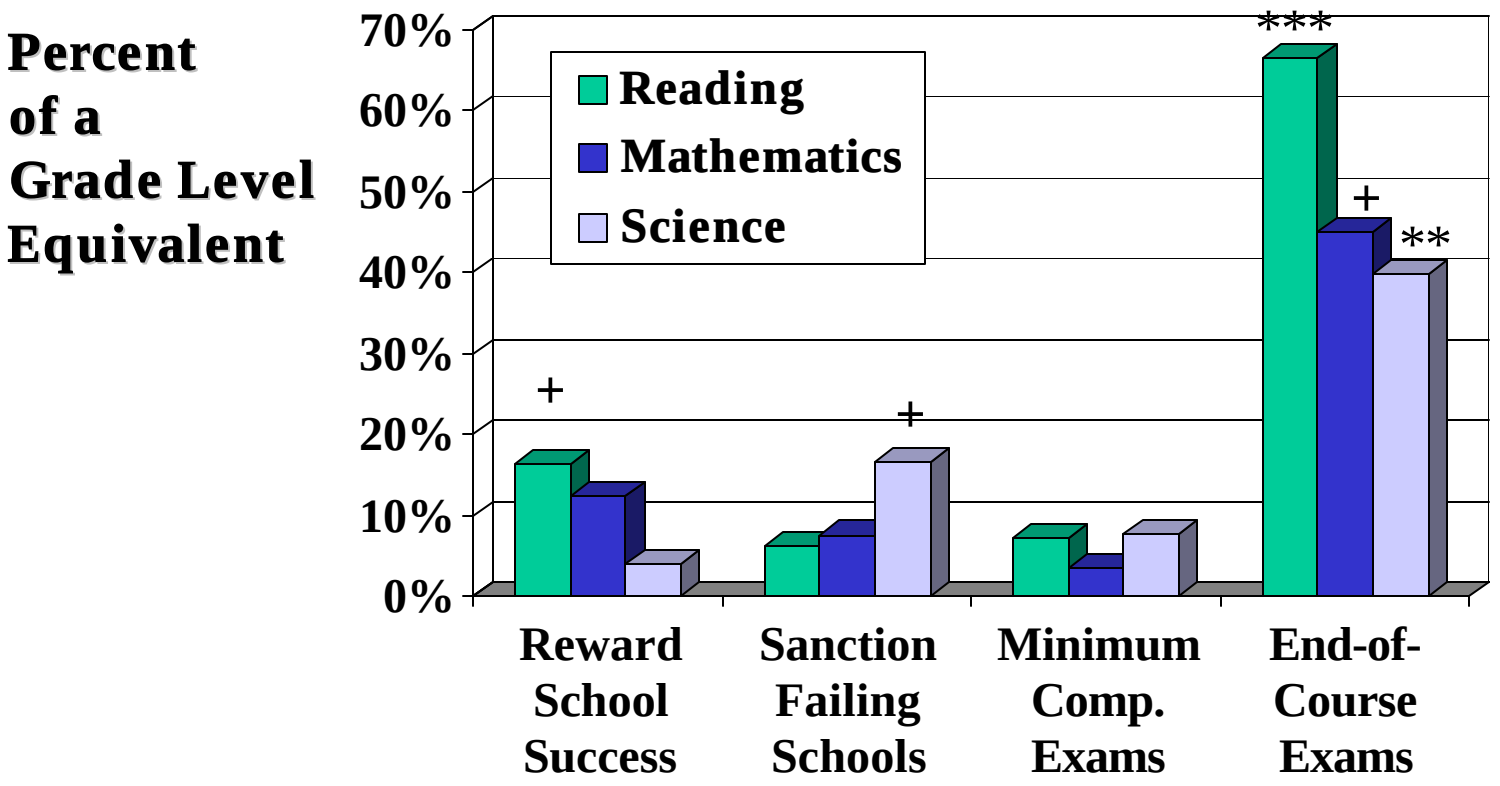
[2] Education in States and Nations. National Center for Education Statistics. U.S. Department of Education. 1991. Pgs. 49, 129, 119.

[3] 1990 Census of Population. Social and Economic Characteristics U.S. Pgs. 174-79.

[4] Digest of Education Statistics. National Center for Education Statistics.1993. pgs . 61 & 76.

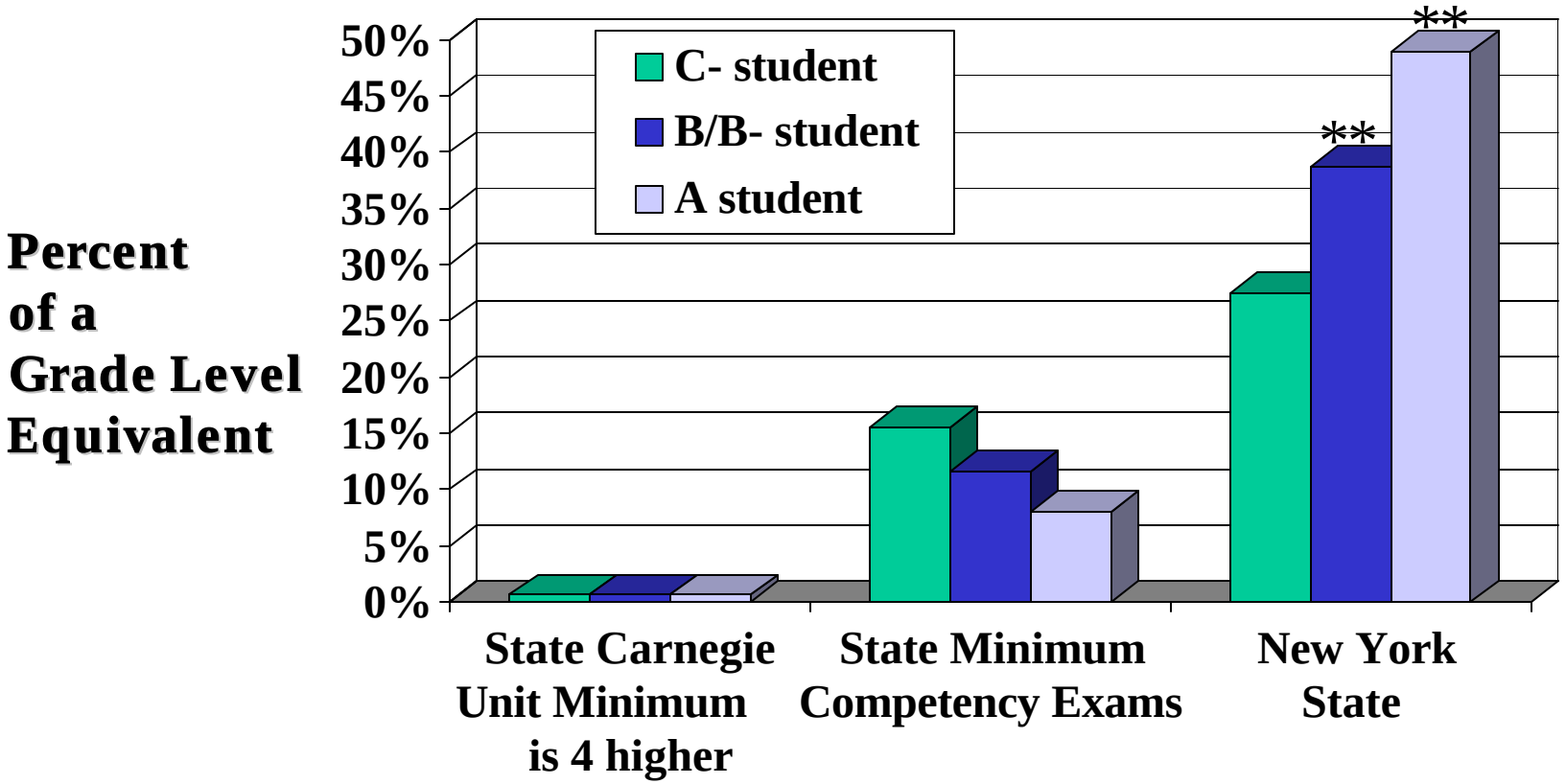
[5] Columns 1, 2 and 3 regressions use a competency exam (MCE) variable for 1991-93 in which VA =0, NC = 1 and EOCE = NY. The MCE96 variable used in column 4, 5, 6, 7 and 8 adds Ohio and Virginia to the MCE category and subtracts NC. The EOCE variable is NY and NC.

# Figure 1--Effects of Standards-Based Reform Initiatives on NAEP 8th Grade Test Scores



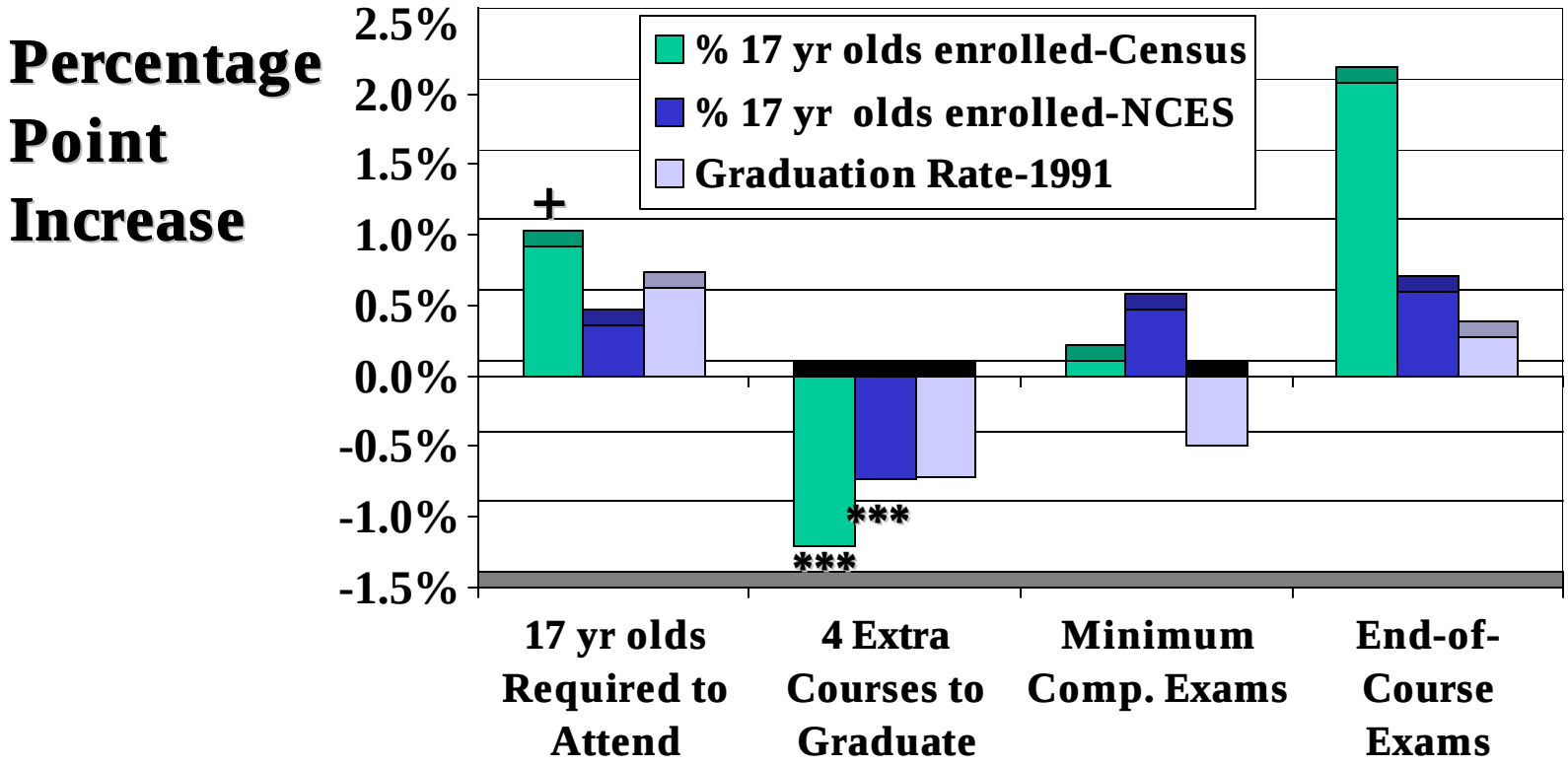

**Education Commission of the States was the source of information on state policies**

# Figure 2--Effects of Graduation Requirements on 8th to 12th Grade Test Score Gains by GPA in 8th Grade



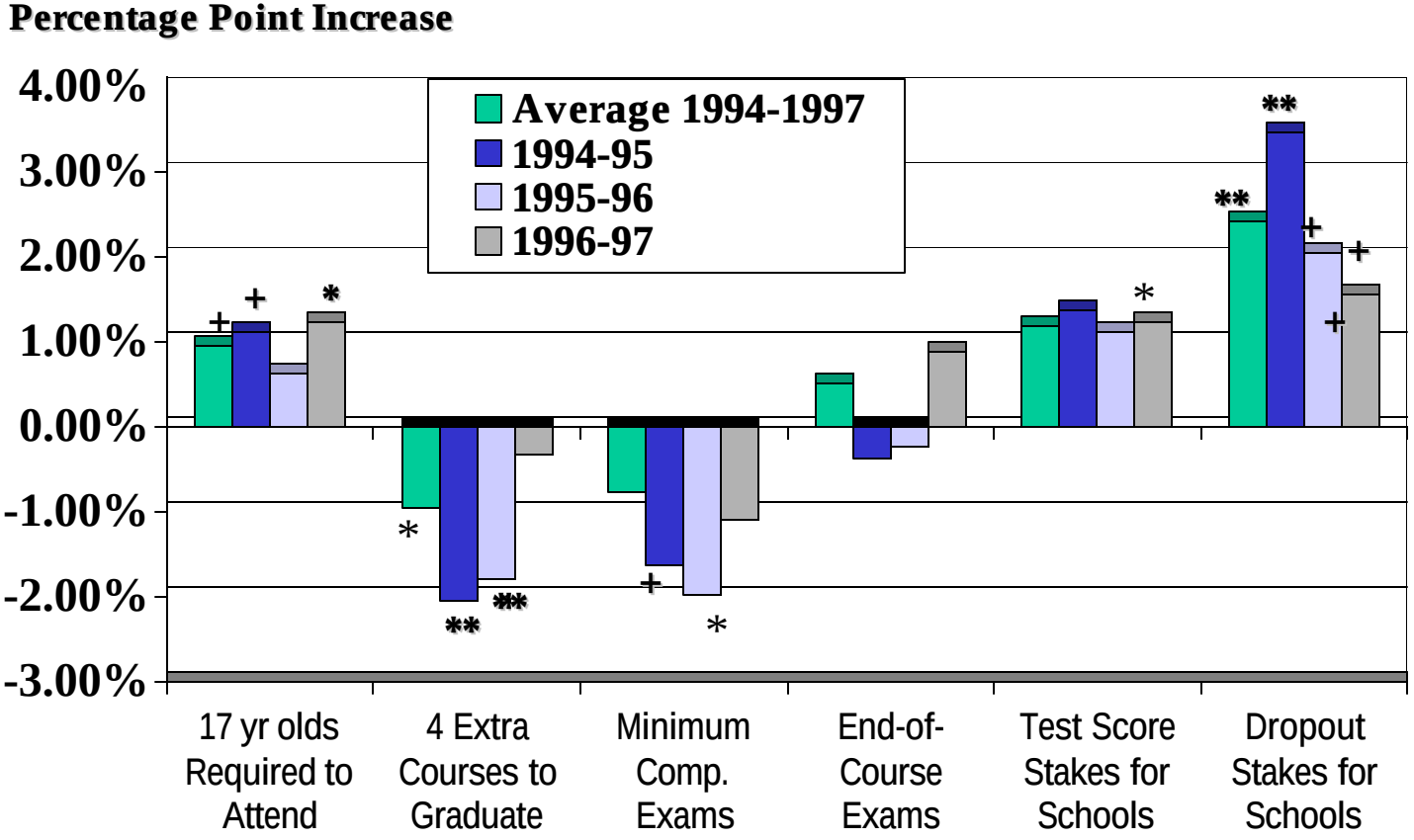

**Source: Analysis of NELS:88 data--controls for attitudes, socio-economic status, GPA & test scores in 8th grade, state & high school characteristics.**

# Figure 3--Effects of State Policies on School Attendance and Graduation Rates



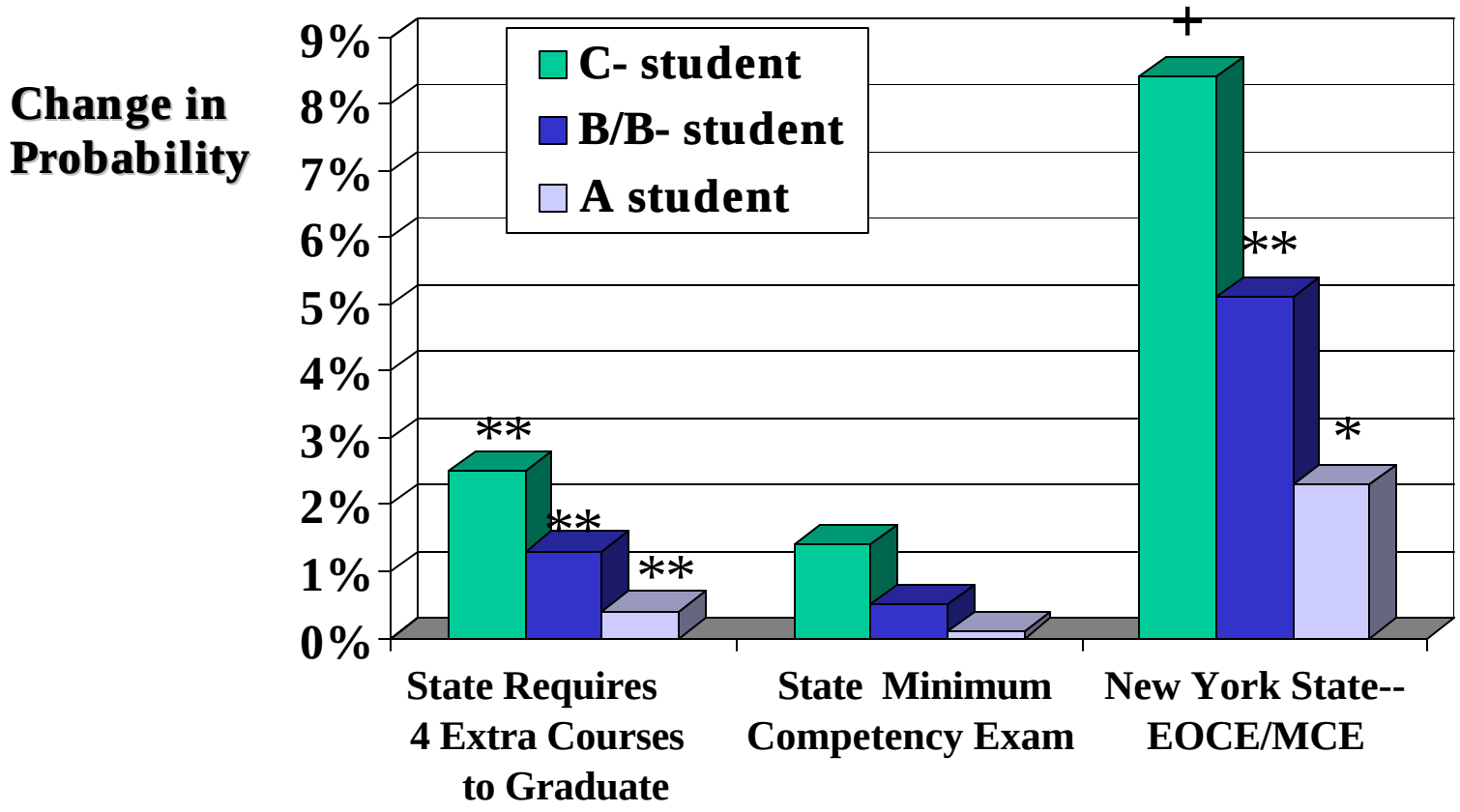

**Analysis of state data from Education in States and Nations and the 1990 Census**

# Figure 4—'Effects' of State Policies on Annual Retention Rates of Public High Schools



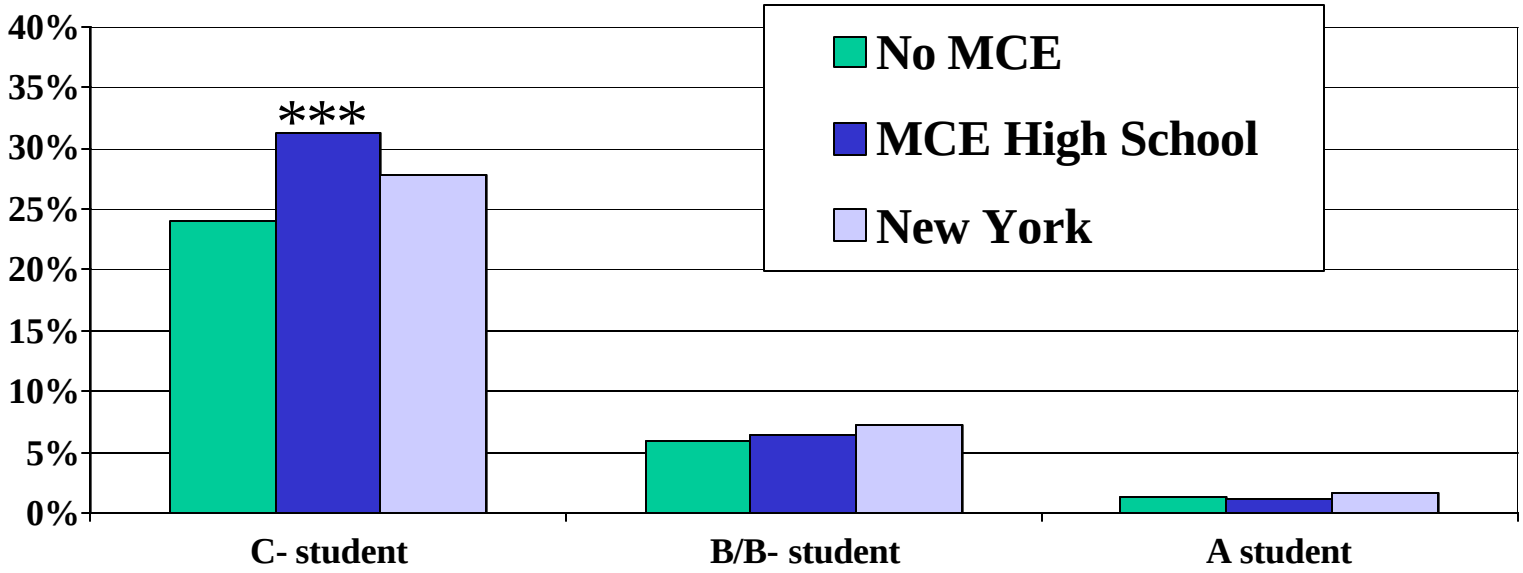

**Analysis of event dropout rates of 26 to 41states--Common Core Data**

# Figure 5--Effects of State Graduation Requirements on Ever Dropping Out of High School by GPA in 8th Grade



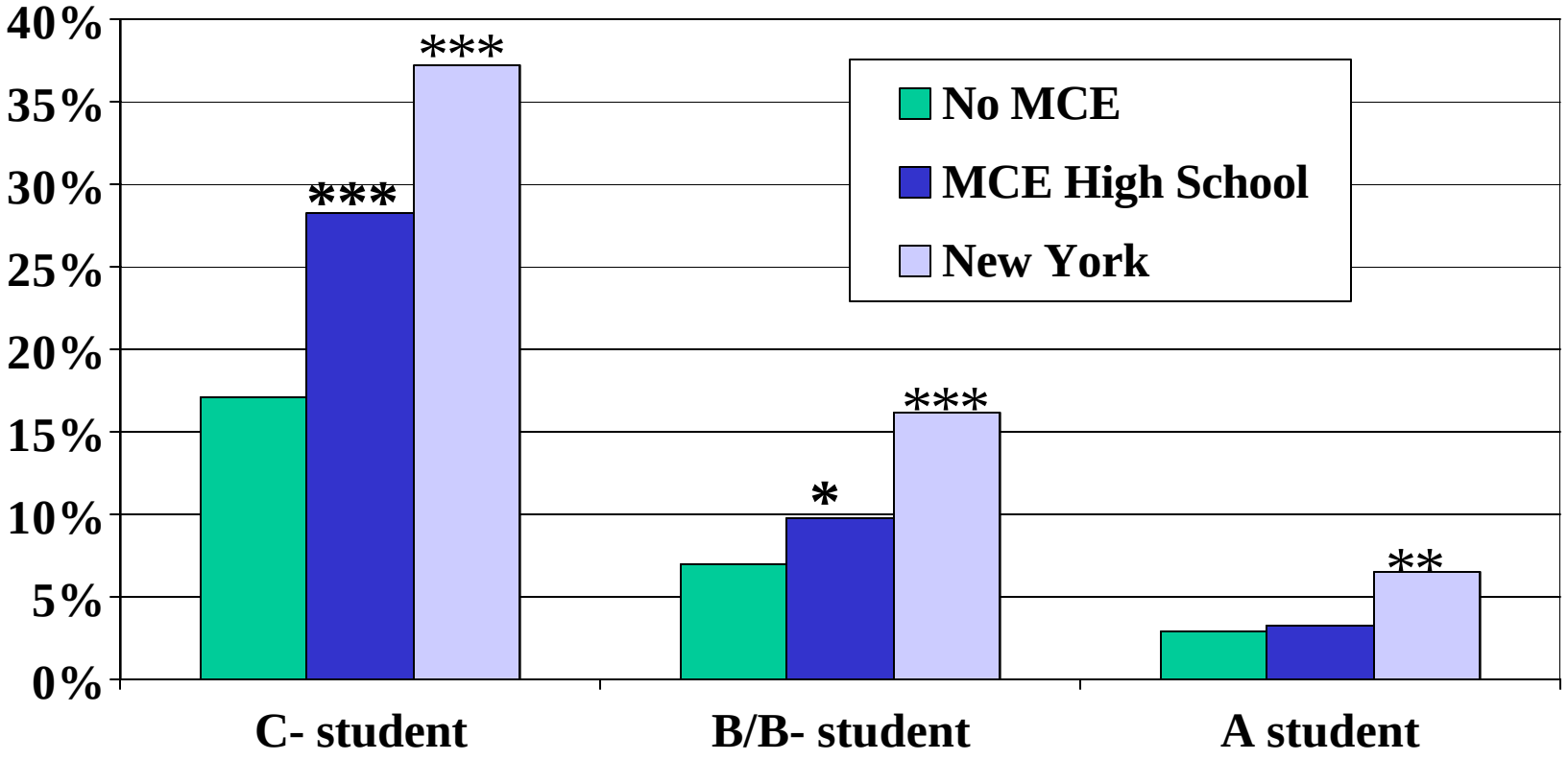

**Source: Analysis of NELS:88 data--controls for attitudes, socio-economic status, GPA & test scores in 8th grade, state & high school characteristics.**

# Figure 6-- Probability of Not Getting a Diploma or GED by 8th grade GPA & State Minimum Competency Exam



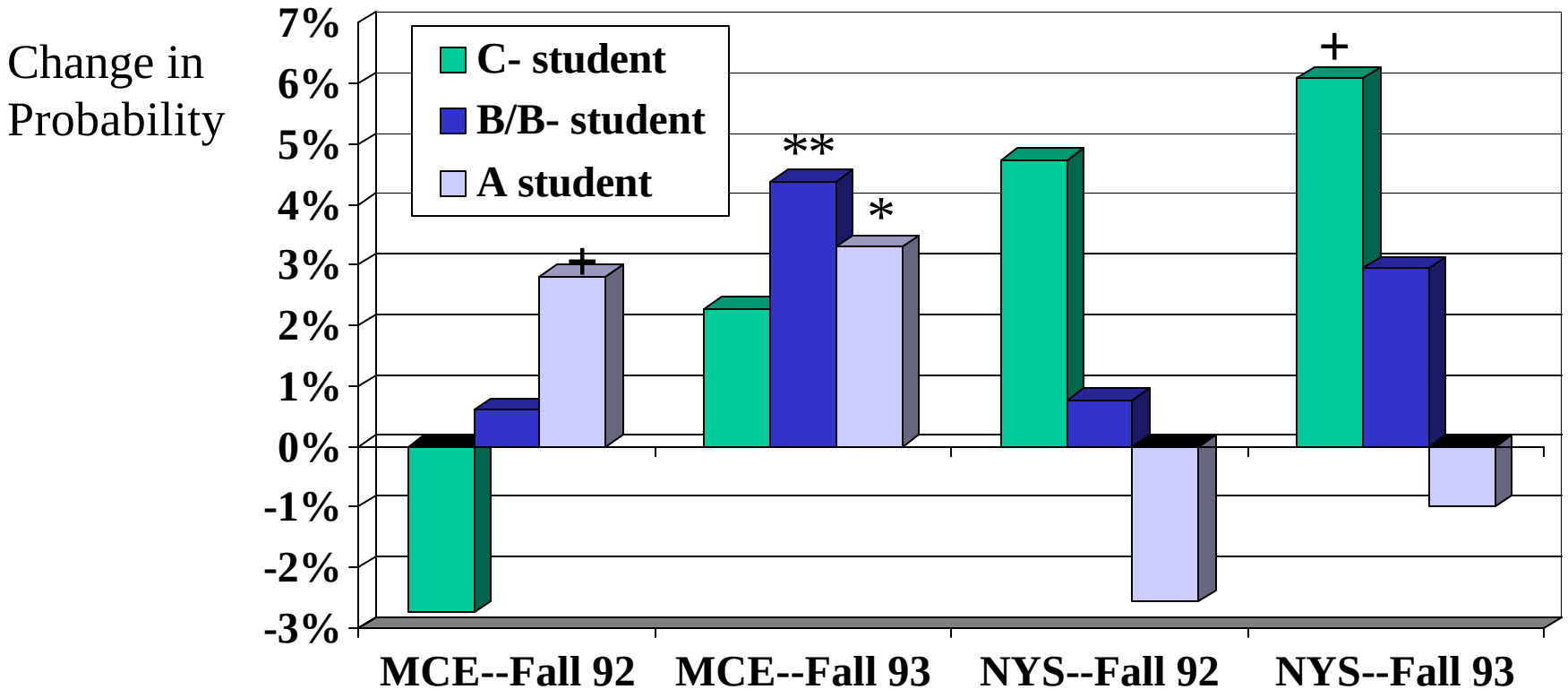

**Source: Analysis of NELS:88 data--controls for attitudes, socio-economic status, GPA & test scores in 8th grade, state & high school characteristics.**

# Figure 7-- Probability of Getting Diploma Late by 8th grade GPA & State Minimum Competency Exam



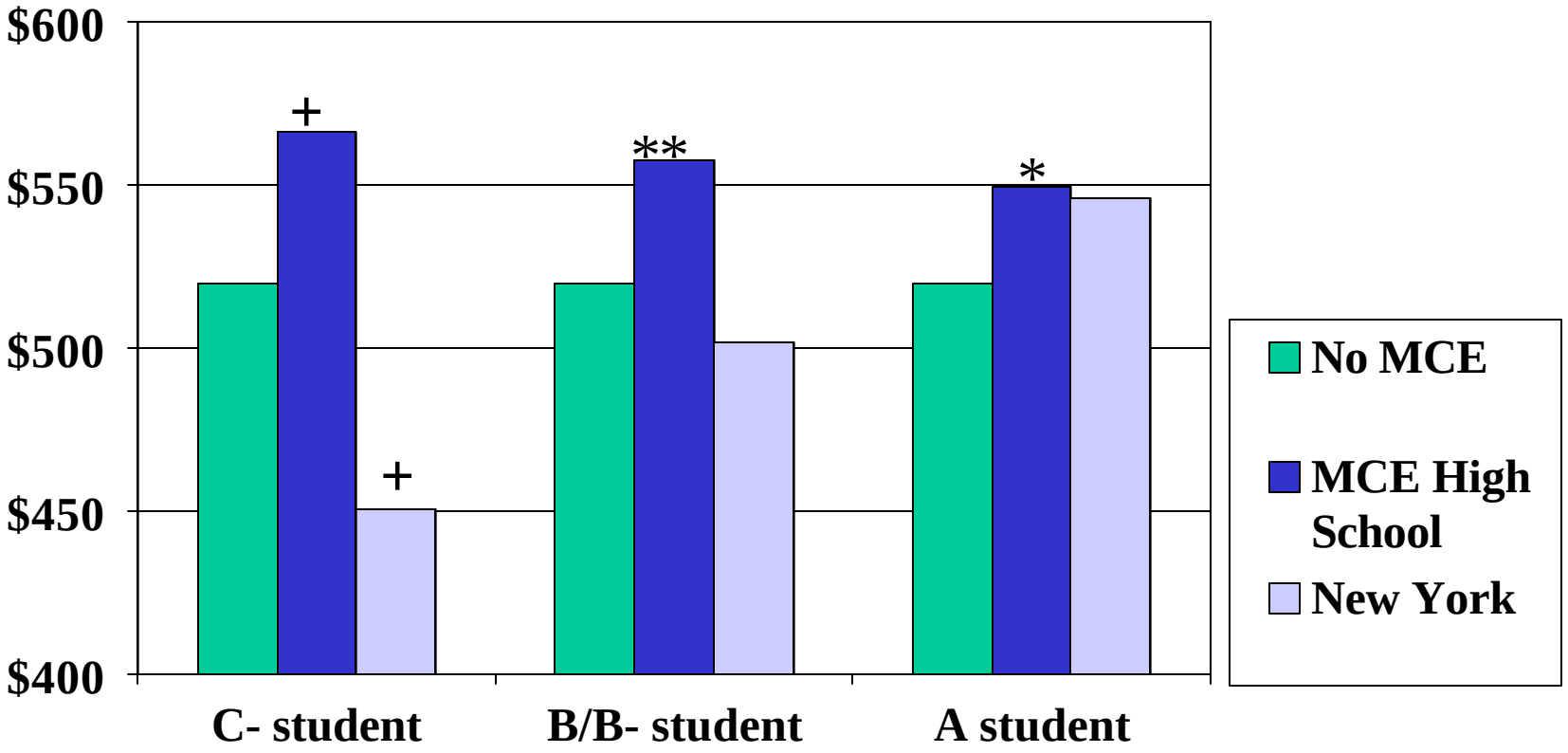

**Source: Analysis of NELS:88 data--controls for attitudes, socio-economic status, GPA & test scores in 8th grade, state & high school characteristics.**

# Fig. 8--Effects of Minimum Competency Exams and New York State on the Probability 8th Graders Attend College 5-6 years later



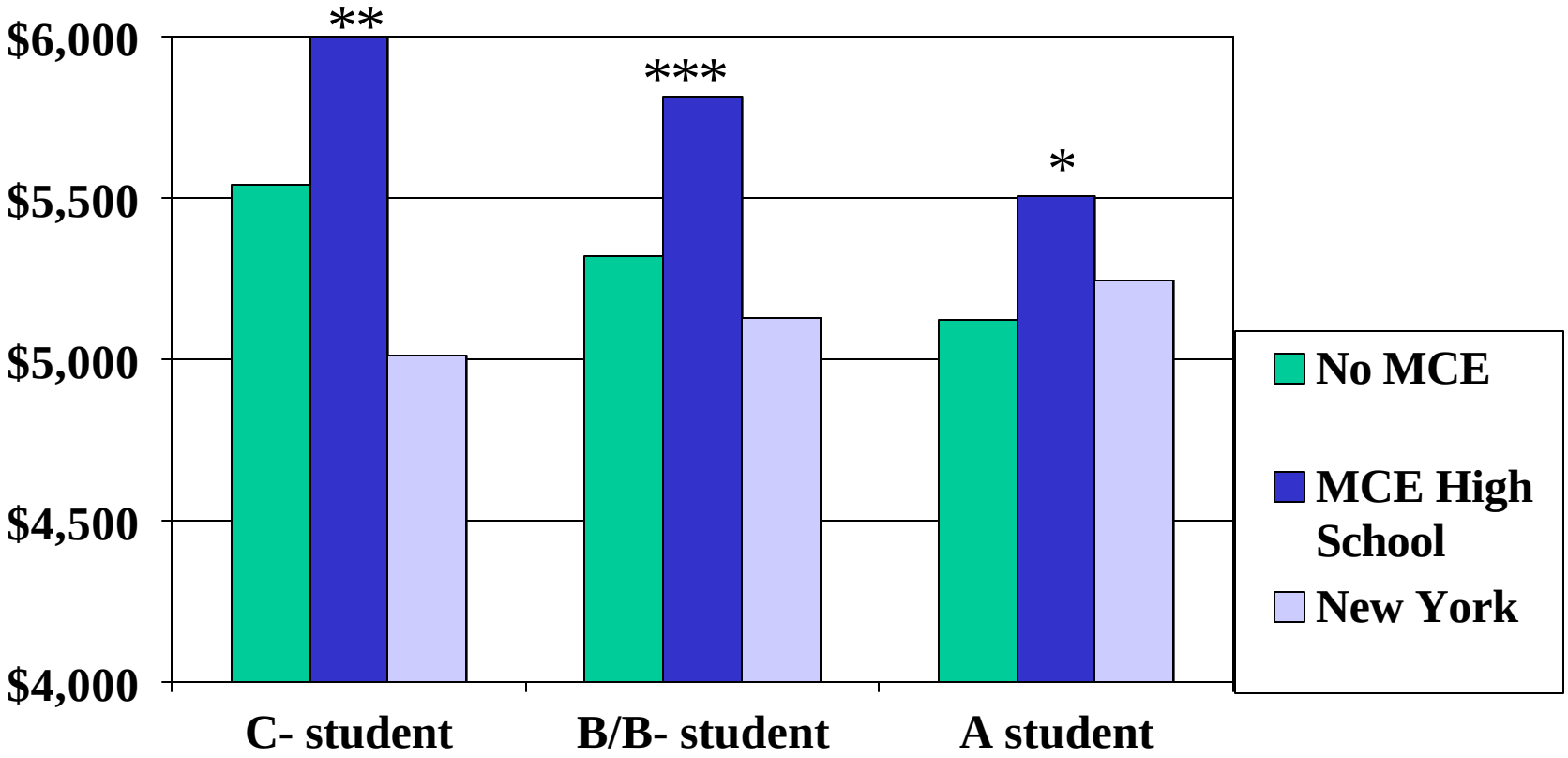

**Source: Analysis of NELS:88 data--controls for socio-economic status, GPA & test scores in 8th grade, state & high school characteristics.**

# Figure 9--Effect of Minimum Competency Exams on Monthly Earnings of Workers in 1992-94



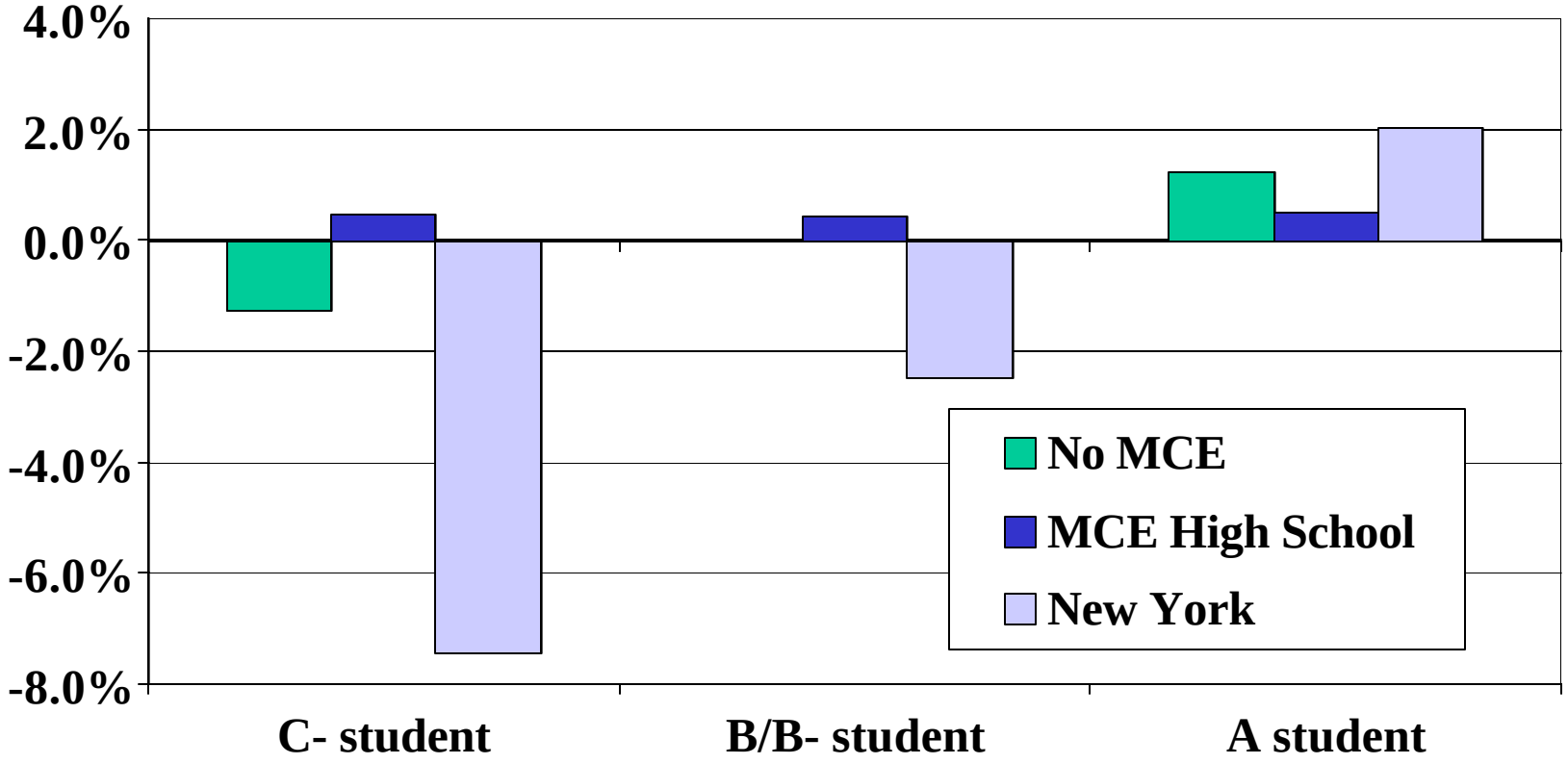

**Source: Analysis of NELS:88 data--controls for college attendance, high school completion, socio-economic status, GPA & test scores in 8th grade, state & high school characteristics.**

# Figure 10--Effect of Minimum Competency Exams on Annual Earnings of Workers in 1993



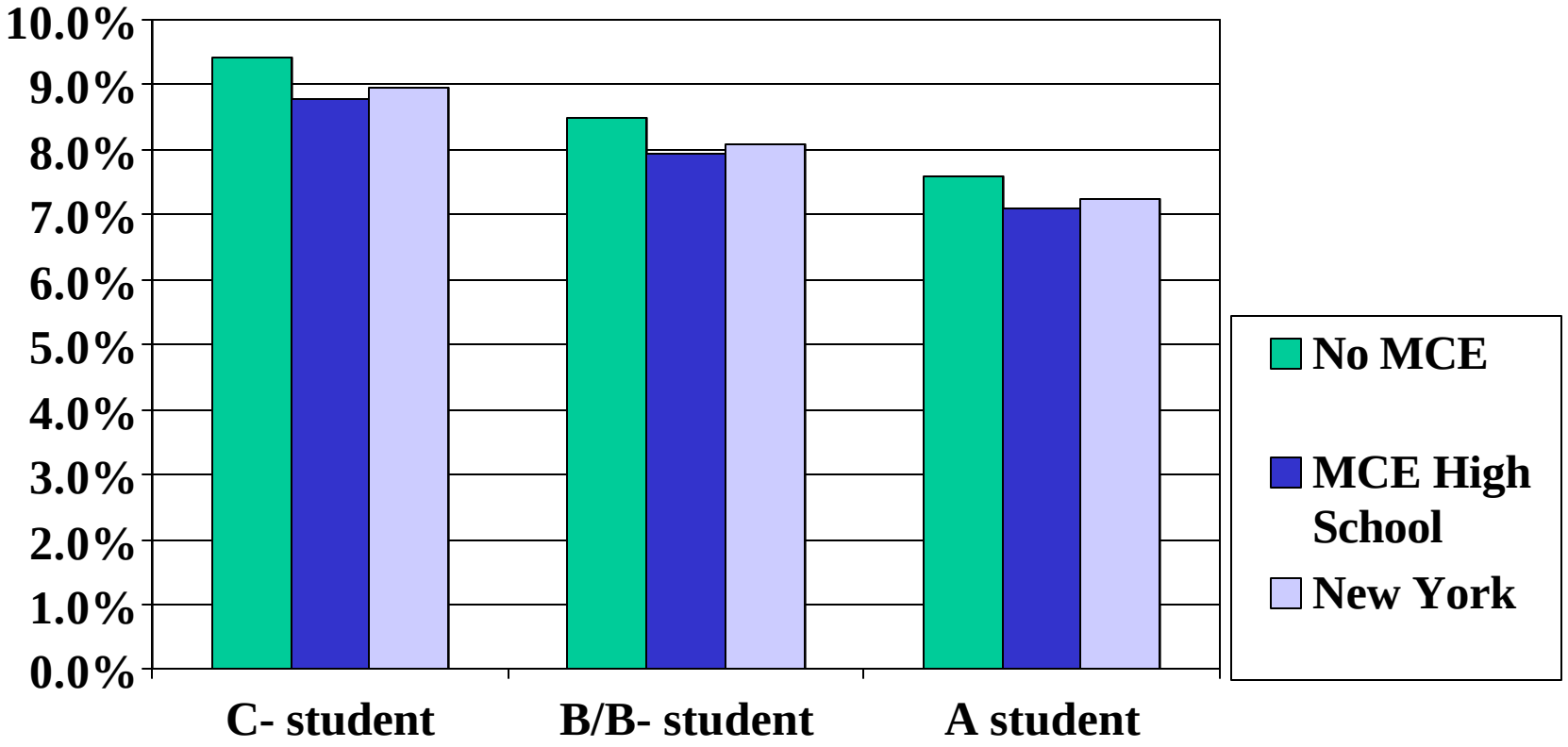

**Source: Analysis of NELS:88 data--controls for college attendance, high school completion, socio-economic status, GPA & test scores in 8th grade, state & high school characteristics.**

# Figure 11--Effect of Minimum Competency Exams on Hourly Wage Rates in 1993




**Source: Analysis of NELS:88 data--controls for college attendance, high school completion, socio-economic status, GPA & test scores in 8th grade, state & high school characteristics.**

# Figure 12--Effect of Minimum Competency Exams on Share of Months Unemployed in 1992-94




**Source: Analysis of NELS:88 data--controls for college attendance, high school completion, socio-economic status, GPA & test scores in 8th grade, state & high school characteristics.**

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## Endnotes

[1] Organization of Economic Cooperation and Development, Education at a Glance , 2000, p. 136, 147.

[2] "In both subjects, most of the countries (5 out of 6 in mathematics and 4 out of 5 in science) with average scores similar to the U.S. in fourth grade have scores in eighth grade that are significantly higher than the U.S. Likewise, many of the countries (8 of 12 in mathematics and 9 of 19 in science) whose scores are below the U.S. in fourth grade have eighth-grade scores that are similar to the U.S., and in science, 3 countries (Singapore, Slovenia, and Hungary) have fourth-grade scores below the U.S. and eighth-grade scores above the U.S." Lois Peak, et al., Pursuing Excellence: A study of U.S. Fourth-Grade Mathematics and Science Achievement in an International Context, National Center for Educational Statistics, Department of Education, 1997, http://nces.ed.gov/pubsearch/pubsinfo.asp?pubid=97255

[3] Warwick Elley, How in the World do Students Read? (The Hague, International Association for the Evaluation of Educational Achievement, 1972) p. 108-9;

[4] For reading we make comparisons by subtracting a country's mean score for 9 year olds from its mean score for 13 year olds. A negative number indicates that a country's students have learned less in the interim than other countries in the study. A positive number indicates they learned more IEA reading tests were each given arbitrary international means of 500 and standard deviations of 100 .

[5] Richard Ingersoll, *Out of Field Teaching and Educational Equity* NCES 96040, (Washington, DC: National Center for Educational Statistics, 1996).

6 Ministere de l'Education Nationale et de la Culture, Reperes and References Statistiques sur les enseignmements et la formation. 1992 Edition, p. 205 & 206.

[7] Robert P. Strauss, "Who should teach in New York's public schools? Implications of Pennsylvania's Teacher Preparation and Selection Experience," forthcoming in *Economics of Education Review.*

8. Since, vocational education is more expensive than traditional academic courses, providing vocational education through schools as is done in Sweden, Holland, France and the United States raises costs. Dual systems of education like the German, Austrian and Swiss systems arrange for employers to provide most of the vocational instruction and thus place lower demands on the taxpayer. In 1980, German employers invested an average of $6000 per year in the training of each apprentice they took on as part of the dual system of vocational training (Noll et al. 1984).

9. OECD, Education at a Glance, Paris, 2000. P. 119 & 103.

[10] Laurence Steinberg, Bradford Brown, and Sanford Dornbusch, *Beyond the Classroom* (New York: Simon and Schuster, 1996), pp. 145-146.

[11] James A. Kulik and Chen-Lin Kulik, "Effects of Accelerated Instruction on Students," *Review of Educational Research*, Vol. 54 No. 3 (Fall 1984), pp. 409-425; David Monk, "Subject Area Preparation of Secondary Mathematics and Science Teachers and Student Achievement," *Economics of Education Review*, Vol. 13 No. 2 (1994), pp. 125-145. and John H. Bishop, "Incentives to study and the organization of secondary instruction." *Assessing Educational Practices*, eds. William Baumol and Becker (Cambridge, Mass.: MIT Press, 1996), pp. 99-160.

[12] Longitudinal Survey of American Youth, "Data File User's Manual" (Dekalb, Ill: Public Opinion Laboratory, 1988), Q. AA17A, AA17B, & AA26A.

[13] Longitudinal Survey of American Youth, "Data File User's Manual" Q. AA37N.

[14] interview with counselor at a wealthy suburban school, August 1997

[15] Ward, "A Day in the Life," *N.Y. Teacher* (Albany, New York, January 1994).

[16] Jerry Jesness, "Why Johnny Can't Fail?" *Reason* (July 1999), [reprinted in *Selected Readings on School Reform* (Thomas Fordham Foundation, Fall 1999), p. 87.]

[17] Peter D. Hart Research Associates, "Valuable Views: A public opinion research report on the views of AFT teachers on professional issues" (Washington D.C.: American Federation of Teachers, 1995), pp. 1-24.

[18] The 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 2014.

[19] Toby Friedman and E. Belvin Williams, "Current Use of Tests for Employment." *Ability Testing: Uses, Consequences, and Controversies, Part II: Documentation Section*, eds. Alexandra K. Wigdor and Wendell R. Gardner, (Washington, DC: National Academy Press, 1982), pp. 99-169.

[20] John H. Bishop, "Impact of Academic Competencies on Wages, Unemployment and Job Performance," *Carnegie-Rochester Conference Series on Public Policy*, Volume 37, (December 1992), pp. 127-194.

[21] M. H. Brenner. "The use of high school data to predict work performance," *The Journal of Applied Psychology* Vol. 52, # 1, (1968), pp. 29-30.
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John Hartigan and Alexandra Wigdor, eds. *Fairness in Employment Testing* (Washington, D.C.: National Academy Press, 1989).
Bishop, "Impact of Academic Competencies," pp. 127-194. [2d reference; see n. 16]

[22] J. C. Hauser and Thomas M. Daymont, "Schooling, ability and earnings: Cross-sectional evidence 8-14 years after high school," *Sociology of Education*, Vol. 50 (July 1977), 182-206.
Paul Taubman and Terence Wales, "Education as an investment and a screening device," *Education, Income and Human Behavior,* ed. F. T. Juster, (New York: McGraw Hill, 1975), pp. 95-122.
Henry Farber and Robert Gibbons, "Learning and Wage Dynamics," *Quarterly Journal of Economics* (1996), pp. 1007-47.

[23] John H. Bishop, (1996) "The Impact of Curriculum-Based External Examinations on School Priorities and Student Learning." International Journal of Education Research; John H. Bishop, "The Effect of National Standards and Curriculum-Based External Exams on Student Achievement." American Economic Review, May 1997, Similar results were obtained by Ludger Wößmann, "Schooling Resources, Educational Institutions, and Student Performance: The International Evidence," Kiel Working Paper No. 983, (May 2000) Kiel Institute of World Economics, Germany, <http://www.uni-kiel.de/ifw/pub/kap/2000/kap983.htm> 1-88.

[24] John H. Bishop, "Are National Exit Examinations Important For Educational Efficiency?" Swedish Economic Policy Review, Vol. 6, #2, Fall 1999, 349-401.

[25] Ibid.

[26] "Quality Counts," *Education Week*, January 11, 1999, p.87.

[27] "Quality Counts," *Education Week*, January 11, 1999, p.93.

[28] Minimum competency exams are additions to, not a replacement for teacher imposed standards. In a MCE regime, teachers continue to control the standards and assign grades in their own courses. Students must still get passing grades from their teachers to graduate. The MCE regime imposes an additional

graduation requirement and thus cannot lower standards (Costrell 1998). The Graduate Equivalency Diploma (GED), by contrast, offers students the opportunity to shop around for an easier (for them) way to a high school graduation certificate. As a result, the GED option lowers overall standards. This is reflected in the lower wages that GED recipients command
Stephen V. Cameron and James J. Heckman, "The Nonequivalence of High School Equivalents" Working Paper # 3804 (Boston, Mass.: National Bureau of Economic Research, 1991).

[29] American Federation of Teachers, *Making Standards Matter:1996* (Washington, DC: American Federation of Teachers, 1996) p. 30.

[30] Suk Kang "A Formal Model of School Reward Systems." in Incentives, Learning and Employability, edited by John Bishop, Columbus Ohio: National Center for Research in Vocational Education, 1985 and .Robert Costrell, (1994) "A Simple Model of Educational Standards." The American Economic Review. Vol. 84, # 4, Sept., 956-971.

[31] Costrell, Robert M. (1998) "Can Centralized Educational Standards Raise Welfare?" *Journal of Public Economics*,

[32] End-of-course examination (EOCE) are similar to MCEs in the following ways. Both are set by and graded to rubrics devised by a state government or a national organization (eg. The College Board) and both carry consequences for students, the teachers and school administrators.

[33] College Board, "More Schools, teachers and students accept the AP challenge in 1998-99," (New York, Aug. 31, 1999), pp. 1-8.

[34] Participation rates are calculated by dividing the number of exams taken by the average enrollment per grade in high school. Participation rates have been rising and in 1999 were 52 percent for Algebra, about 33 percent for geometry and biology, about 28 percent for US history, Spanish and written composition and about 22 percent for economics and chemistry.
California Department of Education, "Communications Assistance Packet: Golden State Examinations" (November 1999).

[35] Sherman N. Tinkelman, "Regents Examinations in New York State after 100 Years" (Albany, N.Y: The University of the State of New York, The State Education Department, 1966), p. 12.

[36] Tinkelman, "Regents Examinations," p. 12. [2d reference; see n. 31]

[37] John H. Bishop, "Nerd Harrassment and Grade Inflation: Are College Admissions Policies Partly Responsible?" Center for Advanced Human Resources Discussion Paper #99-14, (1999c).

[38] Participation rates are calculated by dividing the number of exams taken by the average enrollment per grade in high school.
The New York State Education Department, "New York: The State of Learning—Statistical Profile of Public School Districts" (Albany, February, 1997).

[39] For example, in the new Regents English exam, four essays written under timed conditions responding to source material or literature account for more than half of the points in the exam. A sample writing prompt is: "Write a critical essay in which you discuss **two** pieces of literature you have read from the perspective of the statement that is provided to you in the 'critical lens.' In your essay, provide a valid interpretation of the statement as you have interpreted it, and support your opinion using specific references to appropriate literary elements from the two works. **{Critical lens: "The test of a courageous person is the ability to bear defeat without losing heart."}** Another sample prompt is: "Write an article for the community health newsletter. Using relevant information from text **and** graphs, discuss the factors that influence teenage smoking and the implications of those factors for reducing teenage smoking." Once schools have adjusted to the revised exams and the requirement that all students take them, the Regents intend to raise the scores necessary to pass from the 55% level to 60% and then to 65%. See

www.nysed.gov/rscs/test123.html for copies of the new Regents exams, scoring rubrics and a complete description of the testing program.

[40] Bishop John. "Do Curriculum-Based External Exit Exam Systems Enhance Student Achievement?" University of Pennsylvania, Consortium for Policy research in Education, CPRE Research Report RR-40, 1998, 1-32. John H. Bishop, "Nerd Harrassment, Incentives, School Priorities and Learning," *Earning and Learning*, ed. by Susan Mayer and Paul Peterson, (Washington, DC: Brookings Institution Press, 1999a). John H. Bishop, "Are National Exit Examinations Important For Educational Efficiency?" *Swedish Economic Policy Review*, (1999b).

[41] John H. Bishop, Ferran Mane, Michael Bishop and Joan Moriarty, (2000) "The Role of End-of-Course Exams and Minimum Competency Exams in Standards-Based Reforms" forthcoming in Brookings Papers on Education Policy, Washington, DC, 1-45.

[42] John H. Bishop, Joan Moriarty and Ferran Mane, "Diplomas for Learning: not Seat Time," *Educational Finance to Support High Learning Standards* (The University of The State of New York and State Education Department, 1998), pp. 56-77.

[43] Eric Hanushek and Dongwook Kim, "Schooling, Labor Force Quality and Economic Growth," University of Rochester, Rochester Center for Economic Research Working Paper #411, Sept. 1995, 1-38. Robert J. Barro, "Education and Economic Growth" Harvard University, Dept. of Economics, Feb. 2000, 1-32.

[44] Charisse Jones, "New York City to Stiffen Rules for Graduating." *New York Times*, 5/2/94, p. 1