WORKING
PAPER

Progress in Implementing Standards, Assessments, and the Highly Qualified Teacher Provisions of NCLB: Perspectives from California, Georgia, and Pennsylvania

JENNIFER SLOAN MCCOMBS

WR-256-EDU

April, 2005

EDUCATION

Preface

This paper was presented as part of the Symposium "Implementing Standards-Based Accountability: Results from Classrooms, Schools, and Districts in Three States" at the annual meeting of the American Educational Research Association, Montreal, Canada, April 13, 2005.

This material is based on work supported by the National Science Foundation under Grant No. REC-0228295. Any opinions, findings and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation.

Introduction

No Child Left Behind (NCLB) mandates certain basic requirements and holds states, districts, and schools accountable for meeting them. States must adopt content standards; administer assessments in certain subjects and grades to measure student progress toward meeting those standards; and employ only highly qualified teachers to teach those standards. These are the basic requirements upon which states, districts, and schools are to be held accountable. This paper is one in the symposium "Implementing Standards-Based Accountability: Results from Classrooms, Schools, and Districts in Three States" and details findings from RAND's *Implementing Standards-Based Accountability* (ISBA) study regarding the implementation of these requirements, with a focus on mathematics and science, in California, Georgia, and Pennsylvania.

Background

While NCLB raised the accountability stakes for states, districts, schools, its focus on standards and assessments is not new. In 1989, the nation's governors issued a call for "world-class" standards to guide educational practice, in response to the poor performance of U.S. students on international comparative assessments (McKnight et al., 1987; National Governors Association, 1989; Travers and Westbury, 1989). Since that time, state policymakers have steadily moved toward standards-based accountability (SBA) systems that emphasize explicit content and performance standards, systematic standardized testing, and consequences for results. The National Research Council (1999, pp. 2–3) described the rationale for such a system:

> The centerpiece of the system is a set of challenging standards. By setting these standards for all students, states would hold high expectations for performance; these expectations would be the same regardless of students' backgrounds or where they attended school. Aligned assessments to the standards would allow students, parents, and teachers to monitor student performance against the standards. Providing flexibility to schools would permit them to make the instructional and

structural changes needed for their students to reach the standards. And holding schools accountable for meeting the standards would create incentives to redesign instruction toward the standards and provide appropriate assistance to schools that need extra help.

NCLB requires states to adopt content standards in English language arts, mathematics, and science and annually test all children in reading and math, in grades 3, 4, 5, 6, 7, 8, and at one grade in high school by 2005-06. By 2007–08, states must test students in science at least once in grades 3–5, 6–9, and 10–12. States must establish goals for performance on the assessment and track performance of all students and subgroups of students (e.g., racial/ethnic groups, students with disabilities, migrant students) against these goals. By the end of 12 years, all schools should have reached 100 percent proficiency—that is, all children in the school must pass the state test. In order to help students reach these goals, NCLB also requires that every student be taught by a "highly qualified" teacher, defined as a teacher holding a bachelor's degree, being fully licensed or certified by the state with no certification or licensure requirements waived on an emergency, temporary, or provisional basis, and with demonstrated subject matter competence in the subject he or she teaches.[1]

Schools where students perform well on the assessments may be rewarded to reinforce good practice. Schools where students perform poorly are sanctioned[2] and offered assistance in order to lead them to change practice and improve their services to students. While all states must adopt these basic components, they can be and are operationalized in many different ways.

---

[1] In March 2004, the Department of Education announced new flexibility in its highly qualified teacher requirements for teachers who teach multiple subjects, particularly rural and experienced teachers, and teachers of science.

[2] Schools that fail to make adequate yearly progress face escalating sanctions over time, such as being required to offer school choice or supplemental services and may include, among others, decreased decisionmaking; reconstituting the school staff; instituting a new curriculum based on scientifically based research; extending the school year or school day; and appointing an outside expert to advise the school.

In fact, research has shown that there is considerable variation among states in how the elements of standards-based accountability are implemented. For instance, several national organizations have reviewed existing state standards and reported wide variation in rigor and specificity of standards (Rothman, et al. 2002; Education Week, 2002; Finn & Petrilli, 2000). Difficulty of state assessments also varies—both in content and proficiency cut-scores (Kingbury et al, 2003; McCombs & Kirby, et al., 2004). States have also taken different approaches to meet the highly qualified teacher requirements of NCLB for veteran teachers (National Council for Teacher Quality, 2004; EdWeek, 2004). These differences are likely to affect how SBA is implemented in schools and its potential impact on student performance. For example, lack of specificity in published standards may exacerbate the tendencies of many teachers to pay more attention to state tests than to standards (Stecher et al.,2000). In addition, perceptions regarding the quality of the standards and assessments throughout the system will impact how districts, principals, and teachers react.

Data and Methods

The results presented in this paper primarily rely on the superintendent, principal, and teacher survey reports from the 2003-04 school year. In a few cases, we supplement survey data with information gained from interviews with state officials and district superintendents. For the surveys, state-specific weights were generated to make the responses reflect the state as a whole. The weights reflect both the sample design for each state and the patterns of survey non-response. As a result, the statistics reported here represent estimates of the responses of superintendents, principals and teachers statewide.

Table 1 provides the sample sizes for the estimates reported. In California, a larger percentage of districts declined to participate than in Georgia or Pennsylvania. As a result, the California sample was smaller than the sample in the other two states. Note that due to the nested sampling strategy employed by the study (in which teachers

and principals are nested within schools and schools are nested within districts) the number of responses grows progressively smaller as we move from teachers to principals to superintendents. As a result, the summary statistics based on teacher responses are more precise than those based on principal responses, which are more precise than those based on superintendent responses. Throughout the paper we include standard errors in tables presenting the survey results. For further detail regarding the methods and data used in the ISBA study, please refer to the introductory paper in this symposium.

Table 1. Sample Sizes for Each State

	California	Georgia	Pennsylvania
Districts			
Sampled	40	32	32
Agreed to participate in the study	19	25	24
Superintendents responding to survey	18	20	22
Superintendents participating in interviews	15	12	16
Elementary Schools			
Sampled	45	58	58
Agreed to participate in the study	35	52	54
Principals responding to survey	27	44	50
Teachers sampled within cooperating schools	361	684	619
Teachers responding to survey	262	588	548
Middle Schools			
Sampled	33	58	45
Agreed to participate in the study	28	56	42
Principals responding to survey	24	44	38
Teachers sampled within cooperating schools	331	838	454
Teachers responding to survey	225	730	378

Note: Schools that included both elementary and middle-level grades (e.g., K-8 schools) are included in both the middle and the elementary school samples. Note, however, that the estimates reported here are based only on teachers in the relevant grades (e.g., the middle school estimates include only teachers in grades 6 through 8).

Research Questions

This paper is based on first-year survey results from the ISBA study. It addresses several descriptive questions about how superintendents, principals, and teachers view standards and assessments and how districts and schools are responding to the new highly qualified teacher requirements set forth under NCLB. We address the following research questions:

- To what extent are principals and teachers familiar with state content standards? To what extent do they find them useful?
- What are superintendents', principals', and teachers' views regarding the state assessments?
- What impact has the new highly qualified teacher provision had on districts and schools? What strategies have they taken to ensure compliance with the law?

Where applicable, we discuss differences in responses based on school or district-level characteristics such as AYP status or school-level poverty.

Content Standards

Content and performance standards define the goals for the educational system. Schools are expected to use these statements about "what students should know and be able to do" to establish policies regarding curriculum, professional development, and other school functions, and teachers are expected to use them to guide instructional planning. Like the majority of states, California, Georgia, and Pennsylvania had already adopted content standards in certain grades and subjects prior to NCLB—however, currently there are differences in covered grades by subjects among the states (Table 2).

California's content standards outline the skills, knowledge, and abilities that all students should master at each grade level of their public schooling for a number of content areas, including (among others) English/language arts, mathematics, science, history and social science, and visual and performing arts. Georgia's state standards

(Quality Core Curriculum, or QCC) outline the skills and knowledge that students should possess in English language arts, mathematics, science, social studies, foreign languages, fine arts, health, physical education, technology/career education, and agriculture. The QCC contains grade-by-grade standards for grades K–8 and grade cluster standards for 9–12. Georgia is currently revising the QCC, as officials were concerned that the standards covered too much content and in not enough depth. Georgia's new standards—the Georgia Performance Standards—are being phased in starting in 2005-2006. Pennsylvania's academic standards define what students should know and be able to do in reading, writing, speaking, listening, and mathematics in grades 3, 5, 8, and 11 (which are tested grades) and science in grades 4, 7, 8, and 12. The state is currently in the process of expanding these to cover all tested grades and subjects under NCLB.

Table 2. Content Standards in English Language Arts, Mathematics, and Science, by State and Grade Level

State	English Language Arts	Mathematics	Science
California	K-12	K-12	K-12
Georgia	K-8, High school	K-8, High school	K-8, High school
Pennsylvania	3, 5, 8, and 11	3, 5, 8, and 11	4, 7, 8, and 12

In addition to the reach of the standards across grade levels, a number of factors will influence the degree to which content standards influence classroom instruction including principals' and teachers' familiarity with the standards and their perceptions regarding the quality and usefulness of the standards.

Familiarity with Standards. Almost all principals responded that they were at least familiar with the main points of the content standards in mathematics, science, and English language arts. At the elementary level, a majority of principals in all the states reported having a thorough understanding of the standards in mathematics and English language arts (Table 3). However, elementary school principals were less likely to

report having a thorough understanding of standards in science—33 percent in California, 54 percent in Georgia, and 43 percent in Pennsylvania. This trend held for middle school principals as well.

Table 3. Percentage of Principal Reporting Having a Thorough Understanding of Content Standards

	California		Georgia		Pennsylvania	
	Elementary	Middle	Elementary	Middle	Elementary	Middle
Mathematics content standards	59 (12)	48 (12)	66 (11)	57 (9)	82 (7)	53 (13)
Science content standards	33 (15)	21 (12)	54 (11)	54 (9)	43 (11)	39 (12)
English language arts content standards	70 (13)	62 (10)	71 (9)	58 (9)	76 (8)	57 (13)

Note: Response options included: never heard of them, heard of them but don't know much about them; familiar with the main points but not the details; have a thorough understanding of them

Similar to the principals, almost all teachers who teach a given subject reported being at least familiar with that subjects' content standards. However, we find differences among the percentage of teachers who reported having a thorough understanding of the content standards (Table 4). In California, middle school mathematics and science teachers were significantly more likely to report having a thorough understanding of content standards compared to elementary teachers. In Georgia, 80-85 percent of teachers, across all subject and school levels, reported being very familiar with the standards. The percentages were much lower in Pennsylvania--only 61-64 percent of mathematics teachers reported being very familiar with with the mathematics standards and the figures were even lower for science teachers, with only 20 percent of elementary teachers and 48 percent of middle school teachers reporting having a thorough understanding of the science standards. This finding is not surprising, given that Pennsylvania's science standards only cover a few grades and have not yet been subject to the state assessment.

Table 4. Percentage of Teachers Reporting Having a Thorough Understanding of Content Standards

	California		Georgia		Pennsylvania	
	Elementary	Middle	Elementary	Middle	Elementary	Middle
Mathematics content standards	74 (4)	84 (4)	85 (2)	81 (3)	66 (4)	61 (5)
Science content standards	47 (6)	71 (6)	80 (3)	83 (3)	20 (3)	48 (9)

Notes: Standard errors are in parentheses.
Percentages reflect only teachers who taught the given subject.
Response options included: never heard of them, heard of them but don't know much about them; familiar with the main points but not the details; have a thorough understanding of them

Quality of Standards. Mathematics and science teachers were asked their views regarding the quality of standards in the subject they taught. Specifically, we asked teachers if the standards were too broad, covering more content than could be covered in a year; if they did not cover some important content areas; and if they were well-balanced across subject areas (Table 5). The majority of mathematics teachers in all three states reported that the mathematics standards included more content than could be adequately covered in the school year, while only a small proportion of teachers reported that the standards failed to cover some important content areas. Middle school teachers in Pennsylvania were significantly more likely to report that the standards failed to cover some important content areas compared with elementary school teachers (30 percent compared with 15 percent). Approximately three-quarters of elementary mathematics teachers reported that the standards are well-balanced across subject area. Reports from middle school teachers were only slightly lower.

While the reports of elementary school teachers and middle school teachers were relatively consistent with one another regarding the mathematics standards, this was not the case for science standards. For instance, in each of our states, middle school teachers were more likely than elementary school teachers to report that science standards included more content than can be covered in the school year. While not shown in Table 5, the percentage of science teachers in Pennsylvania reporting that they "did not

know" to the questions about the science standards was quite high across both grade levels—35 to 42 percent. This may be due to the fact that Pennsylvania has only adopted science standards in grades 4, 7, 8, and 12 and does not administer a science assessment.

Table 5. Percentage of Teachers Agreeing with Statements Regarding the Quality of Content Standards

	California		Georgia		Pennsylvania	
	Elementary	Middle	Elementary	Middle	Elementary	Middle
Mathematics standards include more content than can be covered adequately in the school year	83 (3)	86 (3)	70 (3)	84 (2)	74 (4)	79 (6)
Mathematics standards are well- balanced across subject	75 (5)	73 (5)	77 (2)	73 (3)	79 (4)	68 (6)
Mathematics standards do not cover some important content areas	15 (2)	23 (5)	22 (2)	27 (2)	15 (3)	30 (6)
Science standards include more content than can be covered adequately in the school year	60 (6)	74 (5)	56 (3)	82 (2)	49 (4)	78 (3)
Science standards are well-balanced across subject	82 (4)	64 (6)	77 (3)	71 (3)	49 (40)	64 (5)
Science standards do not cover some important content areas	15 (4)	40 (7)	35 (3)	29 (3)	19 (4)	33 (6)

Note: Standard errors are in parentheses.
Response options included: strongly disagree, disagree, agree, strongly agree, I don't know

Usefulness of Standards. Almost all principals at both school levels reported that content standards were moderately or very useful for guiding decisions about the school's curriculum, and the majority in all three states found them very useful (Table 6). Principals in California were particularly likely to report that the standards were very useful—over 90 percent reported this in each of the subjects. In light of the status of Pennsylvania's science standards, it is not surprising that principals in Pennsylvania were less likely to find science content standards useful in guiding school curriculum decisions, compared with content standards in mathematics and English language arts.

For example, at the elementary school level 57 percent of principals reported that science content standards were very useful in guiding their decisions, compared with 83-87 percent of principals when asked about English language arts and mathematics standards.

Table 6. Percentage of Principals Reporting that Standards Were Very Useful for Guiding Decisions about the School Curriculum

	California		Georgia		Pennsylvania	
	Elementary	Middle	Elementary	Middle	Elementary	Middle
Mathematics content standards	93 (4)	95 (4)	79 (6)	71 (8)	87 (5)	76 (10)
Science content standards	93 (4)	98 (2)	76 (7)	61 (7)	57 (11)	67 (11)
English language arts content standards	93 (4)	95 (4)	84 (6)	68 (8)	83 (6)	76 (10)

Note: Standard errors are in parentheses.
Response options included: not at all useful, somewhat useful, moderately useful, very useful, I don't know

We asked mathematics and science teachers if they agreed that the content standards were useful for planning lessons. The vast majority of mathematics and science teachers in California (83-92 percent) and Georgia (89-92 percent) agreed or strongly agreed that the standards were useful for planning lessons. In Pennsylvania, perhaps due to the incomplete grade-coverage of the standards, combined with the lack of related science assessments, teachers were far less likely to report that the standards were useful—67-78 percent in mathematics and only 40-58 percent in science.

Table 7. Percentage of Teachers Reporting that Standards Were Useful for Planning Lessons

	California		Georgia		Pennsylvania	
	Elementary	Middle	Elementary	Middle	Elementary	Middle
Mathematics content standards	93 (2)	83 (5)	92 (1)	89 (2)	78 (3)	67 (7)
Science content standards	86 (3)	86 (3)	90 (2)	92 (2)	40 (3)	58 (6)

Note: Standard errors are in parentheses.
Response options included: strongly disagree, disagree, agree, strongly agree, I don't know

Influence of Standards on Teaching. Not surprisingly, almost all teachers in California and Georgia reported that they had aligned their instruction with content standards in mathematics and science (Table 8). Mathematics teachers in Pennsylvania tended to report aligning instruction with the state content standards (85-90 percent). However, as we would expect, only 42 percent of elementary science teachers in Pennsylvania reported aligning their instruction with the state content standards. Interestingly, 77 percent of middle school science teachers in Pennsylvania reported aligning their instruction with state content standards – a higher percentage than reported that the standards were useful for planning instruction.

Table 8. Percentage of Teachers Reporting Aligning Their Instruction with State Content Standards

	California		Georgia		Pennsylvania	
	Elementary	Middle	Elementary	Middle	Elementary	Middle
Mathematics content standards	97 (1)	96 (2)	95 (1)	94 (1)	90 (2)	85 (5)
Science content standards	87 (3)	91 (3)	95 (1)	95 (1)	42 (5)	77 (6)

Note: Standard errors are in parentheses.
Response options included: strongly disagree, disagree, agree, strongly agree, I don't know

Assessment

As with content standards, the three states differ in the number of grades and subjects in which state standards-based assessments are administered (Table 9). California administers the California Standards Tests (CST) to students in grades 3-11 in

mathematics and English language arts. Students in grade 5 take a science assessment, and high school students in grades 9-11 take end-of-course science assessments. Students in grades 8, 10, and 11 are tested in history and social science. In addition, the state administers the California High School Exit Examination, a criterion-referenced assessment that the state reports as aligned with state standards, for students in grade 10 or higher. Passage of this high school exit exam will be required for graduation starting in 2006. The testing system was authorized in 1997, so it has been in place for a number of years.

Georgia administers the Criterion Referenced Competency Tests (CRCT) to students in grades 1-8 in reading, English/language arts and mathematics, while students in grades 3-8 also take the CRCT in science and social studies. However, in 2002-2003 (a testing year about which our surveys specifically asked teachers), there were technical problems with the assessment, so only students in grades 4 and 8 were tested. Georgia is phasing in promotion gates based on the CRCTs in certain grades. In 2003-2004, third-grade students were required to pass the reading CRCT in order to be promoted to fourth grade, and in 2004-2005, fifth-grade students will be required to pass the mathematics CRCT to advance to sixth grade. Georgia also has a high school graduation test.

Table 9. State Criterion-Referenced Assessments English Language Arts, Mathematics, and Science, by State and Grade Level

State	English Language Arts	Mathematics	Science
California	3-11	3-11	5, High school end-of-course assessments (9-11)
Georgia	1-8, High school end-of-course assessments	1-8, High school end-of-course assessments	3-8, High school end-of-course assessments
Pennsylvania	3, 5, 8, and 11	3, 5, 8, and 11	4, 7, 8, and 12

Pennsylvania administers the Pennsylvania System of School Assessment (PSSA) in reading and mathematics to students in grades 3, 5, 8 and 11 and administers the PSSA in writing to students in grades 6, 9 and 11. Currently, Pennsylvania does not test in science.

Perceptions of Validity. Superintendents and principals were asked whether they felt that state test scores accurately reflected the achievement of the students in their district/school. Almost all superintendents in California and 78 percent of superintendents in Georgia thought that test results were an accurate reflection of student performance, compared with only 32 percent of superintendents in Pennsylvania. Similarly, principals in California and Georgia (60-78 percent) were more likely to agree with this statement than were principals in Pennsylvania (29-58 percent). We were told during state interviews in Pennsylvania that there is considerable debate within the state regarding the appropriateness of the proficiency levels on the PSSA. Many consider them too difficult, which is consistent with these results.

Table 10. Percentage of Superintendents and Principals Agreeing that State Assessment Scores Accurately Reflect Student Achievement

	California	Georgia	Pennsylvania
District superintendent	95 (5)	78 (10)	32 (11)
Elementary school principal	65 (12)	78 (5)	58 (11)
Middle school principal	70 (13)	60 (8)	29 (11)

Note: Standard errors are in parentheses.
Response options included: strongly disagree, disagree, agree, strongly agree

In Pennsylvania, district superintendents from districts that did meet AYP were significantly more likely to agree or strongly agree that test scores accurately reflected student achievement than were superintendents from district that did not meet AYP – 58 percent compared with 5 percent.

Teachers were asked a similar question—To what extent is the state assessment a good measure of students' mastery of content standards? Teachers were not as

sanguine as superintendents and principals in their responses (Table 11). In California, only 38-39 percent of mathematics teachers and 22-28 percent of science teachers reported that the assessment was a good measure of students' mastery of the content standards.

A little over half of the mathematics teachers in Georgia (55-56 percent) reported the CRCT was a good measure and only 43-46 percent of science teachers reported this. In Pennsylvania, of the mathematics teachers who taught a tested grade, only 36-42 percent believed that the PSSA was a good measure of students' mastery of content standards.

One reason why teachers may believe the state assessments are not good measures of students' mastery of content standards is because they believe that the state assessment is too difficult for the majority of their students. In California, middle school teachers were significantly more likely to report this than elementary school teachers. For example, 70 percent of middle school mathematics teachers reported that the test was too difficult for the majority of their students, compared with 48 percent of elementary mathematics teachers. In Georgia, only 27 percent of elementary mathematics teachers reported that the CRCT was too difficult for the majority of their students; however 48 percent of middle school mathematics teachers and 44-52 percent of science teachers did so. The majority of mathematics teachers in Pennsylvania reported that the PSSA was too difficult for the majority of their students—65 percent of elementary teachers and 74 percent of middle school teachers. This finding for Pennsylvania is consistent with what we heard from state officials regarding concerns about the difficulty of the PSSA.

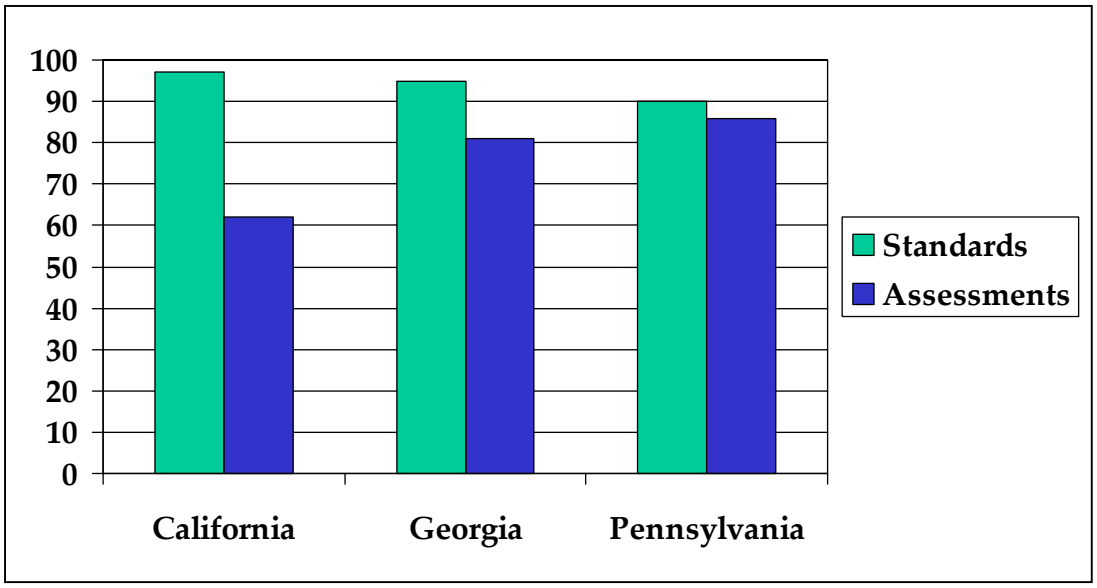
Table 11. Percentage of Teachers Agreeing to Statements Regarding the Quality of the State Assessments

	California		Georgia		Pennsylvania	
	Elementary	Middle	Elementary	Middle	Elementary	Middle
The mathematics assessment:						
Is a good measure of students' mastery of content standards	38 (3)	39 (5)	56 (3)	55 (3)	42 (6)	36 (7)
Is too difficult for the majority of my students	48 (5)	70 (5)	27 (3)	48 (3)	65 (5)	74 (6)
Includes considerable content that is not in our curriculum	27 (5)	39 (6)	19 (2)	24 (3)	36 (6)	43 (5)
Omits considerable content that is in our curriculum	30 (5)	38 (4)	26 (3)	34 (3)	23 (4)	37 (4)
I feel a great deal of pressure to improve my students score on the mathematics assessment	77 (3)	79 (4)	85 (3)	89 (2)	92 (3)	94 (3)
I have aligned my teaching with the mathematics assessment	62 (5)	65 (4)	81 (3)	80 (3)	86 (3)	85 (4)
The science assessment:					NA	NA
Is a good measure of students' mastery of content standards	28 (7)	22 (16)	46 (4)	43 (3)		
Is too difficult for the majority of my students	61 (7)	86 (9)	45 (3)	52 (4)		
Includes considerable content that is not in our curriculum	37 (10)	52 (7)	32 (3)	33 (3)		
Omits considerable content that is in our curriculum	26 (8)	18 (12)	29 (3)	43 (4)		
I feel a great deal of pressure to improve my students score on the science assessment	58 (8)	66 (9)	60 (3)	86 (2)		
I have aligned my teaching with the science assessment	42 (7)	60 (5)	82 (2)	79 (3)		

Note: Standard errors are in parentheses
Only teachers who taught a tested grade are included in this table. While this includes all the teachers in our sample for California and Georgia, it only includes mathematics teachers who taught students in grades 3, 5, and 8 in Pennsylvania.
Response options included: strongly disagree, disagree, agree, strongly agree, I don't know
Pennsylvania does not currently administer a state assessment in science.

Aligning Teaching with Assessments. Regardless of teachers' beliefs regarding how well the state assessments measure students' mastery of content standards, the majority of mathematics teacher reported aligning their teaching with the mathematics assessment—62-65 percent in California; 80-81 percent in Georgia; and 85-86 percent in Pennsylvania (Table 11). And an even greater percentage of teachers reported that they felt pressure to improve student scores on mathematics assessments. However, more teachers reported aligning their instruction with content standards than reported aligning instruction with the state assessment, particularly in California (Figure 1).

Figure 1. Percentage of Mathematics Teachers Reporting Aligning Instruction with Standards and Assessments



Many science teachers in California and Georgia reported feeling pressure to improve student scores on the science assessment; though these percentages were lower than those reported in mathematics. In Georgia, the majority of science teachers reported aligning instruction to the science CRCT (79-82 percent). In California, middle school science teachers were significantly more likely to report such alignment than elementary school teachers (60 percent compared with 42 percent).

Highly Qualified Teachers

Persuasive evidence exists showing that teacher quality matters, that teachers have discernible, differential effects on student achievement, and that these teacher effects appear to persist across years. In an analysis of the value-added literature surrounding teacher quality, McCaffrey et al (2004) concluded that, while the several studies had shortcomings, they also provided evidence that teachers have measurable and differential effects on student achievement. The highly qualified teacher provisions of NCLB are intended to ensure that students have access to competent, knowledgeable teachers. NCLB requires that by 2005-06 all students be taught by a "highly qualified" teacher meaning that teachers must:

1. Hold a college degree
2. Be fully certified or licensed in the state and
3. Demonstrate content knowledge in the subject they are teaching. Content knowledge may be demonstrated in the following ways:
    a. New elementary teachers must pass a state test of literacy and numeracy
    b. New secondary teachers must pass a test or have a college major in that subject
    c. Veteran teachers may either pass the state test, have a college major, or demonstrate content knowledge through a High Objective Uniform State Standard of Evaluation (HOUSSE) a uniformly applied process designed by the state.

However, previous research suggests that the highly qualified teacher requirements may not lead to improved student learning gains. There is little consensus about the relationship between specific teacher credentials (e.g., experience and degree level) and teacher effectiveness. In fact, prior research has found that the teacher attributes such as certification status, degree and experience levels are not strongly

correlated with student learning gains (Goldhaber and Brewer 2000; Hanushek 1986, 1997). Further, "highly qualified" status often hinges on state licensing and testing requirements that vary in rigor or, in the case of veteran teachers on alternative means of proving subject-matter mastery that also vary widely. It is possible that state highly qualified teacher goals may be met without any changes in how well teachers are prepared, recruited, or supported (Keller, 2004).

State Responses. Our three states have responded in different ways to the highly qualified teacher provisions. Both California and Georgia give veteran teachers who are not considered "highly qualified," the choice to take a test to prove subject-matter expertise or go through the state's HOUSSE evaluation procedures. HOUSSE evaluation requirements may be met through years of teaching experience in the content area; college coursework; activities related to the content area at the school or district, regional, state, or national level; scholarship in the content area; "and/or teacher effectiveness." Pennsylvania has not adopted a HOUSSE evaluation system. Instead, Pennsylvania is requiring teachers to pass subject matter tests in order to obtain certification.

The states are also starting from different positions relative to the new requirements. Pennsylvania trains more teachers than it hires, which has made it easy for the state to recruit teachers. In 2003, 95 percent of teachers in Pennsylvania were highly qualified; 93 percent were highly qualified in high-poverty school districts (Education Trust, 2004). According to Pennsylvania state officials, the primary problem Pennsylvania has faced is with middle school teachers. Like many states, Pennsylvania allows teachers with elementary certification to teach in the middle grades (7 and 8). All these teachers now need to be certified in a subject area. Similarly, in 2003, 94 percent of teachers in Georgia were highly qualified (Education Trust, 2004). On the other hand, in 2003, California reported that 48 percent of teachers and 35 percent of teachers in high-poverty schools were highly qualified (Education Trust, 2004). California has a large number of teachers on emergency or temporary credentials, in part due to the class

size reduction policy in the 1990s. This resulted in approximately 30,000 new teachers being hired, many of whom were not credentialed, so these results are not surprising. Like other states, compliance problems in California are particularly acute in middle, small, rural, and alternative schools, as well as in the area of special education.

District Strategies. In our telephone interviews with district officials we asked what they were doing to address the highly qualified teacher provisions. The response of the 33 officials who were responsible for implementing the highly qualified teacher provisions varied significantly by state. Note that responses are not mutually exclusive. In many cases, districts were taking multiple actions—for instance, asking some teachers to take the state certification test and asking other teachers to go back for additional coursework.

In California, six of the 14 California officials we interviewed who reported that their district needed to take action so that all teachers would be highly-qualified noted that they were waiting for the state to clarify the HOUSSE regulations for qualifying practicing experienced teachers and five officials noted that the district was relying on HOUSSE to qualify teachers. Three California officials noted that they were relying on teachers taking the state test while four were relying on providing opportunities for teachers to get professional development or take additional coursework.

The majority of district officials in Georgia (7 of 8 respondents) noted that they were supporting teachers' participation in additional coursework or professional development; half noted that they were asking teachers to take the state test; and one district official said that they were using the state's HOUSSE procedures to certify teachers as highly qualified.

Pennsylvania leaders were relying primarily on teachers taking the state certification test (8 out of 11 officials) and only one district noted that it was offering or requiring additional coursework or professional development.

Most often districts were offering monetary support to teachers who needed to take additional coursework or pass the state test, and some districts offered study groups and mini-courses for teachers who were studying to take the state test.

Impact on Hiring and Retention. In our survey, we asked district superintendents the extent to which the highly qualified teacher provisions of NCLB have made it more difficult to hire or retain teachers (Table 12). About a third of superintendents in California reported that the new requirements made it more difficult (to a moderate or great extent) to hire and retain teachers. Georgia superintendents reported that the requirements have made it relatively more difficult to hire (26 percent) than to retain (17 percent) teachers. Comparatively, superintendents in Pennsylvania reported the least negative impact—only 11-13 percent reported increased difficulty in retaining teachers or hiring new teachers.

Table 12. Percentage of Superintendents Reporting Moderate or Greater Difficulty Hiring and Retaining Teachers Due to NCLB Requirements

	California	Georgia	Pennsylvania
Retain existing teachers	34 (14)	17 (9)	11 (7)
Hire new teachers	38 (14)	26 (11)	13 (7)

Note: Standard errors are in parentheses.
Response options included: not a hindrance, a minor hindrance, a moderate hindrance, a major hindrance

Superintendents were also asked the extent to which it was difficult to hire or retain certain types of teachers under NCLB. California superintendents were most likely to report greater difficulties (to a moderate or great extent) hiring or retaining middle school teachers (73 percent) compared with elementary school teachers (15 percent) or high school teachers (47 percent). In Georgia, superintendents reported increasing difficulties by school level—41 percent reported greater difficulty hiring elementary school teachers; 51 percent reported greater difficulty hiring middle school

teachers; and 61 percent reported greater difficulty hiring high school teachers. In Pennsylvania, no superintendents reported increased problems with hiring or retaining elementary school teachers and only 15 percent reported increased problems with high school teachers; however, 52 percent reported moderate or great difficulties hiring or retaining middle school teachers.

Table 13. Percentage of Superintendents Reporting Greater Difficulty Hiring or Retaining Certain Types of Teachers Due to NCLB Requirements, to a Moderate or Great Extent

	California	Georgia	Pennsylvania
Elementary school teachers	15 (8)	41 (14)	0
Middle school teachers	73 (11)	51 (14)	52 (13)
High school teachers	47 (26)	61 (14)	15 (7)
English language arts teachers	46 (15)	39 (14)	6 (4)
Mathematics teachers	66 (12)	66 (13)	17 (9)
Science teachers	66 (12)	68 (13)	26 (11)

Note: Standard errors are in parentheses.
Response options included: easier, no change, slightly more difficulty, considerably more difficulty

With respect to subject area teachers, superintendents were most likely to report having greater difficulties hiring and retaining mathematics and science teachers than English language arts teachers under NCLB requirements. A much greater percentages of superintendents reported these difficulties in California and Georgia than in Pennsylvania.

School Strategies. We asked principals whether or not they took certain actions in order to comply with the highly qualified teacher provisions under NCLB (Table 14). Answers differed both by state and by school level. In Pennsylvania, 63 percent of elementary school principals reported taking no action to comply with the highly qualified teacher provisions, while only 15 percent of middle school principals reported no action. In Georgia, only 30 percent of elementary principals and 3 percent of middle

school principals took no action. In California, a mere 10 percent of elementary school principals and 4 percent of middle school principals did nothing

Table 14. Percentage of Principals Who Did Not Take Any Actions to Comply with the Highly Qualified Teacher Provisions of NCLB

	California	Georgia	Pennsylvania
Elementary school principals	10 (5)	30 (7)	63 (8)
Middle school principals	4 (4)	3 (2)	15 (8)

Note: Standard errors are in parentheses.
Response options included: yes, no

Of those reporting taking some action due to the highly qualified teacher provision, the most common action was to impose stricter hiring rules (with the exception of elementary school principals in Pennsylvania), to require current teachers to pass subject matter tests, and to require current teachers to obtain certification (Table 15). At the middle school level, 47 percent of principals in California and 61 percent of principals in Georgia reported changing classroom assignments. Increasing class size, firing or transferring teachers, and using substitute teachers were less-frequently used strategies.

When asked if a shortage of highly qualified teachers was a hindrance to efforts to improve student performance, over half (54 percent in California, 69 percent in Georgia, and 84 percent in Pennsylvania) of elementary school principals responded that it was not a hindrance while approximately half of all middle school principals in all three states responded that it was not a hindrance.

Table 15. Percentage of Principals Reporting Taking Specific Actions to Meet Requirements for Highly Qualified Teachers

	California		Georgia		Pennsylvania	
	Elementary	Middle	Elementary	Middle	Elementary	Middle
Change classroom assignments	7 (7)	47 (15)	38 (11)	61 (8)	16 (11)	25 (11)
Increase class size	2 (2)	0	13 (7)	7 (5)	5 (3)	8 (6)
Impose stricter hiring rules	83 (10)	83 (7)	62 (8)	74 (7)	26 (10)	78 (9)
Increase use of substitute teachers	0	6 (4)	5 (5)	0	12 (9)	10 (5)
Require current teachers to obtain certification	80 (9)	79 (6)	67 (10)	81 (7)	72 (12)	81 (8)
Fire/transfer teachers who are not highly qualified	17 (9)	15 (6)	18 (8)	27 (8)	5 (5)	17 (9)
Require current teachers to pass subject matter tests	35 (11)	56 (8)	53 (10)	68 (8)	52 (16)	60 (16)

Note: Standard errors are in parentheses.
Response options included: yes, no

Conclusion

Our initial results show both similarities and differences among states in the approach to and effects of standards, assessment, and highly qualified teacher provisions, and each state's pre-NCLB "starting-point" appears to greatly influence the impact of NCLB's requirements around standards, assessment, and highly qualified teachers. For instance:

- Familiarity with standards among principals and teachers tended to be high, though slightly more so in mathematics than in science. However, in Pennsylvania familiarity and perceived usefulness of the science standards was relatively low. This may be due to the fact that Pennsylvania has only adopted science standards in certain grades, and unlike California and Georgia, does not yet administer a state assessment in science. It will be interesting to track how these responses change as additional standards are adopted and assessment are administered.

- Perceptions regarding the validity of state assessments varied by state—almost all superintendents in California and 78 percent of superintendents in Georgia thought that test results were an accurate reflection of student performance, compared with only 32 percent superintendents in Pennsylvania. Similarly, principals in California and Georgia (60-78 percent) were more likely to agree with this statement than were principals in Pennsylvania (29-58 percent). We were told during state interviews that there is considerable debate within the state regarding whether the proficiency levels on the PSSA are appropriate—many consider them too difficult, which is consistent with these results. In general, teachers across all states were not as sanguine about the validity of state assessments.

- Regardless of teachers' beliefs regarding how well the state assessments measure students' mastery of content standards, the majority of mathematics teachers reported aligning their teaching with the mathematics assessment—62-65 percent in California; 80-81 percent in Georgia; and 85-86 percent in Pennsylvania. And an even greater percentage of teachers reported that they felt pressure to improve student scores on mathematics assessments. However, more teachers reported aligning their instruction content standards than reported aligning instruction with the state assessment, particularly in California.

- The highly qualified teacher requirements of NCLB have had a differential impact on the states. Districts and principals in Pennsylvania, which trains more teachers than it hires, report fewer problems and changes in hiring practices due to the new requirements compared with Georgia and California. However, district officials in all the states report that the requirements have had a greater impact on teachers in middle schools (which had been certified as generalists pre-NCLB in most states) and in hiring or retaining science and mathematics teachers.

REFERENCES

Blank, R.K. (2003). *Meeting NCLB Goals for Highly Qualified Teachers: Estimates by State from Survey Data*. Council of Chief State School Officers: Washington, D.C.

Finn, C., & Petrilli, M. (Eds.). (2000, January). *The State of State Standards 2000*. Washington, DC: Thomas B. Fordham Foundation.

Goldhaber, D. D. & Brewer, D. J. (2000). "Does Certification Matter? High School Teacher Certification Status and Student Achievement." *Education Evaluation and Policy Analysis, 22*(2), 129-145.

Hanushek, E. A. 1986. "The Economics of Schooling: Production and Efficiency in Public Schools." Journal of Political Economic Literature 24(13): 1141-1177.

Hanushek, E. A. 1997. "Assessing the Effects of School Resources on Student Performance: An Update." *Educational Evaluation and Policy Analysis* 19(2): 141-164.

Kingsbury, G. G., Olson, A., Cronin, J., Hauser, C., and Houser, R. (2003). *The State of Standards: Research Investigating Proficiency Levels in Fourteen States.* Lake Oswego, Oregon: Northwest Evaluation Association.

McCombs, J.S., Kirby, S.N., Barney, H., Darilek, H., Magee, S. (2004). *Achieving State and National Literacy Goals, A Long Uphill Road: A Report to Carnegie Corporation of New York*. Santa Monica, CA: RAND Corporation. TR-180-EDU.

McKnight, C. C., Crosswhite, F. J., Dossey, J. A., Kifer, E., Swafford, J. O., Travers, K. J., and Cooney, T. J. (1987). The Underachieving Curriculum: Assessing U.S. School Mathematics from an International Perspective. Champaign, Il.: Stipes.

National Council for Teacher Quality (2004). *Searching the Attic: How States are Responding to the National Goal of Placing a Highly Qualified Teacher in Every Classroom*. Washington, DC: National Council for Teacher Quality. December.

National Governors Association. (1989). *Results in Education: 1989*. The Governors 1991 Report on Education. Washington, D.C.

Rothman, R., Slattery, J. B., Vranek, J. L., and Resnick, L. B. (2002). *Benchmarking and Alignment of Standards and Testing*. Los Angeles, Calif.: University of California, National Center for Research on Evaluation, Standards, and Student Testing (CRESST), CSE Tech. Rep. No. 566.

Stecher, B.M., Barron, S.I. Chun, T.J., Ross, K.E. (2000). *The Effects of the Washington State Education Reform on Schools and Classrooms: Initial Findings*. Santa Monica, CA: RAND Corporation. DB-309-EDU.

McCaffrey, D.F., Koretz, D.M., Lockwood, J.R., Hamilton, L.S. (2004). *Evaluating Value-Added Models for Teacher Accountability*. Santa Monica, California: RAND Corporation. MG-158-EDU.

The Education Trust. (2004). *Telling the Whole Truth (or Not).* Washington, DC: The Education Trust.

Travers, K., and Westbury, I. (1989). The IEA Study of Mathematics I: Analysis of Mathematics Curricula. New York: Pergamon.