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**MATHEMATICA**  
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**Teacher  
Licensure  
Exams: How Do  
They Compare?**

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*Duncan Chaplin  
Steven Glazerman  
Gail Baxter  
Elizabeth Seif*

Submitted to:

American Board for Certification of  
Teacher Excellence  
1225 19<sup>th</sup> Street, N.W., Suite 400  
Washington, DC 20036  
Telephone: (202) 261-2620

Project Officer:  
Joshua Boots

Submitted by:

Mathematica Policy Research, Inc.  
600 Maryland Ave. S.W., Suite 550  
Washington, DC 20024-2512  
Telephone: (202) 484-9220  
Facsimile: (202) 863-1763

Project Director:  
Steven Glazerman

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## A. INTRODUCTION

Teacher licensure is a major issue in education reform (Darling-Hammond et al. 2005; Ballou and Podgursky 2000; Decker et al. 2006; Goldhaber and Brewer 2000). At the heart of many debates over licensure is the use of exams to certify individuals to teach (Goldhaber 2005). For many years, state education agencies and local school districts have used exams to measure prospective teachers' knowledge of pedagogy and subject areas, but they have rarely used exam scores as the sole criterion in licensure or hiring decisions.

A recent entry into the field of teacher testing that seeks to provide alternatives to the current licensure process is the American Board for Certification of Teacher Excellence (ABCTE). ABCTE's novel proposal uses teacher exams as the centerpiece of licensure, requiring the same passing score (cut score) nationwide to create a portable credential known as the Passport to Teaching. ABCTE has developed exams in pedagogy and several subjects, but the exams are still relatively new; they were first released in 2003. Six states recognize American Board certification, and others are considering recognizing the credential for alternative or regular licensure, but policymakers will likely require solid evidence on validity and reliability before adopting ABCTE certifications more widely.

In summer 2005, ABCTE selected Mathematica Policy Research, Inc. (MPR), to conduct longitudinal research on the certification program's effectiveness. As part of that effort, we conducted a study comparing 104 individuals' performance on the ABCTE exams with their performance on the more widely used Praxis II teacher assessments, administered by the Educational Testing Service (ETS), which we refer to simply as the Praxis throughout this report.<sup>1</sup>

We focused on three exams: one in pedagogy and two in subject areas, including "elementary education" (which includes multiple subjects such as math, reading, history, and science) and secondary math. Many states require that teacher candidates pass the Praxis versions of these exams as part of certification. Thirty-seven states require that teachers pass at least one of the Praxis tests covered in our study in order to be certified in those subjects. Almost all of these states require the content exam for secondary math, more than half require the pedagogy exam (the Principles of Learning and Teaching), and 24 require the Elementary Education Content Exam. In all cases, each state sets the Praxis passing score, which varies widely across states.

We compared performance on each of the above Praxis exams to performance on the corresponding ABCTE exams: Professional Teaching Knowledge, Elementary Education in Multiple Subjects, and Secondary Math. We paid special attention to the performance levels

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<sup>1</sup> The Praxis series of teacher assessments includes Praxis I, which covers basic academic skills and is typically taken by those entering teacher preparation programs; Praxis II (used in this study), which covers general and subject-specific knowledge and teaching skills and is typically taken by those about to enter the teaching profession; and Praxis III, which assesses classroom performance by direct observation and is typically given to practicing teachers.

relative to the cut scores needed for passing these exams. Because Praxis cut scores vary by state, we examined the lowest cut score in the nation (least stringent) and the highest cut score in the nation (most stringent).<sup>2</sup>

The goal of this study is to understand the relationship between the Praxis and ABCTE exams. Specifically, we sought to answer the following research questions:

1. Is performance on the ABCTE exams for math, elementary education, and pedagogy aligned with performance on the corresponding Praxis exams? To address this question, we examine the statistical association between the two sets of scores.
2. Are the ABCTE exams more difficult than the corresponding Praxis exams? To address this question, we compare pass rates, i.e., the percentages of the study sample that scored above each of the cut scores set by states for Praxis and by ABCTE nationally.

We found that those who scored higher on ABCTE exams also tended to score higher on the corresponding Praxis exams. In addition, test takers who passed the ABCTE exams were more likely to pass the corresponding Praxis exams than those who failed the ABCTE exams, although the association was not equally strong for all three test subjects. The correlations between ABCTE and Praxis scores were 0.73 for both the math and elementary education subject exams. The correlation for pedagogy scores was 0.30.

We also found that, for at least some states, the ABCTE exams were harder to pass than those the corresponding Praxis exams. For the elementary subject exams, nearly all of our study volunteers passed the Praxis based on the cut score for the most stringent state, but only about 60 percent of them passed the ABCTE exam, which suggests that the ABCTE exam is more difficult to pass. On the math and pedagogy exams, the pass rates for ABCTE tests were in between those for the Praxis based on the cut scores for the least and most stringent states.

The rest of this report provides more detail on the findings. Section B describes the data and analysis methods. Section C presents the main results. Section D presents additional analysis and discussion to address possible explanations for the findings. Section E reports our conclusions.

## **B. DATA AND METHODS**

To describe the relationships between the two sets of exams we recruited volunteers to take both sets of exams. Recognizing that the exams are potentially burdensome, we recruited current and potential teachers who had already taken or were scheduled to take one

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<sup>2</sup> See Appendix A for the states that were least and most stringent by subject as well as each state's cut score.

or both sets of exams and then gave them monetary incentives to complete the additional exams needed to have matched pairs. We did not require study participants to take tests in more than one of the three areas (math, elementary education, or pedagogy), but many took the pedagogy exam and one of the subject exams (math or elementary education). None took all three pairs because teacher candidates do not typically seek certification in both secondary math and elementary education.

Table 1 describes the tests used in our study. There are two Praxis exams for pedagogy, one for elementary teachers and one for secondary teachers, but we grouped them together for most of our analyses as states use similar cut scores for the two tests and ABCTE uses one pedagogy test for both elementary and secondary teachers. The ABCTE pedagogy exam includes both writing and multiple-choice sections. This report focuses on the multiple-choice section of the ABCTE pedagogy exam, but we conducted analyses that incorporate the writing part as well.

The study participants were volunteers whom we recruited from two pools. The first pool consisted of individuals who took the ABCTE exam on their own. We recruited these people to take the corresponding Praxis exams. They tended to be either career-changers seeking ABCTE certification in order to enter teaching or existing teachers seeking certification in a new subject area. The second pool of participants took a Praxis exam on their own. We recruited these people to take the corresponding ABCTE exams. They tended to be students or recent graduates of traditional schools of education.<sup>3</sup>

**Table 1. Tests and Sample Sizes by Subject**

Subject	Praxis	ABCTE	Number of Test Takers <sup>a</sup>
Math	Math: Content Knowledge	Math (for secondary math teachers)	39
Elementary	Elementary Education: Content Knowledge	Multiple Subject Exam (for elementary education)	57
Pedagogy	Principles of Learning and Teaching (PLT) for Grades K–6 and PLT for Grades 7–12	The Professional Teaching Knowledge (PTK) Multiple Choice Test	58

<sup>a</sup>Some test takers completed more than one pair of exams. There were 104 test takers in total.

Table 2 describes our sample based on a background information form completed by participants. The test takers are mostly white and mostly female. They have high college grade-point averages and high levels of education. Just over one quarter were still attending

<sup>3</sup> The second group includes six practicing teachers who took an ABCTE exam for a previous study (Boots 2006) and who had already taken the corresponding Praxis exam before that.

college or graduate school. Almost half were teaching when they participated in the study. Almost two-thirds of the sample members were in the first pool of recruits described above; in other words, they took the ABCTE exams on their own and then completed the corresponding Praxis exams for this study. The rest of the participants were in the second group; in other words, they took the Praxis exams on their own and then completed the ABCTE exams for this study or a previous study.

**Table 2. Background Characteristics of Sample**

Characteristic	Mean <sup>a</sup>
Gender (percent female)	66.3
Race/ethnicity	
White	76.0
Black	14.4
Other	9.6
Age (years)	35.2
Attending college or graduate school	26.0
Grade-point average in college (on a scale of 0 to 4)	3.3
Earned master's degree or other graduate degree	20.2
Currently teaching	46.1
Parent education	
Mother earned bachelor's degree	44.2
Father earned bachelor's degree	46.2
At least one parent worked in education	27.9
Exam taken only for this study	
Praxis	63.5
ABCTE	30.8
Neither (took ABCTE for previous study)	5.8
Sample size	104

<sup>a</sup>Numbers are percentages unless otherwise indicated and may not sum to 100 because of rounding.

It is important to keep in mind three methodological concerns when interpreting our study findings. First, our sample of test takers may not be representative of a population of interest. Second, the elapsed time between each person's completion of the two tests may affect relative performance. Finally, the incentives for performing well on the two types of tests may differ in important ways. We took steps to limit the influence of each of these issues and conducted analyses to address them to the extent possible. We also took these issues into account when presenting the overall study findings. We discuss the three concerns below.

First, a possible concern is that a sample of volunteers may not be representative of the main populations of interest: traditional teacher candidates or candidates who would likely



use the certification route provided by ABCTE. For example, the study volunteers may have a different distribution of knowledge or test-taking skills than the target population. However, by recruiting teacher candidates with a range of abilities and preparation backgrounds and requiring that the candidates had already taken or were scheduled to take one of the two exam types, we were able to build a diverse and realistic sample that covers the range of likely test-taking abilities. Even in the case of some differences from an ideal target population, it is unlikely that the differences matter because we are mainly concerned with the performance on the ABCTE exam *relative* to the Praxis, not absolute levels. Our sample members would have to be idiosyncratic in their relative abilities on the two tests in order for study sample recruitment to introduce bias. Furthermore, we probed our data directly and found that accounting for test-taker characteristics did not change the results. For example, we found no statistically significant differences in the ABCTE-Praxis correlations by race or gender for any of the tests studied.

A second potential concern is that the timing of the tests may have affected relative performance levels observed in our study. If the two exams are not taken simultaneously, then the difference in scores or pass rates may reflect more than difference in difficulty, which is what we are trying to measure in this study, but also changes in teacher knowledge over time, as they gain experience or their recollection of facts fades. To mitigate this problem, we chose only candidates who took the exams used in our study during the 27-month period between September 11, 2004, and December 21, 2006. The average time elapsed between pairs of matched tests was six months for the whole sample, about eight or nine months for the candidates who took the ABCTE test for a study (either the present study or Boots 2006) and about three or four months for those who took the Praxis test for the present study. Table 3 summarizes the number of days between administration of the two tests depending on whether participants took the ABCTE or Praxis exam for a study.

**Table 3. Elapsed Time between Completion of Exams**

	Test Taken for Study			
	ABCTE		Praxis	
Subject	N	Median Days since Praxis	N	Median Days since ABCTE
Math	15	287	24	106
Elementary education	15	252	42	95
Pedagogy	13	259	45	100

The third potential concern relates to the possibility of unequal effort on the two types of exams, only one of which was completed as part of a research study and the other of which was taken for professional reasons. That is, a test score can be influenced not only by a test taker's skills but also by the test taker's effort in preparing for the test and their effort on test-taking day. To get a true comparison of the ABCTE and Praxis test takers' knowledge and skills, we have to assume that test takers exerted equal effort on both tests. In our study, test takers will have been motivated by the prospect of advancing their careers on one test but not on the other. To help equalize effort levels, we offered incentives of

\$100 to \$200 per test taken for our study, based on the score obtained.<sup>4</sup> We also addressed the problem of unequal effort by recruiting sample members who might be able to use the test taken for the study for purposes of advancing their career. For example, we recruited volunteers for Praxis testing of ABCTE candidates more heavily in states that require Praxis for teaching, possibly giving those test takers real-world incentives on both exams. In addition, to address the issue of unequal effort, we repeated the analysis for subgroups defined by the test they took for the study and found no change in the main findings.

## C. RESULTS

This section presents results for the two main research questions, which address the association between the Praxis and ABCTE scores and the relative difficulty of passing the two exams.

### 1. Is ABCTE Performance Aligned with Praxis Performance?

To answer this question, we examined the degree to which scores on the two types of exams were associated. We present the data in three ways: (1) by plotting them on a simple scatter plot; (2) by examining the percentages of sample members who passed both exams or failed both exams; and (3) by examining the correlations between the ABCTE and Praxis scores.

#### a. Scatter Plots

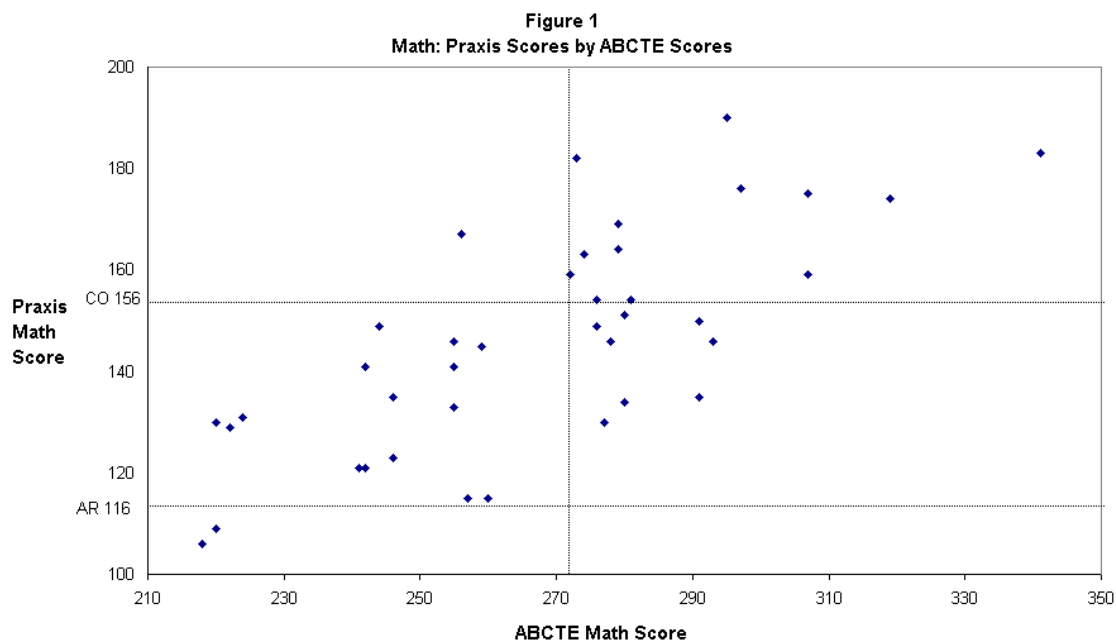
Plotting Praxis scores against ABCTE scores (Figures 1 through 3) is the most direct way to illustrate how the two scores are related. Each point on the graph represents a pair of scores for a single test taker. If the two exams were perfectly correlated, all the points would lie on a straight line. The scores needed to pass each exam are shown with horizontal and vertical dotted lines. ABCTE has one national cut score for each of the three tests. The cut scores for Praxis vary by state; therefore, we show only the lowest and highest cut scores in the nation. State-specific cut scores (listed in Appendix A) are fairly evenly distributed across states requiring Praxis.<sup>5</sup>

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<sup>4</sup> We offered \$100 for completing the exam plus a performance incentive that was tied to the individual's score relative to scores of other test takers participating in the study (approximately \$1 per percentile point). Those who had participated in the earlier study (Boots 2006) received similar performance incentives.

<sup>5</sup> We obtained the ABCTE passing scores from the ABCTE Web site in December 2006 (<http://www.abcte.org/help/passport/exam>). We obtained the data on Praxis passing scores by state from the ETS Web site (<http://www.ets.org/>) in December 2006.

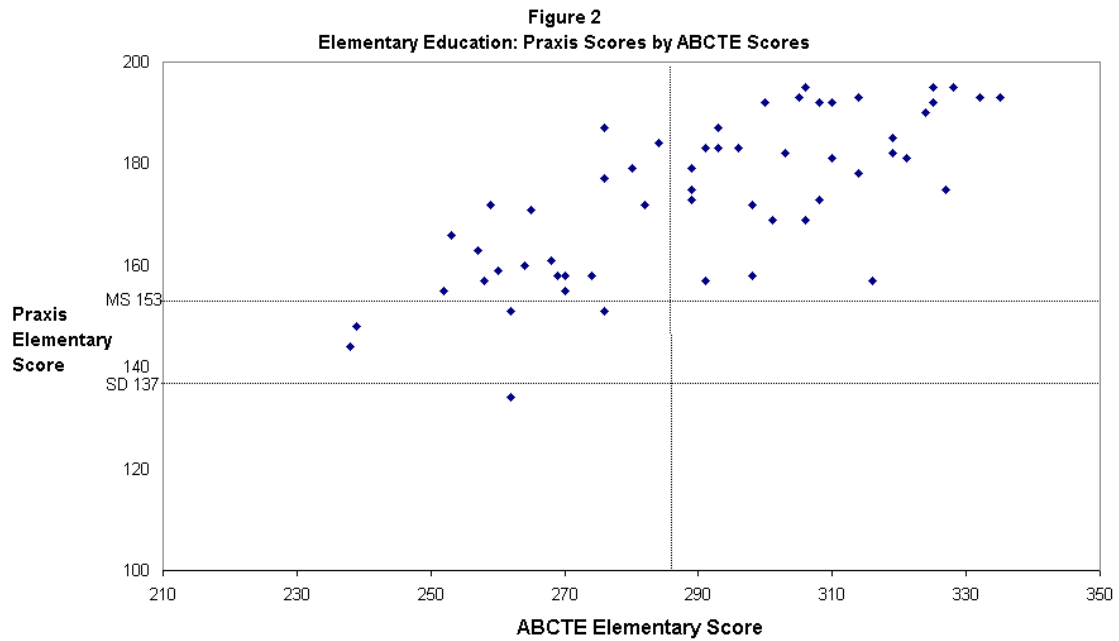
Figure 1 shows the results for math. The data points tend to line up along a positively sloped line, indicating a positive (linear) association. Furthermore, everyone who passed the ABCTE test (points lying to the right of the vertical dotted line) also scored above the lowest Praxis cut score (horizontal dotted line labeled “AR” for Arkansas). A large number of those who failed the ABCTE test (points lying to the left of the vertical dotted line) also exceeded the lowest Praxis cut score, and one test taker who failed the ABCTE scored high enough to pass the Praxis in the state with the highest cut score (Colorado).



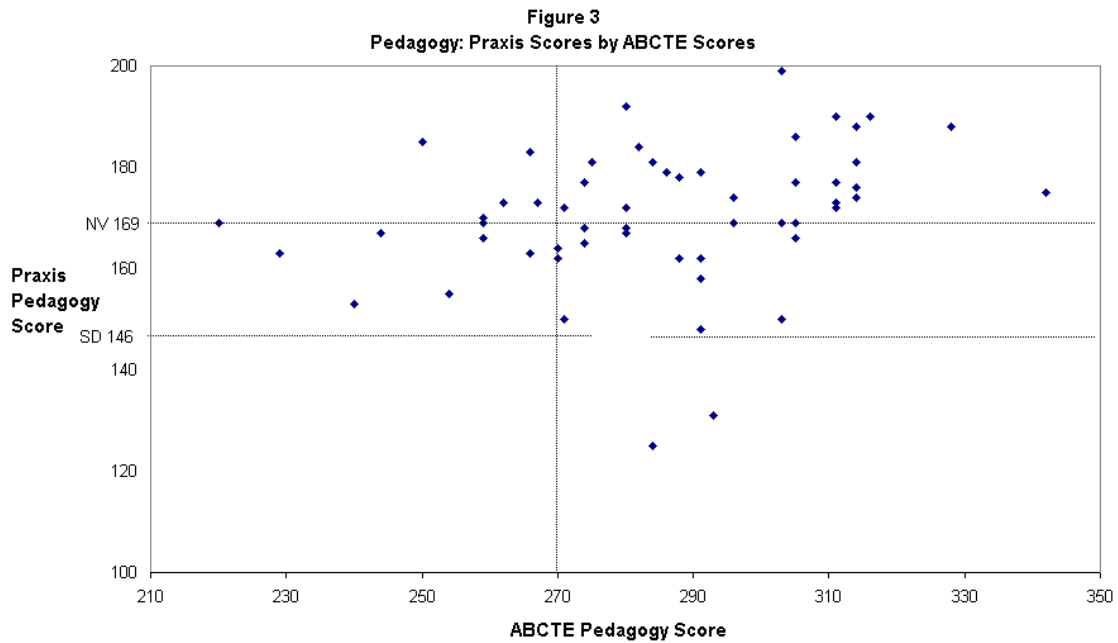
Note: The upper horizontal dotted line shows the score needed to pass the Praxis in the state with the highest cut score. The lower horizontal dotted line shows the score needed to pass Praxis in the state with the lowest cut score. The vertical dotted line shows the score needed to pass the ABCTE test.

Figure 2 shows the results for elementary education. Again, the data points appear to lie along a positively sloped line. In this case, all test takers who passed the ABCTE test also scored high enough to pass the Praxis exam based on the most stringent Praxis cut score in the nation (Mississippi). On the other hand, most of those who failed the ABCTE also scored high enough to meet or exceed the most stringent Praxis cut score, a finding we discuss below.

The scores for the pedagogy exams (Figure 3) do not demonstrate the pattern of positive linear association found for the other two subjects. Notably, the two lowest-scoring test takers on the Praxis scored high enough to pass the ABCTE exam by more than 10 points. Even if the two lowest Praxis scorers were treated as outliers and removed from the sample, the relationship would appear weak.



Note: The upper horizontal dotted line shows the score needed to pass the Praxis in the state with the highest cut score. The lower horizontal dotted line shows the score needed to pass Praxis in the state with the lowest cut score. The vertical dotted line shows the score needed to pass the ABCTE test.



Note: The upper horizontal dotted line shows the score needed to pass the Praxis in the state with the highest cut score. The lower horizontal dotted line shows the score needed to pass Praxis in the state with the lowest cut score. The vertical dotted line shows the score needed to pass the ABCTE test.

## b. Pass Rates

Test takers in our study who passed the ABCTE exam generally passed the corresponding Praxis exam at a higher rate than those who failed the ABCTE exam. For example, as shown in the first row of Table 4, 78 percent of those who failed the ABCTE math exam still passed the corresponding Praxis exam based on the least stringent state's cut score. In comparison, all of those who passed the ABCTE math exam also passed the Praxis math exam based on the least stringent state's cut score. The second row of Table 4 shows the pass rates on the same exam (Praxis math) once we apply the most stringent state's standard, so the rates are lower.

If the ABCTE exam were perfectly aligned with the corresponding Praxis exam, then those who failed the ABCTE would always fail the Praxis, making all the numbers in the first column of Table 4 equal to 0. At the same time, those who pass the ABCTE would also pass the Praxis, making the values in the second column equal to 100 percent and all the differences (in the last column) 100. If the exams were completely unrelated, then we would expect the numbers in each column to be approximately the same and the differences near 0. The larger the difference, the greater is the predictive power of the ABCTE exam.

**Table 4. Is Passing ABCTE Associated with Passing Praxis?**

Subject	Praxis Cut Score	Percent Passing Praxis		Difference
		If Failed ABCTE	If Passed ABCTE	
Math	Least stringent	78	100	22*
	Most stringent	6	52	44*
Elementary	Least stringent	96	100	4
	Most stringent	78	100	22*
Pedagogy	Least stringent	100	96	-4
	Most stringent	54	64	10

\*Significantly different from 0 at the .05 level, two-tailed test.

We found that the differences in pass rates for those who passed versus those who failed the ABCTE exam were positive (greater than 0) for five of the six comparisons made in Table 4 and statistically significant for three of them. This finding suggests that passing the ABCTE exam is associated with passing the Praxis exam. For example, by comparing the pass rate of the ABCTE math exam to the pass rate of the Praxis math exam in the state where passing is easiest (first row of Table 4), we found that the pass rates differed by 22 points, 78 percent versus 100 percent. We found similar or larger differences when we examined the highest cut score for math or the highest cut score for elementary subjects. In states with low Praxis cut scores (where nearly everyone passes), the ABCTE cannot be predictive because there is little variation to predict. This is true of the elementary education exam, which had a high pass rate even using the standard of the most stringent state. The results for pedagogy suggest that the ABCTE is not predictive of Praxis scores because a large percentage of the sample had the same result (passed the ABCTE pedagogy exam).

### c. Score Correlations

Table 4 focuses on pass rates only and thereby ignores variation in performance above and below the cut scores. To make use of the additional information conveyed by the scores, Table 5 presents correlations between the test scores themselves. The correlations are statistically significant for all three tests. The score correlation for the pedagogy exam (0.30) is smaller than that for the math or elementary education exams (both 0.73).<sup>6</sup> A high correlation tends to support the view that the ABCTE exam can serve as a substitute for the corresponding Praxis exam.

**Table 5. Correlations between ABCTE and Praxis Scores**

Subject	Correlation	Number of Test Takers
Math	0.73*	39
Elementary	0.73*	57
Pedagogy	0.30*	58

\*Significantly different from zero at the .05 level, two-tailed test.

## 2. Are the ABCTE Exams More Difficult to Pass?

To address whether the ABCTE exams are more difficult to pass than the corresponding Praxis exams, we compared the percentages of the study sample that scored above each of the cut scores set by states for Praxis and by ABCTE nationally. The evidence suggests that, in at least some states—those with the lowest cut scores—all three ABCTE exams are more difficult to pass than the Praxis exams for the subjects we studied.

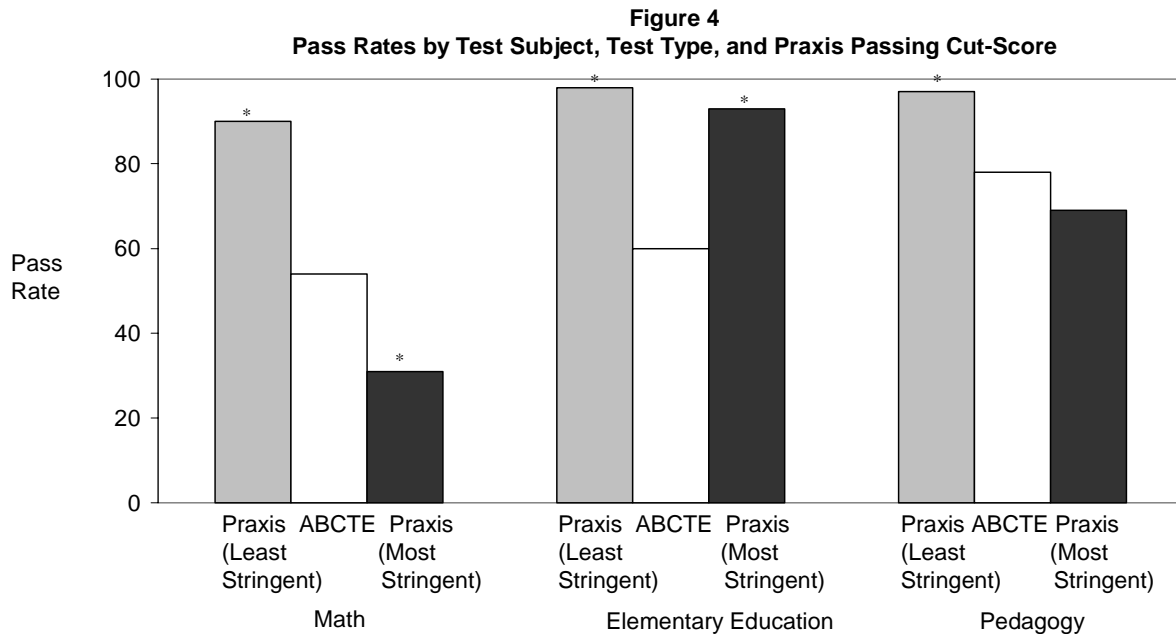
Figure 4 shows the percentage of test takers passing each exam. The pass rates for the Praxis exams are based on the highest and lowest state cut scores. A higher pass rate (taller bar) suggests that the exam is *less* difficult to pass, and a lower pass rate (shorter bar) suggests that the exam is *more* difficult.

For math and pedagogy, the pass rates for the ABCTE tests are between the Praxis pass rates based on the states with the highest and lowest cut scores, although the pedagogy difference based on the most stringent state's cut score is not statistically significant.<sup>7</sup> The other differences are all statistically significant. For the elementary tests, the ABCTE pass

<sup>6</sup> As with all analyses in this report, Table 5 presents the correlation for the pedagogy exam regardless of whether the participant completed the elementary or secondary version of the Praxis (PLT) exam. When we analyze the elementary and secondary versions separately, we observe correlations of 0.40 and 0.22, respectively. We also examined correlations of ranks as a robustness test and found similar results: correlations of 0.72 for math and elementary education and 0.39 for pedagogy.

<sup>7</sup> When we calculated the statistical significance of differences in pass rates we accounted for the covariance between performances on the pairs of exams.

rate was significantly lower than for Praxis in all states, suggesting that the ABCTE exam is harder to pass.



\*Significantly different from the ABCTE pass rate at the .05 level, two-tailed test.

The pass rates in Figure 4 ignore information on variation in test scores above and below the cut scores. To make use of information on such variation, we also analyzed differences between scores on the Praxis and ABCTE scores after standardizing them to a common scale. The patterns from that analysis (presented in Appendix B) were similar to those presented in Figure 4.

#### D. EXPLAINING THE RESULTS

To convey a better understanding of the results presented above, we conducted supplemental analyses. The supplemental analyses try to explain the ABCTE-Praxis score correlations (and why the correlations differ by subject matter) as well as the relative difficulty of the exams.

##### 1. What Explains the Correlations?

Several factors might explain the strength of the relationship between Praxis and ABCTE exam scores and why that relationship was stronger for math and elementary education subjects than for pedagogy. The possible explanations include the test-takers' background characteristics, the content of the exams themselves, and the conditions under which the test-takers completed each exam.

### a. Test-Taker Background

The correlations between the ABCTE and Praxis scores are all positive and statistically significant, but some policymakers might wonder whether performance on the ABCTE exam provides useful information about the skills tested by Praxis above and beyond what is provided by observable test-taker characteristics. We address this issue by testing to see if performance on the ABCTE exam is positively associated with performance on the Praxis after controlling for college grade point average (GPA), education, age, gender, race, and other test-taker characteristics. We used multivariate regression models in which the Praxis test score (expressed in standard deviation units) was the outcome, and the explanatory factors included the corresponding ABCTE test score (again in standard deviation units) and the other variables listed above (college GPA and so forth) as controls.<sup>8</sup> The results are presented in Table 6.

**Table 6. Regression-Adjusted Correlations between ABCTE and Praxis Scores**

Subject	Correlation
Math	0.82*
Elementary	0.73*
Pedagogy	0.30*

NOTE: The correlations are coefficient estimates on the ABCTE scores from regressions of the Praxis scores regressed on the ABCTE scores (after the scores were normalized to have a mean of 0 and variance of 1.0), college GPA, own years of education, parents' years of education for the mother and father separately, years since leaving college, age, gender, and race. The pedagogy model also controls for level (elementary or secondary) of the Praxis test.

\*Significantly different from zero at the .05 level, two-tailed test.

The relationships shown in Table 6 remained statistically significant for all three pairs of tests (math, elementary education, and pedagogy). For example, a 1.0 standard deviation in the ABCTE math test score is associated with a 0.82 standard deviation increase in the Praxis math score after controlling for background factors. If the tests were perfectly correlated, then the coefficient estimates would all be equal to 1.0.

<sup>8</sup> GPA was reported in 6 categories and coded as follows: (3.75 = '3.5 - 4.0', 3.25 = '3.0 - 3.49', 2.75 = '2.5 - 2.99', 2.25 = '2.0 - 2.49', 1.75 = '1.5 - 1.99', and 0.75 = 'Below 1.5'). We distinguished levels of test takers' educational attainment as follows: bachelor's degree or lower, coursework beyond a bachelor's degree but less than a master's degree, and master's degree or higher. We measured each parent's educational attainment in terms of holding a high school diploma or less, coursework beyond a high school diploma but no bachelor's degree, and a bachelor's degree or higher. We coded race/ethnicity by creating one category for white or Asian and one for all others.



## b. Exam Content

In this section, we discuss the content, summarized in Tables 7 through 9, of the ABCTE and Praxis exams based on information obtained from Postman (2005) and communication with ABCTE staff.

**Math.** As shown in Table 7, both math tests cover similar topics, but with some differences in content and testing conditions. For example, the ABCTE exam includes a section testing the ability to convert between different measurement systems, which is not explicitly tested for by the Praxis exam. In addition, 42 percent of the Praxis math test questions focus on the topics of probability, statistics, linear algebra, and reasoning as compared with only 30 percent on the ABCTE test. Calculators were required for the Praxis exam but not allowed for the ABCTE test. Other comparisons are difficult to make because of variation in how the materials are described.

**Table 7. Math Content of the ABCTE and Praxis Math Exams**

ABCTE		Praxis	
Topic	Percent of Questions		Topic
Calculus	13%	24%	Functions, Their Graphs, and Calculus
Functions and Algebra	26%		
Geometry and Measurement	20%	34%	Algebra, Geometry, Trigonometry, and Arithmetic
Trigonometry	11%		
Probability, Statistics, and Data Analysis	12%		
Linear Algebra	6%	42%	Probability and Statistics, Discrete Math, Linear Algebra, Computer Science, Reasoning, and Modeling
Number Sense	12%		

**Elementary Education.** The Praxis and ABCTE exams appear to be similar in terms of content covered. Indeed, the words used to describe the content are almost identical, and the balance across subject areas is generally similar based on the fraction of questions in each section (see Table 8). The ABCTE exam has a greater focus on reading and math while Praxis has a somewhat greater focus on social science and science.

**Table 8. Elementary Education Content of the ABCTE and Praxis Elementary Exams**

ABCTE		Praxis	
Topic	Percent of Questions	Topic	
Reading and English Language Arts	32%	25%	Reading/Language Arts
History and Social Science	20%	25%	Social Studies, Psychology, Anthropology, and Sociology
Math	28%	25%	Math
Science	20%	25%	Science

**Pedagogy.** A breakdown of the number of questions by topic for the Praxis pedagogy test was not available; therefore, the content comparisons in Table 9 describe only the topics covered by each test rather than the percentage of questions by topic.

**Table 9. Pedagogy Content of the ABCTE and Praxis Pedagogy Exams**

ABCTE	Praxis
Instructional Design: curriculum selection, planning, and organizing	Classroom Environment: planning, objectives, assessment, motivation, classroom approaches
Effective Instructional Delivery: clear communication, focused instruction, efficient use of time, teaching study skills	
Assessment	
Classroom Management and Organization	Teaching for Student Learning: classroom management, changing behavior
None	Human Development and Diversity
None	School and Society
None	Teaching Reading and Language Arts: phonics and whole language

Based on this information, we concluded that the ABCTE and Praxis pedagogy tests used in our study contain content that is similar but not identical. The two tests cover the importance of teacher planning, classroom management, assessment, and other basics. However, the Praxis pedagogy test highlights three other sections: one about human diversity and development, one about school and society, and a third about teaching reading

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and language arts. ABCTE highlights other teaching topics, such as teaching students good study skills or efficient use of instruction.

The ABCTE and Praxis pedagogy exams have other potentially important differences. First, they are graded in very different ways. In the Praxis pedagogy exam, writing is a critical component, but a stronger performance on the multiple-choice section can make up for weaker performance in writing and vice versa. However, for the ABCTE exam, the two sections of the test are graded separately, and a test taker must pass both in order to obtain an ABCTE certification. Second, the ABCTE test is primarily a multiple-choice test with only one writing section while the Praxis involves several written sections. Third, the ABCTE test is not grade-specific while we use two versions of the Praxis pedagogy exam—one for grades K–6 and another for grades 7–12.

Our analyses focused on results for the multiple-choice section of the ABCTE pedagogy exam. We compared the ABCTE multiple-choice results to the overall Praxis pedagogy test scores that combine results for both writing and multiple-choice questions. The potential importance of the writing portion is highlighted by the fact that the Praxis pedagogy test guide suggests spending 80 percent of test time on the applied writing responses.

We did not include the ABCTE writing scores in most of our analyses because of the differences in how the ABCTE and Praxis tests are scored. As mentioned above, ABCTE candidates must pass both the writing and multiple choice sections separately to be certified. By excluding the ABCTE writing results from our analysis reported above, we made the exam appear easier to pass than it would normally be for certification candidates. To see whether exclusion of the writing scores made a substantial difference, we analyzed how passing both sections of the ABCTE pedagogy test is associated with passing the Praxis pedagogy test and found that, while the results were slightly stronger than those presented in Table 4, they were not substantively different. We also created an overall ABCTE pedagogy score that combines the writing and multiple-choice scores (giving both portions equal weight) and compared that to the Praxis pedagogy score. The scores had a correlation of 0.36, somewhat higher than the 0.30 correlation found for pedagogy using only the ABCTE multiple-choice pedagogy test.

### **c. Test Fatigue and Motivation**

In Section B we raised the concern that test-takers faced different incentives for each of the two sets of exams they completed. We presume that test-taker took exams on their own to advance their career—for example, to achieve initial state licensure—and took the other exam for the study (the present study or the study by Boots), in which the only incentive was a cash payment based on performance. It is possible that these incentives created unequal levels of motivation. To the extent that they did, the correlations we report are lower bound estimates of the “true” correlation that would result if both exams “counted” for the same high stakes of licensure. If the exams had been taken with the same sets of consequences, then the correlations would have been even higher than what we reported in Section C.

Motivation effects could especially come into play when we consider the role of test fatigue, a factor that happens to matter more for the pedagogy exam than for the subject exams. Test takers who took more than one exam for the study may have reduced their effort on the second exam because of fatigue. The performance-based incentive payment may have been enough to create a reasonable level of effort on the first exam taken for the study but may have had less impact on effort for a second exam if the test takers lost interest or became fatigued. Given the length of the tests, fatigue or loss of interest could be an issue, particularly when participants took more than one exam for the study on the same day. About 83 percent of those in our sample who took the Praxis pedagogy exam also took a subject exam earlier in the day, compared to ABCTE pedagogy completers, just 7 percent of whom took a subject exam earlier in the day. Test takers were given up to four hours for each ABCTE subject exam and three hours for the pedagogy exam (although ABCTE staff report that test takers rarely need all of the allotted time). For Praxis, test takers had two hours per exam. The pedagogy exam was always taken after the subject exam.<sup>9</sup>

The modest sample size of the study limits our ability to perform diagnostic analyses, but we did look at selected cases that were not affected by the fatigue issue. When we limit our sample to the 12 test takers who did not take two tests for the study on the same day, the correlation between the ABCTE and Praxis pedagogy exam scores doubles from 0.30 to 0.60 and is statistically significant at the 0.05 level. When we further limit our sample to the subgroup of 8 test takers who took only the pedagogy test for the study, the correlation is 0.73 and is still statistically significant at the .05 level. These pieces of evidence are only suggestive, given the small numbers of cases, but they are consistent with the idea that scores on the pedagogy exam are more closely associated than they appear in our main analysis.

## **2. What Explains the Relative Difficulty of the Exams?**

Our analyses of the relative difficulty of the ABCTE and Praxis exams should be interpreted with caution for at least three reasons. First, the test takers faced different incentives—professional advancement versus monetary gain—when taking the exams. Second, they may have become fatigued, as discussed above, if they had to take two exams on the same day, which they did more often for the Praxis than for the ABCTE. Finally, they may have gained or lost knowledge during the period between the two exams, which could have affected their relative performance levels.<sup>10</sup>

To assess whether the above three factors might have mattered, we analyzed the differences between the Praxis and ABCTE scores, controlling for which test was taken solely for the study, the days between the tests, the difference in incentives for taking the tests (based on state regulations that either require the Praxis test or accept the ABCTE test),

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<sup>9</sup> This was true for all cases when test takers took two Praxis tests on the same day and for three of four cases when test takers took two ABCTE tests on the same day. We are missing information on the order of testing for the remaining participant who took two ABCTE tests on the same day.

<sup>10</sup> The Praxis and ABCTE exams also differ because the Praxis tests are paper-and-pencil tests while the ABCTE test is computer-based.

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whether the Praxis test was taken last (suggesting a possible burn-out effect), and whether the ABCTE test was taken last or on the same day as another test. We examined the relative pass rates for different subgroups of our sample and repeated the analysis by using a continuous measure of performance that was based on the score itself. In each of these analyses we found little change in our main findings conclusions based on Figure 4. Appendix B illustrates some of these robustness tests using subgroup analysis.

We did find that the test takers scored higher on the exam they completed on their own for job-related reasons than on the one they took for the study, perhaps reflecting greater preparation or test-day effort for the test required by the their job. Despite evidence of a motivation effect, i.e., that our incentive did not perfectly mimic the incentives that test takers face under real-world conditions, the effect does not appear large enough to change the study's main qualitative findings. We conducted the analysis separately for the group that took the Praxis exam for our study and the group that took the ABCTE for our study. As with the full sample results, the ABCTE elementary exam was more difficult to pass than the corresponding Praxis exam for both groups regardless of which cut score we use for Praxis. For math and pedagogy, the results were mostly, but not entirely consistent with the full sample findings. The ABCTE exam was more difficult to pass than the Praxis exam in at least some but not all states, regardless of which exam was taken for the study.

## E. CONCLUSION

In this report, we have compared performance on two teacher licensure exams—the well-known Praxis II exams produced by the Educational Testing Service and a newer set of exams produced by the American Board for the Certification of Teacher Excellence. We obtained the following results:

- **The ABCTE exam scores were positively correlated with the corresponding Praxis test scores in all three subject areas (math, elementary education, and pedagogy).** The correlations remained significant even after controlling for background factors such as college GPA, education, age, race, and gender. The results are not surprising given that the content of the exams appears similar, with substantial overlap for the subject exams in math and elementary education.
- **The relationship between the Praxis and ABCTE exam scores was stronger for the math and elementary education scores than for the pedagogy scores.** This result might have been attributable to differences in the content of the ABCTE and Praxis pedagogy tests or to differences in the amount of effort test takers put into the ABCTE pedagogy exam versus the other exams covered in the study.
- **The ABCTE elementary education test was harder to pass than the corresponding Praxis test.** This finding, based on the relative fractions of our sample that passed each exam, held regardless of which state's cut score we used

for the Praxis and does not appear to be attributable to differences in test-taking effort.

- **For math and pedagogy, the relative difficulty (measured by pass rates) of ABCTE and Praxis depended on the state cut score for passing used by the Praxis exam.** This finding held regardless of which exam was completed first or how close in time the exams were completed, allaying concerns about timing or motivation effects.

These results will help policymakers already familiar with the Praxis exams to put the ABCTE exams in context by assessing the degree to which the ABCTE scores can be accepted as a substitute for Praxis scores. The purpose of this study was *not* to determine whether ABCTE exams are useful for identifying teaching effectiveness or potential. That more ambitious research question would require an outcome measure such as student achievement growth or observed classroom practice to validate the exam's ability to predict good teaching. Therefore, we are conducting additional research to estimate the quality of teachers who obtain American Board certification relative to others already in the teaching workforce. That research will provide the critical information needed to weigh the ABCTE credentialing process.

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## APPENDIX A: PRAXIS CUT SCORES BY STATE

Table A.1 shows the distribution of the test takers in our sample by state. Our sample is distributed across 17 states. Almost a quarter of the sample comes from Idaho, and large fractions come from Pennsylvania and Florida, all states that accept ABCTE certification.

**Table A.1. Distribution of Sample by State**

State(s)	Percent of Sample
Idaho*	24.0
Pennsylvania*	21.1
Tennessee	16.4
Florida*	10.6
Kentucky	5.8
Kansas, New Hampshire*, South Dakota, Minnesota, South Carolina, Utah*, Georgia, Louisiana, North Carolina, Oregon, Vermont, West Virginia (each below 4 percent of sample)	22.1

\*State recognizes ABCTE certification. Mississippi also recognizes ABCTE certification, but was not listed as the home state for any members of our sample.

Table A.2 shows the cut scores for the Praxis II exams covered in the study. The numbers may be used, together with Figures 1 to 3, to determine the approximate fractions of test takers who would have passed the test based on the cut scores for each state.

**Table A.2. Praxis Cut Scores by State (2006–2007)**

State	Pedagogy		Content	
	K–6	7–12	Math	Elementary
AL			118	
AK			146	
AR		164	116*	
CA				
CO			156**	147
CT			137	148
DE			141	151
DC			141	145
FL				
GA			136	
HI	163	157	136	
IA				



Table A.2 (continued)

State	Pedagogy		Content	
	K-6	7-12	Math	Elementary
ID	161		119	143
IN			136	
KS	161	161	137	
KY	161	161	125	148
LA	161	161	125	150
ME	166		126	145
MD		162	141	142
MN	159	157	125	145
MS	152	152	123	153**
MO		160	137	
NE				
NV	169**	161	144	
NH			127	148
NJ			137	141
NC				
ND	162		139	
OH	168	165	139	143
OR			138	
PA			136	
RI	167	167**		145
SC	165	165	131	
SD	146*	146*	124	137*
TN	155	159	136	140
UT	160	160	138	150
VT			141	148
VA			147	143
WA			134	141
WV	165	156	133	
WI			135	147
WY		161		

\* Lowest passing score

\*\* Highest passing score

## APPENDIX B: SUBGROUP ANALYSIS OF PASS RATES

In Section B of the report, we raised the concern that the difference in pass rates between the Praxis and ABCTE exams may reflect factors other than differences in the difficulty of test items, in which case we would run the risk of under- or overestimating the relative difficulty of the ABCTE exam. One possibility was that the incentives or motivation to pass the exams may differ. The other possibility is that the amount of time elapsed between any given test taker completing the two exams may affect performance.

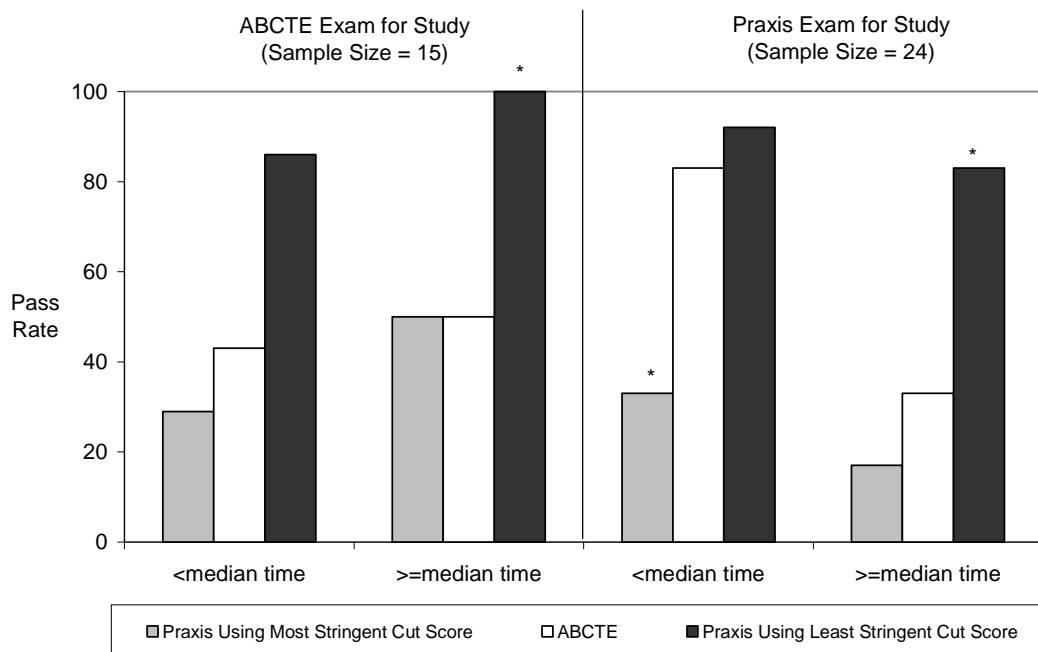
To help address these concerns, we present pass rates by subgroups formed along two dimensions. The first dimension is based on the exam taken for the study (ABCTE or Praxis), and the second dimension is based on the time elapsed between completion of the exams (more than the median number of days or fewer than the median number of days—see Table 3). By dividing the sample into a group that took the Praxis exam for the study and a group that took the ABCTE exam for the study, we can place bounds on the size of the motivation effect. We assume that the effort on the exam taken for the study was lower than the effort on the exam taken for personal reasons; therefore, each subgroup favors one of the two exams. By dividing the sample into those who took the two exams within a shorter period of time versus a longer period of time, we can assess the likelihood of timing effects. The results for those with a shorter elapsed time should have a smaller time effect than those with a longer elapsed time.

The body of this report (Figure 4) shows that the pass rates for the ABCTE exams in math and pedagogy lie in between the two Praxis pass rates based on the states with the highest and lowest cut scores while, for the elementary education exams, the ABCTE pass rates were lower than the Praxis pass rates in all states, suggesting that the ABCTE elementary subjects exam is unambiguously harder to pass than the corresponding Praxis exam. As Figures B.1 through B.3 illustrate, these patterns shown in Figure 4 are usually replicated when we analyze the data by subgroup.

Figure B.1 shows the subgroup results for the math exams only. The comparisons on the left of the vertical dividing line show the results for those who took the ABCTE exam for the study (and the Praxis on their own). If we suspect motivation effects, then the bars representing passing the ABCTE are artificially low. The reverse is true for the comparisons to the right of the vertical line, where the Praxis exams were not necessarily taken for a licensure decision. The fact that the ABCTE pass rate relative to the two Praxis pass rates is the same to the left and right of the vertical line (and the same as in Figure 4) suggests that motivation effects were not strong enough to alter our conclusions. We find the same robustness of the overall result for motivation effects in Figures B.2 (elementary) and B.3 (pedagogy) as well, with one exception discussed below.

The other subgroup illustrated in Figure B.1 is the timing of the completion of the second test relative to the first. As mentioned above, we divided the sample in half for each exam based on the number of days elapsed from completing the first exam to completing the second. Comparing the two sets of three bars on each side of the vertical dividing line, we see little change in the absolute pass rates or their relative position.

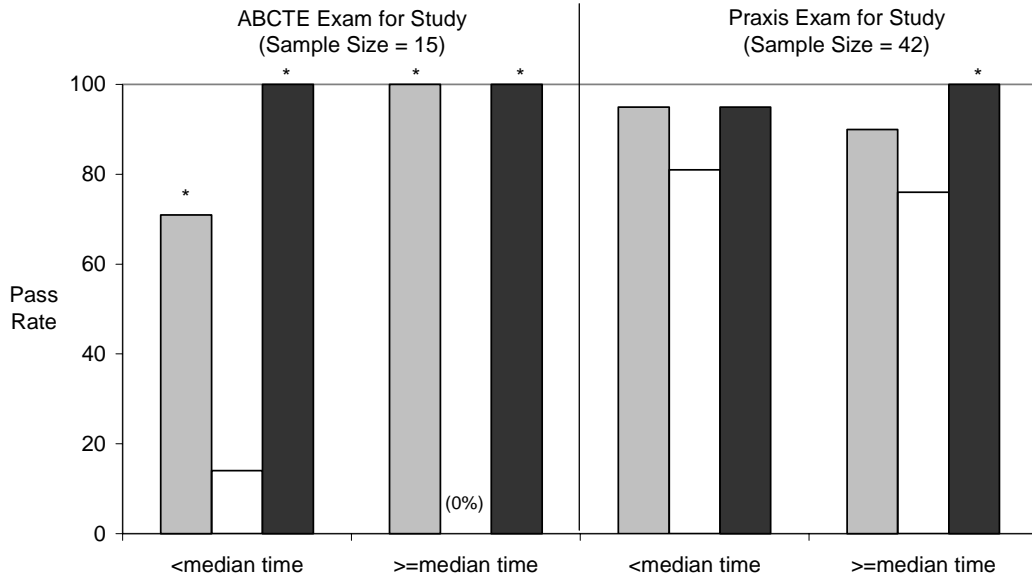
**Figure B.1**  
**Pass Rates in Mathematics**  
**by Exam Taken for Study and Time between Exams**



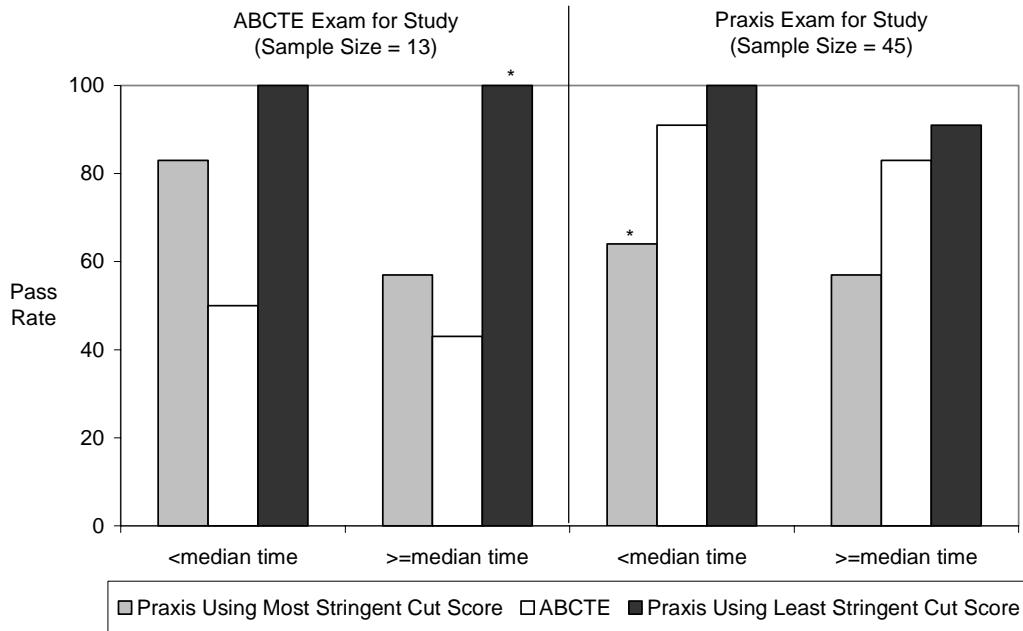
\*Significantly different from the ABCTE pass rate at the .05 level, two-tailed test.

One result from Figure 4 in the main report that is not replicated here is shown in Figure B.3. In Figure 4 the ABCTE pedagogy pass rate is higher (indicated by a taller bar) than the Praxis pass rate based on the state with the most stringent cut score. The same relationship holds for the sample members who took Praxis exam for the study (righthand side of Figure B.3), but not for those who took the ABCTE exam for the study (lefthand side of Figure B.3). The pass rates on the ABCTE pedagogy exam for those who took the ABCTE exam for the study (left of the vertical line) are lower than the pass rates on the pedagogy exam even for the least stringent state. The lower ABCTE pass rate can probably be explained by the fatigue effects discussed in Section D. Some other results not replicated here are related to the statistical significance of the difference between the Praxis and ABCTE pass rates. This is most likely explained by the fact that the subgroup analyses rely on small samples and therefore are likely to yield statistically insignificant differences even when the substantive differences appear large. Overall, however, the subgroup findings generally support the full sample findings shown in Figure 4 in the body of the report.

**Figure B.2**  
**Pass Rates in Elementary Education**  
**by Exam Taken for Study and Time between Exams**



**Figure B.3**  
**Pass Rates in Pedagogy**  
**by Exam Taken for Study and Time between Exams**



\*Significantly different from the ABCTE pass rate at the .05 level, two-tailed test.