Thinking K-16

Vol. 3, Issue 1 A Publication of The Education Trust Spring 1999

Not Good Enough

A Content Analysis of Teacher Licensing Examinations

OVER THE PAST SIX MONTHS, WE HAVE been asked on countless occasions why we are spending so much time on teacher quality issues these days. People seem surprised that an organization whose mission is squarely focused on closing the achievement gap separating poor and minority students from other young Americans would be pushing so hard for higher standards for teachers. "Set higher standards for teachers," they say, "and minority kids will suffer because they will have fewer teachers who look like them."

Let us be clear from the beginning that we reject categorically the assertion that higher standards inevitably mean fewer minority teachers. Underneath that argument is a thinly veiled suggestion that people of color are somehow unable to meet high standards. Yet all of our experience suggests just the opposite: minority and low-income students, including education students, *can* meet high standards if they are taught to high standards. The point is not to set standards below where they should be out of some misguided sympathy–or equally misguided belief that what minority kids need most is teachers who simply look like them. Rather, the point is to *raise* the quality and intensity of the education they receive.

Why We Care

To those who argue–for reasons of diversity or because of fears about supply–that the standards should be kept where they are, we make a simple suggestion.

- First, go spend time sitting in the back of classrooms, especially classrooms in high-poverty schools. Or join our staff as they work with teachers in those classrooms. You'll see some stunningly good teachers, but you will also see teachers who quite obviously cannot get their students to state or local standards because they, themselves, don't meet them.
- Then, once you have a feel for the problem, take a look at the growing body of research on teacher quality and student achievement, much

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Inside Thinking K-16

of it summarized in the Education Trust's *Good Teaching Matters* or *What Matters Most* from the National Commission on Teaching and America's Future. Both of these reports underscore a simple fact: teacher quality is the single most important factor in student achievement.

- Look, too, at who gets our weakest teachers: the very students who most need our best.

In the end, if you spend as much time in high-poverty schools as we do, you can't *not* care about teacher quality. Well-educated and well-supported teachers can help all children to soar to heights literally unimaginable to their poorly educated and poorly supported peers.

Teachers often tell us that they are insulted by the low level of licensing exams.

Unfortunately, existing mechanisms are not even close to adequate for assuring teacher quality. Seven states have no licensing examinations for teachers. The remaining 44 (we include D.C.) require examinations, but the combination of too-low content and too-low passing scores renders these systems effective in excluding only the weakest of the weak.

This does not mean that all teachers are poorly prepared. On the contrary, both our own experiences and recent research prove that many teachers are wonderfully educated. Such teachers often tell us that they are insulted by the low level of content exams.

But the insults to children are even greater. Many are being shortchanged daily by poorly prepared teachers because we have failed to set high enough standards for entry into the field of teaching.

Every American should be deeply concerned about the information in this report. But low-income families, as well as those of color, should be most worried of all, for the simple reason that the schools that serve them are the most likely to hire from the bottom of the pack.

That we dramatically ratcheted up our standards for students without insisting on commensurate increases in standards for teachers is a chilling indictment of all of us: K-12 leaders, policymakers, higher educators and advocates. As they say, however, it is never too late. There are some things that states, districts and colleges can do immediately to reduce the problem. Other things will take more time.

We must begin now–and we must focus on:

- Rigorous preparation for intending teachers;
- Higher standards for entry into the field of teaching–including tough academic examinations; and
- Ongoing support for current teachers.

If we are relentless about these three things, no excuses and no exceptions, our children will succeed.

Kati Haycock
Director

IS CONTENT SUFFICIENT?

In both our analyses and our recommendations, we have concerned ourselves primarily with content knowledge. We have done so not because we believe that deep content knowledge is sufficient or because we think other things are unimportant–things like content pedagogy, knowledge of how children learn, and belief systems, among others. (Nobody who does as much work as we do in higher education could possibly believe that deep subject matter knowledge always equals good teaching.) Nor, it may be important to point out, do we believe that content knowledge is forever fixed when teachers complete their preparation.

Rather, we believe that the grasp of the core concepts and structure of a discipline with which one exits from college is a critical foundation for teaching: if that foundation is inadequate, no instructional wizardry can make up for it. Moreover, though there are many voices within the teacher education reform community for the importance of pedagogy and the like, there are few such voices raised around content, even though teachers who are furthest ahead in implementing their state's standards often struggle more with content than anything else.

So, for the time being at least, we'll be a bit shrill. Until, that is, more faculty in the Arts and Sciences join in and there is, finally, a balance in the conversation and the reform effort.

How Teacher Licensing Tests Fall Short

by Ruth Mitchell, Ph.D., and Patte Barth
The Education Trust

Teachers hold a position of public trust. The community, for its part, is responsible for supporting the goals of education and for allocating sufficient funds to get the job done. But ultimately, whether or not our children succeed academically depends on the knowledge, skill and commitment of their teachers.

With so much riding on the quality of teachers, the public needs assurance that every student is taught by professionals who know a lot about the subjects they teach. This is especially true for students who lack resources at home. These students–much more than their more advantaged peers–depend almost exclusively on their teachers for academic content knowledge. Most states administer teacher licensing examinations as a kind of guarantee that teachers know enough about their subjects. But do these tests really certify that teachers have the breadth and depth of subject knowledge to teach all students to high standards?

> **"Why should prospective teachers go to college if this is all they need to know?"**

The short answer is no. Over the last year, we examined the tests most commonly used for licensing beginning teachers. In general, state licensing requirements place more emphasis on prospective teachers' pedagogical knowledge than on their content knowledge. Moreover, the subject area tests we examined are too weak to guarantee that teachers have the content they need to teach students to high standards.

- **SECONDARY EDUCATION**: Whereas 44 states require candidates for secondary licenses to take some kind of licensing examination, only 29 require them to take tests in the subject area they will teach. The content in the subject tests, with a few (under-used) exceptions, is within easy reach of many of the students the test-takers are expected to teach–about the same as in high-level high school courses.
- **ELEMENTARY EDUCATION**: Seven states have no examination requirements for candidates for elementary certification. The remainder require examinations that cover pedagogy and rudimentary general knowledge and skills. In general, these tests assess verbal and mathematical literacy at about the tenth grade level.[1]

As Lynn Steen, a national adviser to our study, put it: "Why should prospective teachers go to college if this is all they need to know?"

The long answer to our question about the adequacy of existing licensure examinations is a complicated tale that has its origins in good intentions, but in the end pits students'needs against institutional interests and adults' right to jobs. At its core, the system is designed to prevent false negative judgments (about either candidates or the institutions that produce them). But if we were truly concerned about students, we would be more worried about the *false positives*.

Like many practices in education, the criteria for teacher licensure were established in an era that held modest academic expectations for the majority of young people. In the last decade, however, K-12 education began a transformation: high academic

standards are now the expectation for all, not some students. But while we raised standards for students, we have yet to make corresponding increases in standards for teaching.

Unfortunately, raising the level of teacher licensing examinations is no simple matter. The process for defining both test content and what constitutes "passing" takes many factors into account that compete directly with the goal of certifying that candidates have a strong command of subject matter. Projections of teacher supply and demand, protection for the state and university against legal challenges by unsuccessful candidates, and the authority of universities are all considered in the licensing equation.

State licensure policies also rest on assumptions about matters that do not enter the licensing equation but should. Many assume, for example, that the act of majoring or passing a certain number of courses in accredited universities in itself certifies a sufficient level of content knowledge. Licensure policies also typically assume that what beginning teachers don't know now they will learn in time. Underlying the whole process is the assumption that teachers only need to know the content that is expected of their students, and maybe just a little bit more. For all these reasons, licensure examinations don't contain as much content as we believe fully qualified teachers need in order to educate all students to high levels of understanding.

States Not Requiring Licensing Exams:98-99

Idaho
Iowa
North Dakota
South Dakota
Utah
Vermont
Washington

Source: NASDTEC Manual on the Preparation & Certification of Educational Personnel 98-99, Table G-4

Another wrinkle in the process is the establishment of passing scores–the cut-off point between passing and failing the licensing examination. Passing scores are not set by the test publisher; rather they are established state by state. In some states, candidates can pass subject-matter exams by correctly answering as few as half the test items.[2] In areas of short supply, states may still require candidates to take the test, but will waive the requirement for minimum performance. In such cases, any old score will do. Far from a guarantee of high professional standards, certification requirements often define teaching down, even while public demands for teacher performance are being ratcheted up.

There are no bad guys to blame for this situation. Officials who make certification policies are pushed to balance teacher shortages, growing student enrollments, the demand to reduce class size AND make sure a teacher is in every classroom. The colleges that prepare teachers struggle to respond to what often seem to be conflicting state mandates and confusing messages from school districts about what is important. At the same time, universities want to protect both the academic freedom of professors and the right of students to choose how to fulfill core academic requirements. Up and down the line there is concern about the potential impact on the quantity and diversity of the teacher force if the bar is raised high. The pressures on state policymakers are to minimize. In the end, test publishers respond by giving their customers what they say they want: a reliable method for measuring the lowest possible teaching competencies that can hold up in court.

The institutional and logistical issues that influence the makeup of teacher exams are real. Yet they have been allowed to overshadow what should be the paramount consideration of teacher certification: Can this individual teach all students to high, not minimum, standards?

We looked at one aspect of this question, content knowledge, because we find it is the most neglected in teacher education reform. In addition, although it is by no means the only characteristic of a good teacher, we believe content knowledge is the most central. Without it, no manner of teaching skill can possibly yield high student achievement.

WHAT WE LOOKED FOR

Because we were interested in how much teachers know about their subjects, we looked only at examinations of subject matter and general knowledge; we did not examine tests of pedagogical skills and knowledge. There are too many content examinations for the scope of this study. We therefore limited our study to English/language arts, mathematics and science. Within these subjects, in

CONDUCTING THE STUDY

Choosing particular tests to investigate was relatively straightforward once we limited the subject areas. There are only two major providers of teacher examinations: Educational Testing Service (ETS) which publishes the Praxis series and National Evaluation Systems (NES) which designs state-specific examinations. A larger number of *states* require Praxis, but a larger number of *students* take NES examinations, since NES contracts with the big-population states such as Texas and New York. ETS and NES exams are taken by the vast majority of prospective teachers. We therefore based our analysis on tests published by these two providers.

As much as possible we analyzed actual exams as opposed to their widely available sample forms. ETS granted us controlled access to examine their Praxis series examinations on two occasions. Because NES contracts with individual states, access to their tests is in the hands of the appropriate state agency. Our conclusions are based on complete examinations from a single NES state and study guides from six others.

The content analysis of these examinations was conducted initially by a team comprised of Education Trust staff, represented by the authors, and outside consultants. In this method, the team worked through the tests as if they were teacher candidates, noting relevant information about each item. The methodology and preliminary judgments were validated by a distinguished national review panel who went through the analytical model in an abbreviated form. The national panel has endorsed the judgments reported here.

NATIONAL REVIEW PANEL

Gail Burrill, past president of the National Council of Teachers of Mathematics (NCTM), now Senior Program Officer at the National Academy of Sciences (NAS) and associate researcher at the University of Wisconsin, Madison;

George Miller, senior lecturer emeritus of chemistry at the University of California-Irvine;

Dan Jones, Dean of the College of Liberal Arts, Towson University, Maryland;

Lynn Arthur Steen, past president of the Mathematical Association of America (MAA) and professor at St. Olaf College, Northfield, Minnesota;

Eugenie Scott, executive director of the National Center for Science Education; and

George Pullman, associate professor of English, Georgia State University

OUTSIDE CONSULTANTS

Erma Anderson, science education consultant;

Bradford Findell, Program Officer, Center for Science, Mathematics, and Engineering Education at the National Research Council; and

Amy Rukea Stempel, high school consultant with the Edison Project.

WHAT IS SIMPLE OR COMPLEX?

Test items were classified as either "simple," "moderate," or "complex." These categories refer to the level of sophistication demanded by the test question. Here are some examples (answers appear in boldface type).

SIMPLE

A "simple" problem requires the simple recall or recognition of factual material. In math and science, the problem can be solved in one step or by applying a simple procedure. Simple items can be answered successfully with only a superficial level of understanding the concept.

An example of a "simple" question:

Which of the sales commissions shown below is the greatest?[6]

a) 1% of $1,000
b) 10% of $200
c) 12.5% of $100
d) 15% of $100
e) 25% of $40

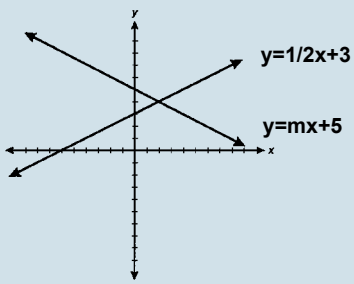
This problem requires the application of one simple arithmetic procedure to answer successfully.

COMPLEX

A "complex" item is a multi-step problem that also requires the development of a strategy drawing on more than one domain. Open-ended items, such as essays and mathematical proofs, tend towards more complexity, but we occasionally found complex multiple-choice items. Complex items require a deeper understanding of concepts than either simple or moderate questions.

Example of a "complex" problem:

Use the graph below to answer the question that follows:[7]



The graph represents a system of linear equations. For what values of m will the solution to the system be in the first quadrant?

a) m < 1/2
b) m < 5
c) m > 1/2
d) m > 5

Gail Burrill wrote that this Algebra 1 question is complex in that it requires students "to use understanding of slope, graphs and solutions to find the answer and gets at more than just applying procedure."

MODERATE

"Moderate," not surprisingly, is between simple and complex: the item requires more than one step, but not necessarily a strategy drawing on other domains.

An example of a "moderate" question:

<u>Directions for Questions 5-6:</u> the group of questions below consists of four lettered headings followed by a list of phrases or sentences. For each sentence, select the one heading that is most closely related to it. One heading may be used once, more than once, or not at all.[8]

a) Nephrons
b) Flame cells
c) Malpighian tubules
d) Skin gills

5. Function in both arachnids and insects ***C***
6. Have cilia to guide waste products to excretory pores ***B***

This question asks for the recall of information, but it also requires the test-taker to use that information to classify the items, making this a moderately complex question.

While we hoped to find complexity, "simple recall" items were the most commonly seen types of questions in the tests we examined.

order to be as fair as possible, we devoted most of our attention to the highest level tests currently used.

The study was guided by the following questions:

- *What is the approximate grade level of this test?*

We wanted to gauge when the content covered on the test is normally taught and learned. Our grade level designation is a judgment of the test as a whole. It represents the grade in school or the year in college at which a typical student would have learned enough to answer most of the test questions correctly.

Our assignment of "grade level" does not take into account passing scores. However, it's important to note again that teachers can become licensed in some states by correctly answering as few as 45% of the test items. While it's not possible to say exactly how such a low passing score affects the designation of grade level, it is likely to reduce the test's effective difficulty level substantially.

- *How challenging are the test questions?*

We evaluated the degree of sophistication demanded by each test item. "Simple" items required only one step and a simple procedure, for example, the simple recall of factual information. On the high end were "complex" problems that required multi-step strategies involving more than one domain, for example, a math problem that draws on concepts from both algebra and geometry. (See "What is Simple or Complex?", page 6)

- *Is this knowledge relevant to teaching?*

While we assumed that teachers should know a great deal more than their students, we also wanted to see if the content is connected to what they will be expected to teach. For example, linear algebra is typically not encountered until college. However, the depth of understanding that linear algebra can develop is relevant to teaching algebra in middle and high school, and probably to algebraic concepts at the elementary level as well.

Our team of analysts went through each test item by item, answering each question as if we were teacher candidates ourselves. Items were classified according to the dimensions listed above. The conclusions summarized in this report are based on the initial documentation by the team and validation from our national panel of advisers (see "Conducting the Study," page 5).

WHAT WE FOUND

We found a few things to admire, a lot of disappointment and one huge gaping hole. One bright spot was the series of "essay" examinations published by ETS, which required candidates to demonstrate their depth of knowledge. The essays tended to cover more sophisticated content, although not quite at the level of a B.A. On a discouraging note, the essays are required by far fewer states than the lower level multiple-choice versions.[3]

We were also impressed by the sample items for the Massachusetts literacy and communications skills exam published by NES. These questions, in the words of Dan Jones on our advisory panel, were "of a higher degree of complexity and expectation than any of the others we looked at." States that contract with NES define the content and level of the assessments and there is considerable variation among NES examinations. Because we did not have access to the complete Massachusetts exam, we cannot make statements about its overall quality, particularly since the one NES-published test we reviewed did not reflect the same complexity as the Massachusetts sample items. But what we were able to see showed considerable promise.

The majority of tests we examined were dominated by high-school level material

In contrast to these few bright spots, the majority of tests we examined were multiple-choice assessments dominated by high-school level material. A few, notably in science, devoted a significant proportion of questions to content learned in middle school. Dan Jones found many of the English language arts questions "disappointing," saying that these tests offer "empty generalizations as the right answers."

According to our consultants and reviewers, most of the tests we examined could be easily handled by advanced high school students. Lynn Steen asserted

that the math tests "could be passed by a B+ student upon leaving high school." When one factors in the low passing scores in some states, passing a licensing exam can mean nothing more than a high school diploma.

We found no evidence of content at the baccalaureate level. Although a bachelor's degree in itself may not certify that the content is relevant to teaching a K-12 curriculum, we did expect to see content demanding a level of sophistication acquired through four years in college. Not one test was up to the level of a graduating college senior.

More to the point, we did not find the content that our panel believes is essential for teachers charged with getting all students to high standards. This "knowledge for teaching" involves the deep mastery of an academic subject that goes beyond, but is still connected to, the level of highest student achievement in K-12. It also equips teachers to answer the perennial question from students–"Why are we learning this?"–with reasons based on understanding of the discipline, rather than "Because you will need it in the next course." Many educators are familiar with the term "pedagogical content knowledge" which includes being able to find cognitive bridges such as metaphors, pictures, or manipulatives that enable students to understand concepts.[4] For example, the Praxis II Mathematics: Pedagogy test asks candidates to write on this question:

> *A small group of students in your seventh-grade math class is unable to determine whether two fractions are equivalent. Describe a strategy, using pictures or manipulatives, that you could use to help foster the students' conceptual understanding of equivalent fractions. Your strategy should stress understanding of what it means for fractions to be equivalent and the development of the ability to determine whether fractions are equivalent.*[5]

What this question does not require, and mathematics pedagogical content knowledge as such does not encompass, is the understanding of equivalence as an essential component of mathematical thinking. A seventh-grade teacher should be able to inspire students by referring to equivalence as a technique in sophisticated proofs. This is the understanding that we are calling "knowledge for teaching." In other words, middle-school teachers need to know how seventh-grade math is foundational to very sophisticated mathematical concepts.

All teachers, including elementary teachers, need to understand not only the structure of the academic discipline, but how, by organizing knowledge in specific forms, it contributes to understanding of the world. They should know why our civilization values the knowledge they are imparting to students, so that they can convey some of the passion for beauty and order that their discipline embodies.

Knowledge for teaching is a gaping hole in licensing examinations. For this reason alone, we cannot say that any of these tests satisfies our first question: Do these tests certify that teachers have sufficient subject knowledge to teach all students to high standards?

While none of these tests adequately addresses content, some of them were found to be better than others. A summary of the tests follows.

ELEMENTARY EDUCATION AND BASIC LITERACY

It is difficult to evaluate the content knowledge in elementary licensing examinations. The tests that elementary teachers most commonly take are concerned largely with pedagogy, not subject matter knowledge, and therefore lie outside this study. However, many states require a test of basic literacy for all prospective teachers, which by default becomes the "content" test for elementary teachers.

Both ETS and NES provide basic literacy or general knowledge tests. Overall, these tests were characterized by simple recognition or recall of general subject matter. A typical treatment of content is seen in this literature question:

> *In the meanwhile there came along a single red ant on the hillside of this valley, evidently full of excitement, who either had dispatched his foe, or had not yet taken part in the battle; probably the latter, for he had lost none of his limbs; whose mother had charged him to return with his shield or upon it. Or perchance he was some Achilles, who had nourished his wrath apart, and had now come to avenge or rescue his Patroclus.*

The [preceding] passage makes use of analogies that originate in

a) Roman mythology
b) Elizabethan drama
c) Greek epic
d) the New Testament
e) Arthurian legends[9]

In questions like this one, the test-taker either knows the answer or does not. It reveals nothing about the candidate's ability to interpret, analyze or otherwise make use of this knowledge.

ETS publishes the widely used Praxis I, also called the Pre-Professional Skills Test (PPST), which is a test of basic skills or literacy. NES publishes similar exams, including CBEST for the state of California. These literacy exams are intended as qualifying tests for entry into teacher preparation programs and are designed to be administered around the second year of college. However, in many states these tests can be taken at any point before licensure and many prospective teachers take them after completing their formal training. In these states, the literacy test becomes by default a qualifying examination for teaching. Indeed, in some states it is the only content test elementary teachers take.

Praxis I addresses only reading, writing and mathematics. None of these sections exceeded high school level, and at least two-thirds of the mathematics items were judged to be middle school. An analysis comparing the distribution of Praxis I math items to the 1996 National Assessment for Education Progress (NAEP) for mathematics (see chart below) seems to indicate that NAEP emphasizes a better balance of mathematics, even at the eighth grade level, than does Praxis I.

	Praxis I	NAEP Grade 8	NAEP Grade 12
Number	37.5%	25%	20%
Measurement	5%	15%	15%
Geometry	15%	20%	20%
Data Analysis	20%	15%	20%
Algebra	12.5%	25%	25%

The PPST reading passages were on the level of the *National Geographic*, typically high school readings but clearly accessible to middle and upper-elementary school students. In general, the questions that referred to these passages asked for either direct recall of information in the passage or for obvious inferences or interpretation.

Alice Fletcher, the Margaret Mead of her day, assisted several American Indian nations that were threatened with removal from their land to the Indian Territory. She helped them in petitioning Congress for legal titles to their farms. When no response came from Washington, she went there herself to present their case.

According to the statement above, Alice Fletcher attempted to:

a) imitate the studies of Margaret Mead
b) obtain property rights for American Indians
c) protect the integrity of the Indian Territory
d) become a member of the United States Congress
e) persuade Washington to expand the Indian Territory[10]

This question is simple on several levels. The reading passage itself is straightforward with relatively simple vocabulary and syntax. The question asks only for a literal recognition of information provided in the passage. This question might easily be found on a middle-school reading exam.

The writing questions, or prompts, in the paper-and-pencil version were bland and general with no specified audience or discernible purpose. An example: "Which of your possessions would be the most difficult for you to give up or lose?"[11] George Pullman of the national advisory panel described the writing prompts this way: "The weakness tends to be *a*contextuality – the kind of 'once off the top of your head to no one in particular for no reason except to test your writing' test that is so common. The better prompts have a clear context and a set audience and purpose."

The basic literacy exams showed little complexity; rather the test items tended to require only simple recall or the application of a set procedure. These tests are taken by students at any

point between two and four years into their college careers. Yet overall we found these tests to be far less difficult than either the SAT or ACT – tests that students should have performed on with some success in order to have been admitted to their universities at the outset. These tests were mostly at the eighth to tenth (sometimes seventh) grade level.

SECONDARY MATHEMATICS

Most of the content of the Praxis II and NES mathematics examinations can be found in a broad high school curriculum. Only a few questions went beyond calculus or addressed concepts typically not learned until the first two years of college. Most of the items on the exams differed little from what can be found on a test of high school mathematics.

A notable feature of most of the mathematics tests was that mathematical definitions and basic formulas were provided up front (e.g., formulas for the area of a triangle and the circumference of a circle). Even though we tended to view recall items as low level in our analysis, this was one instance when our reviewers believed the ability to recall was important. Lynn Steen commented that by not asking candidates to produce formulas on demand, it's as if the test publishers "don't care whether candidates actually know anything, but only whether they can carry out learned procedures."

Of the Praxis II tests, we looked at three which contained the most advanced material. These were Mathematics: Content Knowledge (0061); Mathematics: Proofs, Models, and Problems, Part I and Part II (0063 and 0064). The following table summarizes the content distribution of Mathematics: Content Knowledge, which is a 50-item multiple choice test:

Content distribution by NAEP categories

	Praxis II Math (0061)	NAEP Grade 8	NAEP Grade 12
Number	10%	25%	20%
Measurement	0%	15%	15%
Geometry	34%	20%	20%
Data Analysis	10%	15%	20%
Algebra	46%	25%	25%

This distribution should be compared to the table on page 9 for the Praxis I mathematics. Despite the obviously larger percentage of algebra items, our analysis concluded that only eight of 50 items were clearly college level. In addition, 70% of the items were simple, and only 16% complex.

Although the vast majority of the items did not require complex problemsolving, more than half of the questions asked for some application of concepts to problemsolving situations. Steen thought these multiple-choice tests contained "a significant number of unusual questions that would exercise the metacognitive capabilities of candidates."

In contrast, he thought the Mathematics: Proofs, Models, and Problems (0063 and 0064) "included nothing that was not absolutely straightforward." We considered these examinations together because they consist of only four and three problems respectively. We saw two forms (different years of the same test) for a total of 14 problems, ranging from geometry to linear algebra. However, only four out of the 14 problems were concerned with topics taught in college, and just four were considered complex.

Mathematics items in NES tests vary from the mostly routine questions in the complete state test we reviewed to the more complex and sophisticated item from the Massachusetts test cited on page 6. The complete secondary mathematics test we reviewed had a large number of items placed in a real-world context, which at first sight looks like a good idea. But frequently the contexts are thinly veiled procedural or even recall items. Many of the contexts are contrived, a few are silly, and at least two are wrong. Some items conceal a tiny mathematical topic, reached after wading through a heavy context.

This math test could be answered with ease by a mathematics student after finishing AP calculus, or even before, since the only calculus items are often included in the pre-calculus course.

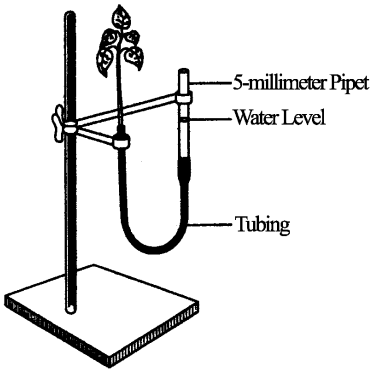
In general, the tests assess mostly tenth to eleventh grade level content. Nothing in either the Praxis II tests or the NES tests probes the intellectual substance of college mathematics that should equip high school teachers with robust backgrounds for dealing with the myriad ideas that will emerge from discussion with students.

SECONDARY SCIENCE

In the Praxis II series, we had to choose among a large variety of tests in several scientific disciplines. As in the case of mathematics, we wanted to look at the tests with the highest academic challenge. But we also had to choose those most used by states buying Praxis II tests (for example, only 21 candidates throughout the entire country took the Physical Science: Content Essays [0482] test between 1995 and 1998). The three most used Praxis II tests in science that are also the most challenging are General Science: Content Essays (0433), Biology: Content Knowledge, Part I and Part II (0231 and 0232).

Like the other Praxis II essay examinations, General Science: Content Essays has only three questions, which candidates answer in writing. Although three questions cannot measure the breadth of knowledge required at the secondary teaching level, the examination assesses the candidate's ability to use and analyze critical concepts in science covered in introductory college courses in life science, physics, chemistry, and earth science. The three questions broke into six parts: the most challenging were the physical science and general science questions; of the life science questions, one required procedural knowledge and the other only tapped recall. Three of the parts required complex, multi-step answers, but the life science question that required recall also only asked for a single-step answer, surprising in a test requiring written responses.

This example is typical of the science content essays in that the challenge ranges from recall to complexity:



The potometer shown above is used to estimate transpiration rate in plants.

A. Define the process of transpiration.

B. Identify three variables that would affect transpiration rate. Describe how the potometer can be used to test these variables.

C. Discuss how and why a change in each variable is expected to affect the transpiration rate.[12]

The Biology: Content Knowledge, Part I (0231) test, with 75 multiple-choice items, tested knowledge of the basic principles of science; molecular and cellular biology; classical genetics and evolution; diversity of plants and animals; ecology; science, technology, and society. Almost half of its items could be answered with simple recall of information; only seven required multi-step problemsolving, and only 12 required the application of a concept.

The second part of the Biology: Content Knowledge, Part II (0232) test also has 75 multiple-choice items, but they test knowledge that would be acquired in high school advanced or honors classes and some in first-year college biology classes. The questions covered molecular cellular biology; classical genetics and evolution; diversity in plants and animals; and ecology. Compared with Part I, there was a considerable increase in the number of items requiring either moderate or complex problemsolving (57 in Part II), and in procedural or conceptual knowledge (62).

While all three of the tests examine knowledge of the "big ideas," the concepts defined in the National Science Education Standards and many state frameworks for science, only Biology: Content Knowledge Part II reflects the depth of knowledge that one would expect of a beginning teacher of biology. Biology: Content Knowledge Part I does not cover a wide or deep enough selection of topics to adequately reflect what a high school science teacher needs, even as a beginner.

The NES science tests, like the mathematics tests, were extremely variable. The complete test we examined had tests in general science, biological science, chemistry, and physics. A feature of NES examinations which differentiates them from ETS's Praxis series is that NES tests include pedagogical questions within the test. In the general science test, 11% of the questions were concerned with the pedagogy of science; in the physics test, 15%; the biological science test, 17%; and 20% in chemistry.

In no case did the academic knowledge tested go beyond grade 12 level, and a large number of the items in all four tests were at the grade 8, 9, or 10 level (even some at grade 7). In general, the NES complete test reflected the techniques of multiple-choice tests from 30 years ago.

On a positive note, the NES-published Massachusetts sample test again provided an example of greater sophistication, asking for a written response to an earth science problem on earthquakes. Eugenie Scott and George Miller wrote that this problem "requires both scientific and engineering/social knowledge to answer all the parts ... If the objective of the sample is to have candidates prepare for science, technology and society (STS)-type items, then this should be effective." However, without access to the whole exam, it's not possible to know if the test adequately addresses breadth as well as candidates' depth of knowledge of key concepts.

SECONDARY ENGLISH/ LANGUAGE ARTS

Secondary English/Language Arts tests are concerned with general knowledge about literature; knowledge of grammar, style, and etymology; and knowledge of resources (dictionaries, thesaurus, etc.). We looked at two Praxis II tests in English: English Language, Literature, and Composition: Content Knowledge (0041) and English Language, Literature, and Composition: Essays (0042).

We examined two forms of the Content Knowledge test, published about five years apart. The test asked students to answer 150 items in two hours. The questions were mostly recall items to which a student either knows the answer or doesn't. For example:

> *If we could only get one of them new-fangled carriages that make no noise that Father O'Rourke told him about, them with the rheumatic wheels.*[13]
>
> *The underlined word in the lines above is an example of*
>
> *a) a metaphor*
> ***b) a malapropism***
> *c) an oxymoron*
> *d) a synecdoche*

The first 65 or so items are about literature. The range is not wide: most of the items are concerned with classic English literature, nineteenth century American literature, and a smattering of world literature, the stuff of college survey courses. The other questions (the majority) ask about language use, editing, etymology, and research resources (dictionaries, thesaurus, etc.)

The test was overwhelmingly concerned with breadth of content knowledge. The result was a superficial treatment–who wrote what, or where do you find this. Although taught in college survey courses or in English education courses (where technical grammatical content is often taught), the material is not conceptually too difficult for high school students. There are no questions demanding a depth of knowledge that would enable "people to show that they know how to do useful things with what they know," in George Pullman's words.

The story was surprisingly different with the English Language, Literature, and Composition: Essays test (0042). The test is two hours long and requires two essays. One provides two poems, usually on the same theme, and asks for a close critical comparison. The second essay presents an issue in the English profession: one example asks the candidate to write on the canon and discuss attempts to expand it; another asks the candidate to compare two schools of criticism, practical and response criticism, for example. The scoring guides show that a high level of argument, knowledge of the subject, and writing ability is required to receive the highest score.

The essay test demands the knowledge of the field and experience with close reading that is typically acquired in introductory courses to the English major. It comes closer to knowledge for teaching than other tests, but its questions are not constructed with the specificity that would require knowledge at the level of a college graduate. We therefore put it within the scope of a major who has completed the junior year. Even so, it remains the highest level achieved by *any* of the tests we examined.

Only nine states require the Essays test (0042). Sadly more than 30 states certify secondary English teachers without testing any writing beyond the content-less essay in the basic skills tests.

The NES single-subject tests combined pedagogical and content material, but this time, within the same question. Here is an example from the ExCET (Texas) Preparation Manual:

Write an essay in which you:

- *Analyze how the speaker uses metaphor to reflect on truth and ignorance, and*
- *Propose learning activities for a specific secondary grade level that would help students build an understanding of the poem and explain why you would use these activities.*

[The poem is "Truth" by Gwendolyn Brooks]

In NES English/language arts secondary tests, most of the items concerned literature; grammar and style; and pedagogy. Most of the answers to the literature questions would be found in college survey courses, because they include examples from the best known Greek tragedies and traditional British and American literature. Comprehension questions include passages from American Indian and African American writers, but are all on the level of simple recognition.

Some NES states require written essays, usually providing a challenge on the level of a first or second-year college student. A Colorado prompt asks students to compare excerpts from the *Rig Veda* and a Navajo myth, and then discuss the functions of myth with analysis of the themes and stylistic devices of the two passages. While a college-level challenge, this prompt does not draw on the specific knowledge of issues in literary criticism to be expected of an upper division college student, as does the essay question cited from the Praxis II test, English Language, Literature and Composition: Essays (0042).

THE MATTER OF PASSING SCORES

Our judgments about the licensing exams are based on a best case scenario. In estimating the test level, we assumed that all items had been answered correctly. In the real world, of course, there are passing scores, which establish the cut-off point between pass and fail. Passing scores are set by the individual states and can vary considerably for the same test. For example, on the Praxis II test, Mathematics: Content Knowledge (0061) – a test we estimated to be at the advanced high-school level– required scores range from Oregon's high with a scaled score of 147 to Georgia's low at 124. At the high end, an Oregonian need only answer about 65% of the questions correctly to begin teaching high-school mathematics.[14] In Georgia, a prospective mathematics teacher can become licensed by correctly answering fewer than half (about 46%) of the test items. Ironically, students would receive "Fs" for producing such scores in the classroom, yet this is all states require of their teachers.

Passing scores for other teacher licensing tests show similar patterns of variation among states as well as a tendency for dumbing down. Nowhere is this trend more apparent than in the widely used Praxis I,

Praxis I Math — Passing Scores By State 1998-99

State	Passing Score	Estimated % Correct To Pass	% of Test Takers Nationally Who Would Fail to Make this Cut
Virginia	178	68-73%	44
Hawaii	176	60-65%	36
Oregon	175	60-65%	31
Florida	175	60-65%	31
Kansas	174	60-65%	26
DC	174	60-65%	26
Delaware	174	60-65%	26
Alaska	173	53-58%	22
Wisconsin	173	53-58%	22
North Carolina	173	53-58%	22
Kentucky	173	53-58%	22
Georgia	173	53-58%	22
West Virginia	172	53-58%	18
New Hampshire	172	53-58%	18
Maine	172	53-58%	18
South Carolina	172	53-58%	18
Arkansas	171*	53-58%	15
Oklahoma	171	53-58%	15
Nebraska	171	53-58%	15
Texas	171	53-58%	15
Nevada	170	45-50%	12
Montana	170	45-50%	12
Tennessee	169	45-50%	10
Mississippi	169	45-50%	10
Minnesota	169	45-50%	10

*** Effective July 1999**
See Sources Page 23

Praxis I Reading — Passing Scores By State 1998-99

State	Passing Score	Estimated % Correct To Pass	% of Test Takers Nationally Who Would Fail to Make this Cut
Virginia	178	71-76%	43
North Carolina	176	63-68%	30
Alaska	175	63-68%	24
Delaware	175	63-68%	24
Hawaii	175	63-68%	24
South Carolina	175	63-68%	24
Wisconsin	175	63-68%	24
New Hampshire	174	63-68%	19
Oregon	174	63-68%	19
Kansas	173	55-61%	16
Kentucky	173	55-61%	16
Maine	173	55-61%	16
Minnesota	173	55-61%	16
Oklahoma	173	55-61%	16
DC	172	55-61%	12
Florida	172	55-61%	12
Georgia	172	55-61%	12
Nevada	172	55-61%	12
West Virginia	172	55-61%	12
Arkansas	172*	55-61%	12
Texas	172	55-61%	12
Mississippi	170	47-53%	8
Montana	170	47-53%	8
Nebraska	170	47-53%	8
Tennessee	169	47-53%	6

***Effective July 1999**

See Sources Page 23

a basic literacy test that we judged to be at about the tenth to eleventh grade level. In most of the 25 states using this test, an elementary teacher can become certified by correctly answering somewhere between 47 and 61% of the reading and mathematics items. A few states have raised their Praxis I cut scores in highly publicized efforts to raise teacher quality. In Virginia, for example, prospective teachers must now meet a scaled score of 178, or correctly answer about 71 to 76% of the test items. However, at best, this translates into a mediocre performance on a high-school level exam.

Because licensing exams are reported only on a pass-fail basis, there is no way of knowing if successful candidates score high or just barely make the cut. Certainly, bright teacher candidates breeze through these tests and many report feeling insulted by the tests'low level. Failing these tests sends a clear signal that the candidate is unsuitable for teaching. But passing does not tell us whether prospective teachers know enough content to teach effectively.

WHO DETERMINES TEST CONTENT

The content in subject-matter licensing exams is not, as one might expect, a deliberate, well-considered statement of what teachers should know in order to be qualified professionals. Licensing examinations are meant to establish a floor. In fact, the process used to define test specifications and validate items pushes content levels to the basement.

Both NES and ETS are providing their customers, the states, with the product they ask for. These publishers guarantee that licensing exams are psychometrically sound. In addition, the tests have undergone a validation process designed to assure that they can withstand potential legal challenge of the sort recently experienced by Alabama.[15] Such concern has led test developers to include only content that they can prove a beginning teacher actually uses in his or her practice. This practice reduces the likelihood that tests will contain content higher than the high school level. The minimalist approach to content is justified by an assumption that professional growth and knowledge will occur over time. However, there is no evidence that indeed this happens among all teachers.

Tests are validated in a multi-phase process. Content specifications are provided by groups of teachers and representatives of professional organizations such as the National Council of Teachers of Mathematics, the National Council of Teachers of English, the National Science Teachers Association, and so on. Because NES contracts individually with states, these specifications are provided by the customer.

A bank of items and/or objectives is then developed by subject specialists, test experts and teachers. The tests are validated by panels comprised mostly of novice teachers who have less than five years of experience. The panels consider two

questions about each item: "Is the knowledge in this question used in my teaching?" and "What percentage of beginning teachers would answer it correctly?" The panel reviews are a fundamental part of the process of validating test content. These findings are also considered in establishing passing scores, as are projected supply and demand of teachers by field and impact statements on minority candidates.

Unless a state suddenly experiences a glut of prospective teachers (hardly likely when most are claiming shortages) this process cannot accommodate raising the bar on licensing exams. In fact, over time the process itself creates a downward spiral of expectations.

THE WRONG ANALOGY

The reason for a minimal approach to teacher licensing is at root legal: litigation has established that entry-level qualifications must have direct relevance to the job. The analogy is with trade: a carpenter cannot be required to pass an examination in calculus if calculus is never used in framing. Thus, test publishers build a firewall against litigation by checking with early-career teachers about the knowledge they claim to use on the job.

We believe the trade analogy undermines the professional status of teachers. Other professionals–including lawyers, accountants, doctors and nurses–must pass tests that are notoriously tough. Often, as these professionals advance in their fields, they must pass still other exams which specifically test their increasing content knowledge. Not so in teaching.

Many of those involved with licensing policy want to avoid unfairly excluding people from becoming teachers. While conducting this study, we also heard over and over again that the purpose of licensing was to assure that beginning teachers would do no harm. But we know from research that poorly prepared teachers do harm. And they do the most harm to the students who have the least support to fall back on for their academic development.[16]

Clearly, states have an interest in preventing lengthy suits. Schools of education have an interest in showing high success rates among their graduates. School administrators, too, have an interest in filling vacancies.

But all of these factors conspire to keep licensing criteria minimal. Lost in this process is the *students*' interest in having teachers who have the content knowledge needed to help them reach new and higher academic standards.

CAN LICENSING EXAMS MEAN SOMETHING?

Several states are attempting to raise licensing requirements. A few, like Massachusetts, are making efforts to install higher level tests. Other states, notably Maryland and Virginia, are raising passing scores. But while the attempts are laudable, raising passing scores on low-level examinations will produce only modest returns in the long run. What's needed to assure a higher caliber teacher corps is a reevaluation of the assumptions and goals upon which the current tests are based.

Poorly prepared teachers do harm. And they do the most harm to the students who have the least support to fall back on for their academic development

The first assumption that needs to be reexamined is that teachers' content knowledge grows over time. If true, a minimal approach to licensing is certainly less risky. Yet there is no structure to ensure that a teacher's intellectual growth will happen. Existing career ladders and requirements for continuing certification do not emphasize content knowledge, on the whole, and they are by no means found in every state. States need to build such structures. But they also need to certify a solid academic foundation in the beginning.

Second is the assumption that minimum content knowledge for K-12 teachers means K-12 content, and maybe just a little bit more. Most of the content on licensing examinations is most typically found in high school curricula. On the few occasions that tests addressed content beyond high school, it was at the level of the first or second year of college, never at the level of a bachelor's degree. Such low levels of content are insufficient.

The third assumption is about licensure and not specifically about the exams. Many states assume that passing college courses assures a "college level" mastery of content. But there is ample research showing that this is not the case. More importantly, there is no indication that the content learned in college courses is at all relevant to what prospective teachers will need to teach.

In the end, this was the most disturbing aspect to us. What we have named knowledge for teaching – the deep understanding of key concepts connected to K-12 curriculum–is absent from the licensing examinations.

The movement to draft K-12 content standards began with a question: What should students know and be able to do to be competent, literate high school graduates? After long public discussions involving educators, subject specialists, industry and civic leaders, the answer was content that was significantly higher than schools were currently teaching. Moreover, it was determined that this higher-level content must be mastered by each and every student – including those students that schools had traditionally left behind.

This discussion should not be over. It must extend to the next logical question: What should teachers know and be able to do to teach their students to these new standards? When we hold such discussions, as some college faculty are beginning to do now, we are bound to find that the content requirements for teachers also need to be significantly higher. And licensing examinations must reflect this content.

Raising the level of licensing examinations is not without risks. The threat of litigation will continue to loom for states and tougher tests add to the panic of administrators scrambling now to put a teacher in every classroom. Even the simple act of raising passing scores can have an immediate impact on teacher supply.

Yet the short-term risks of shortages and ill-prepared candidates are inconveniences compared to the long-term devastation of placing barely qualified teachers in charge of our students'intellectual development.

Teachers truly hold society's future in their hands. There are many gifted teachers currently practicing who both know their subjects well and can convey that knowledge to their students. But there is no present mechanism to ensure that *all* teachers have these qualifications, or will attain them in time.

Everybody–students, parents, teachers themselves, and members of the community–holds a high stake in making sure teachers have the knowledge they need to teach all students to high standards. With public support and political will, policymakers and educators can loosen the stranglehold that litigation and psychometrics have on developing licensing examinations. They can make them into instruments that signify high professional standards and tests that teachers will be proud to pass.

Are Teacher Candidates Adequately Prepared? A Virginia Example

Of the 5,000 Virginia teacher candidates who took the PRAXIS I, a basic-skills test:

35% failed the writing portion
35% failed the math portion
20% failed the reading portion

FURTHERMORE,
Nationwide, nearly half of all teacher candidates would have failed to make the Virginia cut.

Source: Data derived from the Washington Post, February 21, 1998.
Notes: Passing the reading portion of the exam required that candidates answered approximately 71-76% of the questions correctly; passing the math portion of the exam required that candidates answered approximately 68-73% of the questions correctly; data not available for the writing portion of the exam.

ACTING ON THIS INFORMATION

Some recommendations from the Education Trust

SHORT TERM ACTIONS FOR STATE, LOCAL AND EDUCATION LEADERS

1 All states should assess the academic knowledge of intending teachers, using the most rigorous available examinations.

FOR ELEMENTARY TEACHERS, assessments should measure whether the candidate has at least the general knowledge acquired in a four-year liberal arts degree program. None of the currently available examinations (with the possible exception of Massachusetts') does this very well, leaving states with two short-term options, neither good. The first is simply to raise the passing score on whichever general knowledge exam is currently in use. The second, possible only in states that have rigorous, internationally-benchmarked high school exit exams (like New York Regents Exams), is to administer that high school exam to intending elementary school teachers and demand a "distinguished" or "advanced" performance level.

FOR SECONDARY TEACHERS, states should require both the essay-rich assessments (for example, the Praxis II English Language, Literature and Composition: Essay or Mathematics: Proofs, Models and Problems, or NES'Massachusetts Science Essay Exam) and multiple-choice content examinations. This way, both breadth and depth of subject knowledge will be tested.

2 Minimum passing scores should be raised.

3 School districts should request from all applicants for teaching jobs their scores on relevant licensure examinations, as well as copies of college transcripts or other evidence of content expertise. While all teacher hiring decisions should factor in this information, high-poverty schools, where students are especially dependent upon their teachers for content learning, should give test scores and transcripts considerable weight in the hiring process.

4 University leaders should note that current state policies do not preclude them from setting higher academic standards for graduation from their institutions than states require for licensure. Indeed, they would be well advised to consider doing what the Texas A & M System recently did: set higher standards for itself than did the State Licensure Board.

LONGER TERM ACTIONS FOR STATE, LOCAL AND EDUCATION LEADERS

1 All states should immediately initiate a process aimed at developing clear academic standards for what teachers need to know in the various content areas in order to teach students to the state K-12 standards. The standard-setters should start with the K-12 standards, but ask specifically what more a teacher needs to know both to have the deep understanding necessary to teach a concept well, and also the knowledge necessary to link that concept to others. At the secondary level, especially, these standards should represent the kind of knowledge that should be acquired during four years of intensive study at the collegiate level. This process should be led by faculty from the relevant disciplines, but should also include teachers and education faculty.

2 These new standards for teachers should serve as a framework for rethinking how teachers are prepared, including what courses they are required to take. Broad general education requirements, which allow students to fulfill science requirements with courses like Astronomy or Human Sexuality, may not be sufficient to provide elementary teachers with the content background that matches what they will be teaching. The same is true of secondary teachers and the academic major: as one group of university-based mathematicians just found, while students could learn all of the content necessary to teach to that state's standards in the courses available to a math major, completion of the major would by no means guarantee the right combination of content.

3 These standards should also guide the development and/or selection of rigorous new academic assessments for initial licensure. These should be developed, tested, and put into place as soon as possible.

4 Passing state licensure exams should not be left to chance. Rather, to ensure that institutions of higher education take seriously their responsibility to prepare intending teachers for these exams, states should adopt and put into place accountability systems that hold colleges strictly accountable for the success of their graduates. These accountability systems should affect the arts and science departments that do most of the content preparation of future teachers, as well as schools of education.

5 Colleges and universities should be held clearly accountable for preparing all of the students in their teacher preparation programs—including minority students—to pass state licensure exams. As in the state of Texas, institutions that do not succeed with minority students should get help improving their success. If they fail to improve, state registration or accreditation should be revoked.

ACTIONS FOR NATIONAL DISCIPLINARY LEADERS

1 Like the leaders in the field of mathematics, other disciplinary associations should take the lead in designing and carrying out a process for developing model academic standards for teachers at each level of the education system. The process should include the relevant subject-matter associations from both higher education and K-12. The model standards will serve as a reference point for state and local academic leaders as they answer the question "What do our teachers need to know to teach children to our standards?"

2 The disciplinary associations at both levels should also collaborate on the development of rigorous assessments of academic content for prospective teachers. As in the examinations developed by the American Chemical Society, these might initially be used voluntarily both by colleges (for program improvement purposes) and by individuals (to demonstrate unusual mastery). Over time, however, they might be used for initial licensure.

Notes

1 See State tables, pages 20-21
2 See State tables, pages 20-21
3 Out of the 21 states using ETS secondary English language arts examinations, only nine have selected the English Language, Literature and Composition: Essays. The Mathematics: Proofs, Models and Problems exams are used in only seven of the 22 states administering ETS secondary mathematics assessments. See State tables, pps. 20-21.
4 The ability of Stephen Jay Gould in his book *Full House* (New York: Random House, 1997) to explain statistical probabilities rests on a wide range of metaphors, from baseball to the sidewalk wanderings of a drunk emerging from a bar.
5 Praxis II, Mathematics: Pedagogy (0065), 1993, p.10. This example comes from the complete tests now released publicly.
6 from TAAG for Praxis I, Princeton NJ: ETS, 1998, p. 57 number 3
7 from the Massachusetts Teacher Tests™ Test Information booklet, Massachusetts Department of Education, 1998. p. 42
8 TAAG for Biology and General Science, 1998, Biology: Content Knowledge, Part 2 (0232), Princeton NJ: ETS, 1998, p. 24
9 The Praxis Series, NTE Core Battery Tests, Practice and Review, Princeton NJ: ETS, 1992, p. 49
10 TAAG for Praxis I, Princeton NJ: ETS, 1998, p. 43, number 4
11 Interestingly, the computer version of Praxis I had more purposeful prompts, some of which required the defense of an argument, although they still lacked a specific audience.
12 TAAG Biology and General Science, Princeton NJ: ETS. 1998, p. 69
13 Praxis II, TAAG, English Language, Literature, and Composition: Content Knowledge (OO41)
14 The Praxis II scaled scores are unweighted, making a straight percentage of correct items a relevant indicator.
15 Richardson v. Lamar County (AL) Bd. of Educ. 1989
16 see Haycock, Kati, "Good Teaching Matters," Thinking K-16, Summer 1998, Washington DC: Education Trust.

Thinking K-16 is published by The Education Trust, Inc.
1725 K Street, N.W., Suite 200
Washington DC, 20006.
Phone: 202/293-1217
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Website: http://www. edtrust.org

The Education Trust was created to promote high academic achievement for all students at all levels — kindergarten through college. While we know that all institutions could better serve their students, our work focuses on the schools and colleges most often left behind in efforts to improve education: those institutions serving Latino, African American, Native American and low-income students.
The Education Trust works alongside policymakers, parents, education professionals, and community and business leaders, in districts across the country, who are trying to transform their schools and colleges into institutions that genuinely serve all students.

Thinking K-16 is published with the intent to share lessons learned in these communities with policymakers as well as with educators and members of the public concerned with the quality of education provided our neediest young people.

Co-Editors, Patte Barth, Jeanne Brennan, Amy Wilkins
Desktop Editor, Karen Mora

How to Read This Chart

The chart below allows the reader to identify which states are using which content knowledge examinations for teacher licensure in elementary education, secondary English/language arts, and secondary mathematics. Actual requirements can vary (some states, for example, require tests for out-of-state applicants only): readers should contact the appropriate state agency with questions about requirements.

There are two major test publishers: Educational Testing Service (ETS) which publishes the Core Battery, NTE, and Praxis series, and National Evaluation Systems (NES) which designs state-specific examinations. Tests listed on the chart include:

ETS: PRAXIS I: a three-part exam in Mathematics, Reading and Writing
PRAXIS II: subject area tests
Core Battery: consists of three tests: general knowledge professional knowledge and communication skills.
NTE: subject area tests
NES: state-specific exams
OTHER: "*" denotes that licensing exams are either developed by the state or administered by the Local Education Authority, the State Education Authority, or an Institution of Higher Education.

The chart shows, reading from left to right across rows, by state:

- The basic skills exam used for Elementary teaching.
- The basic skills exam used for Secondary teaching.
- The English subject area exam(s) used for Secondary teaching.
- The Math subject area exam(s) used for Secondary teaching.

Please keep in mind:

- We are listing SUBJECTAREA exams only; not pedagogy exams.
- Tests being phased out appear in italics. Both the National Teachers Exam (NTE) and the Core Battery will be completely phased out by June 2000, and replaced with PRAXIS II. They are included in the chart because they are in use for the 1998-99 year covered by the chart.
- We limited our study to English/language arts, mathematics and science. The chart includes only English/language arts and mathematics subject area exams for secondary teaching. States may require additional subject area exams in other subject areas.
- Because NES contracts with individual states, access to their tests is in the hands of the appropriate state agency. We had access to complete examinations from a single NES state, which we are prohibited from naming, and study guides from six others. Due to these limitations, NES exams are listed simply as NES.

The data used to build this chart are drawn from *Understanding Your Praxis Scores, The Praxis Series: Professional Assessments for Beginning Teachers, 1998-99 Spring Edition*, (Educational Testing Service), and the *NASDTEC Manual on the Preparation and Certification of Educational Personnel, 1998-99* (National Association of State Directors of Teacher Education & Certification).

Content Knowledge Exams, By State 1998-99

	ELEMENTARY	SECONDARY		
State	**All Elementary**	**All Secondary**	**Secondary English**	**Secondary Math**
Alabama	*	*		
Alaska	PRAXIS I	PRAXIS I		
Arizona	*	*		
Arkansas	PRAXIS I	PRAXIS I	PRAXIS II: E LL& C (essays)	PRAXIS II: Math (content)
			PRAXIS II: E LL& C (content)	PRAXIS II: Math (proofs I & II)
California	NES	NES	NES	NES
			PRAXIS II: E LL& C (essays)	PRAXIS II: Math (proofs I & II)
Colorado	NES	NES	NES	NES
Connecticut	PRAXIS I	PRAXIS I	PRAXIS II: E LL& C (essays)	PRAXIS II: Math (content)
			PRAXIS II: E LL& C (content)	
Delaware	PRAXIS I	PRAXIS I		
DC	PRAXIS I	PRAXIS I	PRAXIS II: E LL& C (content)	PRAXIS II: Math (content)
				PRAXIS II: Math (proofs I)
Florida	PRAXIS I	PRAXIS I	PRAXIS II: E LL& C (content)	*NTE: Math*
Georgia	PRAXIS I	PRAXIS I	PRAXIS II: E LL& C (essays)	PRAXIS II: Math (content)
			PRAXIS II: E LL& C (content)	PRAXIS II: Math (proofs I)
Hawaii	PRAXIS I	PRAXIS I	PRAXIS II: E LL& C (content)	PRAXIS II: Math (content)
Idaho				

Content Knowledge Exams, By State 1998-99

	ELEMENTARY	SECONDARY		
State	All Elementary	All Secondary	Secondary English	Secondary Math
Illinois	NES	NES	NES	NES
Indiana	*Core Battery*	*Core Battery*	*NTE: E L& L*	*NTE: Math*
Iowa				
Kansas	PRAXIS I	PRAXIS I		
Kentucky	PRAXIS I	PRAXIS I	PRAXIS II: E LL& C (essays)	PRAXIS II: Math (Content)
			PRAXIS II: E LL& C (content)	PRAXIS II: Math (Proofs I)
Louisiana	*Core Battery*	*Core Battery*	*NTE: E L& L*	*NTE: Math*
Maine	PRAXIS I/*CB*	PRAXIS I/*CB*		
Maryland	*Core Battery*	*Core Battery*	*NTE: E L& L*	*NTE: Math*
Massachusetts	NES	NES	NES	NES
Michigan	NES	NES	NES	NES
Minnesota	PRAXIS I	PRAXIS I		
Mississippi	PRAXIS I	PRAXIS I	*NTE: E L& L*	*NTE: Math*
Missouri	*	*	PRAXIS II: E LL& C (content)	PRAXIS II: Math (content)
Montana	PRAXIS I	PRAXIS I		
Nebraska	PRAXIS I	PRAXIS I		
Nevada	PRAXIS I	PRAXIS I	PRAXIS II: E LL& C (essays)	PRAXIS II: Math (content)
				PRAXIS II: Math (proofs I)
New Hampshire	PRAXIS I	PRAXIS I		
New Jersey	*	*	PRAXIS II: E LL& C (content)	PRAXIS II: Math (content)
New Mexico	*Core Battery*	*Core Battery*		
New York	NES/*CB*	NES/*CB*	NES	NES
North Carolina	PRAXIS I	PRAXIS I	PRAXIS II: E LL& C (essays)	PRAXIS II: Math (content)
			PRAXIS II: E LL& C (content)	
North Dakota				
Ohio	*Core Battery*	*Core Battery*		*NTE: Math*
Oklahoma	PRAXIS I/NES	PRAXIS I/NES	NES	NES
Oregon	PRAXIS I/NES	PRAXIS I/NES	PRAXIS II: E LL& C (essays)	PRAXIS II: Math (content)
			PRAXIS II: E LL& C (content)	PRAXIS II: Math (Proofs I & II)
Pennsylvania	*Core Battery*	*Core Battery*	PRAXIS II: E LL& C (content)	PRAXIS II: Math (content)
Rhode Island	*Core Battery*	*Core Battery*		
South Carolina	PRAXIS I	PRAXIS I	*NTE: E L& L*	*NTE: Math*
South Dakota				
Tennessee	PRAXIS I	PRAXIS I	PRAXIS II: E LL& C (essays)	PRAXIS II: Math (content)
			PRAXIS II: E LL& C (content)	
Texas	PRAXIS I/NES	PRAXIS I/NES	NES	NES
Utah				
Vermont				
Virginia	PRAXIS I	PRAXIS I	*NTE: E L& L*	*NTE: Math*
Washington				
West Virginia	PRAXIS I/NES	PRAXIS I/NES	PRAXIS II: E LL& C (content)	PRAXIS II: Math (content)
Wisconsin	PRAXIS I	PRAXIS I		
Wyoming	*	*		

Test Title Key: E L& L= "English Language & Literature (0040)"; ELL& C (essays) = "English Language, Literature & Composition: Essays (0042)"; E LL& C (content) = "English Language, Literature & Composition: Content Knowledge (0041)"; Math (Proofs I) = "Mathematics: Proofs, Models & Problems, Part I (0063)"; Math (Proofs II) = "Mathematics: Proofs, Models & Problems, Part II (0064)".

STATE TABLES

Content Knowledge Exams: Passing Scores by State 1998-99

Praxis II — Eng Lang, Lit & Comp: Content (0041)

State	Passing Score	Estimated % Correct To Pass	% of Test Takers Nationally who would fail to make this cut
Connecticut	172	76-79%	34
Florida	165	68-71%	21
Hawaii	164	68-71%	20
Oregon	164	68-71%	20
Georgia	163	68-71%	18
Arkansas	159*	64-67%	12
Missouri	158	64-67%	11
Tennessee	157	64-67%	10
New Jersey	155	64-67%	8
West Virginia	155	64-67%	8
North Carolina	154 (9-12)	59-63%	7
	152 (6-8)	59-63%	6
Pennsylvania	153	59-63%	7
DC	142	51-55%	2
Kentucky	138	51-55%	2

*Effective July 1999

Praxis II — Mathematics: Content (0061)

State	Passing Score	Estimated % Correct To Pass	% of Test Takers Nationally who would fail to make this cut
Oregon	147	64-66%	70
Connecticut	141	60%	60
DC	141	60%	60
Kentucky	141	60%	60
Missouri	137	56-58%	56
Arkansas	136**	56%	51
Hawaii	136	56%	51
Tennessee	136	56%	51
North Carolina	133	52-54%	48
West Virginia	133	52-54%	48
New Jersey	130	50-52%	43
Pennsylvania	127	48-50%	38
Georgia	124	46%	34
Nevada	*		

* Multiple Scores Required
** Effective July 1999

Praxis II — Eng, Lang, Lit & Comp: Essays (0042)

State	Passing Score	% of Test Takers Nationally who would fail to make this cut
California	160	30
Connecticut	160	30
Nevada	155	21
Arkansas	150**	14
Oregon	145	8
Georgia	135	4
Kentucky	135	4
North Carolina	135	4
Tennessee	*	

*Test Required - Passing score not set
** Effective July 1999

Praxis II — Math: Proofs, Models & Problems Part I (0063) and Part II (0064)

State	Passing Score	% of Test Takers Nationally who would fail to make this cut
	Part I	
California	170	59
DC	154	37
Nevada	152	35
Arkansas	144*	26
Oregon	144	26
Kentucky	141	23
Georgia	139	20
	Part II	
California	159	72
Oregon	140	49

* Effective July 1999

STATE TABLES

Content Knowledge Exams: Passing Scores by State 1998-99

Praxis I — Writing (0720)

State	Passing Score	% of Test Takers Nationally who would fail to make this cut
Virginia	176	56
Wisconsin	174	32
Alaska	174	32
Texas	173	23
Arkansas	173*	23
South Carolina	173	23
North Carolina	173	23
Delaware	173	23
Tennessee	172	15
Oklahoma	172	15
New Hampshire	172	15
Nevada	172	15
Nebraska	172	15
Mississippi	172	15
Minnesota	172	15
Kentucky	172	15
Kansas	172	15
Georgia	172	15
West Virginia	171	11
Oregon	171	11
Hawaii	171	11
Florida	171	11
DC	171	11
Montana	170	7
Maine	168	3

*** Effective July 1999**

NTE —English Language & Literature (0040)

State	Passing Score	% of Test Takers Nationally who would fail to make this cut
Louisiana	550	20
Mississippi	530	14
Virginia	520	11
South Carolina	500	7
Indiana	500	7
Maryland	500	7
Arkansas	490	6

NTE — Mathematics (0060)

State	Passing Score	% of Test Takers Nationally who would fail to make this cut
Virginia	580	34
South Carolina	560	25
Louisiana	550	20
Indiana	530	13
North Carolina	530	13
Ohio	530	13
Mississippi	520	11
Maryland	520	11
Kentucky	500	7
Arkansas	*	
Florida	*	

*** Multiple scores required.**

The data used to build these tables are drawn from the following documents:

Passing Score: *Understanding Your Praxis Scores, The Praxis Series: Professional Assessments for Beginning Teachers, 1998-99 Spring Edition,* (Educational Testing Service, 1999).

Estimated % Correct to Pass: *Test Analysis: Pre-Professional Skills Tests, October 28, 1989 Administration, Form 3MPS1, Unpublished Report,* (Educational Testing Service, 1990).

% of Test Takers Nationally Who Would Fail to Make this Cut: *The Praxis Series, Professional Assessments for Beginning Teachers: 1995-96 Percentile Ranks and Summary Statistics,* (Educational Testing Service, 1996).

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