PREPARING TEACHERS

BUILDING EVIDENCE FOR SOUND POLICY

Committee on the Study of Teacher Preparation Programs
in the United States

Center for Education

Division of Behavioral and Social Sciences and Education

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COMMITTEE ON THE STUDY OF TEACHER PREPARATION PROGRAMS IN THE UNITED STATES

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Preface

The quality of teachers is increasingly recognized as critical to student learning. Holding schools and teachers accountable for student performance is a key element of plans for improving public education and is likely to remain so as the No Child Left Behind legislation is updated. Yet while the education of public school teachers has been the subject of concern, it has not been a primary focus of standards-based reform efforts. This study was mandated by Congress to answer basic questions about teacher education and the research that supports it and to highlight the way forward.

The study had two objectives: (1) to pull together a disparate and uneven research base, so that policy makers can see clearly what is and is not known and (2) to propose a research agenda to fill the gaps in that knowledge base. Our focus was clearly defined: we examined initial preparation for reading, mathematics, and science teachers. That is, although teacher learning is best understood as a process that continues throughout teachers' careers—for example, through induction, mentoring, in-service professional development, and professional collaboration—our focus was the ingredients essential to preparing "well-started beginners."

While preparation is undeniably important, other factors have significant influence on the strength of the nation's teaching force. The incentives that attract aspiring teachers, the status of the field, the compensation teachers can expect, the conditions in which they do their work, and their opportunities for professional advancement are just a few of the factors that

affect who becomes a teacher and who stays in the field. In a report more than 20 years ago, the Carnegie Task Force on Teaching as a Profession made a number of recommendations regarding teacher preparation, but it also clearly articulated the importance of seeing it as tightly integrated with other aspects of teachers' professional lives and other elements of the education system. Although our report is not intended to address all the issues related to teacher quality, we emphasize that effective teacher education is one necessary condition for ensuring the quality of the teaching force, but is neither the only condition nor a sufficient one.

Teacher preparation programs are turning out more than 200,000 new teachers every year, and those teachers are badly needed to fill vacancies in a field that has high turnover and a particular need for teachers prepared and willing to work with the neediest children. It is important to strengthen teacher preparation, not just because teachers make up one of the largest occupational groups in the United States, but also because they are asked to serve every child and family in the country. Their work is a basis for democratic citizenship, and they are at the heart of one of the central experiences of growing up—schooling. Nevertheless, teaching has never attained the same status as law or medicine, and the uneven quality of teacher preparation is a reflection of the ambivalence with which university scholars and others have historically viewed this female-dominated field. If that is to change, improving teacher preparation is vital.

We found many gaps in the knowledge base, but it is important also to highlight the considerable grounding we found for many types of guidance regarding the preparation of reading, mathematics, and science teachers. Our goal was to provide a dispassionate summary and objective analysis that will help policy makers debate alternatives and help teacher educators provide stronger preparation, while also providing guidance for much-needed research. Teacher education deserves careful, balanced scrutiny, and that is what we have worked to provide.

A number of individuals assisted us in our information gathering and analysis and we are very grateful for their thoughtful input and their time. At our first meeting, several people provided us with a variety of perspectives and information about a range of questions related to our charge: Joan Baratz-Snowden of the American Federation of Teachers; Vicki Bernstein of the New York City Department of Education and the New York Teaching Fellows Program; Jean Braxton, dean of the School of Education of Norfolk State University; Daniel Fallon of the Carnegie Corporation; Mary Hatwood Futrell of the School of Education and Human Development of George Washington University; Frederick Hess of the American Enterprise Institute; Deborah McGriff of Edison Schools; and Jon Snyder of the Bank

Street College. At another of our meetings several individuals assisted us in exploring methodological issues: Pamela Grossman, Nomellini Olivier professor of education at Stanford University; Karen Hammerness, a post-doctoral fellow at Stanford University; Raven McCrory of the Division of Science and Mathematics Education at Michigan State University; Susan Moore-Johnson, professor of teaching and learning at Harvard University; Stephen Raudenbush of the Department of Sociology at the University of Chicago; Kate Walsh, president of the National Council on Teacher Quality; and Robert Yinger, professor of educational studies and teacher education at the University of Cincinnati and research director for the Ohio Teacher Quality Partnership.

We held workshops to explore several issues in depth. The first addressed both teacher licensure and program accreditation and we gratefully acknowledge the assistance of presenters: Dan Goldhaber of the Center on Reinventing Public Education at the University of Washington; Peter McWalters of the Rhode Island Department of Education; Frank Murray, president of the Teacher Education Accreditation Council; Kara Schmitt, formerly of the Michigan Department of Consumer and Industry Services; Kathy Sullivan of the North Carolina Department of Public Instruction; J. Fredericks Volkwein of the Penn State Center for the Study of Higher Education; Judith Watkins of the Council for Higher Education Accreditation; and Arthur Wise, president of the National Council for the Accreditation of Teacher Education.

At our second workshop we explored two issues. One was the preparation of mathematics and science teachers, and we thank: Sybilla Beckmann, a professor of mathematics at the University of Georgia; Rodger Bybee of the Biological Sciences Curriculum Study; Elizabeth Davis of the Department of Applied Economics at the University of Michigan; James Hiebert of the School of Education at the University of Delaware; Barbara Miller of the Education Development Center; Paul Sally, director of undergraduate mathematics education at the University of Chicago; Mark Windschitl of the College of Education at the University of Washington; and Robert Yager of the College of Education at the University of Iowa. The second issue was perspectives on professions in the United States, and we thank: Steven Brint, a professor of sociology at the University of California, Riverside, and Lee Shulman of the Carnegie Foundation for the Advancement of Teaching.

We explored several state and regional analyses of teacher preparation by commissioning two studies, and we extend our sincere thanks to Tim Sass of Florida State University and to Pamela Grossman and her colleagues for their investigations of data from Florida and New York City, respectively. We also thank Douglas Harris of the University of Wisconsin at Madison;

George Noell of Louisiana State University; Kent Seidel and Robert Yinger, both of the University of Cincinnati; and David Wright of the California State University System for their contributions to the workshop.

Finally, the intellectual leadership demonstrated by costudy directors Lisa Towne and Stuart Elliott in guiding the committee's work was outstanding. The substantive and editorial contributions of Alexandra Beatty were of the highest quality and added significantly to the shape and eloquence of the report. The combined administrative support and responsiveness of Tina Winters and Patricia Harvey were also of the highest quality, and we are extremely grateful for all they did throughout the committee process. We would have no report without them. We also wish to note that the views expressed in this report are those of the committee, not the sponsors who generously supported our work.

This report has been reviewed in draft form by individuals chosen for their diverse perspectives and technical expertise, in accordance with procedures approved by the Report Review Committee of the National Research Council. The purpose of this independent review is to provide candid and critical comments that will assist the institution in making its published report as sound as possible and to ensure that the report meets institutional standards for objectivity, evidence, and responsiveness to the study charge. The review comments and draft manuscript remain confidential to protect the integrity of the deliberative process.

We thank the following individuals for their review of this report: Deborah H. Cunningham, Educational Management Services, New York State Education Department; Robert E. Floden, Institute for Research on Teaching and Learning College of Education, Michigan State University; Carolyn D. Herrington, Department of Educational Leadership and Policy Studies, Florida State University; Paul W. Holland, Paul Holland Consulting Corporation; Kenneth Howe, School of Education, University of Colorado at Boulder; Roger Howe, Department of Mathematics, Yale University; Joseph Krajcik, School of Education, University of Michigan; Henry M. Levin, Economics and Education, Teachers College, Columbia University; P. David Pearson, Graduate School of Education, University of California, Berkeley; Penelope L. Peterson, School of Education and Social Policy, Northwestern; and Steven Rivkin, Department of Economics, Amherst College.

Although the reviewers listed above have provided many constructive comments and suggestions, they were not asked to endorse the conclusions or recommendations nor did they see the final draft of the report before its release. The review of this report was overseen by Diana Pullin, School of Education, Boston College, and Burton Singer, Emerging Pathogens Insti-

tute, University of Florida. Appointed by the National Research Council, they were responsible for making certain that an independent examination of this report was carried out in accordance with institutional procedures and that all review comments were carefully considered. Responsibility for the final content of this report rests entirely with the authoring committee and the institution.

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Ellen Condliffe Lagemann, *Chair*
Committee on the Study of Teacher
Preparation Programs in the United States

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Summary

Teachers make a difference. The success of any plan for improving educational outcomes depends on the teachers who carry it out and thus on the abilities of those attracted to the field and their preparation. Yet there are many questions about how teachers are being prepared and how they ought to be prepared. As mandated by Congress, the U.S. Department of Education requested that the National Research Council conduct a study of teacher preparation with specific attention to reading, mathematics, and science. The Committee on the Study of Teacher Preparation Programs in the United States was charged to address four questions:

1. What are the characteristics of the candidates who enter teacher preparation programs?
2. What sorts of instruction and experiences do teacher candidates receive in preparation programs of various types?
3. To what extent are the required instruction and experiences consistent with converging scientific evidence?
4. What model for data collection would provide valid and reliable information about the content knowledge, pedagogical competence, and effectiveness of graduates from the various kinds of teacher preparation programs?

We examined many aspects of the complex and diverse network through which the majority of the nation's teachers are prepared. It was exceptionally difficult to assemble a clear picture of teacher preparation because

there have been no systematic efforts to collect the necessary data; thus, we can provide only partial answers to the first three questions in our charge. However, we did find many sources for conclusions about the skills and knowledge most likely to be valuable to beginning teachers, as well as clear indications of the research that is most needed to build a base of knowledge to guide improvements to teacher education.

HOW TEACHERS ARE PREPARED AND CERTIFIED

The lack of data related to the first two questions in our charge, about the characteristics of teacher candidates and how they are prepared, is surprising—at the very least because of the huge scale of the enterprise. There are approximately 3.6 million public school elementary and secondary teachers in 90,000 public schools in the United States. More than 200,000 students complete a teacher preparation program each year. Little is known about these teacher candidates except that they are predominantly female and white.

Aspiring teachers in the United States are prepared in many different kinds of programs, which in turn reflect many different kinds of career pathways. Between 70 and 80 percent are enrolled in "traditional" programs housed in postsecondary institutions; the rest enter the profession through one of the approximately 130 "alternative" routes.

Yet however they are designated, teacher preparation programs are extremely diverse along almost any dimension of interest: the selectivity of programs, the quantity and content of what they require, and the duration and timing of coursework and fieldwork. Any pathway is likely to entail tradeoffs among selectivity, the intensity of the training, and the obstacles it presents to teacher candidates. More selective pathways, and those that require greater effort and time to complete, may have the disadvantage of yielding fewer teachers to fill vacancies, for example, but the teachers they do produce may be more highly qualified.

There is some research that suggests that there are differences in the characteristics of teacher candidates who are attracted to different pathways and types of programs. There is also some research comparing the outcomes for graduates of different kinds of programs. However, the distinctions among pathways and programs are not clear-cut and there is more variation within the "traditional" and "alternative" categories than there is between these categories. We found no evidence that any one pathway into teaching is the best way to attract and prepare desirable candidates and guide them into the teaching force. This finding does not mean that the characteristics of pathways do not matter; rather, it suggests that research on the sources of the variation in preparation, such as selectivity, timing, and specific components and characteristics, is needed.

The wide variety in teacher education programs led us to consider the current mechanisms for accountability and quality control in teacher education, which strongly affect the ways that teachers are prepared. These mechanisms are a patchwork of mandatory and voluntary processes, including state program approval, program accreditation, and teacher licensure and certification. These mechanisms are not effectively linked in a coherent, outcomes-driven accountability system, and they are not grounded in solid empirical research about which program elements or accountability mechanisms are most effective, partly because such research is not available. Thus, they neither achieve the goal of a true accountability system nor provide evidence about the value of different mechanisms for producing effective teachers. In view of this lack of information, the committee recommends that the U.S. Department of Education undertake an independent evaluation of teacher education approval and accreditation in the United States.

HIGH-QUALITY PREPARATION

For the third question in our charge, about the extent to which current practices in the preparation of mathematics, reading, and science teachers are consistent with converging scientific evidence, we found a range of potential relevant material. This material included a relatively small body of evidence about the effects of particular kinds of instruction and an even smaller body of evidence about the effects of particular approaches to teacher preparation. Other available research included descriptive and qualitative studies about many aspects of teaching and learning in the three subjects and a substantial body of empirical work on learning and cognition. In addition, the relevant professional organizations have drawn on the available research and their own intellectual traditions and experience as educators to develop content and achievement standards for students and for teachers and, in some cases, for teacher education.

These sources together provide the basis for conclusions about:

- what successful students know about the subject,
- what instructional opportunities are necessary to support successful students,
- what successful teachers know about the subject and how to teach it, and
- what instructional opportunities are necessary to prepare successful teachers.

In analyzing the available evidence, we were mindful of the need to distinguish the basis for different sorts of claims and arguments, even as we

synthesized the most important points for policy makers and teacher educators and highlighted questions that have yet to be answered.

There has been an extraordinary amount of work, from a variety of fields, on questions about the factors that influence the effectiveness of teaching, but this work is only a starting point. There is little firm empirical evidence to support conclusions about the effectiveness of specific approaches to teacher preparation. However, we found no reason to question the recommendations professional societies have made about what is important for teachers to know. Moreover, those recommendations integrate well with the relatively small body of empirical work. The research base is strongest for reading and least strong for science, and our conclusions about preparation in the three fields reflect these differences.

In general, the evidence base supports conclusions about the characteristics it is valuable for teachers to have, but not conclusions about how teacher preparation programs can most effectively develop those characteristics. For all three fields, we conclude that both strong content knowledge (a body of conceptual and factual knowledge) and pedagogical content knowledge (understanding of how learners acquire knowledge in a given subject) are important.

For teachers of reading, it is important to (1) understand that students must master the foundational skills of reading (which include a firm grasp of phonics and comprehension strategies), and (2) possess a range of approaches for helping all students develop this mastery.

In mathematics, it is important for teachers to be able to foster students' understanding of the core elements of mathematical proficiency (which include conceptual understanding, procedural fluency, and capacity for reasoning and problem solving). This capacity requires not only mathematical knowledge, but also understanding of how mathematics learning develops and of the variation in cognitive approaches to mathematical thinking.

In science, the key points are similar to those for mathematics teachers: a grounding in college-level study of the science disciplines suitable to the age groups and subjects they intend to teach; understanding of the objectives for students' science learning; understanding of the way students develop science proficiency; and command of an array of instructional approaches designed to develop students' learning of the content, intellectual conventions, and other attributes essential to science proficiency.

This was the picture we found of the evidence relevant to teacher preparation. There is very little systematic research regarding the specific ways teachers of reading, mathematics, and science are currently being prepared that we could use to make comparisons with that picture. The limited information we found does not support conclusions about the current nature and content of teacher preparation programs.

EVALUATING EFFECTIVENESS

Ideally, teacher education programs would be evaluated on the basis of the demonstrated ability of their graduates to improve the educational outcomes of the students they teach. Unfortunately, the data needed for such evaluation do not exist, although there has been some promising work. More such research is needed, but identifying and measuring the relationship between teacher preparation and student outcomes poses methodological difficulties.

First, it is difficult to measure teacher effectiveness in valid and reliable ways. Assessments of K-12 student learning are the most readily available quantitative measures of educational outcomes. These types of measures serve important purposes, but they do not address the full range of outcomes of concern to policy makers. Indeed, much of the K-12 curriculum is not addressed by such tests. The assessment community has made important strides in developing richer measures of achievement but these are not yet at the stage where they could be easily used for systematic analysis of teacher effectiveness.

Second, establishing clear causal links between aspects of teacher preparation and outcomes for students is extremely difficult. The effects of teacher preparation are hard to disentangle from other factors, such as school, curriculum, community, and family influences. Efforts to establish causal links are also hobbled by the relative lack of data on the characteristics of teachers and their preparation; the dearth of robust measures of teachers' knowledge and practice; and difficulties in linking student achievement to instruction or to what teachers know. And, there is considerable distance in time and place between teachers' preparation and the effects their teaching may later have on student achievement.

These obstacles partly account for the paucity of strong empirical evidence regarding the effects of teacher preparation. Yet we believe that building knowledge about teacher preparation, as in any field of scholarly inquiry, requires ambitious and creative approaches to empirically examining causal relationships. It is very important to connect what occurs in preparation programs to characteristics of their graduates, to the ways those teacher-graduates interact with their students, and to learning outcomes for those students.

A MODEL FOR FUTURE RESEARCH

Because the information about teacher preparation and its effectiveness is so limited, high-stakes policy debates about the most effective ways to recruit, train, and retain a high-quality teacher workforce remain muddled. If the base of empirical knowledge about teacher preparation is thin, the way

forward is to build on what has been done by drawing on the professional consensus in each academic field for hypotheses about which features of teacher preparation are most promising and to subject those hypotheses to rigorous research. We were asked to develop an approach to future research that would provide a firmer foundation for policy and practice in the future. We organized our response around two overarching needs:

1. improved understanding of the relationships between characteristics of teacher preparation and student learning, and
2. a comprehensive, coherent system for collecting data about teacher preparation.

High-Priority Research Questions

The primary need is to build a body of evidence, developed from multiple perspectives and using an array of research designs, that establishes links between teacher preparation and learning—both teachers' learning and K-12 students' learning. Particularly valuable will be research that identifies and explains

- the features that make programs attractive to academically accomplished teacher candidates,
- the ways teachers' knowledge affects outcomes for students, and
- the characteristics of clinical experiences that affect outcomes for the students teacher candidates will later teach.

Data Collection

A comprehensive data collection system would provide not only baseline information for identifying and monitoring trends in teacher preparation, but also the necessary infrastructure for research into complex questions about teacher preparation.

A comprehensive data system for teacher preparation would provide meaningful information about teacher candidates, preparation programs, practicing teachers, the schools where those teachers teach, and the students they teach: that is, it would incorporate indicators beyond standardized test scores, degree title, courses taken, or certification category. These data would be integrated so that information about teacher candidates and their preparation can be connected with their knowledge, teaching practices, career paths, school environments, and student outcomes. One key to integration will be consistent definitions of key indicators so that data from states can be compared and used for research.

As states pursue strategies for sharing data and making it more accessible

through web-based systems, possibilities for research in teacher preparation will expand. The federal government can play a critical role in coordinating states' efforts and encouraging them to move in this direction.

CONCLUSION

The quality of the nation's teachers has been the subject of sharp critiques, and so have many preparation programs. Yet, teacher preparation is often treated as an afterthought in discussions of improving the public education system. Federal and state policy makers need reliable, outcomes-based information to make sound decisions, and teacher educators need to know how best to contribute to the development of effective teachers. Clearer understanding of the content and character of effective teacher preparation is critical to improving it and to ensuring that the same critiques and questions are not being repeated 10 years from now.

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Accountability and Quality Control in Teacher Education

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Our examination of teacher preparation for reading, mathematics, and science brought out some interesting differences among the three as well as some important similarities. We found a variety of sources to support conclusions relevant to teacher preparation. The support was strongest for conclusions about reading and weakest for conclusions about science. Overall, based on professional consensus in each field about what successful students know and a variety of evidence about the experiences that support student learning, we offer conclusions that can point teacher educators toward the best currently available guidance about preparation in these fields.

The next question to ask, then, is how these conclusions can be useful to policy makers in holding teacher education preparation programs accountable for the quality of the education they provide. Before discussing the utility of our conclusions for this purpose, we consider more broadly the accountability mechanisms in public education and teacher preparation.

ACCOUNTABILITY: AN OVERVIEW

Accountability—the mechanism by which institutions meet their obligation to report to others about how their resources have been used and to what effect—is a central concept in democratic societies (Trow, 1996). It can function through a variety of structures, including government regulation, private markets, and self-regulation (Graham, Lyman, and Trow, 1995). Accountability has become the cornerstone of K-12 education re-

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form efforts in the United States, as it has in business and other sectors, though there have been disagreements about which sorts of accountability measures are the most useful in the context of public education.

Following decades of state leadership in standards-based accountability, federal policy makers intensified the focus with the No Child Left Behind Act of 2001. That law tied federal funds to measures of student learning, mandating that states assess achievement in core subjects annually with the goal of ensuring that all students reach proficient levels in those subjects by 2014. Educators are expected to draw on a range of performance indicators to diagnose problem areas and sharpen interventions. Though standards-based testing and accountability are not without problems and detractors, most believe that they are here to stay, and that—on balance—they are having a positive effect (Stecher and Naftel, 2006; Massell, 2008).

Two types of accountability bear directly on teacher education, one related to programs and one related to teachers:

1. the direct monitoring of teacher preparation *programs*, by means of program approval and accreditation, and
2. the monitoring of individual *teachers*, through certification and licensure.

States and professional accrediting bodies exert direct influence over the operations and content of teacher education programs. Certification and licensure policies affect teachers directly, but they also affect preparation programs, which have the goal of certifying their graduates in particular areas and preparing them for the tests that states require of prospective teachers. Indeed, in some states the connection is explicit: for example, the subject-matter content standards for Florida teachers are designed to undergird both the state's ongoing approval processes for teacher education programs and the content of the subject-specific certification examinations required for full licensure. In addition, we note that teachers' performance on high-quality state certification and licensure tests could theoretically be an important measure of what graduates of preparation programs have learned.

The charge to this committee does not include reference to accountability or any individual quality control mechanisms. Yet our examination of the quality of teacher education inevitably led us to consider program approval, accreditation, and certification as crucial policy levers. Accountability mechanisms can be viewed as means of protecting the public from educational malpractice, or, more ambitiously, of ensuring that high standards are met. In either view, their functioning is critical to understanding of both the forces that shape teacher preparation and possible opportunities to leverage future improvements. Congress sought this report on the state

of teacher preparation because adequate information about key aspects of teacher education is not readily available. Accountability mechanisms are important tools for improving teacher education and could be an excellent ongoing source of the kind of information Congress has requested. For these reasons, we determined that a report on teacher preparation programs would be incomplete if it did not address accountability mechanisms. We look first at accountability mechanisms that affect teachers directly.

CERTIFICATION, LICENSURE, AND TESTING

Certification

The quality of individual teachers is addressed by states in various ways. *Certification* is the process by which states assess individuals' qualifications for teaching jobs, and each state develops and enforces certification in its own way. According to data collected by the Education Commission of the States and the National Comprehensive Center for Teacher Quality and made accessible in an interactive website (see http://mb2.ecs.org/reports/reportTQ.aspx?id=1137 [December 2009]), of 54 jurisdictions (states, U.S. Territories, and the District of Columbia), the state board of education authorizes teacher certification in 21, in 16 it is the state education agency, and in 16 it is a board or commission established specifically for that purpose (no policy was found for Guam or Michigan). Requirements may include background checks and fingerprinting; character recommendations; oaths of allegiance; minimum age; state-mandated teacher tests of basic skills, professional knowledge, or content knowledge; the completion of coursework in various domains (e.g., subject-matter majors or minors, the teaching of reading, classroom management, content courses aligned with state level standards for students); and participation in clinical field experiences (National Association of State Directors of Teacher Education and Certification, 2000).

The requirements for teacher certification have evolved over time, reflecting shifting expectations of teachers. In the colonial period, religious elders and important citizens would assess the moral and physical strength of teacher applicants. In the mid-19th century, reformers worked to establish professional standards and examinations. Tests were based on individual authors' views of what constituted professional knowledge, which might include geography or mathematics facts or moral views (Sedlak, 2008). Gradually, the curricula of teacher education programs expanded to include educational foundations (philosophy, psychology, sociology), instructional methods, and subject-matter courses.

Program administrators looked for guidance in designing their curricula from a variety of sources: professional organizations, local and state

boards of education, state legislatures, other teacher preparation programs, faculty in the disciplines, state superintendents of schooling, and education research. The content of teacher preparation programs is determined in part by state requirements (which are developed through the political process), but they also reflect the values and views of faculty in both colleges of education and disciplinary departments. There is no centralized source of information about state requirements or the content of teacher preparation programs currently offered in the United States. We could find no evidence that state requirements for teacher certification are based on research findings, and it appears that they vary significantly.

States also vary in the way they classify teaching certifications: teachers can be granted provisional certificates, professional or permanent certificates, or emergency certificates. Most states have a staged licensure process: 31 require an initial license that is valid for 2-5 years, with a permanent license to follow when additional requirements are fulfilled (such as completing advanced degrees or continuing professional development) (National Association of State Directors of Teacher Education and Certification, 2000). To earn a full license, teachers in some states must pass assessments of classroom performance. These assessments include the Interstate New Teacher Assessment and Support Consortium (INTASC) content-specific portfolios and Praxis III, an observation instrument developed by the Educational Testing Service.

Licensure

The terms certification and licensure are essentially synonymous in education, though that is not the case in all professional contexts. Some states issue teaching certificates and others issue licenses, with both typically serving the same function. The National Board for Professional Teaching Standards also offers certification, available in all states, that identifies successful candidates (among teachers who have been in the classroom for at least 3 years) as accomplished teachers, and the states offer other sorts of specialized certification as well.

Testing

Forty-two states require some form of teacher testing as part of the certification or licensure process (National Association of State Directors of Teacher Education and Certification, 2000). Teacher tests may cover basic skills, general knowledge, subject-matter knowledge, or pedagogical knowledge. Different tests are used to evaluate candidates in more than 25 credential areas (e.g., elementary education, chemistry, art, special education), and every state sets its own pass rates. There are more than 600 teacher tests

currently in use (National Research Council, 2001). Two test development companies, the Educational Testing Service (ETS) and National Evaluation Systems (NES), produce most of these tests, although some states develop their own. The limited information available about the development of these tests suggest that decisions about test content are generally based on either the mapping of K-12 student standards or teacher standards or the consensus views of panels of professionals (teachers, teacher educators, state department staff, faculty from the disciplines) (Wilson and Youngs, 2006).

There is a limited amount of research on the psychometric characteristics of these tests. For example, Wilson and Youngs (2006) located 14 studies of teacher testing, but all were conducted before the National Teachers Examination (NTE) was replaced with PRAXIS. Moreover, variation in the ways these tests are developed and used makes it very difficult to generalize about them. For example, states use different cutoff scores even when using the same test. Moreover, candidates also take these tests at different times in their careers, and thus will have had varying amounts of education and student teaching when they are tested. The available research was not designed to account for these and other sources of variance in performance: consequently, there is very little systematic information about the content or the predictive validity of these tests.

The quality of teacher tests has been a subject of public concern, with critics charging that they are simplistic and calling attention to embarrassingly low cut scores (e.g., Fowler, 2001). ETS has published reports about how their tests are constructed, but most teacher tests are not available to researchers for content analyses or research. One reason for the lack of access is that testing companies invest considerable funds in test development, and they do not want to bear the cost of replacing publicly released items, which they would have to do if the test items were available for study. One report on test content (Mitchell and Barth, 1999) found that most teacher tests in English/language arts, mathematics, and science used a multiple-choice format and covered knowledge at the high school level: they "found no evidence of content at the baccalaureate level" (p. 8).

For tests of professional knowledge to provide valid information on which to base accountability systems, they will need to be aligned with scientifically based research on student learning and instructional practices. However, for this kind of alignment to be possible, the developers of teacher licensing exams would need to make the necessary data available so that qualified researchers can, without breaching test security, study and report on the content of these exams.

PROGRAM APPROVAL

States also exercise authority over the programs that educate prospective teachers through program approval. An individual teacher can apply directly to the state department of education for certification, but individual teachers can also be recommended for certification by state-approved programs of teacher preparation. That is, program approval allows for graduates of particular programs that meet state criteria to be automatically recommended for individual certification at the program's discretion. State departments of education set program approval requirements and stipulate the review process for program approval, which typically involves an initial registration process and ongoing reviews; this process may or may not be related to national accreditation reviews (National Comprehensive Center for Teacher Quality, 2006). We could find no systematic information on or analysis of how state program approval is carried out or of its effects on quality.

Teacher education programs and state departments of education do have significant experience with managing program approval in their own states. In Michigan, for example, program approval often requires the construction of a matrix that aligns all state requirements to all program content. These analyses can include presentation of annotated course syllabi that highlight and point out where, when, and how particular topics are covered. Reviews may also include materials that demonstrate alignment between a program and state requirements. Some states convene panels of teacher educators from across the state to review these materials.

Teacher education program approval is typically mandatory. However, the effects of state approval on program quality have not been systematically demonstrated. The current mechanisms and standards vary considerably across states, can be inefficient, and can include requirements that have little empirical base.

STANDARDS

Central to state review and program accreditation processes are the standards against which institutions are judged. Many states have their own standards for teachers, and some have standards for beginning teachers. Others use the standards of the National Council for Accreditation of Teacher Education (NCATE) or the Teacher Education Accreditation Council (TEAC). NCATE's standards are developed through a consensus process and are updated every 7 years (National Council for Accreditation of Teacher Education, 2008). Data from the National Comprehensive Center for Teacher Quality show that 32 states require their programs to align their curricula in some way with K-12 academic standards, and 28

require that programs align their curricula in some way with state standards for K-12 teachers (see http://www2.tqsource.org/mb2dev/reports/reportTQ.aspx?id=946 [December 2009]). However, we were not able to find any comprehensive documentation or analysis of the standards that states used in accrediting teacher preparation institutions. From our examination of materials from TEAC, NCATE, and four states (California, Florida, Michigan, and New York), as well as regional agencies, it seems that states' standards generally incorporate or draw on local requirements and the recommendations of professional associations and that their content and character vary significantly.

The standards that do exist are not based on research that demonstrates links between particular standards and improved outcomes for students taught by teachers who were educated in a particular way because such evidence is not available. Thus, as in other professions, states and accrediting bodies draw on the standards developed by professional associations, other consensus recommendations, widely held commitments, or recognized best practices. We note that teacher education is hardly alone in lacking data that directly link components of professional preparation to the outcomes for those who receive the professionals' services.

ACCREDITATION

Professional societies associated with other fields, such as architecture, medicine, and law, require preparation programs to obtain national accreditation as a way of assuring the public of the programs' soundness and rigor. This is not a requirement for teacher education programs, though individual states can mandate it, requiring either state program review or accreditation by a national body (National Research Council, 2001). Virtually no research exists that demonstrates the effects of accreditation on teacher quality (Wilson and Youngs, 2006). Again, there is limited centralized information about the specifics of how programs are actually accredited across the states. Data available on the National Comprehensive Center for Teacher Quality website indicates that each state develops its own policy (see http://www2.tqsource.org/prep/policy/index.asp [December 2009]). States may accept the accreditation of one of two national bodies, NCATE and TEAC, or develop their own requirements for program review.

There are also six regional agencies (the Middle States, New England, North Central, Northwest, Southern, and Western Associations of Schools and Colleges) that accredit institutions of higher education—though not teacher education programs specifically—and some states rely on this general accreditation. Many states allow more than one route to program approval, either accepting more than one type of review (national or state) or requiring that programs meet both the standards of a national or regional

TABLE 8-1 Accreditation for Teacher Preparation Programs

State	State-Set Requirements	NCATE	TEAC	One or More Regional Bodies	No Policy Found
AK				*	
AL				*	
AR		*			
AS					*
AZ		*	*	*	
CA	*			*	
CO		*	*	*	
CT		*		*	
DC	*				
DE	*	*			
FL				*	
GA		*	*	*	
GU					*
HI					*
IA[a]	*				
ID		*	*	*	
IL		*	*	*	
IN		*			
KS		*			
KY	*	*			
LA	*	*			
MA					*
MD		*			
ME		*	*	*	
MI	*				
MN	*				
MO	*	*	*	*	
MS		*			
MT	*	*			
NC		*	*		

body and additional standards set by the state. Eight states do not appear to have set a formal policy for accreditation. In addition, some states have a policy for intervening with or closing a program that does not meet its criteria. The variation in states' policies regarding accreditation is shown in Table 8-1.

Some states have performance, or competency-based, processes, requiring that programs demonstrate how they ensure that prospective teachers have acquired the necessary knowledge and skill; others examine program outcomes, examining graduation, job placement, and retention rates. See Boxes 8-1 and 8-2 for descriptions of the approval processes for New

TABLE 8-1 Continued

State	State-Set Requirements	NCATE	TEAC	One or More Regional Bodies	No Policy Found
ND		*			
NE	*	*			
NJ		*	*		
NM					*
NY	*	*	*	*	
OH	*	*			
OK	*	*			
OR				*	
PA		*	*	*	
PR		*			
RI		*		*	
SC	*	*			
SD		*		*	
TN	*				
TX	*				
UT		*	*	*	
VA					*
VI					*
VT				*	
WA				*	
WI				*	
WV				*	
WY					*
Total	17	30	12	22	8

[a]The database shows no policy for Iowa, but we obtained independent confirmation of the state's policy as well as information for California (Commission on Teacher Credentialing, 2007).

SOURCE: Compiled from data available on the website of the National Comprehensive Center for Teacher Quality, see http://www.ecs.org/html/offsite.asp?document=http%3A%2F%2Fwww%2Etqsource%2Eorg%2Fprep%2Findex%2Easp++ [December 2009]); updated to 2006.

York and Florida, respectively. The accreditation standards for NCATE are shown in Box 8-3.

According to data from NCATE and TEAC, over half of the approximately 1,300 U.S. teacher education programs they examined are accredited by one of the two national bodies: 632 by NCATE (see http://www.ncate.org/public/listofaccredinst.asp [December 2009]) and 59 by TEAC (see http://www.teac.org/index.php/membership/teac-members/ [December 2009]). NCATE, which was established in 1954, draws on the expertise of a variety of professional associations concerned with education in developing its standards; see Box 8-4. (We note that disciplinary organizations, such

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BOX 8-1
New York State Teacher Education Program Approval Process

The initial process of registering teacher preparation programs in the state involves providing written documentation of such things as program philosophy or mission; faculty cooperation across university departments; efforts to recruit faculty and students from historically underrepresented populations; efforts to educate potential students about labor market conditions for each certification area; use of assessments; and facilities.

In addition to these general requirements, state regulations specify a "content core" and a "pedagogical core" for each certification type. For example, elementary education programs are required to provide study (and specify each by listing the relevant college course numbers) that will permit candidates to obtain an 11-point list of pedagogical knowledge, understanding, and skills (e.g., human development, learning, language acquisition; curriculum planning; technology). The list is different for alternative certification programs. The field experience portion of pedagogical core is further specified, requiring at least 100 hours of field experiences related to coursework prior to student teaching or practica and at least two college-supervised student-teaching experiences of at least 20 school days each. The types of experiences and overseeing faculty are also specified.

Once programs are registered with the state, all programs must be accredited by the state once every 4 years. Accreditation can be obtained through the State Regents Accreditation of Teacher Education (RATE) process or through accreditation by NCATE or TEAC.

RATE includes five standards of quality:

1. commitment and vision
2. philosophy, purposes, and objectives
3. standards for program registration
4. teaching effectiveness of graduates, including evidence their graduates:
   a. promote well-being of all their students
   b. help them learn to their highest levels of achievement and independence
   c. use their knowledge to create nurturing environment for all students
5. assessment of candidate achievement

Additional standards relate to financial resources, support servies, advertising, candidate complaints, public disclosure of accreditation status, and annual reports.

Each program submits a self-study report for review by up to three external reviewers, selected by the New York State Department of Education. The program submits written reports to the state commissioner who makes a recommendation to the Board of Regents, which ultimately decides accreditation action.

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as the American Mathematical Society, are not included.) The organization has repeatedly revised the accreditation process. The current process emphasizes the need for institutions to demonstrate that the content of their programs aligns with relevant standards. TEAC was created in 1997 by a group of education school deans and college presidents. TEAC's accreditation model is based on audits in which the organization's quality principles (e.g., evidence of student learning, assessment of student learning) are applied (Murray, 2001). A TEAC audit may be coordinated with state standards and accreditation procedures. As this report is being completed, TEAC and NCATE are discussing possibilities for creating a uniform system of accreditation that would combine their separate efforts.

The accreditation process of the six regional agencies is not comparable to the specialized accreditation offered by NCATE or TEAC. Teacher preparation institutions that are accredited through the regional agencies must demonstrate that they meet the standards of eligibility of the Commission of Higher Education and then go through a process of self-study determined by the regional agency and aligned with that agency's standards. The regional agency procedures may include paper reviews of program curricula; in other cases on-site reviews are conducted by teams of educators and others. Historically, these regional agency reviews have tended to emphasize inputs, asking such questions as whether prospective teachers have the opportunity to learn various knowledge and skills. Only recently has attention turned to accountability for outputs, that is, results.

Accreditation also commonly includes some sort of peer review or audit of programs by teams of peers, which may include teachers, teacher educators, state education department staff, school administrators, and faculty from the disciplines. For example, NCATE has a board of examiners who are trained by NCATE in the accreditation processes (for details, see http://www.ncate.org [October 2009]). TEAC sends a team of auditors to check the accuracy of the materials submitted by an institution. These auditors include TEAC-trained educators, and in some states local practitioners and representatives of the relevant state department of education (for details, see http://www.teac.org [October 2009]). Regional agencies use similar processes, with faculty from peer institutions who make campus visits to check the validity of self-studies. The practices for appointing and educating these visiting peers vary among the accrediting bodies.

We note that the identification of suitable peers for the accreditation of teacher education programs presents some challenges. The criteria for the selection of peers—whether teachers, administrators, or researchers—might have a profound influence on the resulting review because of those individuals' professional views regarding the elements that are important or effective in teacher preparation. Similar concerns would hold for parents, policy makers, or any other participants. Moreover, without a strong empirical

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BOX 8-2
Florida State Teacher Education Program Approval Process

Review and approval of educator preparation programs in Florida consists of two parallel systems—one for initial approval and one for continuing approval—both of which are governed by both law and rules. The focus of the initial review is process oriented; the focus of the continued review is performance based.

In brief, institutions seeking initial approval of their programs submit curriculum folios describing the design, delivery, content, and evaluation of each program for review by statewide teams of peer reviewers. This folio review is followed by an on-site review for institutions that do not currently have approved programs. Initial approval is granted first for all of the programs the institution is seeking approval for; then, the institution transitions to the continued program approval standards and process, for which there are annual reporting requirements and a site visit every 7 years in order to monitor program outcomes, candidate performance, and continuous improvement.

The standards for (performance-based) continued review include three major standards, on content, on the candidate teachers, and continuous improvement. The key elements in each of these standards is shown below.

Standard 1. Core Curriculum Content

1. Current mandated state requirements and curricular content are consistently implemented and published in required documents.
2. Field or clinical sites represent diverse cultures and varying exceptionalities and performance levels, in a variety of settings, including high-needs schools.
3. Faculty meet state-mandated requirements for supervision of field or clinical experiences.
4. School district personnel meet state-mandated requirements for supervision of field or clinical experiences.

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base on which to make decisions about the quality of teacher preparation, any interested party can claim some reason for participating in accreditation visits and processes.

In sum, teacher education program accreditation traditionally has been voluntary and has been conducted by states and national nongovernmental organizations. More institutions are currently accredited by NCATE than by any other state or national body. The effects of state program reviews and national accreditation on program quality have not been systematically demonstrated. There is no centralized information about how comparable these various modes are. States' accountability practices have relatively little foundation in empirical findings because little such evidence is available. We note that this dilemma is not unique to education.

Standard 2. Candidate Competency

1. Each program consistently applies state-mandated admission requirements.
2. Candidate evidence of attainment of uniform core curricular content is assessed and data is collected from coursework, field or clinical experiences, and on the Florida Teacher Certification Examinations.
3. Candidates demonstrate impact on P-12 student learning based on student achievement data in field or clinical experiences and during the first year of teaching.
4. The program documents the assistance and the results of the assistance provided to program completers who do not meet employer satisfaction in their first 2 years of teaching.

Standard 3. Continuous Improvement

1. The program remains responsive to the needs of the state and districts served.
2. Employers of program completers indicate satisfaction with the level of preparedness for the first year of teaching, including the rehire rates of program completers and length of stay in the classroom.
3. Program completers indicate satisfaction with the level of preparedness for the first year of teaching.
4. Continuous improvement across and within programs is the result of routine analysis of data collected on Standards 2 and 3; admission, enrollment, and completion status of each candidate; and results of recent faculty experiences.

COMPARISONS WITH OTHER FIELDS

The challenges of effectively using accountability measures to ensure quality are not unique either to education or to the U.S. system, but the U.S. education system has charted its own course to a considerable extent. A detailed comparative analysis of accountability practices across occupations was not part of the committee's charge and little information was available, but we do note a few general findings. A comparison of preparation and training in seven fields conducted by The Finance Project (Neville, Sherman, and Cohen, 2005) found that the standards for entry are less consistent, across the states, for teaching than for any of the other six fields examined (law, accounting, architecture, nursing, firefighting, and law enforcement).

BOX 8-3
Standards of the National Council of
Accreditation in Teacher Education

Twenty-five states have adopted or adapted NCATE unit standards and administer them. Twenty-five states delegate NCATE to conduct the program review process for purposes of NCATE accreditation and state approval. NCATE has six standards, detailed below.

Standard 1: Candidate Knowledge, Skills, and Professional Dispositions: Candidates preparing to work in schools as teachers or other school professionals know and demonstrate the content knowledge, pedagogical content knowledge and skills, pedagogical and professional knowledge and skills, and professional dispositions necessary to help all students learn. Assessments indicate that candidates meet professional, state, and institutional standards.

Standard 2: Assessment System and Unit Evaluation: The unit has an assessment system that collects and analyzes data on applicant qualifications, candidate and graduate performance, and unit operations to evaluate and improve the performance of candidates, the unit, and its programs.

Standard 3: Field Experiences and Clinical Practice: The unit and its school partners design, implement, and evaluate field experiences and clinical practice so that teacher candidates and other school professionals develop and demonstrate the knowledge, skills, and professional dispositions necessary to help all students learn.

Standard 4: Diversity: The unit designs, implements, and evaluates curriculum and provides experiences for candidates to acquire and demonstrate the knowledge, skills, and professional dispositions necessary to help all students learn. Assessments indicate that candidates can demonstrate and apply proficiencies related to diversity. Experiences provided for candidates include working with diverse populations, including higher education and P-12 school faculty, candidates, and students in P-12 schools.

Standard 5: Faculty Qualifications, Performance, and Development: Faculty are qualified and model best professional practices in scholarship, service, and teaching, including the assessment of their own effectiveness as related to candidate performance. They also collaborate with colleagues in the disciplines and schools. The unit systematically evaluates faculty performance and facilitates professional development.

Standard 6: Unit Governance and Resources: The unit has the leadership, authority, budget, personnel, facilities, and resources, including information technology resources, for the preparation of candidates to meet professional, state, and institutional standards.

BOX 8-4
Professional Associations That Provide Input to the National Council for the Accreditation of Teacher Education

Teacher Education Associations
American Association of Colleges for Teacher Education (AACTE)
Association of Teacher Educators (ATE)

Teacher Associations
American Federation of Teachers (AFT)
National Board for Professional Teaching Standards (NBPTS)
National Education Association (NEA)
National Education Association (NEA) Student Program

Child-Centered Associations
Association for Childhood Education International (ACEI)
Council for Exceptional Children (CEC)
National Association for the Education of Young Children (NAEYC)
National Association for Gifted Children (NAGC)
National Middle School Association (NMSA)

Subject-Matter Associations
American Alliance for Health, Physical Education, Recreation and Dance (AAHPERD)
American Council on the Teaching of Foreign Languages (ACTFL)
International Reading Association (IRA)
International Technology Education Association (ITEA)
National Council for the Social Studies (NCSS)
National Council of Teachers of English (NCTE)
National Council of Teachers of Mathematics (NCTM)
National Science Teachers Association (NSTA)
North American Association for Environmental Education (NAAEE)
Teachers of English to Speakers of Other Languages (TESOL)

Educational Leadership Associations
American Association of School Administrators (AASA)
Association for Supervision and Curriculum Development (ASCD)
National Association of Elementary School Principals (NAESP)
National Association of Secondary School Principals (NASSP)

Policy Maker Associations
Council of Chief State School Officers (CCSSO)
National Association of State Boards of Education (NASBE)
National School Boards Association (NSBA)

SOURCE: Data from http://www.ncate.org/governance/MemberOrganizations.aspx [March 2010].

The study noted that in all of the other fields, candidates are required to pass a single national exam or a state exam with a national component before they are allowed to begin practicing. None of the other fields allows candidates to gain licensure through alternative routes or to begin practicing before they have met all licensure requirements. The authors also found that all of the six comparison fields have more consistent program approval mechanisms across the states than does education.

Most of the 50 countries that participated in the Third Trends in International Mathematics and Science Study (TIMSS) have the same basic elements in place for teacher education and certification (Mullis et al., 2008). For example, 42 require that candidates who wish to teach at the elementary or primary level earn a degree from a teacher education program, and more than 40 require some sort of practicum (opportunity to apply what was taught in the classroom). The requirements are somewhat different for mathematics and science teachers, but more than half of the countries also require passage of an exam and have a probationary period for new teachers. These comparisons, though limited, suggest that the United States is quite different from other countries in having such a highly variable approach to accountability for teacher education.

An analysis of teacher education and development policies in a smaller group of countries that participated in TIMSS (the United States, Australia, England, Honk Kong, Japan, Korea, the Netherlands, and Singapore) provides a more detailed analysis (Wang et al., 2003). This study found that the United States and Australia have the least centralized systems and are the only two that do not have a single national agency that oversees teacher preparation programs. The scope of the challenge of ensuring accountability in the United States is suggested by the sheer numbers of programs in the country: 1,500 according to the National Center for Education Statistics. In comparison, no other nation has more than a few hundred.[1] The United States and England are the only two countries in the study that allow alternative routes to teacher certification. It is also worth noting that some countries that perform at high levels on TIMSS, such as Singapore and Finland, provide financial support for teacher candidates and are recognized for their ability to recruit high-achieving students for teacher preparation programs.

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[1]The Netherlands offers teacher preparation in 12 public universities and 13 professional colleges; Australia has 35 institutions; and England has 123. Japan has 138 institutions that offer preparation in mathematics and 149 that offer preparation in science (with some overlap).

CONCLUSION AND RECOMMENDATION

It is clear from our review of accountability in teacher preparation that the existing evidence does not support a strong conclusion about the effectiveness of the current accountability process in teacher education. Thus, there would be significant value in investment in research and development to improve the research base and technical infrastructure for teacher education accountability. In addition, although empirical links between teacher preparation and student learning have not been established, current accountability mechanisms could likely use information that is available. Specifically, accountability systems could better integrate in their evaluations indirect evidence, such as consensus about the intellectual foundations and priorities in academic fields and findings about promising instructional approaches.

As part of the broader research agenda on teacher education (discussed in Chapter 9), we recommend research on developing valid means of establishing links between teachers' preparation and outcomes for students that could be used in accountability policies for teacher preparation programs. This research will require attention to conceptual, data, and measurement issues, with a particular focus on improving the development of measures and technologies that would make it possible to accurately measure the teaching knowledge and practices that are most closely associated with gains in K-12 student achievement. Such measures are particularly needed for accountability purposes.

The accountability systems now in use are haphazard. Not enough is known about the effectiveness of any of their major elements—certification, testing, program approval, and accreditation—either at promoting the practices and approaches that are supported by research and professional consensus or at assuring the public of the quality of programs. The senior leadership of NCATE offered this committee access to its accreditation reports to help us describe programs. However, because teacher preparation varies so much across and within states and because programs bring different—often unique—forms of evidence to bear as they make the case for meeting NCATE standards, we were not able to use these rich sources of information to compare approaches across programs. Yet policy makers need guidance as to how to address the politically difficult issue of accountability in the context of a wide variety of practices. If the Department of Education wishes to meet the serious lack of information about teacher preparation programs, a comprehensive evaluation is needed.

Recommendation 8-1: The U.S. Department of Education should sponsor an independent evaluation of teacher education approval and accreditation in the United States. The evaluation should describe the

nature, influence, and interrelatedness of approval and accreditation processes on teacher education program processes and performance. It should also assess the extent to which existing processes and organizations align with best practices in accountability and offer recommendations for how they could do so more effectively in the future.

The evaluation should focus specifically on evidence of learning and effects on outcomes. On the first point, the recommended evaluation should focus on the nature and rigor of the evidence base used to inform approval and accreditation standards and processes. The evaluation should also include an assessment of the near- and long-term effects of these mechanisms on key processes and, especially, K-12 student outcome measures. On the second point, the evaluation should assess the extent to which the information gathered in accreditation reviews serves as a force for ongoing improvement at the program level and whether and how it could contribute to a broader knowledge base about teacher preparation.

Both further research and an evaluation of existing accountability mechanisms are critical. All teacher education programs should be able to demonstrate that their graduates can teach in ways that have been shown empirically to lead to gains in K-12 student learning. As research strengthens the knowledge base that can be used for accountability purposes, it will be possible to better examine many questions. In particular, as stronger indicators are developed, states and independent associations that are involved in teacher education program approval and accreditation will be able to use them as a basis for their accreditation standards and reviews.

Although the empirical basis for this sort of accountability is slim at present, the field is not starting at zero. As we discuss throughout this report, a growing body of literature has identified some of the behaviors and skills of teachers that boost K-12 student learning in core subjects, and that knowledge base can be tapped for teacher education accountability. And even in the short term, there are ways to focus current accountability systems on the best available evidence. The established, consensus- and research-based conclusions of the professional and academic communities associated with school subjects provide a critical source of guidance to programs and state accountability systems as to the kinds of content and knowledge and pedagogical content that benefit teachers.

We note as well that there is no reason that program accountability should not extend to all types of programs that prepare teachers, including newer programs that operate outside state postsecondary institutions. As we discuss in Chapter 3, the distinction between traditional and alternative pathways is problematic, but in most states programs described as traditional or alternative are subject to separate systems of accountability and quality control. Thus, requirements for teacher education programs not

only vary across states, they vary within states as well. In our view, states should hold *all* preparation programs to the same standards.

Finally, we suggest that accountability ought to focus on assessments that show program graduates can practice effectively. Workforce trends across sectors reflect heightened demand for workers at all levels who can demonstrate their knowledge and skill; high-stakes teacher certification tests are an example of this phenomenon in the teacher labor market (National Research Council, 2002b). But passing a paper-and-pencil test is different from demonstrating effective teaching practices, and a few states are developing performance assessments that are or will be part of their teacher certification requirements (e.g., the Performance Assessment for California Teachers; see Pecheone and Chung, 2006).

Most relevant for our purposes, however, is the observation that, despite changes in the rhetoric, teacher education program accountability is still overly dependent on input and process requirements. Many states continue to require programs to offer particular courses, set minimum admissions standards, ensure minimum contact hours with faculty and student teacher supervisors, and the like. The national accrediting bodies have made progress toward implementing outcome-oriented standards, but much remains to be done. We envision an accountability system that is based primarily on the evaluation of program graduates' ability to use instructional practices that facilitate K-12 student learning in core subjects. Although such an approach is likely to be more difficult and expensive than the current one, it is a fundamental need if teacher education is to reflect the ultimate outcome, student learning.

More systematic information about the development and content of tests used for teacher accreditation or certification is needed. Accountability is a complex component of the education system and one that provokes strong opinions. Questions about the quality of the nation's teachers go to the heart of many contentious issues in education policy. For example, discussion of licensure, certification, and accreditation naturally suggests comparisons with other fields in which these issues arise, such as medicine, law, accounting, and various technical occupations. This comparison in turn raises questions about the status of teaching as a field. The purpose of this committee was not to determine whether teaching ought to be considered a profession, nor to rehash the arguments in that debate. Whatever the answer to that question, it seems reasonable to ask that teacher candidates and teacher preparation programs be held to high standards and that the accountability system used be both professionally responsible and publicly credible.

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Appendix A

Dissent, *Michael Podgursky*

This report goes beyond our charge from Congress. We were not asked to make recommendations about how teachers ought to be prepared or the necessary preparation of teachers. We were not asked to make recommendations to states about how they should approve teacher training programs. There is simply no scientific research basis for making these recommendations.

Congress asked us to assess available data on teacher preparation programs in the United States and whether the training teachers receive is consistent with scientifically based research. If reliable data are lacking (as they clearly are), we were to make recommendations regarding data collection.

Since the body of scientifically based research on teacher preparation is very thin, the committee chose to rely heavily on descriptive and qualitative studies, as well as the opinions of panels of teachers and teacher educators. This evidence is then reported in ways that obfuscate the weak research base for the recommendations. The report frequently asserts that these various types of evidence are consistent, but it fails to provide supporting documentation.

The proposals for data collection are not well thought out. Clearly it would be useful to know more about what teacher training programs do. However, the rather nebulous language used to describe elements of such a database are not helpful or practical. The proposal for a national longitudinal survey on teacher candidates is not well developed.

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Appendix B

How Teachers Learn Critical Knowledge and Skills: Tracing One Example

Learning Objective

Reading diverse text with understanding.

Student's Opportunity to Learn

Develop and enhance language and meta-cognitive skills to meet the demands of specific printed texts.

Experience supported opportunities to learn to interpret diverse kinds of texts for diverse purposes.

Teacher Study

Linguistic and psychological studies:

- development of oral and written language abilities, including relations among meta-cognitive abilities, print processing abilities, and comprehension abilities
- theories of text-comprehension

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Pedagogy of reading (teaching and assessing):

- activities to develop and practice comprehension and metacognition strategies on oral language, on written text read aloud, and as the student reads independently
- activities to develop concepts and words (oral and written)
- activities to develop the skills needed to lead text-based discussions focused on constructing the meaning of text and engaging in knowledge building with text

Teacher's Opportunity to Demonstrate Knowledge

Suppose a linguistically/culturally diverse student in your classroom has excellent decoding skills but has trouble comprehending the texts you assign. What are some reasons why comprehension may be a problem for this student?

Describe the interplay between prior knowledge and reading strategies as students read and comprehend a text on a particular topic.

Analyze a text for its affordances and challenges and identify probing questions that will assess students' understanding of the content.

Discuss the purpose and use of comprehension strategies. When do readers use them? How do they contribute to reading comprehension?

Discuss how readers' perspectives influence what they comprehend and interpret from a text.

Teacher's Opportunity to Demonstrate Practice

Select a text that you or your cooperating teacher uses as part of the regular curriculum—this could be a selection in a basal reading program or a leveled text or a trade book. Read through the text and identify the likely areas where your linguistically/culturally diverse student may have trouble comprehending the text. Plan a lesson that builds or activates prior knowledge to build a bridge between what your student knows and the new information the student needs to understand the text better.

Select two different, but relatively easy, texts for your students to read, one on a familiar topic and one on an unfamiliar topic. Develop, conduct, and evaluate a lesson in which you show students how you can read texts on a familiar topic by activating and using prior knowledge. Then show them

how you often use comprehension strategies to comprehend a text on the unfamiliar topic since you do not have much background information on which to rely.

Select a text that will be used in content instruction (a text book or trade book). Identify a set of learning goals appropriate to the use of that text; identify semantic and linguistic features that might impede students' comprehension of the text, script how you will launch the discussion of the text, and script a set of probing questions that you will use to guide a discussion of the text so that the discussion is consistent with your learning goals and reflects the textual challenges.

Read a text on a topic with which you are very unfamiliar. As you read, think about and list the different comprehension strategies you use to assist you in making sense of this difficult text. In a small group, discuss with your peers the strategies you used and the reasons why you used them. Next use a think-aloud to assess a typical third-grader's comprehension abilities as the student reads a text. Make a list of the specific strategies the student uses. Compare and contrast these lists with your peers. Develop a profile of a typical third-grade reader's strategies for comprehending text.

Develop, implement and evaluate a comprehension lesson where students learn how to revisit a story from a different perspective. Then, ask students to write a story of their choosing from a perspective that is different from the one taken by the author of the story.

Appendix C

Biographical Sketches of Committee Members

Ellen Condliffe Lagemann (*Cochair*, 2007-2009, *Chair*, 2009-2010) is the Levy Institute research professor and a senior scholar at the Levy Economics Institute at Bard College in New York. Previously, she was the Charles Warren professor of the history of American education at Harvard University and former dean of the Harvard Graduate School of Education. She also served as the president of the Spencer Foundation, as a professor of history and education at New York University, and as a professor of education at the Teachers College at Columbia University. She is a past president of the National Academy of Education and the History of Education Society, and has served on the boards of the Teaching Commission, Jobs for the Future, the Russell Sage Foundation, and the Center for Advanced Study in the Behavioral Sciences. She has written widely on many topics, including education reform, education research, philanthropy in education, women's history, and nursing. She has an undergraduate degree from Smith College, an M.A. in social studies from Teachers College, and a Ph.D. in history and education from Columbia University.

Herbert K. Brunkhorst is professor in the Department of Biology in the College of Natural Sciences and chair of the Department of Science, Mathematics, and Technology Education in the College of Education at the California State University at San Bernardino. He previously taught at the precollege level. He has served as a senior faculty researcher for the U.S. Department of Education's Salish Consortium, a multidimensional collaborative research effort for improving science and mathematics teacher education. He

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is a fellow of the American Academy for the Advancement of Science, and was elected director of the preservice teacher preparation division of the National Science Teachers Association. He has a B.A. in biology from Coe College, an M.A.S. in science education and a Ph.D. in science education and plant physiology from the University of Iowa.

Margarita Calderón is a senior research scientist at the Center for Data-Driven Reform in Education at Johns Hopkins University. She is a co-principal investigator on a randomized evaluation of English immersion, transitional, and two-way bilingual programs for the Institute for Education Sciences of the U.S. Department of Education. She is also conducting longitudinal research and development projects in El Paso, Texas, on teachers' learning communities, bilingual staff development, and adult English-language learners. Other research topics include ESL reading, Spanish-English transitional reading, two-way bilingual reading, and the transition from Spanish reading into English reading. She has a B.A. in English, French, and journalism, an M.A. in applied linguistics from the University of Texas, El Paso, and a Ph.D. in educational management, sociolinguistics, and organizational development from Claremont Graduate School and San Diego State University.

Marilyn Cochran-Smith is the John E. Cawthorne professor of teacher education for urban schools at the Lynch School of Education of Boston College where she directs the doctoral program in curriculum and instruction. She is the immediate past president of the American Educational Research Association and has also served as the co-chair of the organization's National Consensus Panel on Teacher Education. Her research has concentrated on teacher education across the professional lifespan; teaching and issues of race, class, culture, and gender; teacher research/practitioner inquiry; children's early language and literacy learning, and outcomes, teaching quality, and competing agendas for education reform. She has a B.A. in sociology from the College of Wooster, an M.Ed. in curriculum and instruction from Cleveland State University, and a Ph.D. from the University of Pennsylvania.

Janice Dole is in the Department of Teaching and Learning at the University of Utah. After several years as an elementary teacher, she held positions at the University of Denver, the Center for the Study of Reading at the University of Illinois at Urbana-Champaign, and Michigan State University. She has written for many different audiences, including teachers, administrators, and reading researchers and other educational researchers. She is currently a member of the Reading Development Panel for the National Assessment of Educational Progress and working for the research and

development section of the American Federation for Teachers. Her current research focuses on comprehension instruction at the K-3 level and reading professional development for K-3 teachers in at-risk schools. She has M.A. and Ph.D. degrees from the University of Colorado.

Donald N. Langenberg is chancellor emeritus of the 13-institution University System of Maryland. Previously, he was a professor of physics and then chancellor of the University of Illinois at Chicago. He served as deputy director of the National Science Foundation under President Jimmy Carter. His research has been primarily in experimental condensed matter physics and materials science, with a major focus on the study of superconductivity. He has served as chair of the American Association for the Advancement of Science and of the National Association of State Universities and Land Grant Colleges, as president of the American Physical Society, and on the boards of the Alfred P. Sloan Foundation and the University of Pennsylvania. As chair of the National Reading Panel in 1998-2000, he headed the committee that issued *Teaching Children to Read*. He has a B.S. from Iowa State University, an M.S. from the University of California at Los Angeles, and a Ph.D. from the University of California at Berkeley, all in physics. He also has received honorary degrees from the University of Pennsylvania and the State University of New York.

Ronald Latanision is the corporate vice president and practice director of the Mechanical Engineering and Materials Science Center at Exponent Consulting, Inc. He is the author or co-author of more than 200 scientific publications, and he has been a consultant to industry and government. He served as a science adviser to the Committee on Science and Technology of the U.S. House of Representatives, and he served on the Nuclear Waste Technical Review Board under President George W. Bush. He is a member of the National Academy of Engineering and of the American Academy of Arts and Sciences. He has a B.S. in metallurgy from the Pennsylvania State University and a Ph.D. in metallurgical engineering from Ohio State University.

James Lewis is a professor in the Department of Mathematics and director of the Center for Science, Mathematics, and Computer Education at the University of Nebraska at Lincoln. He previously served as department chair, and during that tenure the department won the university-wide Departmental Teaching Award and a Presidential Award for Excellence in Science, Mathematics, and Engineering Mentoring. He served as the coprincipal investigator for the Nebraska Math and Science Initiative and led a study to revise the mathematics education of future elementary school

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teachers at the university. He has M.S. and Ph.D. degrees in mathematics from Louisiana State University.

David H. Monk is professor of educational administration and dean of the College of Education at the Pennsylvania State University. Previously, he was a professor at Cornell University, and he has also been a 3rd-grade teacher and a visiting professor at the University of Rochester and the University of Burgundy in Dijon, France. He serves on the editorial boards of *The Economics of Education Review*, *The Journal of Education Finance*, *Educational Policy*, and the *Journal of Research in Rural Education*. He consults widely on matters related to educational productivity and the organizational structuring of schools and school districts and is a past president of the American Education Finance Association. He has an A.B. in economics from Dartmouth College and a Ph.D. in educational administration from the University of Chicago.

Annemarie Sullivan Palincsar is the Jean and Charles Walgreen Jr. professor of reading and literacy in the School of Education at the University of Michigan. Her research focuses on the design of learning environments that support self-regulation in learning activity, especially for children who experience difficulty learning in school. She studies how children use literacy in the context of guided inquiry science instruction, what types of text support children's inquiry, and what support students who are identified as atypical learners. She is a member of the Reading Study Group at RAND, the National Education Goals Panel, and the National Advisory Board to Children's Television Workshop. She is the coeditor of *Cognition and Instruction*. She has a B.S. in special education from Fitchburg State College and M.S. and Ph.D. degrees in education from the University of Illinois at Urbana-Champaign.

Michael Podgursky is Middlebush professor of economics at the University of Missouri at Columbia. Previously, he served on the faculty of the University of Massachusetts at Amherst. He has published numerous articles and reports on education policy and teacher quality and coauthored a book titled *Teacher Pay and Teacher Quality*. He is a member of the advisory boards of the National Center for Teacher Quality and the American Board for Certification of Teacher Excellence. Podgursky served on the faculty of the University of Massachusetts at Amherst. He has a B.A. degree in economics from the University of Missouri at Columbia and a Ph.D. degree in economics from the University of Wisconsin at Madison.

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