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WORKING PAPER SERIES

# Why California Needs a High School Exit Examination System: Enrollment + Motivation + Engagement => Learning

John H. Bishop

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**Abstract**

## **Why California Needs a High School Exit Examination System Enrollment + Motivation + Engagement => Learning**

**Introduction:** The purpose of the educational enterprise is LEARNING. Engagement is essential to achieving this purpose. Students must come to school, pay attention, do homework, engage with the subject and construct their new knowledge in ways that allow them to retrieve it later. How are students induced to do all this hard work? Teachers try to make their subject interesting, but sixty-one percent of American students, nevertheless, say they “often feel bored”(OECD 2002 p. 330). Studies of time use in classrooms have found that American students actively engage in a learning activity for only about half the time they are scheduled to be in school. A study of schools in Chicago found that public schools with high-achieving students averaged about 75 percent of class time for actual instruction. For schools with low achieving students, the average was 51 percent of class time (Frederick, 1977). Overall, Frederick, Walberg and Rasher (1979) estimated 46 percent of the potential learning time is lost due to absence, lateness, inattention, classroom disruptions or teachers being off task.<sup>1</sup> In 1998, 23 percent of high school seniors reported not being assigned homework or not doing the homework assigned (NCES, Condition... 2001b, p. 41). Studies have found that learning has a strong relationship with time on task (Wiley 1986), time devoted to homework (Cooper 1989; Betts 1996) and the share of homework that is completed. Differentials in time committed to learning are likely to be an important reason for variations in achievement across students and across schools.

Additional motivators---diplomas, grades, certificates, exit exams, college admissions, etc.—are, therefore, essential. We assess each student’s learning, we honor it in ceremonies and signal or describe it to parents, employers and colleges expecting them to reward the learning in their own way. The prospect of these rewards strengthens incentives for students to

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<sup>1</sup> Students who do not regularly attend school end up way behind. In the Program for International Student Assessment (PISA) study (OECD, 2003a), the 3.1 percent of American 15 year olds who had skipped five or more classes in the past two weeks scored slightly more than a standard deviation lower [approximately four U.S. grade-level equivalents (GLE)] on the PISA reading literacy assessment than the 55 percent of students who said they were attending regularly.

enroll in and attend school, participate in class and become engaged in learning. How student achievement is signaled and the impact of signals and the achievement they represent on these rewards also influences the priority that parents, school board members, teachers and administrators place on hiring better teachers, setting higher standards for students versus keeping school taxes low. Debates about the proper criteria for awarding a high school diploma are, at their root, debates about how additional motivators for learning should be structured. Awarding diplomas is not an end in itself; it is a means to the end of stimulating students to learn more.

The paper is organized under the following headings:

- A. Why are higher standards needed?**
- B. Policy Responses to Low Standards and Low Achievement**
- C. Why high school exit exams should be a part of Standards-Based Reform**
- D. Evidence that MCT/SBEs Increase True Learning**
- E. Increased Math Achievement in High School Generates Very Large Benefits**
- F. High School Exit Exams Increase College Attendance**
- G. High School Exit Exams Raise the Wages and Earnings of Young Workers**
- H. Plaintiffs present no evidence that CAHSEE will significantly decrease high school completion rates.**

**A. Why Higher Standards Are Needed?**

Higher standards are needed because:

- Wage rates for low skill work have been falling and are likely to continue to fall. After adjusting for inflation, high school dropouts with full time jobs now earn 10 percent less than they did in 1974. Male high school graduates are also earning less than they did 30 years ago. By contrast, college graduates are now paid 33 percent more if male and 57 percent more if female than their counterparts three decades ago. (Census Bureau

2006). Unemployment rates for low skilled workers are three to four times higher than for college graduates.

- Technical change, globalization and immigration of poorly educated workers have substantially increased the economic payoff to all types of academic and technical skills, so the current generation of students needs to achieve at higher levels than earlier generations.
- Education systems in East Asia and Europe have significantly higher enrollment rates and upper- secondary graduation rates than California. Their upper-secondary students also have substantially greater achievement in mathematics, science and foreign languages (OECD 2003, 2004). If Europe, Singapore and Korea can simultaneously achieve high completion rates and high achievement, **Why Can't We?** Clearly, adolescents are able to learn a lot more than they typically do in California and elsewhere in the United States.
- Sixty-eight percent of professors say that "A high school diploma is no guarantee that the typical student has learned the basics" (Public Agenda, 2002b, p. 38).<sup>2</sup>
- "The CEO of a California-based high tech firm told me that **'there is no amount of overtime that we will not pay, there is no level of temporary services that we will not use, there is no level of outsourcing or offshoring that we will not do, in order to prevent us from having to hire one new, permanent worker in the U.S.'**(Charlie Cook, March 9 2004) "
- Fifty-eight percent of employers say that "A high school diploma is no guarantee that the typical student has learned the basics"(Public Agenda, 2002b p.38). As a result, the

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<sup>2</sup> In 2002 representative samples of professors and employers were asked: "How would you rate [recent job applicants/new students] when it comes to grammar and spelling? Would you say excellent, good, fair or poor? 'Excellent' ratings were awarded by only 2 percent of employers and professors. 'Fair' or 'Poor' ratings were given by 74% of professors and 73% of employers. With respect to "their ability to write clearly," fair or poor ratings were awarded by 75% of professors and 73% of employers. For "basic math skills," fair or poor ratings were given by 65% of professors and 63% of employers respectively (Public Agenda, Complete Survey Findings for *Where We Are Now*, 2002b, p. 41-43).

employers who can afford to be choosy have become reluctant to hire recent high school graduates.<sup>3</sup>

**Who suffers when students fail to devote sufficient time and effort to learning in high school?** Not corporate America, they can respond to shortages of skilled workers by moving critical functions abroad and simplifying the jobs that stay in the U.S.<sup>4</sup> Profits need not decline. It is the students who lose. They lose in two ways.

First, their college aspirations end up not being fulfilled. Just about everybody wants to go to college—even those with poor grades and low test scores. Completing a college program, however, depends on the quality of the student's preparation in high school. For high school sophomores who tested in the top quartile in 1980, 62 percent actually got a bachelors degree in the next 12 years and another 7.2 percent got an associates degree. What about students in the bottom quartile of the test score distribution? In 10<sup>th</sup> grade 75 percent of them said they intended to go to college. But, twelve years later only 3.3 percent of them had actually obtained a bachelors degree and only 4.1 percent had gotten an Associates degree. Other student background characteristics—parent's education, race, socio-economic status also influence success in college but none has as powerful an effect on actual outcomes.<sup>5</sup> Many students appear to believe that they do not need to apply themselves in high school to achieve their goal of going to and completing college. They know that a local college will admit them even if they don't know how to spell or write a coherent paragraph. What they do not realize is that actually completing a

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<sup>3</sup> A supervisor at New York Life Insurance (a company that had recently moved some claims processing work to Ireland) commented on television "**When kids come out of high school, they think the world owes them a living**" (PBS, March 27, 1989). Surely this generalization does not apply to every graduate.

<sup>4</sup> In a *Wall Street Journal* Op-Ed piece on 13<sup>th</sup> of February 2004, Carly Fiorina, then CEO of Hewlett Packard, wrote "Not only do our competitors have increasingly knowledgeable work forces, but they can compete for jobs that were once the sole province of the developed world. There is much outcry over this new reality, but not much constructive action. That's why I tried to provoke debate last month when I said, "**There is no job that is America's God-given right anymore.**" Craig Barrett, Chairman of Intel, agreed: "Workers in China, India and Russia can do just about any job in the world, adding: 'The U.S. has a very simple choice to make. We have to decide if we're going to be competitive in those markets.'"(Clint Sweet, "U.S. overseas payrolls grow," *Sacramento Bee*, March 09, 2004).

<sup>5</sup> National Center for Education Statistics, *Digest of Education Statistics*, 1993, p. 137 and 1998 p. 329.

degree program will be extremely difficult if they have not developed these and other basic skills in high school.<sup>6</sup>

Second, low achievers will also pay a price by having to work in low wage jobs offering little job security and few chances for advancement. We seldom measure the actual literacy levels of adults but when we do we find that literacy has at least as big an effect on earnings and unemployment as years of schooling. Table 1 presents evidence for this assertion from the National Adult Literacy Survey. Adults in the bottom prose literacy group earn one-third as much as those in the top literacy group and were 6.5 times more likely to be unemployed. High school dropouts, by contrast, earned 43 percent of what college graduates earn and were 2.6 times more likely to be unemployed.<sup>7</sup>

**Table 1**  
**Impact of Literacy and Schooling on the Earnings and Unemployment of Males**

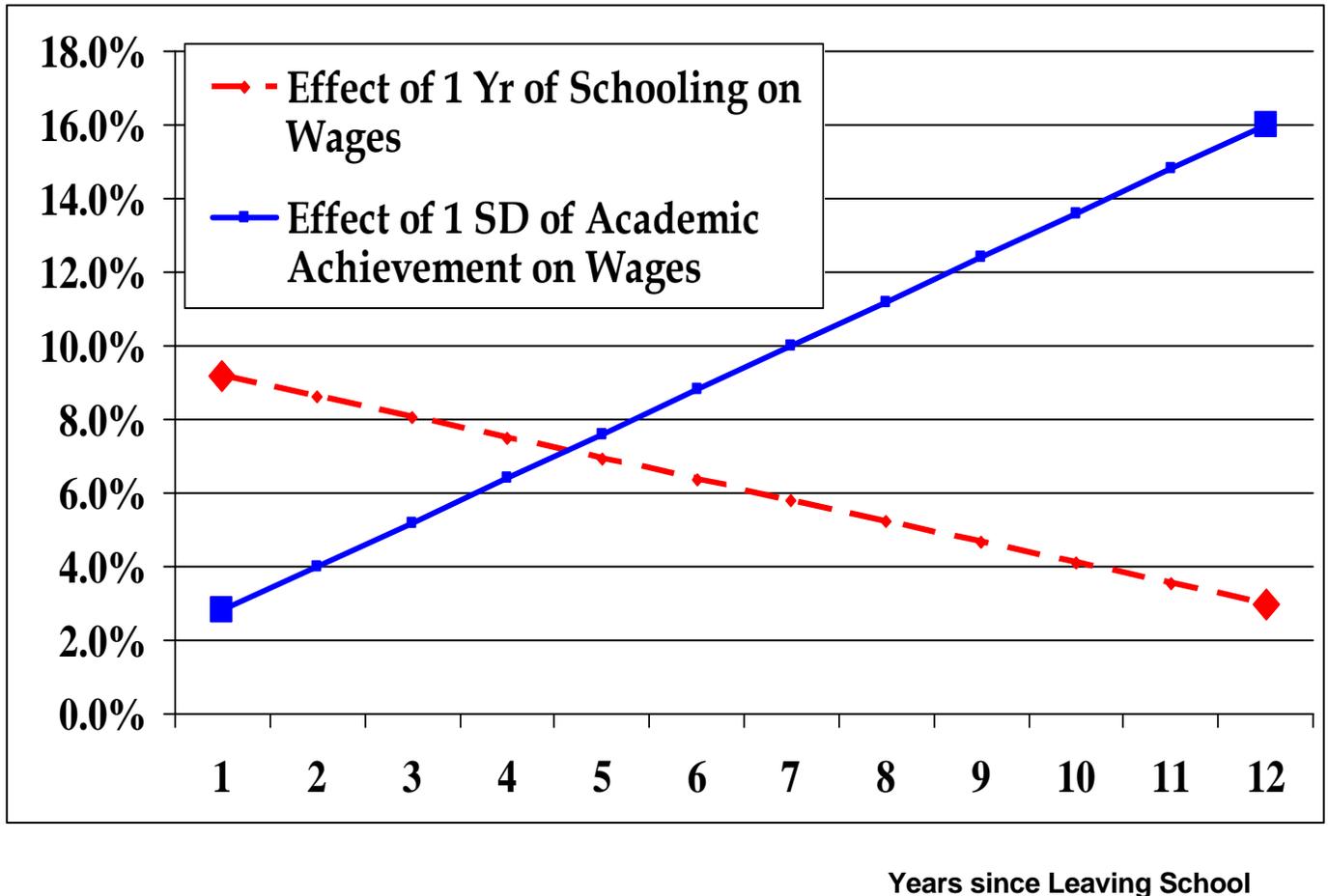
<b>Prose Literacy</b>	<b>Earnings</b>	<b>Unemployment Rate--1992</b>		<b>Schooling</b>	<b>Earnings</b>	<b>Unemployment Rate--1992</b>
Level 1	\$48,965	2.3 %		BA or more	\$38,115	4.8 %
Level 2	\$39,941	4.1 %		Assoc. Degree	\$31,855	5.5 %
Level 3	\$29,610	6.4 %		13-15 Yrs	\$27,279	7.4 %
Level 4	\$22,046	11.5 %		12 Yrs	\$22,494	8.2 %
Level 5	\$15,755	14.9 %		9-11 Yrs	\$16,194	12.4 %

Source: National Adult Literacy Survey of 1992, National Center for Education Statistics, Literacy in the Labor Force,

<sup>6</sup> James Rosenbaum, "College for all: Do Students understand what College demands?" Northwestern University, (1999), 1-36. and Clifford Adelman, "Answers in the Tool Box: Academic Intensity, Attendance Patterns and Bachelors Degree Attainment." Wash, DC: Office of Educational Research and Improvement, 1999, 1-87.

<sup>7</sup> These tabulations do not measure the causal effects of either schooling or prose literacy. Causal effects will be smaller because early literacy levels influence completed schooling, because additional schooling raises literacy and because working in white collar and professional and managerial jobs raises literacy and increases the probability of returning to school for further education.

**Figure 1**  
**The Effect of Schooling and Academic Achievement on Wage Rates**  
**by Years since Leaving School-- (Altonji & Pierret)**



Altonji and Pierret's (1998) study of how scores on the Armed Forces Qualification Test (AFQT) taken while a teenager effect subsequent labor market success provides estimates of the magnitude of the effects of literacy and basic skills in the late 1980s and early 1990s. The solid line in Figure 1 represents the effect of a one standard deviation (4-5 grade level equivalent) increase in academic achievement on wage rates when years of schooling and work experience are controlled for. The dashed line represents the effect of an extra year of schooling on wages from the same regression. In the first year after leaving school, Altonji and Pierret found that a one standard deviation increase in test scores led to only a 2.8 percent increase in wage rates the first

year out of school. Eleven years later, however, the effect was **16 percent**.<sup>8</sup> By contrast, the percentage impact of one additional year of schooling decreased with time out of school from 9.2 percent right after leaving school to 3 percent for those out of school for 12 years.

Literacy's effect on wages is initially small because employers seldom know which job applicants have the literacy skills they seek. Over time, however, employers learn which employees are the most competent by observing job performance. Those judged most competent 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,<sup>9</sup> 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.<sup>10</sup> As the individual ages, actual literacy becomes more important, educational credentials become less important.

This means that the past practice of awarding diplomas to students who have very low literacy generates only a temporary boost to that individual's reputation and wages. The practice has instead had the long term effect of damaging the reputation of the diploma as an indicator of literacy and numeracy and by extension the reputation of every recent graduate looking for a job. Many employers now hold unwarranted negative stereotypes about recent high school graduates.

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<sup>8</sup> Large as it is, this 16 percent figure substantially understates the total effect of improved K-12 learning on earnings as an adult. First, test scores influence hours of work and the risk of unemployment, not just wage rates. Secondly, the AFQT is an incomplete measure of what students are learning in high school. If reliable measures of other skills learned in school (such as science, social studies, writing, technical and computer skills) were included in the model, the total effect of test scores would be larger. The third and most important source of bias comes from using a contemporaneous measure of schooling as a control. Much of the benefit of learning in the first 12 years of school comes from the assistance it provides in continuing schooling beyond high school. Yet, this benefit of learning in high school does not get picked up by the AFQT coefficient. It is captured, instead, by the coefficient on the contemporaneous measure of schooling. If a prospective measure of schooling (completed schooling at the time of the AFQT test) were substituted for the contemporaneous measure, the coefficient on the AFQT would have been much larger (Altonji and Pierret, 1998).

<sup>9</sup> 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.; Department of Labor, *General Aptitude Test Battery Manual* (Superintendent of Documents, 1970); John E. Hunter, James J. Crosson and David H. Friedman, "The Validity of the Armed Services Vocational Aptitude Battery (ASVAB) For Civilian and Military Job Performance" (Department of Defense, August 1985). John Hartigan and Alexandra Wigdor, eds. *Fairness in Employment Testing* (Washington, D.C.: National Academy Press, 1989). 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.

<sup>10</sup> 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; and Henry Farber and Robert Gibbons, "Learning and Wage Dynamics," *Quarterly Journal of Economics* (1996), pp. 1007-47.

A personnel director interviewed for a CBS special on educational reform proudly stated, "We don't hire high school graduates any more, we need skilled workers."<sup>11</sup> The resulting damage to the job prospects of all high school graduates vastly outweighs the fleeting benefits received by the small group awarded diplomas despite very low levels of literacy and numeracy [Empirical evidence supporting this statement is in section G].

The lack of rigorous standards for getting a diploma and the long delays before the labor market starts rewarding school-based learning sends students the wrong signal about the value of effort and engagement during high school. Teenagers know that college educated adults have good jobs and live in large attractive houses. That's why so many want to go to college. 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, many will pursue a strategy of studying just hard enough to get the diploma and be admitted to college, but no harder. Unfortunately, sixty-two percent of high school students say: ***"I don't like to do any more school work than I have to."***<sup>12</sup> Apparently, most have chosen the **"do the minimum"** strategy. This is one of the reasons why so many professors, employers and community leaders support higher minimum standards for getting a high school diploma.<sup>13</sup>

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<sup>11</sup> CBS, (1990, September 6) "America's toughest assignments: solving the education crisis." New York.

<sup>12</sup> Longitudinal Survey of American Youth, "Data File User's Manual" Q. AA37N.

<sup>13</sup> In 2002 representative samples of parents, teachers, employers and professors were asked: "Before students are awarded a high school diploma, would you want [your/the] school district [where you work/teach] to require students to: (a) Pass a basic skills test in reading, writing and math? or (b) Pass a more challenging test showing they have learned at higher levels or (c) Requiring kids to pass a test is a bad idea. The *'Bad Idea'* answer was chosen by 9% of employers, 12% of parents and professors and by 20% of teachers. The *'Basic Skills test'* answer was selected by 61% of employers, 54% of parents and 53% of professors. The *'More Challenging Test'* answer was chosen by 28% of employers and 32% of parents and professors. (Public Agenda, *Complete Survey Findings for Where We Are Now*, 2002b, p. 32.)

## **B. Policy Responses to Low Standards and Low Achievement**

Education leaders in many states are trying to counter the low standards and weak incentives for hard study by making students, staff and schools more accountable for learning. State education departments have responded by developing content standards for core academic subjects, administering tests assessing this content to **all** students, publishing individual school results and holding students and schools accountable for student achievement. Most states pursuing standards based reform have established minimum competency high school graduation exams (MCEs) and test based school accountability systems.

**Minimum Competency and Standards-Based Graduation Exams:** Twenty-one states required students in the graduating class of 2005 to pass a series of tests before they were awarded a regular high school diploma (Quality Counts 2005. p. 91). According to a report of the Center on Education Policy (2004) seven states used minimum competency tests (MCTs) focusing on basic skills below the high school level and eleven states used “Standards-based Exams” (SBEs) that were aligned with state standards and generally targeted at the high school level. Half the states set no time limits for the tests. The other states gave students between 5 and 7 hours to complete the test battery. MCTs and SBEs raise standards for students who are in the school’s least challenging courses. School administrators want to avoid high failure rates, so they will focus additional energy and resources on raising standards in the early grades and improving the instruction received by struggling students.

**Holding Secondary Schools Accountable:** Formal systems for holding schools accountable are rapidly spreading. Forty-nine states publish school report cards and sixteen states have a formal mechanism for rewarding schools either for year-to-year gains in achievement test scores or for exceeding student achievement targets. Thirty-six states have special assistance programs to help failing schools turn themselves around. If

improvements are not forthcoming, twenty-four states have the power to close down, take over or reconstitute failing schools (Quality Counts 2004, p.106-8). These tests typically carry low or no stakes for students but potentially moderate or high stakes for teachers and school administrators. The lack of real consequences is likely to result in many high school students not putting much effort into answering constructed response questions of tests that are not part of a course grade.<sup>14</sup> This doesn't pose a problem when a state's high school graduation exam is used as the indicator of student achievement for high school accountability. If California were to cancel the CAHSEE, how would it induce high school students to try hard on the tests used for school accountability? The two forms of accountability are complementary.

### **C. Why High School Exit Exams should be a part of Standards-Based Reform**

Many California education leaders and politicians demand higher standards for graduating from high school and state sponsored exit exams to ensure higher standards. They argue, as follows:

- Incentives for students to develop high-level skills in history, science, foreign language and English literature have been undermined by the high stakes attached to the SAT-1 and the ACT-- tests that have little or no relationship to the high school curriculum. Incentives to take rigorous courses and to study diligently would be enhanced by high school exit exams that influence admission to state universities and expanded offerings of voluntary externally examined AP and IB courses (Board of Admissions and Relations with Schools 2002).

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<sup>14</sup> This observation is based on interviews with the directors of the testing and accountability divisions in Manitoba and New Brunswick Canada and the large increases in student performance that occurred in New Brunswick, Massachusetts, Michigan and other states when no-stakes tests become moderate or high-stakes tests. Experimental studies confirm the observation. In Candace Brooks-Cooper master's thesis, a test containing complex and cognitively demanding items from the NAEP history and literature tests and the adult literacy test was given to high school students recruited to stay after school by the promise of a \$10.00 payment for taking a test. Students were randomly assigned to rooms and one group was promised a payment of \$1.00 for every correct answer greater than 65 percent correct. This group did significantly better than the students in the other test taking conditions, one of which was the standard try your best condition. Candace Brooks-Cooper, 1998.

- While teacher evaluations should be an important part of the assessment of student learning, many important instructional goals can also be assessed externally. These external assessments add a new and important perspective to the evaluation of learning. (Becker and Rosen 1992; Costrell 1994; Betts and Costrell 2001). An evaluation system combining continuous and external assessment generates a more valid assessment of learning than either methodology on its own (Board of Admissions and Relations with Schools 2002) .
- Economists who have analyzed learning incentives agree that teacher grades and external assessments are both valuable motivators for students to try hard in class. The incentive effects of external assessments are complementary to the incentive effects of teacher grades (Becker and Rosen 1992; Costrell 1994; Betts and Costrell 2001; Board of Admissions and Relations with Schools 2002). Both forms of evaluation should be used to award high school diplomas in California.

The California High School Exit Examination (CAHSEE) should therefore be viewed as a supplement to teacher grades, not a replacement for them. When information from multiple sources is used, learning is measured more validly and the high stakes decisions that are based on the information will be better informed. Incentives to learn will strengthen. Opportunities for students and parents to game the system by seeking out easy graders or pressuring teachers to set lower learning standards will diminish.

Figlio and Lucas (2001) have found that even though students learn substantially more when their teacher is a tough grader, parents do “not perceive tougher teachers to be better teachers (p. 20).” Difficult homework assignments intrude on parents’ time and often put the family under stress, so parents complain. This may be one of the reasons why 30 percent of American teachers report being pressured “to reduce the difficulty and amount of work you assign” and “to give higher grades than students’ work deserves” (Hart 1995). When the only

signal of student achievement is teacher grades, parents seem to prefer high grades not high standards.

Teachers who work in systems with external exams are aware of their tendency to protect teachers from pressures to lower standards. When a proposal was tabled in Ireland to drop the nation's system of external assessments and have teachers assess students for certification purposes, the union representing Ireland's secondary school teachers reacted as follows:

*Major strengths of the Irish educational system have been:*

*(i) The pastoral contribution of teachers in relation to their pupils*

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

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

*The role of the teacher as judge rather than advocate may lead to legal accountability in terms of marks awarded for certification purposes. This would automatically result in a distancing between the teacher, the pupil and the parent. It also opens the door to possible distortion of the results in response to either parental pressure or to pressure emanating from competition among local schools for pupils. (Association of Secondary Teachers of Ireland, Flyer, 1990, p. 1).*

In the U.S., locally elected school boards and the administrators they hire make the thousands of decisions that determine academic expectations and program quality. When external assessment is absent, students and their parents benefit little in the near term from administrative decisions that opt for higher standards, more qualified teachers or a heavier student workload. The immediate consequences of such decisions are largely negative: higher local property taxes, more

homework, having to repeat courses, lower GPA's, complaining parents and higher risks of not graduating on time.

Opponents of external exit exams argue that focusing student attention on extrinsic rewards for learning will weaken student's intrinsic motivation to learn and that "preparation for high stakes tests often emphasizes rote memorization and cramming of students and drill and practice teaching methods (Madaus 1991, p. 7) " However, analyses of international data from the Third International Math and Science Study (TIMSS) and International Assessment of Educational Progress have found that students in nations and Canadian provinces with high school exit exams were significantly less likely to say that memorization is the way to learn the subject and significantly more likely to be doing experiments in science class. Quizzes and tests were more common in Canadian diploma exam provinces, but in other respects these provinces were not significantly different on a variety of indicators of pedagogy. Students in these provinces were just as likely to enjoy the subject, more likely to believe that science is useful in every day life and more likely to talk with their parents about school work. Students in the TIMSS study were significantly more likely to get tutoring assistance from teachers after school. Madaus's prediction that students would avoid opportunities to learn material that is not likely to be on the exam was not supported. Students in Canadian provinces with high school exit exams spent significantly more time reading for fun and watching science documentaries (Bishop 1996). The study using TIMSS data found no relationship between high school exit exams and reading for fun. (Bishop 1999b).

The exit examinations developed by the committees of experienced teachers that are assigned the task are generally better than the teacher made final exams they supplement or replace.<sup>15</sup> Proposed questions are carefully reviewed for ambiguity and bias and then pre-tested.

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<sup>15</sup> Fleming and Chambers (1983) study of tests developed by high school teachers found that "over all grades, 80% of the items on teachers' tests were constructed to tap the lowest of [Bloom's] taxonomic categories, knowledge (of terms, facts or principles)"(Thomas 1991, p. 14). Rowher and Thomas (1987) found that only 18 percent of history test items developed by junior high teachers and 14 percent of items developed by senior high teachers required the integration of ideas. College instructors, by contrast, required such integration in 99 percent of their test items.

The exams are published shortly after test day and receive another round of intense public scrutiny. Education leaders in California want teachers to give students better instruction in writing and have included an externally set essay in the CAHSEE. Well designed essay questions can also enliven class discussions and induce better teaching (see example in footnote).<sup>16</sup>

Steinberg, Brown and Dornbusch's (1996) study of nine high schools in California and Wisconsin concluded that:

The adolescent peer culture in [middle class] America demeans academic success and scorns students who try to do well in school.....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 (145-6).

James S. Coleman explains this phenomenon in the following way: "students who get especially high grades create negative externalities for other students, insofar as the teacher grades on the curve....Often a norm arises in this case...; students impose a norm that restricts the amount of effort put into schoolwork (1990 p. 251)." External exit exams are one way to end student perceptions they are being graded on a curve. On external exams, everyone in the class can get an A. One is competing with anonymous students in other schools, not one's classmates. Peers should become less supportive of students who joke around in class or try to get the

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<sup>16</sup> Judge for yourself. New York's English Regents exam asks students to write four essays over a six hour period. One of the prompts always has the following "critical lens" format.

*Write a critical essay in which you discuss **two** works 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, agree or disagree with the statement as you have interpreted it and support your opinion using specific references to appropriate literary elements from the two works. Guidelines....*

*\* Use the criteria suggested by the critical lens to analyze the works you have chosen*

*\* Avoid plot summary. Instead use specific references to appropriate literary elements (for example: theme, characterization, setting, point of view) to develop your analysis....*

*\* Follow the conventions of standard written English.*

In June 1999 the 'critical lens' was: "In literature, evil often triumphs but never conquers." In June 2000 it was: "It is not what an author says, but what he or she whispers that is important."

class off track and more supportive of those who cooperate with the teacher. Improved classroom culture should result in students learning more.

#### **D. Evidence that MCT/SBEs Increase True Learning**

The web sites of most of the state education departments implementing high stakes testing systems report that growing numbers of students are reaching proficiency on the state's MCT/SBE and school accountability tests. While flat or declining scores on a new high stakes test might reasonably lead one to conclude that true achievement has not improved, rising scores do not necessarily imply that true achievement has risen. Numerous authors (Linn 1990; Koretz et al 2001) have pointed out that rising test scores might instead reflect teaching to the test—i.e., better alignment of instruction with the topics and question formats found on the state's high stakes test. Consequently, studies evaluating the effects of high-stakes testing on achievement must track their effects by studying scores on a zero-stakes audit test—e.g. National Assessment of Educational Progress (NAEP)--that represents a broader domain of knowledge than the content standards that informed the construction of the state's high stakes tests.<sup>17</sup> The issue is not whether the positive time trends on the state's high stakes test are steeper than the trends on the audit test. That is almost guaranteed. The issue is "Do the audit tests respond to the introduction of a MCE?" and if so "How large is the response?" To assist the reader in judging whether estimated effects are substantively important, I have translated all impact estimates into a common metric of grade level equivalents.<sup>18</sup>

The best way to assess the effects of high school exit exams is to compare achievement gains in states that have recently introduced exit exams to gains in states that have not. The first such study was by Norman Fredrickson (1994). He found that states introducing "high stakes" testing systems (minimum competency tests for graduation for the most part) achieved

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<sup>17</sup> For a more extensive discussion of methodological issues surrounding estimating the effects of external examination systems see: Bishop 1996, Linn 2000, Koretz et al 2001, Hanushek and Raymond 2003 and Jacobs 2001.

<sup>18</sup> One grade-level equivalent is assumed to be 12 points on the 8<sup>th</sup> grade NAEP scale.

larger gains on National Assessment of Educational Progress (NAEP) mathematics questions between 1978 and 1986.

Subsequent studies have all examined data from the 1990s a period during which many states were introducing standards-based reform strategies holding schools accountable for improving student achievement. The indices of high-stakes testing used in these studies largely reflect the growth of school accountability testing systems not high school exit examinations. Martin Carnoy and Susanna Loeb (2003) found that 4<sup>th</sup> and 8<sup>th</sup> grade math achievement gains from 1996 to 2000 were significantly larger in states with strong test-based accountability. Effects were particularly strong for Blacks and Hispanics and remained large when adjustments were made for changes in exclusion rates. Hanushek and Raymond (2003, 2005) also report that states introducing test-based accountability tended to have larger test score gains from 4<sup>th</sup> to 8<sup>th</sup> grade. They also conclude special education placement rates did not rise more rapidly in states introducing test-based accountability. Barak Rosenshine (2003) excluded states with big increases in exclusion rates and then compared four-year NAEP test score gains of the remaining high-stakes states to the gains in states with no stakes. He concluded “that students in the clear high-stakes states were, indeed, learning mathematics and reading that was beyond the specific content of the statewide tests (p. 3).” Henry Braun’s (2004) study of gains between 1992 and 2000 concluded: “For each grade, when we examine the relative gains of states over the period, we find that the comparisons strongly favor the high-stakes testing states. Moreover, the results cannot be accounted for by differences between the two groups of states with respect to changes in the percent of students excluded from NAEP over the same period (p. 2).”

Plans for new high school graduation tests and school accountability systems are announced many years in advance of actual implementation. These announcements start a change process that affects elementary as well as secondary school teachers. Consequently, it will typically be a “half a generation” (CEP, 2004 p. 26) before students exhibit the full effects of

a new MCT, SBE or universal system of end-of-course exams.<sup>19</sup> This implies that statistical power is maximized by measuring change over a long period—one that runs at least from the announcement date to many years after the new graduation requirements are imposed.

The rest of this section presents an analysis that compares the effects of innovations in school and student accountability on trends in mathematics achievement since 1992 (Bishop 2005) that has just been published in the latest *Yearbook of the National Society for the Study of Education*. Figure 2 plots the gains from 1992 to 2003 on 8<sup>th</sup> grade NAEP math tests (adjusted for the effects of changes in exclusion rates) against Education Week's overall rating of the quality of each state's standards and school accountability system for 1996, 1997 and 2002. School accountability systems were not well developed in 1992, so the positive relationship visible in Figure 2 suggests that the introduction of standards-based reform and school accountability systems during the 1990s had positive effects. Some of these states, however, were also introducing new student accountability systems during this period. During this period Hawaii ended its MCT, five states introduced new minimum competency high school exit exams and two—New York and North Carolina-- introduced a universal system of end-of-course exams on top of a preexisting MCT. Previous studies of impacts have either not distinguished between student and school stakes or analyzed one without controlling for the other. What effects did the new exit exams have and how do the impacts of student accountability compare with the impacts of school accountability?

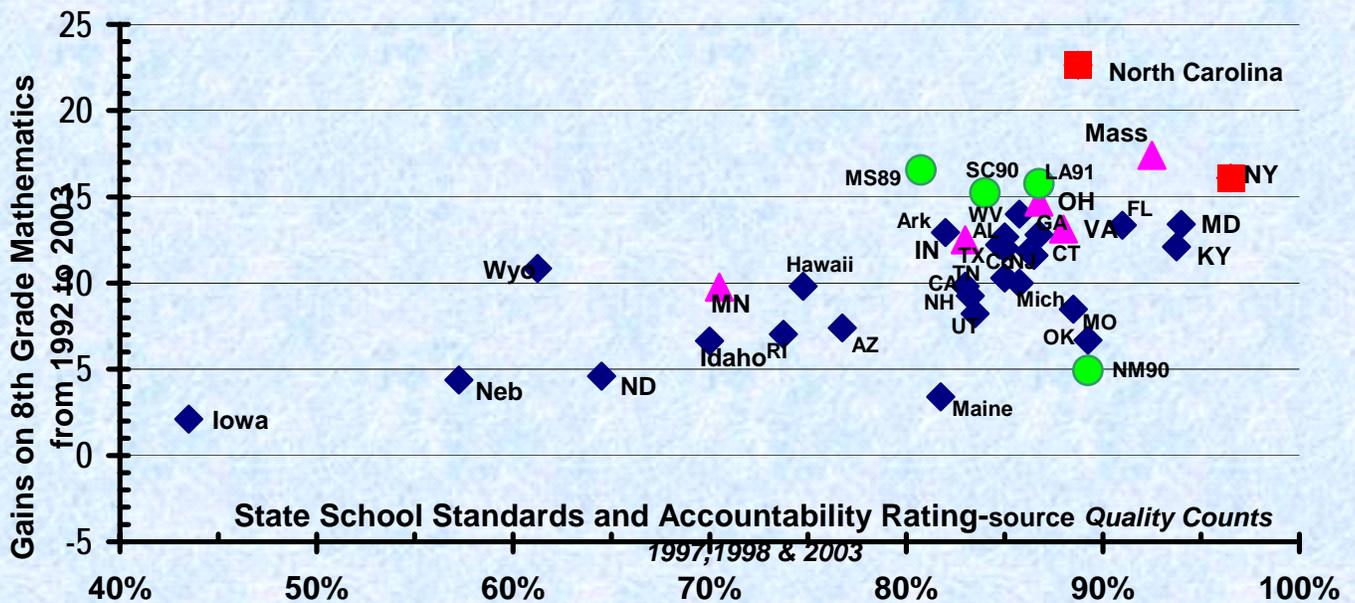
Figure 2 suggests that the states that introduced new student accountability systems during this period had particularly large gains. The two states—North Carolina and New York, represented by squares—that established a universal system of end-of-course exams during the 1990s had much larger gains on the NAEP tests than would be predicted by their Education

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<sup>19</sup> This is one of the reasons why Amerein and Berliner's (2002) interrupted time series approach to measuring the effects of high stakes tests is flawed. The other weaknesses of the study are errors in dating the introduction of high stakes tests in many states, the use of national average scores as a comparison rather than states that did not implement high stakes testing and the arbitrary way of handling changing rates of exclusion (Hanushek and Raymond 2003b).

Week accountability rating. So did the five states—Indiana, Massachusetts, Minnesota, Ohio and Virginia represented by triangles---that introduced standards-based minimum competency exams between 1992 and 2003 and the four states—Louisiana, Mississippi, New Mexico and South Carolina represented by circles—that introduced MCT/SBEs between 1989 and 2001.

**Fig. 2--State Standards and Accountability Rating and 1992 to 2003 Gains on NAEP 8th grade Math--Adjusted for Exclusions**



Multivariate regressions were run to assess the effects of introducing school accountability and various types of student accountability on test score gains from 1992 to 2003 and from 1990 to 2003. Increases in the exclusion of students from testing tend to generate spurious increases in mean test scores that may bias efforts to evaluate high stakes testing. To avoid such a bias and to adjust for allowing testing accommodations in 2003, changes in the exclusion of students from NAEP testing were included in the regressions. Results are presented in Table 2. The coefficients on the exclusion variables imply that an increase in

exclusion rates removes from the NAEP sample students who tend to score about 68 points (5.6 GLEs) below the statewide average. This is a high but not implausible estimate of the size of the bias that results. When this variable is dropped (compare row 2 to row 3, or row 6 to row 7), coefficients on the school and student accountability variables hardly change at all. Carnoy and Loeb (2003) and Braun (2004) came to similar conclusions about the lack of an effect of changing exclusion rates on estimates of the effect of high stakes testing for school accountability.

**Table 2**  
**Effects of Introducing Student and School Accountability Systems**  
**on NAEP Mathematics Achievement in 8th Grade**

Achievement Growth 1992→2003	Q.C. Index of Standards & Accountability	Universal Curriculum-Based Exit Exam	New H.S. Minimum Competency Grad Test <sup>20</sup>	Test Score in 1992 or 1990	Change in exclusions from 1990-92 to 2003	Adj. R Square # obs.
8 <sup>th</sup> Grade	.232*** (.055)				.722** (.285)	.377 41
8 <sup>th</sup> Grade	.187*** (.052)	7.44*** (2.50)	2.22+ (1.43)			.418 41
8 <sup>th</sup> Grade	.189*** (.057)	7.10*** (2.32)	2.19* (1.32)		.677** (.256)	.499 41
8 <sup>th</sup> Grade	.081* (.047)	7.23*** (2.84)	4.06*** (1.16)	-.238*** (.055)	.679*** (.209)	.666 41
<b>Growth 1990→2003</b>						
8 <sup>th</sup> Grade	.236*** (.059)				.876*** (.319)	.406 37
8 <sup>th</sup> Grade	.177*** (.050)	10.54*** (2.59)	3.08** (1.64)			.530 37
8 <sup>th</sup> Grade	.183*** (.048)	9.60*** (2.46)	2.44* (1.41)		.641** (.274)	.586 37
8 <sup>th</sup> Grade	.090+ (.055)	9.01*** (2.27)	3.00** (1.31)	-.199** (.075)	.689*** (.252)	.652 37
<b>Independent Variables</b>						
<b>Mean</b>	80.63	.045	.091	267	2.90	
<b>Std. Dev.</b>	11.11	.211	.362	8.95	2.38	

Author's analysis of state NAEP data. The dependent variable is the 2003 test score with accommodations allowed minus the 1992 or 1990 test score without accommodations. Data on 1992 was not available for Alaska, Illinois, Kansas, Montana, Nevada, South Dakota, Vermont and Washington, so they are not included in the estimations. New York and North Carolina introduced universal curriculum-based external exit exams during the 1990s. The Quality Counts Index of Standards and Accountability is the mean of the 2003 overall rating and an average of 1996 and 1997 Standards and Accountability ratings.

<sup>20</sup> For the 1992 to 2003 analysis, the states introducing a MCT between 1993 and 2003 graduating classes--Indiana, Massachusetts, Minnesota, Ohio and Virginia—are coded as "1" on this variable. Hawaii ended a minimum competency exam during the period, so it is coded "-1". For the 1990 to 2003 model Louisiana which first applied their MCT graduation requirement to the class of 1991 is also coded as a 1. States that did not introduce a MCT prior to 2003 or had an MCT prior to the time period analyzed and retained it are coded as a zero.

The Quality Counts school accountability index is a significant predictor of the growth of mathematics achievement. In models with no controls for student accountability, a two standard deviation (22 point) increase in the 1996-2003 School Accountability Index led to a 5 point gain in math achievement. The estimated effects of a two standard deviation increase in the index drops to 4.2 points when the introduction of new high school exit exams is controlled for and drops to 1.8 points when 1992 test scores are included as a control variable.

During the period from 1992 to 2003, the two states that added a universal system of end-of-course exams to an existing MCT system, North Carolina and New York, improved their math achievement by three-fifths of a GLE more than other states with similar Quality Counts school accountability ratings and changes in rates of exclusion. For the thirteen-year period from 1990 to 2003, the estimated effect of the Universal CBEEES is about three-quarters of a GLE.<sup>21</sup>

The five states-- Indiana, Massachusetts, Minnesota, Ohio and Virginia—that shifted from a no-student stakes environment to a MCT or SBE between 1992 and 2003 had a statistically significant 4.06 point larger gain in 8<sup>th</sup> grade mathematics than other states with similar QC school accountability ratings and changes in exclusion rates. For the 1990 to 2003 period, Louisiana must be included in the states introducing a MCT. The regression in the last row of the Table 1 reports that the six states introducing MCT after 1990 experienced a 3.0 point larger 8<sup>th</sup> grade mathematics gain from 1990 to 2003 than other states. On the NAEP mathematics test 12 points is roughly a grade level equivalent, so the predicted effect of introducing a MCT or SBE was 34 percent of a grade level equivalent (GLE) for the 1992 to 2003 period and 25 percent of a GLE for 1990 to 2003.<sup>22</sup>

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<sup>21</sup> Virginia had a MCT in the early 1980s but dropped it in favor of a 6<sup>th</sup> grade high school admission test introduced in 1990. The Standards of Learning were phased in at the end of the 1990s and became a Universal CBEEES with the graduating class of 2004. If Virginia is reclassified as a new Universal CBEEES, the coefficient on Universal CBEEES falls by about 20 percent and the coefficient on MCT/SBE is unchanged.

<sup>22</sup> The predicted effect of a state shifting from no student accountability to a Universal CBEEES is the sum of the MCT/SBE and the universal system of end-of-course exams coefficients or between .8 and 1.1 grade level equivalents.

### **E. Increased Math Achievement in High School Generates Very Large Benefits**

An increase in mathematics achievement of one-quarter or one-third of a grade-level equivalent may seem small, but it is in fact very significant because mathematics course taking and achievement are powerful determinants of college completion, job performance and earnings as an adult (Bishop 1991, 1992). The most recent and also the best study of the economic benefits of learning mathematics is by Heather Rose and Julian Betts (2001, 2002) of the Public Policy Institute of California. Rose and Betts measured the effect of taking specific mathematics courses during high school on earnings twelve years after graduating from high school. Controlling for ethnicity, parent's education, family income, school characteristics, years of schooling attained, and the number credits obtained in each science subject, in English and in foreign languages, they determined that each extra algebra/geometry credit raised earnings by 2 percent, each extra advanced algebra/statistics/pre-calculus credit raised earnings by 3 percent and a calculus credit raised earnings by 4.3 percent. Let's be very conservative and use the 2 percent figure for algebra/geometry to value the earnings benefit of a grade level equivalent of math and assume the extra math achievement does not change the number of years students spend in school or college. The Census Bureau reports that in 1999 the total expected lifetime earnings between age 18 and 64 was \$786,000 for high school dropouts, \$1,121,000 for high school graduates, \$1,335,000 for those with some college, \$1,445,000 for those with an associates degree, \$1,898,000 for those with a bachelors degree and \$2,204,000 for those with a masters degree (Census Bureau, 2002, 2000). Using an average of these undiscounted lifetime earnings totals and the lower estimate (.25 GLE) of a MCE's effect on math achievement (with no gains in other subjects) the benefit per student is \$9119 in 1999 dollars over their lifetime.<sup>23</sup> There were 459,138 students in the Class of 2006 who are

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<sup>23</sup> The simple average of dropouts, HS grads, some college, associates degree, bachelor degree and masters degree recipients was \$1,465,000. Employer paid social security taxes, health insurance and contribution to pension plans are 24.5 percent of wages and salaries so the \$1,465,000 figure needs to be multiplied by 1.245 to calculate total compensation paid over an entire lifetime: \$1,824,000. One-half of one percent of this is \$9,119.

Supposed to take the CAHSEE, so my lower bound estimate of the undiscounted total benefit of the math learning effects of the exit exam system for just one graduating class is 4.187 billion dollars or 12 percent of total current expenditures on public K-12 education in California in 1998/99. If we discount lifetime earnings benefits back to age 18 using the current interest rate on 30 year fixed rate mortgages (a nominal rate of 6.5%), the present discounted value at age 18 of an individual's expected lifetime compensation is roughly \$885,700.<sup>24</sup> The present discounted value (PDV) of the lower bound estimate of the lifetime benefit on math learning stimulated by CAHSEE per student is \$4428. For the entire graduating class the discounted benefit of the gain in math achievement gain from CAHSEE is 2.03 billion dollars or roughly 5.9 percent of California's spending on K-12 education.

Larger estimates would result if (1) the effects of CAHSEE on mathematics achievement are larger in 12<sup>th</sup> grade than in 8<sup>th</sup> grade, (2) reading literacy and writing ability are also improved by the CAHSEE, (3) higher achievement in high school causes college attendance and completion to increase, and/or (4) the CAHSEE induces employers to revise their negative stereotypes of the graduates of California high schools. These last two effects might be quite large. We, therefore, turn to a closer analysis of the effects of minimum competency exam graduation requirements on college attendance and success in the labor market.

#### **F. High School Exit Exams Increase College Attendance**

Critics of high stakes testing argue that teaching to exit exams diminish the time spent on more important skills that would help students in college and in jobs. If this were the case, we would expect students in states with graduation tests to be less likely to go to and stay in college and less likely to get good jobs. In the next two sections I test these hypotheses and show that they are rejected when put to an empirical test.

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<sup>24</sup> Nominal interest rates must compensate investors for expected inflation. When expected rates of wage and price inflation are accounted for, a 6.5 percent nominal rate of interest is actually only a 3 percent real rate of interest. Discounting at a 3 percent real interest rate thus reduces the \$1,465,000 lifetime earnings figure to approximately \$711,400 at age 18. We then calculate the PDV of lifetime compensation by multiplying by 1.245 and we have \$885,700. One-half of one percent of this is \$4428.

If tougher high school graduation requirements raise the achievement of high school graduates, as intended, they should increase the proportion of high school graduates going to college. Analyzing HSB data on graduates in 1980, Bishop and Mane (1999) found that high school graduates coming from high schools with an MCE graduation requirement [as reported by the principal] were significantly more likely to be in college during the four-year period immediately following high school graduation. Effects were largest for students in the middle and bottom of the test score distribution and tended to be greater in the 2<sup>nd</sup> and 3<sup>rd</sup> years after graduation than in the 1<sup>st</sup>, 4<sup>th</sup> and subsequent years after graduation. Opponents of tougher graduation requirements concede this point but argue that it may be accomplished by reducing the number of high school graduates not by increasing the numbers attending and completing college.

To avoid this problem Bishop, Mane, Bishop and Moriarty (2001) studied the proportion of 8<sup>th</sup> graders in 1988 who subsequently went to college not the proportion of high school graduates who went to college. Opponents of tougher graduation requirements predict that the reductions in high school graduation rates they expect to result will then lower the proportion of 8<sup>th</sup> graders with low GPAs who eventually attend college. Proponents of MCEs disagree. They argue that MCE tests assess very basic skills and that students who cannot, after many tries, pass such tests are not prepared for college level work. Open door institutions may admit them, but they will need extensive remedial course work and are unlikely to complete any course of study. It is better, proponents argue, for high schools to hold **all** students to higher standards and that poorly prepared students be told of their deficiencies early in high school when there is time to do something about them. The result, they argue, will be an increase in the number of high school graduates who have the skills and knowledge necessary to succeed and thrive in college. They, therefore, would predict that, even when tougher graduation requirements delay or prevent some from graduating from high school, the proportion of 8<sup>th</sup> graders who enter college on schedule in fall 1992 will not decline and a year or so later college enrollment rates will be higher. The

positive effect of higher expectations in high school on college enrollment rates is delayed because college retention rates rise and because some enter college one year later due to delays in completing high school.

Logistic regressions were estimated predicting college enrollment in the fall of 1992 and the spring of 1994 of students who were in 8<sup>th</sup> grade in the spring of 1988. The results are presented in row 1 and 2 of table 3. MCEs had significant positive effects on college attendance, but only in the sixth year after 8<sup>th</sup> grade not the fifth year after 8<sup>th</sup> grade. The positive effect of state MCEs on college enrollment in 1993/94 was not significantly different for students with good and bad GPAs in 8th grade. Students in MCE states had rates of college attendance six years after eighth grade that were 4 percentage points higher than for student from non-MCE states. New York is one of the MCE states and is not visibly different from the other MCE states.<sup>25</sup>

The proportion of 8<sup>th</sup> graders who get an Associates degree before year 2000 is also slightly higher (0.9 percentage point higher), but not by enough to be statistically significant (Bishop and Mane 2004). Compared to high school graduates, the PDV of lifetime compensation is \$106,858 higher for those with some college. An Associates degree adds an additional \$81,242 of discounted lifetime compensation. Discounted lifetime compensation is \$264,024 higher for those who have a Bachelors degree rather than an Associates degree. We multiply these discounted compensation differentials by the MCE induced change in probability of reaching each level of completed schooling reported in Bishop and Mane (2004). This generates an upper bound estimate of the predicted effect of CAHSEE induced changes in college attendance on expected discounted lifetime compensation of \$3949 per student or

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<sup>25</sup> Academic course requirements had no significant effects on college attendance. Increases in the total number of courses required to graduate significantly lowered college attendance rates. A four Carnegie unit increase in elective and non-academic course graduation requirements reduced college enrollment by 1.8 percentage points in fall 1992 and by 2.4 percentage points in spring 1994.

{\\$106,858\*.04 + \\$81,242\*.009 + \\$264,024\*(-.004)}.<sup>26</sup> This predicted benefit of the CAHSEE is an addition to the direct ‘math learning’ effects on compensation calculated in the previous section that were drawn from studies where years of schooling were held constant.

**Table 3**  
**Effect of Graduation Requirements on Courses Taken in High School**

	Mean (Standard Dev.)	State Total Courses to Grad.	Acad. Courses Req. to Grad.	State Minimum Comp Exam	SMCE for C-Student	SMCE for A Student	New York	Size: ('00s of Students/Grade)	School Socio-Econ Status	Family Socio-Econ Status	R Sq RMSE # obs
Attended College Fall 1992	.537 (.499)	-.018+ (.012)	.029 (.025) [.70]	.008 (.095)	-.132 [.35]	.12+ [.33]	.078 (.168)	-.056*** (.018)	.395*** [.0003]	.707*** (.042)	.2695 11,559
Attended College Spring 94	.508 (.50)	-.024** (.011)	-.017 (.024) [.11]	.183** (.090)	.153* [.195]	.210** [.097]	-.085 (.157)	-.006 (.017)	.330*** [.0036]	.728*** (.044)	.2728 11,563
Log Wage Rate-1993	1.274 (.569)	-.0053** (.0024)	.0111** (.0053) [.31]	-.001 (.019)	.004 [.89]	-.004 [.83]	-.004 (.036)	-.0003 (.004)	.007 [.53]	-.020** (.010)	.0928 0.54 11,333
Employment 0-21 months	13.4 (7.7)	-.018 (.032)	.056 (.074) [.61]	.102 (.267)	.91** [.016]	-.60* [.074]	-.030 (.524)	.007 (.055)	-.409 [.39]	-.64*** (.132)	.1512 7.07 11,393
Earnings in 1993	\$5317 (5694)	-40.7* (23.3)	-26.0 (52.5) [.23]	601*** (183)	628** [.035]	577*** [.011]	-863** (321)	-54+ (39)	184 [.60]	-.246** (.98)	.2388 \$4824 9,670
On-the-Job Training of workers	.120 (.325)	-.005 (.021)	-.027 (.048) [.55]	.446*** (.169)	.12 [.61]	.74*** [.0024]	-.68* (.37)	.033 (.034)	.086 [.70]	.167* (.088)	.0601 4,813
Formal Training of workers	.227 (.419)	-.022+ (.016)	-.043 (.034) [.04]	.322** (.130)	.225+ [.198]	.406** [.030]	-.15 (.26)	.002 (.026)	.132 (.145)	.014 (.070)	.0277 4,817

Source: Analysis of NELS:88 follow up data that includes students who dropped out of high school. In the model predicting test score gains the following background variables measured in the 8<sup>th</sup> grade were controlled: family SES, family structure, # of siblings, ethnicity, religion, gender, GPA in 8<sup>th</sup> grade, hours of TV, hours doing homework, Read for fun index smoking, advanced courses, remedial courses, central city and rural, locus of control, self esteem and hours working for pay (plus it's square). The characteristics of the school attended during 10<sup>th</sup> grade also controlled were: Catholic school, secular private school, private school controlled by other church, teacher salary, percent student body white, percent free lunch, mean 8<sup>th</sup> grade test score, mean family SES and enrollment per grade in hundreds (plus the square of size deviated from its mean). The following characteristics of the state were controlled for: mean unemployment rate, mean weekly wages in retailing, payoff to completing high school, payoff to completing college and ratio of tuition to the retail wage and dummies for 4 Census regions. The MCE variable is a 1 for AL, FL, GA, HI, LA, MD, MS, NV, NM, NJ, NY, NC, SC, TN & TX. Model predicting college attendance and hard work also controlled 8<sup>th</sup> grade test scores. Models predicting labor market outcomes included additional controls for high school completion and college attendance. All models were estimated unweighted. Numbers in parenthesis below the coefficient are Huber-White standard errors that correct for clustering by school.

<sup>26</sup> These calculations are upper bounds for the effects of changes in schooling on compensation because the PDVs are gross differentials comparing one level of schooling to another without controlling for ability, family background and selection effects that influence schooling attainment and also directly boost lifetime compensation. The Census publications provide estimates of lifetime earnings profile. Lifetime compensation profiles are calculated averaging male and female earnings for each age-education category and then multiplying by 1.245. The changes in probability of going to college and completing various degrees were calculated by multiplying the logistic coefficient on MCE by P\*(1-P) where P is the proportion of the population that obtained the education level specified.

### **G. High School Exit Exams Raise The Wages and Earnings of Young Workers**

Economic theory predicts that high school exit exams will make graduates more attractive to employers. First, the improvements in student achievement MCT/SBEs generate cause worker productivity to increase.<sup>27</sup> This higher productivity tends to raise wage rates and eventually the effect of academic achievement becomes very large<sup>28</sup>. The second way MCT/SBEs improve job opportunities is by sending a credible signal to employers that “ALL recent graduates from this state meet or exceed your hiring standards.” The fact that they have passed the MCT/SBE is the proof. In most communities, competencies developed in high school are poorly signaled to employers. This makes employers with the most attractive jobs reluctant to risk hiring recent high school graduates. Instead, they prefer to hire workers with many years of work experience because the applicant's work record serves as a signal of competence and reliability that helps them identify the most qualified. The third mechanism is by improving the quality of the information that employers have on the academic achievement of job applicants. With better information on school achievement, high wage employers will feel better recruiting new employees directly from their local high schools. Rewards for achievement in school will rise.

Establishing a minimum competency exam, therefore, is one way a state education system can try to help its graduates get better jobs. The existence of the minimum competency exam graduation requirement should be well known to local employers. With the MCE requirement, the diploma now signals more than just seat time; it signals meeting or exceeding certain minimum standards in reading, writing and mathematics as well. Many MCE states have used their minimum competency exam graduation requirement and other school reform policies as marketing

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<sup>27</sup> Brenner, “High school data to predict work performance,” pp. 29-30. [2d reference; see n. 9]  
Dept. of Labor, “General Aptitude Test Battery Manual.” [2d reference; see n. 9]  
Hunter and others, “Validity of ASVAB for job performance.” [2d reference; see n. 9]  
Hartigan and Wigdor, *Fairness in Employment Testing*. [2d reference; see n. 9]  
Bishop, “Impact of Academic Competencies,” pp. 127-194. [2d reference; see n. 9]

<sup>28</sup> Taubman and Wales, “Education as an investment,” pp. 95-122. [2d reference; see n. 10]  
Bishop, “Impact of Academic Competencies,” pp. 127-194. [4d reference; see n. 7]  
Farber and Gibbons, “Learning and Wage Dynamics,” pp. 1007-47. [2d reference; see n. 10]  
Altonji and Pierret 1998.

tools for attracting high wage employers to their state. Because of pooling, all high school graduates should benefit from a MCE regime, not just the students with low achievement levels in 8<sup>th</sup> grade. This logic leads to the hypothesis that students from states with minimum competency exams will obtain higher wage rates and higher earnings than students from states without MCE graduation requirements.

Have minimum competency exams indeed improved the labor market outcomes for recent high school graduates? To answer this question Bishop, Mane, Bishop and Moriarty (2001) estimated models in longitudinal data from NELS-88 predicting five early labor market outcomes: the log of the hourly wage rate, the total number of months worked in the 21 month period following high school graduation, earnings in calendar 1993 in dollars, and for those who had a job zero-one variables indicating whether they received on-the-job training and whether they obtained formal job training at a school. These models included controls for high school completion—indicators for “Ever dropped out,” “Obtained a GED,” “Failed to get either a diploma or a GED” and the magnitude of the delay in completing high school if there was a delay—for current and past college attendance--dummy variable for full-time college attendance during the period for which earnings is measured, and a dummy for part time attendance during that period and the number of semesters of college attendance prior to the earnings measurement period. The models also control for many characteristics of the student and her family in 8<sup>th</sup> grade (listed in source note for Table 3).

Our analyses of the effects of graduation requirements on early labor market outcomes are presented in the bottom five rows of Table 3. Minimum competency exams had large and significant effects on many of the labor market indicators. In MCE states, employment was significantly higher for students with low GPAs and significantly lower for high GPA students. Total earnings in 1993 was a remarkable 11 percent greater in MCE states. The probabilities of getting job training (both formal and informal training) were also significantly higher in states with

MCEs. Apparently, MCEs helped low GPA graduates get work more quickly and high GPA graduates get better jobs offering training.<sup>29</sup>

In another paper, Ferran Mane and I (2004) studied outcomes eight years after high school graduation to see how long the effects of MCT/SBEs lasted and whether they differed by the socio-economic background. Those who attended high school in MCE states earned 11 percent (\$548 per year) more in 1993 and 4.2 percent (\$1103 per year) more in 2000.<sup>30</sup> Wage rates in 2000 were also 2.6 percent higher in MCE states. The substantial effect of MCEs on earnings eight years after graduating from high school suggests (1) that the learning gains generated by MCEs (the .25 to .34 GLE gain in math achievement and gains in other subjects or after 8<sup>th</sup> grade) must have been substantively quite important and/or (2) that the MCE's tendency to counter negative employer stereotypes about youth must have resulted in much better opportunities for training and promotions that generated long lasting effects.

These direct estimates of the effect of MCT/SBEs on wages and compensation are quite substantial. If, for example, we take just the benefits during the first nine years after graduation, the PDV of the MCE benefit per student is \$7122 in 1999 dollars over the lifetime. If the earnings benefit continues to grow with the rise of nominal compensation per hour (while declining as a share of worker earnings) until the worker retires at age 64, the PDV of the lifetime compensation benefit per student of the MCE is \$30,668 in 1999 dollars. The comparable estimate of the lower bound lifetime compensation benefit of the .25 GLE gain in math achievement by 8<sup>th</sup> grade was \$4428 per student for the entire working lifetime expressed in 1999 dollars. This suggests that

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<sup>29</sup> Increases in the number of elective courses required to graduate did not have positive effects on any labor market indicator. Quite the reverse, increased elective course requirements significantly lowered wage rates, earnings and the likelihood of formal training. The effects of academic course requirements were generally not significantly different from the effects of elective course requirements. The exception to this generalization was wage rates. Being required to take extra academic courses had a significantly more positive effect on wage rates than elective course requirements. This implies that if total graduation requirements are fixed, increasing academic requirements will significantly increase wage rates. However, when an increase in academic course requirements is associated with an equal increase in total course requirements, wage rates are predicted to rise but not by a significant amount.

<sup>30</sup> The SES interactions show that MCE effects were significantly more positive for low SES students in 1993 but smaller in 2000.

our previous lower bound calculation of CAHSEE's impact has missed important effects on learning after 8<sup>th</sup> grade and gains in subjects other than mathematics.

Whose predictions were correct? Our analysis of college attendance rates, labor market success and test scores overwhelmingly rejects the hypotheses that test based student accountability systems hurt students by inducing teachers to teach to severely flawed tests. Scores on tests that are not part of state accountability systems are higher in states with strong Standards Based Reform (SBR) policies. Furthermore, the estimated impacts of test-based accountability policies on indicators of success after high school are positive, not negative as predicted by SBR critics. Indeed, it is the predictions of the proponents of high school exit exams--student accountability will help students get better jobs and stay in college longer—that receive support. The studies reviewed and described above prove that most students benefit from SBR policies. There are, however, some who might suffer a cost--those who would have graduated under the old rules but do not graduate because they cannot pass the tests. How large a group might this be? Let us examine the evidence.

**H. Plaintiff presents no evidence that CAHSEE will significantly decrease high school completion rates.**

Even though the request for an injunction predicts that the CAHSEE will cause a big decline in high school completion, they have not submitted any evidence refuting Humro's exhaustive analysis of enrollment trends in 9<sup>th</sup>, 10<sup>th</sup>, 11<sup>th</sup> and 12<sup>th</sup> grade and counts of students taking and passing the CAHSEE that predicts no significant decline in graduation rates. HumRRO reports that 363,036 students from the class of 2006 passed both parts of the CAHSEE before the start of the 2005-06 academic year. That figure is 21,939 larger than the total number of high school diplomas awarded in 2002-03 by California public schools. With 52,911 students having passed one but not both of the CAHSEE tests and all of senior year to

pass the other component of CAHSEE (and an option of staying in school an extra year or two), I would be astounded if the number passing both tests does not exceed 400,000 by June 2007.

The plaintiffs appear to be trying to convince the court that CAHSEE will be the cause of the unsatisfactory graduation rate they forecast for the class of 2006. But graduation rates have been unsatisfactory for decades. The exit test was not a graduation requirement for students graduating prior to 2006, yet the ratio of diplomas awarded in year 2001-02 to 10<sup>th</sup> grade public school enrollment for fall of 1999 (three years earlier) was 72.4 percent. For graduates in 2002-03, the ratio was 74.0 percent (National Center for Education Statistics 2005). If you divide 363,036 (the number who passed both parts of the exit exam prior to September 2005) by Rumberger's estimate of the number of 10<sup>th</sup> graders in the fall of 2003 you get 74 percent, an identical percentage. If the graduation rate of the class of 2006 turns out to be unsatisfactory, the CAHSEE graduation requirement will not be the culprit. The causes will be no different from the ones that caused low graduation rates during the 1990s: high rates of absenteeism and class ditching, drug problems, classroom disruptions, not completing assigned homework and poor teaching. These are the problems that must be fixed if California is to achieve higher graduation rates. Postponing the application of the CAHSEE graduation requirement would have negligible effects on the 2006 graduation rate.

Studies comparing the 10<sup>th</sup>, 11<sup>th</sup> and 12<sup>th</sup> grade dropout rates of states with and without MCEs have consistently failed to find MCEs having statistically significant effects (Lillard and DeCicca 2001, Jacobs 2001, Dee 2003, Warren et al 2005). Francisco Martorell's (2005) study of the Texas system compared students who just barely passed the TASS to those who almost passed it. He found no differences between the barely passers and the almost passers in the fraction who were attending school in the final six-week period of 12<sup>th</sup> grade. Students do not quit school when they fail a graduation test on the first, second or third try because they tend to attribute bad outcomes to external factors, bad luck and other temporary circumstances (I was feeling sick, the test didn't cover the material I studied or I didn't try) rather than to their innate

ability (Miller and Ross 1975, Zuckerman 1979, Buehler, Griffin and Ross 1994).<sup>31</sup> They are optimistic about their chances of passing the next time. When I surveyed tenth graders in New York, New Jersey and Ohio who had failed an MCE, only 4.3 percent of them expressed a fear that they would not graduate. Most reacted by “studying harder next year” (24%), taking summer school courses (29%), repeating the same course next year (24%), taking a special course the next year (9%) and/or getting tutoring help (30%).<sup>32</sup>

Texas students who barely failed TAAS the first time they took it were no less likely to graduate than those who barely passed. This pattern was repeated in later administrations of the TAAS to students who had failed it earlier. The differential between barely passers and almost passers was only .002 for those taking the test in the fall of 11<sup>th</sup> grade and only .006 for those taking the test in the spring of 11<sup>th</sup> grade. Only in 12<sup>th</sup> grade where the test takers had already failed many times before did a differential between barely passers and almost passers appear. Most students passed the test on one of the 7+ opportunities they were offered. Martorell calculated that 1.4 percent of the students who had ever taken one or more of the Texas exit exams did not graduate because of “the inability to pass” effect. Well-controlled cross-section studies of aggregate state level data come to similar conclusions. Aggregate measures of regular diploma graduation rates are either not significantly lower or only slightly lower (Warren et al 2005 obtained a statistically significant 1.5 percent lower) when a state has a MCE graduation requirement (Bishop and Mane 2000; Bishop, Mane, Bishop and Moriarty 2001; Lillard and DeCicca 2001; Jacobs 2001; Dee 2003). Studies of the numbers of students getting a GED have found that MCEs significantly increase the number of students getting a GED. The rise in the

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<sup>31</sup> D. T. Miller and M. Ross, “Self-serving biases in attribution of causality: fact or fiction?” *Psychological Bulletin* (1975), pp. 82, 213-225. M. Zuckerman, “Attribution of success and failure revisited: or The motivational bias is alive and well in attributional theory,” *Journal of Personality* (1979), pp. 47, 245-287. R. Buehler, D. Griffin, and M. Ross, “Exploring the ‘Planning Fallacy’: Why people underestimate their task completion times?” *Journal of Personality and Social Psychology* (1994), pp. 67, 366-381.

<sup>32</sup> Tabulation of Educational Excellence Alliance survey data collected from 3949 10<sup>th</sup> grade students in New York, New Jersey and Ohio who had failed one or more state graduation exam.

number of GEDs awarded is either roughly equal to or greater than the number of regular diplomas not awarded because of the MCE. All of the studies of aggregate data on graduation rates have focused on public high schools where the MCE graduation requirement operates. Private high schools are not subject to MCE graduation requirement so the tougher graduation requirements in the public sector is likely to have induced some students to transfer to and graduate from a local private high school. This implies that the studies reviewed above may be overstating the negative effects of public school MCEs on overall graduation rates.

For the sake of argument, however, assume that CAHSEE causes a 1.5 percentage point reduction in the proportion of students getting a regular high school diploma. How would the lost earnings and compensation of those who are assumed to not graduate because they cannot pass CAHSEE compare to the benefits of higher achievement, college attendance and better jobs demonstrated in previous sections of the paper? One way to calculate an upper bound for the expected cost of not completing high school is to multiply .015 (Warren et al and Martorell's estimate of the effect of MCEs) by \$215,062, the present discounted value of the compensation differential between a graduate with a regular diploma and a dropout. Even though we are assuming dropping out lowers lifetime earnings by more than one third, the expected loss is only \$3275 because the studies predict only a few students will dropout because of the exit exam. Martorell found that four to five years after expected graduation barely passers were earning only 3.7 percent more than those whose best TASS score was just below the graduation cutoff. This implies much smaller financial costs to being unable to pass the test. Regardless, the upper bound estimated lifetime earnings impact of \$3275 for dropping out is smaller than the \$4412 per student estimate of the lifetime compensation benefit of greater college attendance calculated in section F. It pales by comparison to the \$30,668 per student lifetime benefits of greater learning and improved reputation of high school graduates that MCEs were found to generate in section G.

**Summary and Conclusions:** Any time government changes a policy, some people win and others lose. The introduction of high school exit exams to induce students to pay closer

attention in class and to study harder and persuade teachers to set higher standards creates major benefits (discounted projected lifetime benefits of over \$30,000) for the vast majority (over 98 percent) of students. Betts and Costrell (2001) have shown that even dropouts benefit from higher graduation standards. The only students hurt by the change are those who would have gotten a diploma under the old standards but cannot meet the new standards.. Plaintiffs have provided no evidence that large numbers of students will not get a diploma from a public school because of CAHSEE. In September 2005 the number of students in the Class of 2006 who had passed both parts of CAHSEE was 21,939 larger than the total number of high school diplomas awarded in 2002-03 by California public schools. Those who do not pass the CAHSEE by June 2006 will be strongly urged to continue their schooling and will be able to pass it later.

Toward the end of the 1990s business and political leaders in California began to realize that they faced an educational crisis. Only 18 percent of California's 8<sup>th</sup> graders were proficient in mathematics and 21 percent were proficient in reading (NCES, Reading Report Card 1998; Mathematics Report Card 2000). In mathematics California's students were an entire grade level equivalent behind the national average. Only Louisiana and the District of Columbia had lower rates of reading proficiency. Most of the high tech professional jobs were going to immigrants from Asia and in-migrants from other states. The CEOs of the flagship high tech companies were complaining about the quality of the education and pointing out that decisions to put new facilities in California are influenced by the quality of the local labor force. In 2004 Carly Fiorina, CEO of Hewlett Packard went public: "**There is no job that is America's God-given right anymore**". Another CEO (who understandably wanted to remain anonymous) told Charlie Cook "**There is no amount of *overtime* that we will not pay, there is no level of *temporary services* that we will not use, there is no level of *outsourcing or offshoring* that we will not do, in order to prevent us from having to hire one new, permanent worker in the U.S. (2004).**"

Given the competitive threat and the positive experience of the 21 other states that established high school exit exams as much as 20 years earlier, the decision of the governor and state legislature to set higher standards for awarding high school diplomas by establishing the CAHSEE clearly serves the public interest. The purpose of schooling is LEARNING. Awarding diplomas is not an end in itself; it is a MEANS to the END of GREATER LEARNING. Raising the bar for getting a diploma is an effective way of inducing teachers to set higher standards and stimulating students to pay closer attention in class, cooperate with classmates and the teacher and complete their homework.. It will stimulate more students to go to college and help them get better jobs. Introducing the CAHSEE also directly addresses the serious problem of negative stereotypes about the quality of the graduates from California high schools and community colleges that was helping to provide a justification for business decisions to expand abroad or elsewhere in the United States.

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