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ABSTRACT

The links between the characteristics of teacher education institutions, their programs, and teacher effectiveness as measured by scores on teacher licensure examinations were studied for the Southeast United States. Four sources of data were used: (1) data on 39,140 prospective teachers who took the Praxis II examinations for teacher licensure; (2) data on the 152 postsecondary institutions these teachers attended; (3) data on 76 of the 152 teacher education programs at these institutions; and (4) SAT scores for 9,078 of the Praxis test takers who had also taken the SAT. Data indicated that higher education institutions that have teacher education programs vary greatly in background characteristics and average licensure scores of their students. Five characteristics of institutions and programs were identified as conducive to higher teacher licensure scores. Private institutions outperformed public ones, and universities outperformed colleges. Teacher education programs with a higher number of traditional students outperformed those with fewer such students. Teacher education programs with ethnically diverse students outperformed those with overwhelmingly white faculties. Institutions with large proportions of education majors and minors and large proportions of their budgets devoted to teacher education performed worse than institutions with small proportions of education majors and minors and small proportions of their budgets devoted to teacher education. Findings show that teacher education programs are neither uniformly successful nor uniformly unsuccessful. (Contains 9 figures and 25 references.) (SLD)

Policy
Information
Report

Teaching the Teachers:
Different Settings, Different Results

ETS
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Testing Service

Research Division

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Foreword

Perhaps no issue is of greater importance to K-12 education than the quality of the teaching force. While there is almost universal agreement that student success is predicated on effective teachers, there are intense debates about the quality of those who teach and how best to produce an effective teaching force. These debates are having a significant impact on policy decisions throughout the country at local, state, and federal levels. We are seeing school districts and states attempting to implement rewards and sanctions for teachers on the basis of student outcomes. A number of states are rewarding teachers with significant pay increases for demonstrations of accomplished practice through such mechanisms as the National Board for Professional Teaching Standards. Recent federal legislation requires states to report publicly the performance of their teacher education programs. We see states increasing requirements for initial licensure at the same time that we see greater investment in supporting the development of beginning teachers during their first years of practice. These trends, as well as others, reflect the urgency that policymakers from all along the political spectrum are giving to the task of supporting the development of an effective teaching force.

As is often the case with contentious policy debates, passion sometimes leads to polarization and simplification of the issues. But simple generalizations, while seductive, do not serve the public well, particularly when issues are complex and untidy. Given the prominent role of Educational Testing Service® in the assessment of teachers throughout their careers, we take seriously our responsibility for contributing to the dialogue about the quality of the teaching force and teacher education. We believe it is important to bring to the fore data that illuminate complicated issues so that policymakers can make more informed decisions.

I am very proud to present this report by my colleague Harold Wenglinsky. This study is the third in a series that examines critical issues surrounding the teaching pipeline. Last year, I collaborated with Andrew Latham and Robert Ziomek on *The Academic Quality of Prospective Teachers*, in which we examined the college entrance examination scores of various categories of prospective teachers. We found that the academic quality of prospective teachers, using the very rough measures of SAT® and ACT scores, was extremely varied. For example, while the scores of those seeking elementary licensure lagged behind those of the average college graduate, those seeking subject matter licenses (e.g., mathematics or social studies) had SAT scores that exceeded those of the average college graduate. We also found that licensure testing had a major impact on the academic quality of the teaching pool as those who met the licensure requirements had much higher SAT and ACT scores, as well as college grades, than those candidates who did not meet the requirements. We also determined that raising licensure standards was not an easy solution. Indeed, the profile of successful candidates would improve if licensing standards were increased. However, the pool would be much smaller, and less diverse, suggesting that many more unlicensed teachers would find their way into the classrooms in order to meet increasing demands for teachers.

In another recent ETS study, Richard Coley and Barbara Bruschi compared the literacy skills of teachers to those of adults in other occupations. They found that the literacy skills of teachers were comparable to those of other professionals. For instance, teachers performed as well as lawyers, physicians, and electrical engineers, while outperforming managers and administrators on two of the three forms of literacy that were studied. Their standing was particularly impressive when taking into account the large difference we found in compensation. Compared to other college graduates at the highest level of literacy, teachers earned $222 less each week.

Teaching the Teachers: Different Settings, Different Results represents the third of these efforts to study aspects of teaching and learning, in this case to study the effectiveness of the institutions in which teachers are prepared. The study was an undertaking of nearly three years. Institutions and their schools of education were studied by drawing on multiple sources of information, including government

databases and a study-administered questionnaire to deans of education. The study then related these aspects of institutions and schools of education to the performance of teacher candidates on the Praxis II teacher licensure examinations. Once again, we find a more complex story than the political rhetoric would lead one to conclude. The quality of results in teacher education is highly variable, but is associated with some very clear attributes of teacher education institutions. Wenglinsky's results make clear once again that teaching requires a mastery of both content and pedagogy, and that one at the exclusion of the other is insufficient.

We intend to continue to expand our research on teaching. Recently we have established a research center to take on this work. We are now conducting studies that will look at student academic performance as an important indicator of teacher effectiveness. We have a series of studies exploring the validity of the assessments of National Board for Professional Teaching Standards. While none of these efforts is expected to settle the questions under study once and for all, it is hoped that they will encourage other researchers in the field to pursue these lines of inquiry further. The report that you are about to read should be understood in that light.

Drew Gitomer
Vice President
Research Division

Preface

The matters of teacher preparation and effectiveness are discussed on the front pages of newspapers these days, and are prominent in the positions of candidates for political office — from the local to the presidential level. The debate over solutions is vigorous — and polarized. However, *facts* are in short supply. As Drew Gitomer explains in the Foreword, ETS is expanding its research effort to inform this debate and the choices that have to be made. This report, *Teaching the Teachers,* is our largest undertaking to date.

Paul E. Barton, Director
ETS Policy Information Center

Acknowledgments

This report could not have been written without the contributions of many people and organizations. Financial support was provided by the Teaching and Learning Program and the Research Division of Educational Testing Service. Data on Praxis licensure examinations were provided by the Teaching and Learning Program. Data on SAT scores were provided by the schools and colleges program, also of Educational Testing Service. Data on teacher education institutions were drawn from the Integrated Postsecondary Educational Data System, a database of the National Center for Education Statistics. Data on schools, colleges and departments of education came from a questionnaire sent to deans of education as part of this study. Assistance in the development and administration of this survey was provided by Barbara Bruschi, Myra Joy, Diane Rein, and Gita Wilder. The report was reviewed by Paul Barton, Richard Coley, Emily Feistritzer, Robin Henke, Daniel Mayer, Robert Mislevy, and Richard Tannenbaum. Richard Coley also provided the graphics; Carla Cooper designed the cover and provided desktop publishing services. Amanda McBride was the editor. Kathleen Benischeck coordinated production. Last but not least, Drew Gitomer provided guidance and feedback through all stages of the project. This report does not, however, necessarily represent the views of those who contributed to its production. Any errors of fact or interpretation are the responsibility of the author.

Executive Summary

Opinion is sharply divided on the question of the effectiveness of teacher education programs. Some policymakers contend that these programs are largely successful in preparing college students to become teachers. In this view teacher education programs require few, if any, changes. Other policymakers contend that these programs are largely failures. In this view teacher education should, with few exceptions, be abolished. The empirical basis for either of these views is, however, weak. Little research has been conducted on the effectiveness of teacher education programs, and what has been done has produced largely contradictory findings.

The current study takes a step toward remedying this gap in the research literature by examining the links between the characteristics of teacher education institutions, their programs, and teacher effectiveness as measured by scores on teacher licensure examinations for one region of the country, the Southeast. It begins by painting a portrait of the current teacher education system. To do so, it draws upon four sources of data:

- data on 39,140 prospective teachers who took the Praxis II examinations for teacher licensure, drawn from a data base of the Educational Testing Service's Teaching and Learning Program
- data on the 152 postsecondary institutions these prospective teachers attended, drawn from the U.S. Department of Education data base known as the Integrated Postsecondary Educational Data System
- data on 76 of the 152 teacher education programs housed in these institutions, drawn from a questionnaire sent to the deans of education for this study
- SAT scores for the 9,078 of the Praxis test takers who had also taken the SAT, drawn from a data base of the Educational Testing Service's School and College Services Program

These four data sources indicate that higher education institutions that have teacher education programs (henceforth referred to as teacher education institutions) vary greatly in the background characteristics and average licensure scores of their students.

- Institutions that are private, larger, and with more graduate students have higher average licensure scores than institutions that are public, smaller, and with fewer graduate students.
- Institutions that are private, larger, and with more graduate students have students who had scored higher on the SATs, on examinations for entry into teacher education programs, and who come from more affluent backgrounds than institutions that are public, smaller, and with fewer graduate students.

The data also reveal differences in the characteristics of the teacher education programs themselves.

- While most teacher education institutions have a relatively small percentage of their students majoring or minoring in education, at some institutions education majors and minors are more prevalent, constituting more than one-quarter of the student body.
- Most students who enroll in teacher education programs are comparable to the average college student in having a traditional college experience, namely attending full time, living on campus, and being less than 25 years old. Nonetheless, a substantial percentage of education students are nontraditional.
- Teacher education programs generally have strong links to the local community; most place their prospective teachers in jobs within the state, provide in-service training to local school districts, and are highly influenced by state and local regulations and mandates.
- The representation of minorities among education faculty varies. In the bulk of teacher education programs faculties have minority representation comparable to the levels at the institution as a whole; in substantial proportions of teacher education programs, however, there are

either higher or lower percentages of minority faculty compared to the institution as a whole.

Thus, there is great diversity both in the outcomes of teacher education programs, as measured by licensure scores, and the characteristics of these programs, their teacher education institutions, and the students that attend them. To tease out the relative influence teacher education program characteristics, teacher education institution characteristics, and student background characteristics have on licensure scores, it was necessary to apply advanced statistical techniques to the data from the four sources. Three sets of relationships were measured:

- the links between the characteristics of teacher education *institutions* and student scores on a series of licensure tests
- the links between the characteristics of teacher education *programs* and student scores on a series of licensure tests
- the links between the characteristics of teacher education institutions and the characteristics of teacher education programs within those institutions

For purposes of this study, the "effectiveness" of teacher education institutions and their programs should be understood as the tendency of certain characteristics of these institutions and programs to be associated with higher licensure scores, above and beyond the characteristics of the students enrolled in them. This notion of effectiveness is a relative one; it identifies ways in which some institutions are more effective than others by virtue of their higher scores, but does not indicate an absolute level of scores at which institutions cross the line from ineffectiveness to effectiveness. While this research can suggest directions for the improvement of institutions and programs, it is more in the purview of policymakers to define what level of teacher preparation is "good enough" to provide primary and secondary school students with the teachers they deserve.

The study found that five characteristics of institutions and programs were indeed conducive to higher teacher licensure scores:

- Private institutions outperformed public ones.
- Universities outperformed colleges.
- Teacher education programs with a higher number of traditional students outperformed those with fewer such students.
- Teacher education programs with ethnically diverse faculties outperformed those with overwhelmingly White faculties.
- Institutions with large proportions of education majors and minors and large proportions of their budgets devoted to teacher education performed worse than institutions with small proportions of education majors and minors and small proportions of their budgets devoted to teacher education.

These findings suggest that neither the views of supporters nor those of detractors of teacher education programs are entirely correct. For one thing, teacher education programs are neither uniformly successful nor uniformly unsuccessful. Depending on their characteristics, some produce teacher candidates who perform well on licensure tests, whereas others do not. While the successful schools may be a minority, they are a substantial one. For instance, private institutions, which were found to be particularly effective, constitute one-quarter of institutions with teacher education programs. For another, while some characteristics of effective programs are what detractors would expect, others are what supporters would expect. Supporters view higher education as an environment conducive to preparing teachers. This research supports this contention, finding that prospective teachers who have a traditional college experience outperform those who do not. Detractors, however, note that teacher education programs may place too great an emphasis on knowledge of pedagogy, potentially at the expense of knowledge of the subject matter to be taught. This research supports this contention

as well, finding that prospective teachers in institutions with high proportions of education majors and minors perform less well than prospective teachers in institutions with somewhat less emphasis on pedagogical training.

While this study does take a first look at the links among teacher education institutions, teacher education programs, and teacher effectiveness, much remains to be done. Future research should examine a number of issues, including:

- the impact of teacher education institutions on other measures of teacher effectiveness, including classroom observations

- the impact of other characteristics of teacher education programs, such as curriculum and mentoring programs for student teachers

These issues for further research notwithstanding, it is hoped that the current study provides sufficient evidence that the key to improving teacher education programs lies neither in their abolition nor in their being maintained as they are. Rather, ineffective programs should be reformed to emulate the practices of effective ones.

Chapter One: The Controversy over Teacher Education

There is a broad consensus among policymakers and educators that one of the biggest challenges of the 21st century will be to confront the trade-off between teacher quantity and teacher quality. On the one hand, there is growing pressure to hire more teachers. Student enrollments are increasing dramatically just as large numbers of teachers are reaching retirement age. Initiatives at the federal and state levels to reduce class size by hiring more teachers further exacerbate this problem. On the other hand, policymakers want to improve the quality of the teaching force. The promulgation of high academic standards in many states has led to concerns that teachers will not be prepared to help their students meet them. And the experience in Massachusetts, where 60 percent of the prospective teaching force failed a proficiency test (although the appropriateness of the test has been subject to debate), suggests that those concerns may be justified (Bradley, 1999). The challenge for educators and policymakers is that the twin pressures for quantity and quality, if left to their own devices, are at odds with one another. In states like California, as districts hire more and more teachers, they bring in an increasing proportion of uncertified teachers, *de facto* lowering standards. As states like Massachusetts raise the bar for teachers, they will find fewer and fewer that they can hire.

Yet this dilemma is more apparent than real. Both the number and quality of teachers can be enhanced by improving their preparation for teaching. Just as improving K-12 education will help more students meet high academic standards, improving preservice teacher training will help more teachers make the grade. Although most policymakers agree that improving teacher preparation is the key to resolving the quantity-quality trade-off, they disagree on the changes to teacher preparation that need to occur to foster improvement. At the risk of simplifying the matter, most policymakers want either to preserve most aspects of the current system of teacher education, increasing its role in teacher preparation without changing its content, or to abandon the system wholesale.

The current system of teacher education can be briefly characterized as one that emphasizes professional knowledge at the expense of content knowledge, and one that emphasizes the control of teacher education by schools, colleges, and departments of education (SCDEs) housed in higher education institutions rather than control by K-12 school districts. Professional knowledge typically refers to knowledge of how students learn, teaching methods, and child development. Content knowledge typically refers to knowledge of subject matter from an academic discipline. In other words, content knowledge is what is to be taught, and professional knowledge is how to teach it. To receive a license that allows them to teach in a given state, most prospective teachers need to learn both content and professional knowledge at an institution of higher education. They are required to complete a certain number of credit hours of professional knowledge courses, a certain number of credit hours of content knowledge courses and to engage in student teaching. All of the professional knowledge courses, and some of the content knowledge courses, are taught by the SCDEs. The clinical training, while occurring in an elementary, middle, or high school, is also organized and supervised by the SCDEs. Usually, prospective teachers are also required to pass external examinations of their professional and content knowledge prior to or shortly after they begin teaching.

One set of proposals to reform teacher education has been put forward by the National Commission on Teaching and America's Future (NCTAF), whose recommendations are described in its report *What Matters Most: Teaching for America's Future* (NCTAF, 1996). In addition to its recommendations on recruiting teachers, increasing opportunities for career advancement, and organizing schools to support better teaching, the report makes a series of proposals for reforming the teacher education system. It calls for the establishment of state licensing boards, comprised of

faculty from SCDEs as well as particularly gifted teachers and principals. These boards would promulgate high standards for teaching. All SCDEs would be required to obtain accreditation from an independent organization, the National Council for the Accreditation of Teacher Education (NCATE). The state would be required to close SCDEs that are consistently found to be inadequate. The requirements of teacher education institutions (TEIs)[1] would be modified to require four years of college with a major in an academic subject, followed by postbaccalaureate education courses and a one-year student teaching experience in a K-12 school closely affiliated with a college or university, known as a professional development school. And all prospective teachers would be required to pass examinations in professional knowledge and content knowledge to receive their licenses.

Yet this set of proposals, while making the system of teacher education more uniform, does not change its emphasis on professional knowledge or the predominance of SCDEs. All preservice teacher training will continue to come from SCDEs; there is no provision for alternate pathways to teaching except through those SCDEs. And professional knowledge will continue to be emphasized at current levels; all of the proposals continue to make professional knowledge courses a prerequisite for teaching. Required licensure tests will include one for professional knowledge. Accreditation of institutions by NCATE will simply bring deviant institutions into conformity with a model that requires substantial amounts of coursework in professional knowledge or high passage rates on the professional knowledge test, along with NCATE's requirements for content knowledge. And while the proposal to move education courses to the postbaccalaureate level will increase students' opportunities to take courses in content knowledge, it also avoids reducing the courseload in professional knowledge; students simply take the education courses later.

An alternative to the NCTAF proposals is suggested by the Thomas B. Fordham Foundation (TBFF), as contained in its manifesto "The Teachers We Need and How to Get More of Them" (TBFF, 1999). In addition to recommending differential pay for teachers based on their knowledge and skill, the abolition of teacher tenure, and principal control over personnel decisions, the manifesto contains various proposals pertinent to teacher education. It would eliminate all requirements for the licensure of teachers except for criminal background checks, examinations of content knowledge, and a major in the relevant subject. The manifesto would also encourage pathways to teaching other than through SCDEs. Data on the passage rates of SCDEs on licensure examinations would be published, and prospective teachers could choose to take education courses at whichever of these institutions they wished. Alternately, prospective teachers could opt out of SCDEs, instead receiving compressed training in conjunction with student teaching. This training need not be provided by SCDEs.

The TBFF proposals are tantamount to the elimination of the current system. The SCDEs lose their monopoly on teacher education — prospective teachers may go elsewhere for their career preparation, either to the school districts that will hire them or to other training academies. Given the costs in time and money of a college- or university-based teacher education program, it is unlikely that many students will continue to choose SCDEs for their preparation. Licensure tests in professional knowledge will also be eliminated; prospective teachers need only be proficient in the subject matter they intend to teach. This change will also have the consequence of reducing the power of SCDEs; even if teacher candidates might choose them over other sources of training in professional knowledge, there is no incentive for them to master that professional knowledge, since it will not be "on the test."

Thus the two dominant proposals to reform teacher education and increase the supply of high-quality teachers are diametrically opposed to one

[1] The phrase "teacher education institutions" refers to postsecondary institutions that house SCDEs.

another. NCTAF seeks to preserve or even enhance the importance of professional knowledge in preparing teachers; TBFF seeks to increase the importance of content knowledge at the expense of professional knowledge. NCTAF seeks to maintain the predominance of higher education generally and SCDEs in particular over teacher education; TBFF seeks to give the control over teacher education to teacher candidates and the principals who hire them. In essence, the NCTAF approach views a somewhat enhanced version of the current system of teacher education programs housed in colleges and universities as the solution to deficits in teacher quality; TBFF views the current system as the problem.

In holding these views, the two proposals make dramatically different empirical assumptions about the link between TEIs and teacher effectiveness. In the NCTAF view, TEIs are conducive to high-quality teaching, albeit with modest changes. The more prospective teachers who go through the moderately enhanced version of the current system of coursework and receive permanent licenses to teach, the higher the quality of the teaching force. And to the extent that the current system needs to be changed, it is only insofar as requirements need to be increased and loopholes that evade these requirements closed. In the TBFF view, TEIs are deleterious to high-quality teaching. The more coursework in education that prospective teachers have to complete, the less likely that they will be good teachers. And many people who would make excellent teachers are turned away from elementary, middle, and secondary schools because they have not taken the requisite education courses. In both the NCTAF and TBFF views, TEIs are a uniform lot, either providing what students need to become good teachers or creating an unnecessary and even dangerous hurdle to becoming a teacher.

Yet a middle ground between these two views certainly exists, namely that the ability to prepare high-quality teachers varies greatly among TEIs. Perhaps certain types of teacher education program are particularly adept at preparing teachers while others are not. If this is the case, then the solution to the quality-quantity trade-off is neither to maintain the current system nor to abolish TEIs as the primary site for teacher training. Rather, the practices of the most effective institutions should be identified and emulated by the least effective ones. In this way, the quality of prospective teachers coming through the pipeline can be increased, making it possible both to raise the bar for licensure and still meet the growing demand for more teachers. Many educational organizations advocate this middle ground. NCATE, for instance, has moved toward accrediting TEIs based not simply on their course requirements, but on the performance of prospective teachers on licensure tests closely aligned to state academic standards. To the extent that states require NCATE accreditation, such an approach would push ineffective TEIs to emulate their effective counterparts, or else face the possibility of closure.

This report provides an empirical basis for this middle ground. It presents the results of a study that distinguishes the characteristics of effective TEIs from those of ineffective ones. The study identified 40,000 prospective teachers who took licensure examinations, and related their scores on the examinations to the characteristics of their TEIs. The study finds that the effectiveness of teacher education does indeed vary a great deal, depending on five characteristics of the programs. Private institutions do a better job than public ones; universities do a better job than colleges; institutions where the scope of the SCDE is more limited do a better job than institutions where the SCDE predominates; SCDEs where prospective teachers tend to be traditional college students, living on campus and attending school full-time, do better than those where nontraditional students predominate; and SCDEs with ethnically diverse faculties do better than those with few minority faculty members. Before discussing these results in more detail, however, it is necessary to provide some context for them. The next chapter will summarize what is known about TEIs and their effectiveness from other research studies. Chapter Three will present information from this study that describes the

great diversity of TEIs, and explains how the data for this study were collected. Chapter Four will present results concerning the connection between certain characteristics of TEIs and teacher licensure examination scores, and then touch on the statistical techniques employed to accomplish this. Chapter Five will suggest what else needs to be done to learn about the effectiveness of TEIs and identify some implications of the study for policymakers.

Chapter Two: What the Prior Research Says

The views of NCTAF and TBFF make certain empirical assumptions about the impact of TEIs on teacher effectiveness; the one assumes that TEIs have, on average, a positive impact on teacher effectiveness, while the other assumes that TEIs have no impact or even a negative impact on teacher effectiveness. Prior research has taken various approaches to testing these assumptions. One approach is to gauge the overall impact of teacher licensing policies, including teacher education, licensure examinations, and supporting beginning teachers (referred to as "induction") by comparing licensed teachers to their unlicensed counterparts. Another approach is to measure the benefits of teacher education programs with full course-taking requirements by comparing them to streamlined alternate forms of certification. Or studies can examine the importance of preparation in professional knowledge, characteristic of SCDEs, relative to preparation in other areas such as content knowledge, not necessarily characteristic of SCDEs. NCTAF would expect that the first approach would find that licensed teachers outperformed unlicensed ones, that the second approach would find that teacher education programs with full course-taking requirements outperformed alternate certification programs, and that the third approach would find that professional knowledge was more important than content knowledge. TBFF, on the other hand, would expect that licensed teachers would perform no better than unlicensed ones; that alternate certification programs would do just as well, if not better than, traditional programs, and that professional knowledge would be less important than content knowledge. Much of the prior research on teacher education has taken one of these three approaches. Unfortunately, the results from the first two approaches have been inconsistent. The results from the third approach, while consistent, have not entirely supported either the NCTAF or TBFF perspectives.

Studies measuring the impact of licensing on teacher effectiveness have produced mixed results. Practicing teachers tend to have one of four categories of license: a permanent or regular license, which indicates that they have met all requirements for becoming a teacher; a probationary license, which indicates that they have met most requirements and will meet the remaining few during the first year or two of teaching; an emergency license, which indicates that they have not met most requirements but are permitted to teach nonetheless; and no license whatsoever. While most teachers have permanent or probationary licenses, during periods when teaching is in high demand there is growing pressure to confer emergency licenses or to allow unlicensed teachers to teach. In such circumstances, researchers have an opportunity to compare the effectiveness of teachers with permanent or probationary licenses to those with emergency licenses or none at all. The two most recent studies to do so, however, have reached contradictory conclusions. Goldhaber and Brewer (1999) used a national data base of students and teachers, the "National Educational Longitudinal Study of 1988–92," to relate types of teacher licensure to student academic performance in mathematics and science. They compared teachers who had a permanent license in the subject they were teaching to teachers who had an emergency license in that field and those who had either no license at all or a license in another field. They found that the students with teachers who had either permanent or emergency certification in the relevant field outperformed students with teachers who had no license in that field. They also found no significant difference between students whose teachers had permanent licenses in the field and those who had emergency licenses. Pointing to this second finding, they concluded that the full set of requirements associated with permanent licenses did not translate into improved student performance; teachers could just as well avoid the required coursework, testing, and induction programs and simply receive an emergency license.

Another study, however, reached the opposite conclusion. Linda Darling-Hammond (2000) compared the percentages of

teachers in each state with permanent licenses to the state average of students' scores in mathematics and reading from the National Assessments of Educational Progress in 1990, 1992, 1994, and 1996. The study found that states with higher percentages of permanently licensed teachers had higher test scores in both subjects; this characteristic explained from two-thirds to four-fifths of the variation in test scores. The findings from earlier studies have been similarly contradictory. Perhaps the leading reason for this ambiguity is that the categories of licenses being compared each include a wide range of teachers and circumstances, depending on the state. In some states, permanent certification means a great deal of coursework in education; in other states it reflects more emphasis on content knowledge. And teachers with emergency licenses can either be particularly gifted prospective teachers that a school system wants to attract with reduced requirements, or underqualified prospective teachers who are hired to address a teacher shortage. It is thus difficult to use comparisons among license types to learn about the impact of teacher education on teacher effectiveness or student academic performance.

Studies can also compare outcomes between traditional certification and alternate certification programs. Many states have developed a set of procedures that permit prospective teachers with a bachelors' degree in a relevant field to receive a license without having to take the full complement of professional knowledge courses. Comparing these teachers to those who had to meet all requirements would suggest the added benefit of the full requirements above and beyond the minimal ones of alternate certification. Here too, however, the results from prior research are mixed. One study of New Jersey's alternate certification program found that it provided positive benefits over traditional certification (Natriello et al., 1990), while another found the same program to have deleterious effects (Smith, 1990). Reviews of the research thus disagree on the lesson to draw from alternate certification, some claiming that it indicates the uselessness of traditional requirements and particularly SCDEs (Kwiatowski, 1999) and others claiming that it indicates that there is no viable shortcut to taking the full complement of courses from SCDEs (Darling-Hammond, 1990). Some of the ambiguous results from these studies may be explained by the fact that the prospective teachers who pursue alternate certification may not be a homogeneous group; those who receive alternate licenses may be high performers being lured into teaching from other professions through reduced entry requirements, or low performers who could not meet the requirements of a traditional license. Depending on the kinds of teachers utilizing alternate certification programs, they could perform either better or worse than traditionally certified teachers.

While studies of teacher licensing and alternate certification have not been conclusive, another approach has yielded more definitive results. Some studies compared the impact of professional knowledge preparation to the impact of subject-matter preparation. Rather than investigating the characteristics of teacher education programs of prospective teachers, these studies tended to survey established teachers as to their levels of preparation in professional knowledge and content knowledge and link these to measures of teacher effectiveness. A summary of the results of 65 of these studies in the subject of science, referred to as a meta-analysis, found that both preparation in science and preparation in professional knowledge were linked to teacher effectiveness (Druva & Anderson, 1983). Other reviews have also found this to be the case (Byrne, 1983; Ashton & Crocker, 1987). More recently, Monk (1994) studied a national sample of more than 2,000 students and their teachers, and found that both the subject matter and pedagogical preparation of teachers had an impact on student achievement in mathematics and science. These studies of content and professional knowledge thus suggest that good teacher preparation requires courses in both areas; subject matter knowledge without professional knowledge produces teachers who cannot convey what they know about the subject, and professional knowledge without subject matter knowledge

produces teachers who have nothing to convey.

In sum, prior research has supported neither the views of NCTAF nor those of TBFF. Research on the impact of teacher licensing on student outcomes has been mixed, as has research comparing alternate certification to traditional programs. And the findings of studies of professional and content knowledge have not given preference to either type of knowledge; both have been found to be important components of effective teaching.

A third view, that TEIs vary in their effectiveness, makes its own set of empirical assumptions. It predicts not only that some TEIs will have more positive outcomes for their prospective teachers than others, but that the TEIs with more positive outcomes will have a common set of characteristics that are distinct from those of TEIs with more negative outcomes. This view can be tested by studying the links between various characteristics of TEIs and measures of teacher effectiveness. Those characteristics of TEIs that are associated with positive outcomes can be deemed as characteristics of effective TEIs, which ineffective institutions should seek to emulate.

Unfortunately, little work of this sort has been undertaken. To date, virtually no large-scale studies attempt to gauge the impact of TEI characteristics on teacher effectiveness. The one exception is a study of 2,229 students attending 15 public institutions in North Carolina (Ayres & Bennett, 1983; Ayres, 1983). That study related scores on the National Teacher Examination (NTE®) to the average age and SAT scores of the student body, the number of hours of general education required, the level of educational attainment and salaries of the faculty, the size of the library, and the size of the institution. It found that TEI characteristics were quite important, explaining 88 percent of the variation in NTE scores. However, a reanalysis of the data found that only the educational attainment of the faculty had a statistically significant effect on NTE scores (Pascarella & Terenzini, 1991). In addition to the Ayres and Bennett work, a few studies found a specific teacher education program to have an impact on its graduates, but these studies have consisted of no more than 300 teacher candidates and cannot compare the influence of the institution under study to the influence of other institutions with other characteristics.

However, while little is known about the links between TEI characteristics and teacher effectiveness, a great deal is known about the characteristics of TEIs themselves, as well as of the students attending them. This body of research is generally referred to as research on the "teaching pipeline."

The "teaching pipeline" is the series of steps through which college students become teachers. For the most typical students, these steps include entry into a teacher education program, completion of course requirements in the program, engaging in student teaching with faculty supervision, passing an exit or licensing examination, and being inducted as a teacher. Many students deviate from this process in various ways, however. For instance, one alternate route involves entering a teacher education program at the post-baccalaureate level after having graduated from college and even having worked for a few years in another occupation. Another alternate route is not to enter a teacher education program at all, and instead engage in student teaching and receive professional development in professional knowledge during the period of induction.

A surprisingly large proportion of college students experience some aspect of the teacher pipeline. According to a study by the National Center for Education Statistics (NCES, 2000), four years after college 36 percent of all graduates reported having engaged in student teaching, having received some form of teacher certification, or having considered teaching. One-third of these students, or 13 percent of college graduates, had taught within the first four years out of college. The kinds of students who chose the pipeline is a subject of some controversy. Academically, those who plan on entering teaching enter college with lower SAT and ACT scores. However, a recent study shows that the SAT and ACT scores of prospective teachers vary widely, depending on what

they plan to teach (Gitomer, Latham, & Ziomek, 1999). Although the SAT and ACT scores of prospective elementary school teachers are lower than those of the average college graduate, those of prospective teachers taking licensure tests in specific subject areas (e.g., mathematics or science) are equal to or above those of the average college graduate. Further, as students progress through the pipeline, lower achieving teaching candidates are weeded out; prospective teachers who passed entrance examinations for teacher education programs and those who passed licensure examinations had higher college entrance examination scores than their counterparts who failed these tests. Other studies have shown that those entering the teaching pipeline are more likely to be female and less likely to be Asian Americans (NCES, 2000).

Research also reveals great diversity in the routes candidates pursue toward becoming teachers. According to one study (NCES, 1997), 139,000 teachers were hired in 1993–1994; of these, just 42 percent were both fresh out of college and had never taught before. The alternate route of a postbaccalaureate teaching program is experienced by a substantial number of teachers; of the 200,000 teaching candidates attending TEIs in 1998, 28 percent were enrolled at this level (Feistritzer, 1999). Also, many teaching candidates do not major in education; of the 200,000, 29 percent of those planning to enter elementary education were not majoring in education, and 49 percent of those planning to enter secondary education were not doing so (Feistritzer, 1999). Substantial numbers of prospective teachers do not enroll in teacher education programs at all; of college graduates who entered the pipeline, 7 percent were teaching four years out of college but had not been involved in teacher education (NCES, 2000). Compared to all other college graduates who entered the pipeline, these "unprepared" teachers were from high-achieving rather than low-achieving backgrounds. They had higher SAT and ACT scores, were more likely to have obtained a masters degree, were more likely to have been enrolled in a private doctorate-granting institution, and were more likely to aspire to a doctoral degree.

Various studies of prospective teachers reveal great uniformity in their demographic characteristics (Zimpher & Sherrill, 1996; Goodlad, 1990; Feistritzer, 1999). They are overwhelmingly female (80%), White (80%) and from middle- or high-income families (85%). In addition, most prospective teachers enroll in teacher education full time (87%) and are young, less than 25 years old (87%).

The faculty of teacher education programs evince somewhat different characteristics. They, too, are overwhelmingly White (92%), but, compared to the students, a greater percentage are male. The two-thirds of the faculty that are tenured are predominantly male (80%), while nontenured faculty are more than 50 percent female. Most faculty hold doctoral degrees (80%) and commit the bulk of their time (60% of it) to teaching.

The institutions that prospective teachers attend vary in their characteristics (Feistritzer, 1999). Three-quarters of teaching candidates attend public institutions, whereas one-quarter attend private institutions. Nearly half attend institutions with enrollments of 10,000 or more students; one-quarter attend institutions of 5,000 to 9,999 students; and one-quarter attend institutions of less than 5,000 students.

The teacher education programs housed within these institutions vary in their characteristics for entry, their course requirements, and their characteristics for exit (Feistritzer, 1999). One-half of the students entering SCDEs are sophomores; one-third are juniors, and the rest are seniors or first-year students. All SCDEs require a test of some kind for entry, and one-half require a basic skills test that has been approved by the state. Other admissions requirements include a minimum GPA (required at 94% of the SCDEs), recommendations (required at 80% of the SCDEs), interviews (required to 65% of the SCDEs), and a minimum college entrance examination score (required at 33% of the SCDEs). Most SCDEs offer a four-year program (78%). In addition, 11 percent offer a five-year program. One-half offer programs at the postbaccalaureate level. At the undergraduate level, course

requirements typically consist of 51 to 52 credit hours of general studies, 36 to 39 hours in the major, 24 to 31 hours of professional knowledge and 14 to 16 hours of student teaching. These requirements add up to more credit hours than are typically established for other students; the average undergraduate takes 120 hours, prospective secondary teachers take 129 hours, and prospective elementary school teachers take 134 hours of coursework. Student-teaching requirements vary widely from SCDE to SCDE, with 40 percent requiring at least a semester and 60 percent requiring less than a semester. One-half of SCDEs have students teach under the supervision of one teacher in a single school; one-third have students under the supervision of various teachers at various schools. Finally, almost all SCDEs require an exit or licensure test (up from just 5% in 1983). The nature of the test, however, varies widely among SCDEs.

From this pastiche of TEIs from various studies over the last decade, some crucial points emerge. First, students and faculty possess fairly uniform demographics. Both are predominantly White and at least middle class. The students are predominantly female whereas the faculty are predominantly male, but this may change as the overwhelmingly male senior faculty are replaced by the predominantly female junior faculty. Also, students are predominantly of a conventional type; most attend college full-time and are less than 25 years old. Second, the bulk of TEIs are large public colleges and universities; however, there are substantial numbers of private and smaller institutions that provide teacher education. Finally, the requirements associated with SCDEs are substantial. Most require entrance and exit examinations, and their course requirements are greater than those for other college students.

Yet much still remains unknown about the SCDEs and the institutions in which they are housed. Little is known about the size of SCDEs relative to the overall institution; still less is known about the relationship between SCDEs and their surrounding communities. And, as this review of prior research has revealed, almost nothing is known about how the various characteristics of institutions and SCDEs described here relate to actual outcomes among teachers. This study will present information about the link between TEI characteristics and teacher effectiveness. But before doing so, it is worthwhile to use information from this study to elaborate on the description of TEIs and SCDEs found in the research on the teaching pipeline.

Chapter Three: A Portrait of Education Schools and Their Students

While prior research reveals a great deal about the character and variety of TEIs, much remains unknown. This chapter examines the characteristics of TEIs, the students who attend them, and the SCDEs housed within them. TEIs can be characterized as one of seven types: small public colleges, small public universities, small private colleges, small private universities, large public colleges, large public universities, and large private universities (too few students attend large private colleges to consider this as a separate type). As a first look at the central question of this study, the link between TEIs and outcomes for prospective teachers, prospective teachers' scores on licensure examinations will be compared among the seven institutions; then other characteristics of the prospective teachers, including their demographics and their scores on examinations for entering SCDEs, will be compared. Then, the SCDEs will be characterized in terms of four issues: (1) the scope of SCDEs in relation to their corresponding TEIs; (2) the extent to which prospective teachers are more or less traditional than the TEI student body; (3) the extent to which the SCDE focuses on issues in the local school district; and (4) the extent of ethnic diversity among the faculty. While these four issues are hardly exhaustive of what needs to be known about SCDEs, they all play a significant role in policy and research discussions of teacher education.

Compiling information on all of these characteristics of SCDEs and TEIs for the same set of students involved gathering data from several sources. The core of the resulting data base consisted of data from the Teaching and Learning Program of ETS (TLP), which administers The Praxis Series™ of teacher assessments. These assessments include Praxis I, an examination for entrance into an SCDE, and Praxis II, a licensure examination. Praxis II is currently used as a licensing requirement in 34 states. Because Praxis II is most commonly used as a requirement in the Southeast, this region was selected for study. The 400,000 prospective teachers who took Praxis between 1994 and 1997 in this region were identified. From these a sample of approximately 40,000 students was selected.[2] For each of these prospective teachers, the TLP data base provided scores on Praxis II assessments, as well as background information that test takers provided when they registered for the examination. This information included parents' education levels and the prospective teacher's ethnicity. Praxis I scores were also available for nearly 10,000 students.

The registration materials also asked test takers to indicate the TEI that they had attended, making it possible to link information about test takers to information about their institutions. Institutional information was collected from the Integrated Postsecondary Educational Data System (IPEDS), a database maintained by the United States Department of Education. Because IPEDS contains information on every college and university in the U.S., it was possible to gather information on all of the 152 institutions attended by the 40,000 prospective teachers in TLP. The information collected in this way included whether the institution was public or private, the number of students enrolled, and the percentage of students who were undergraduates.

Knowing the TEI for the students also made it possible to collect information on their SCDEs. Unfortunately, there is no pre-existing national data base that includes information on the issues regarding SCDEs discussed above. It was therefore necessary to send questionnaires to the deans of

[2] The sample was generated by stratifying the population by attendance at a Historically Black College or University and attendance at other institutions. All prospective teachers from Historically Black Colleges and Universities were included; from the remainder, a random sample of an equivalent number of prospective teachers was selected.

education in the 152 institutions under study. One-half of the deans of education responded, representing 66 percent of the 40,000 students in the study. From these responses, it was possible to derive information about the scope of SCDEs, the extent to which prospective teachers were traditional students, the degree of local involvement, and faculty diversity.[3]

Finally, it was deemed useful to known more about the test performance of prospective teachers prior to entering an SCDE. While Praxis I scores provided some of this information, it was also possible to obtain SAT scores for a large group of prospective teachers. This was accomplished by linking the Social Security numbers in TLP to Social Security numbers in a data base containing all SAT scores from 1989 through 1996. This procedure resulted in 9,078 scores on both the verbal and mathematics sections of the SAT. Thus the resulting data base consisted of the scores of the 40,000 students on Praxis II, their background characteristics, and some characteristics of their TEIs. In addition, information on SCDEs was obtained for two-thirds of the students and either SAT or Praxis I scores for two-fifths of the students.

Seven types of TEIs were identified based on whether they were public or private, the numbers of students enrolled, and the percentage who were undergraduates. Institutions with more than 10,000 students were deemed large, and those with less than 10,000 deemed small; institutions where more than 10 percent of the student body consisted of graduate students were deemed universities, and the rest were deemed colleges. And public institutions were distinguished from private ones. Of the eight possible categories, large private colleges were not included in the comparisons because too few students attended private institutions with enrollments of more than 10,000 students, less than 10 percent of whom were graduate students.

Scores on six Praxis II assessments were compared among these seven types of TEIs (Figure 1).[4] The six assessments were elementary education, early childhood education, educational leadership, communication skills, general knowledge, and professional knowledge. Educational leadership is taken primarily by prospective principals, and so is somewhat different in the composition of its test takers than the others; communication skills, general knowledge, and professional knowledge form what is referred to as the core battery, given to prospective teachers irrespective of the particular subject they intend to teach.[5] Elementary and early childhood education assessments are given to prospective teachers planning to teach in elementary school or an early childhood program, respectively. Tests in specific subjects were not included due to the small numbers of prospective teachers who had taken any given one. However, in the future, as the subject tests become more closely aligned with emerging content standards for students, greater emphasis will be placed on these tests and less on the core battery.

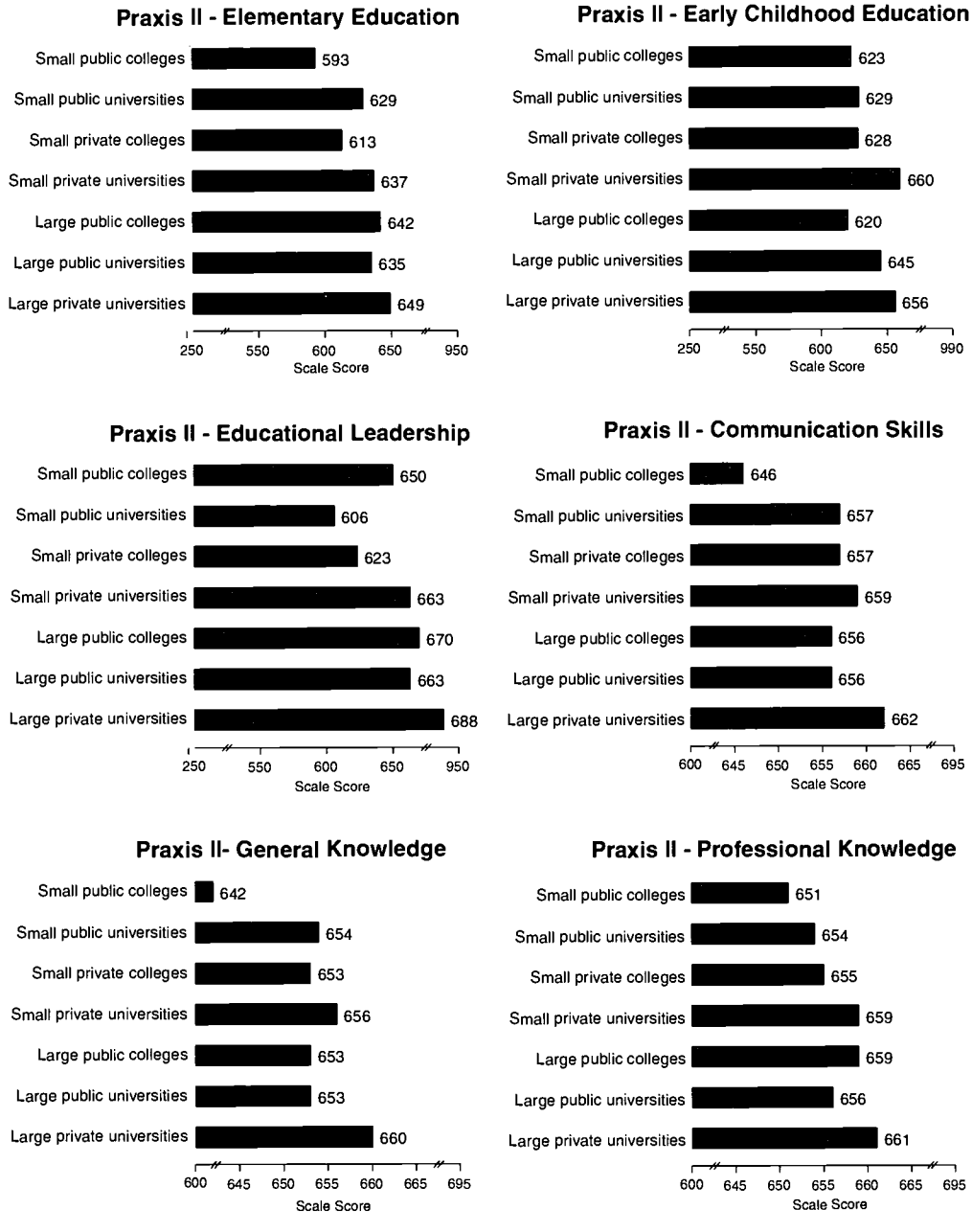
For all six of these tests, a common pattern emerges. Private schools usually have higher scores than public schools; universities usually have higher scores than colleges; and larger schools usually have higher scores than smaller schools. This is most consistently the case with the core battery and elementary education tests, where small public colleges have the lowest scores, large private universities have the highest scores, and the other categories fall in the middle. In the case of early childhood education, large public colleges have the lowest scores and small private universities the highest. Thus, while private universities seem to perform better than the other institutions, size

[3] The SCDEs that responded to the survey were housed in institutions that differed to some extent in their characteristics. The TEIs of responding SCDEs were larger than the other TEIs, for instance. However, a propensity score analysis was conducted to measure the influence of nonresponse on the study's findings, and found no significant change in results.

[4] All comparisons discussed in the text were statistically significant.

[5] While the core battery was the major set of tests given at the time of this data collection (1994–1997), it has since been phased out by ETS and its clients.

Figure 1
Average Praxis II Scores for Teacher Candidates, by Type of Institution



Source: Tabulated by author from database of Teaching and Learning Program of ETS.

does not seem to be as important a factor, with smaller schools often doing better than larger ones. Results for the educational leadership test also appear to be different, not surprising given the test's distinct pool of test takers. While large private universities remain the high scorers, small public colleges, large public colleges, and large public universities also have quite high scores; small public universities and small private colleges have the lowest scores.

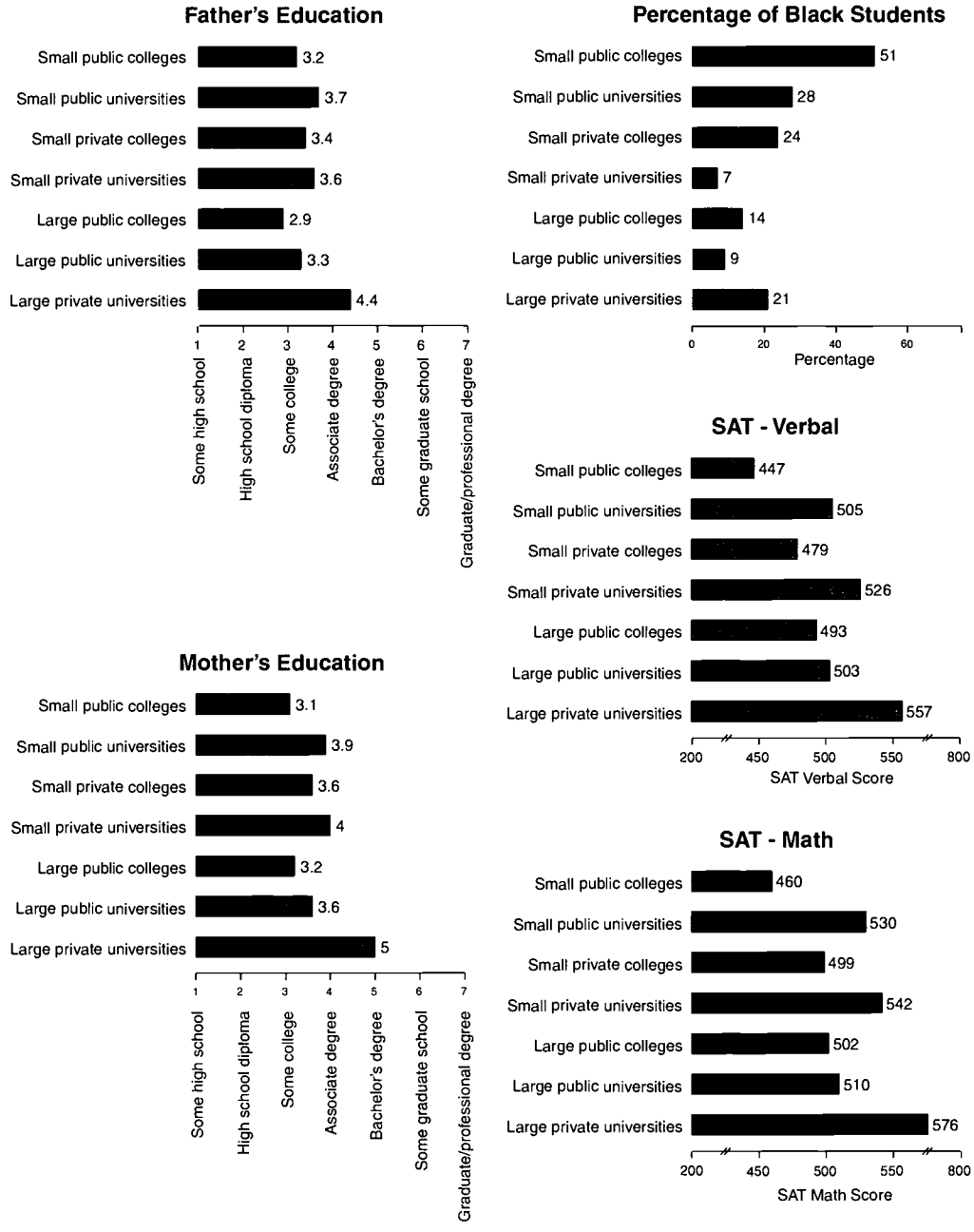
Although institutions seem to differ greatly in their scores on Praxis II, these differences may not have anything to do with the policies, programs, or practices of the institutions; it may be that prospective teachers at higher performing institutions were higher achievers before they even entered those institutions. This possibility can be examined by comparing the characteristics of students at the seven types of institution prior to entering college (Figure 2). Indeed, it appears that more-advantaged students attend institutions that are larger, private, and enroll a larger percentage of graduate students. The SAT scores and the level of the mother's education are highest at large private universities and lowest at small public colleges. Father's education is also generally higher at universities than at colleges, and at private than at public institutions (size is less important in this case). The ethnicity of the student body, however, does not conform to this pattern; small public colleges seem to have the largest percentage of African American students (51%), but large private universities have a larger percentage than do large public colleges or universities or small private universities. Thus, the size of the school, whether it is public or private, and the percentage of undergraduates are less important in this case.

Not only may institutions vary in the characteristics of students prior to entering college but they may differ in the characteristics of prospective teacher education students within the institution's student body. This possibility can be assessed through examining scores on the entrance examination for teacher education programs, Praxis I (Figure 3). These tests are given in three subjects and two formats for a total of six types of assessment: paper-and-pencil tests of reading, writing, and mathematics, and computer-based tests in the same three subjects. The pattern of differences among types of institution are the same for the six tests: Students attending larger institutions score higher than those attending smaller institutions; those attending universities score higher than those attending colleges; and those attending private institutions score higher than those attending public institutions. For instance, on the paper-and-pencil reading tests small public colleges have the lowest scores and large private universities the highest scores.

It appears then that there is a general pattern among Praxis II scores, Praxis I scores, and background characteristics of the seven types of institution. Students tend to perform best at institutions that are private, large, and where graduate students are plentiful, and less well at institutions that are public, small, and where there are few or no graduate students. However, not only do students leave certain institutions performing better than other students, but they also enter the institutions performing better. It is therefore not known whether the institutions provide an advantage to their students or instead simply attract better students. To identify an effect of attending a type of institution, it is necessary to use more sophisticated statistical techniques, and these will be discussed in the next chapter.

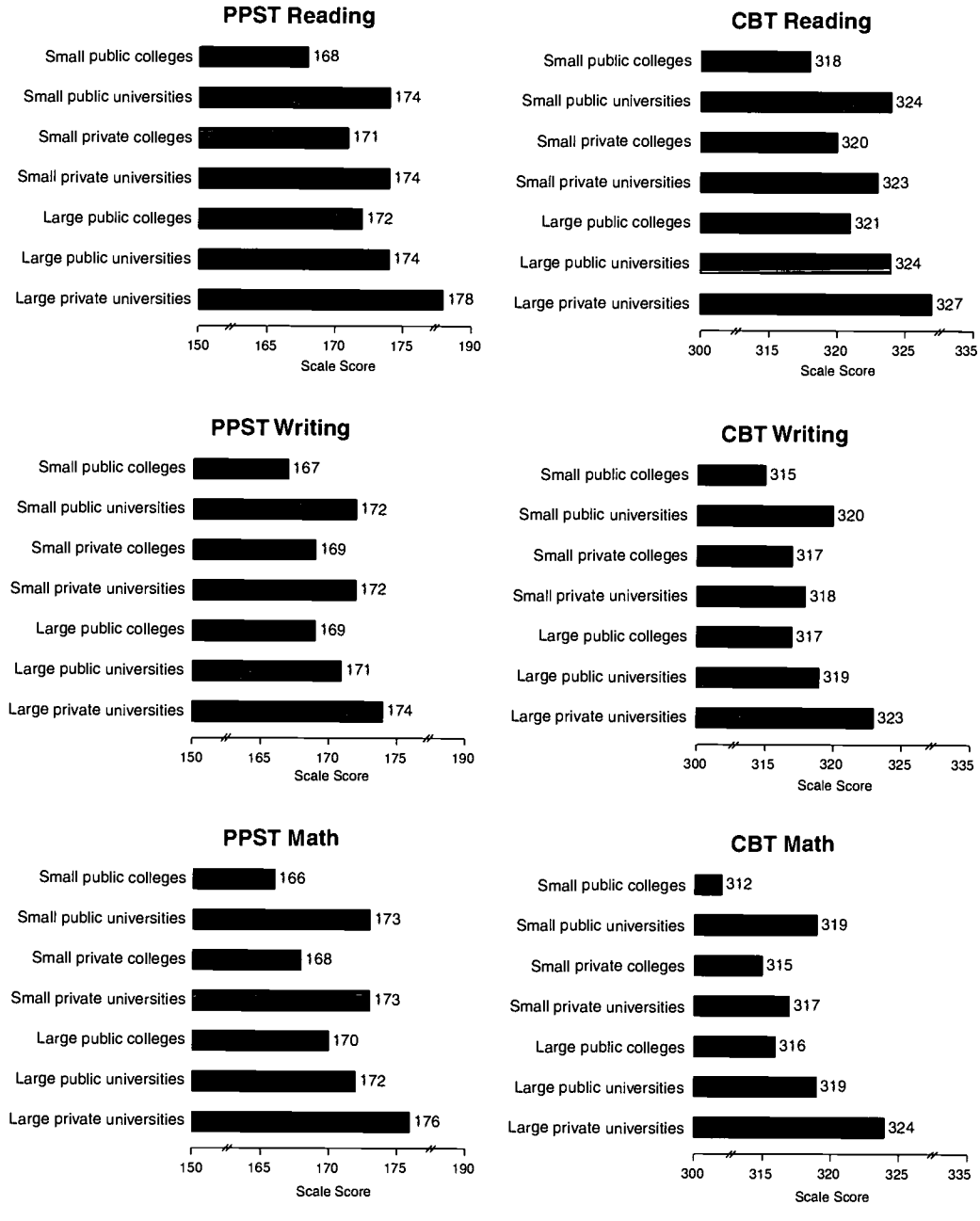
The questionnaires sent to deans of education also provide useful descriptive information. One issue of interest is what the scope of SCDEs is relative to the TEIs in which they are housed. This issue was measured through two questions, one asking the percentage of juniors and seniors who majored or minored in

Figure 2
Background Characteristics of Teacher Candidates, by Type of Institution



Source: Tabulated by author from databases of Teaching Learning Program and School and College Services Program of ETS.

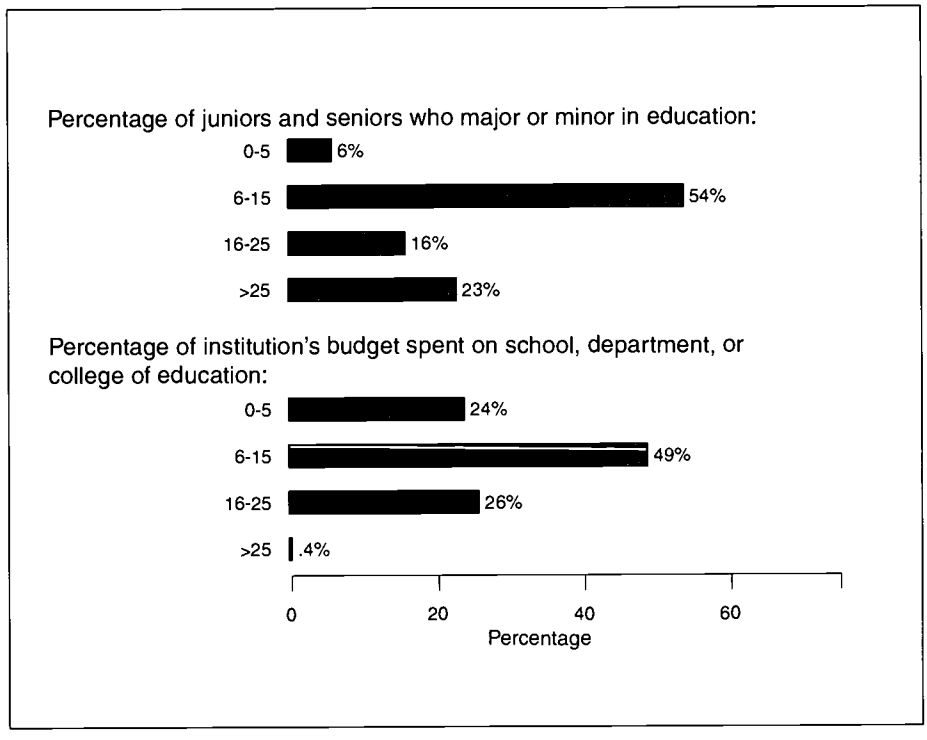
Figure 3
Praxis I Scores, by Type of Institution



Source: Tabulated by author from database of Teaching and Learning Program of ETS.

education and one asking the percentage of a TEI's budget spent on its SCDE (Figure 4). The largest share of respondents indicated that between 6 percent and 15 percent of juniors and seniors were education majors or minors, and that an identical percentage of TEI budgets went to the SCDE. Interestingly, a sizable minority of institutions (23%) reported that more than 1 out of 4 of their students were education majors or minors. There is thus a small but substantial group of institutions in which large proportions of the students major or minor in education.

Figure 4
The Scope of Education Schools



The questionnaire also sought to determine whether prospective teachers were more likely than other TEI students to be traditional students. Deans of SCDEs were asked to compare to the entire undergraduate student body the percentage of students in teacher education who are part-time, more than 24 years old, and living off campus, attributes of nontraditional students (Figure 5). The largest share responded that prospective teachers were similar to other students in these respects. For instance, fully 63 percent of the deans reported that the percentage of teacher education students not living on campus was about the same as that of the entire undergraduate student body.

The questionnaire revealed that most SCDEs are highly involved in their local communities. This phenomenon was measured by asking deans the percentage of teacher education graduates placed in jobs in the state, whether the SCDE provides in-service training for local school districts, the degree to which the teacher education curriculum is influenced by local or state policies, and the percentage of faculty serving on local school boards or community advisory committees (Figure 6). Most teacher education graduates are indeed placed in-state; 80 percent of deans indicated that more than half of their students ended up teaching in the state. Nine out of 10 of the deans reported that they provided training to local school districts. And 93 percent of deans reported that they were highly influenced by state or local regulations or mandates. The one exception to this picture of heavy local involvement is that a relatively small percentage of education faculty actually serve on school boards or community action committees; 6 out of 10 deans reported that between 1 percent and 25 percent of their faculty fit into this category.

Finally, the questionnaire indicates that minorities are no more underrepresented in SCDE faculty than in other types of faculty (Figure 7). Forty-three percent of deans reported that the percentage of minority faculty was

Figure 5
Traditional and Non-traditional College Students

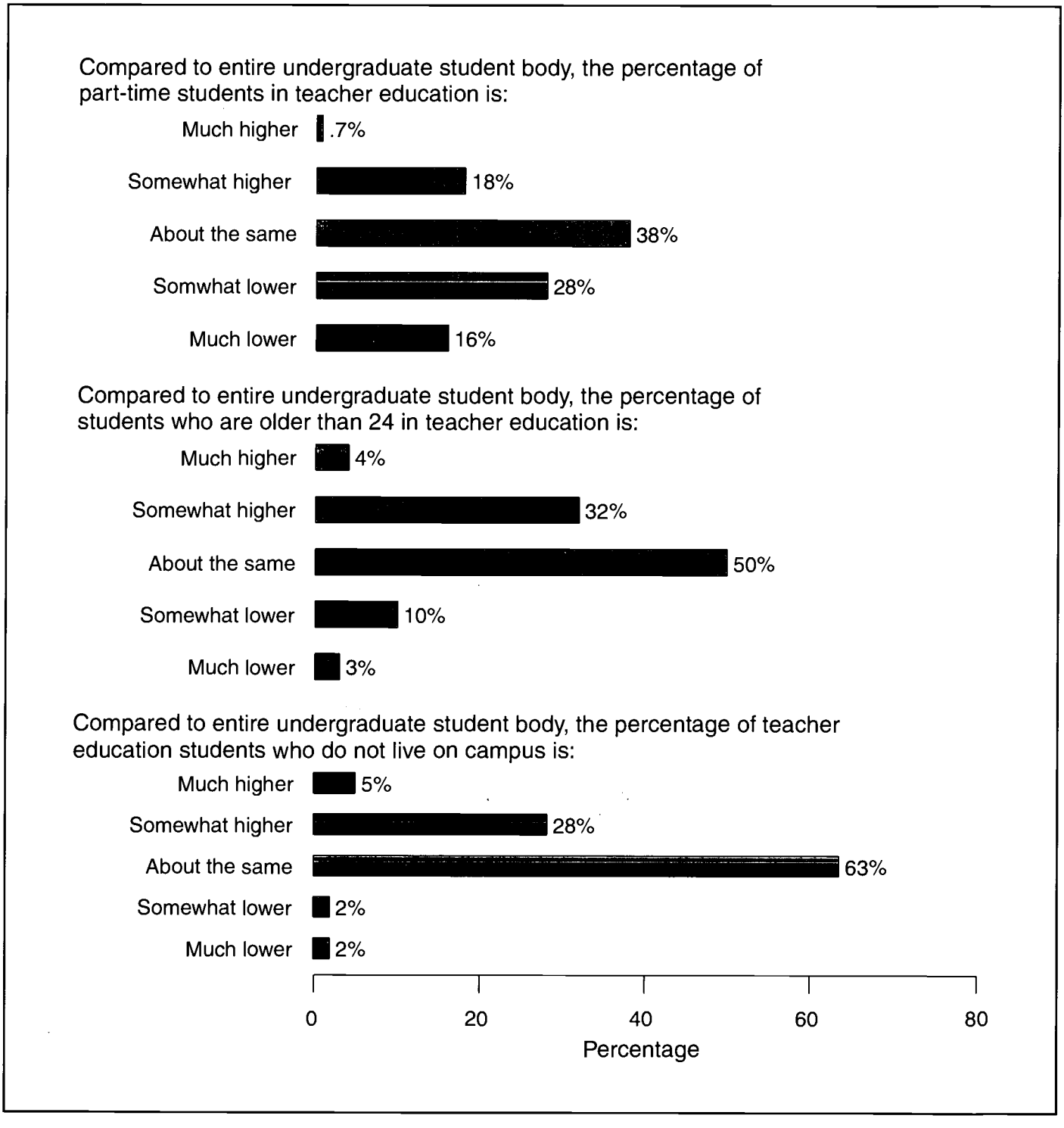
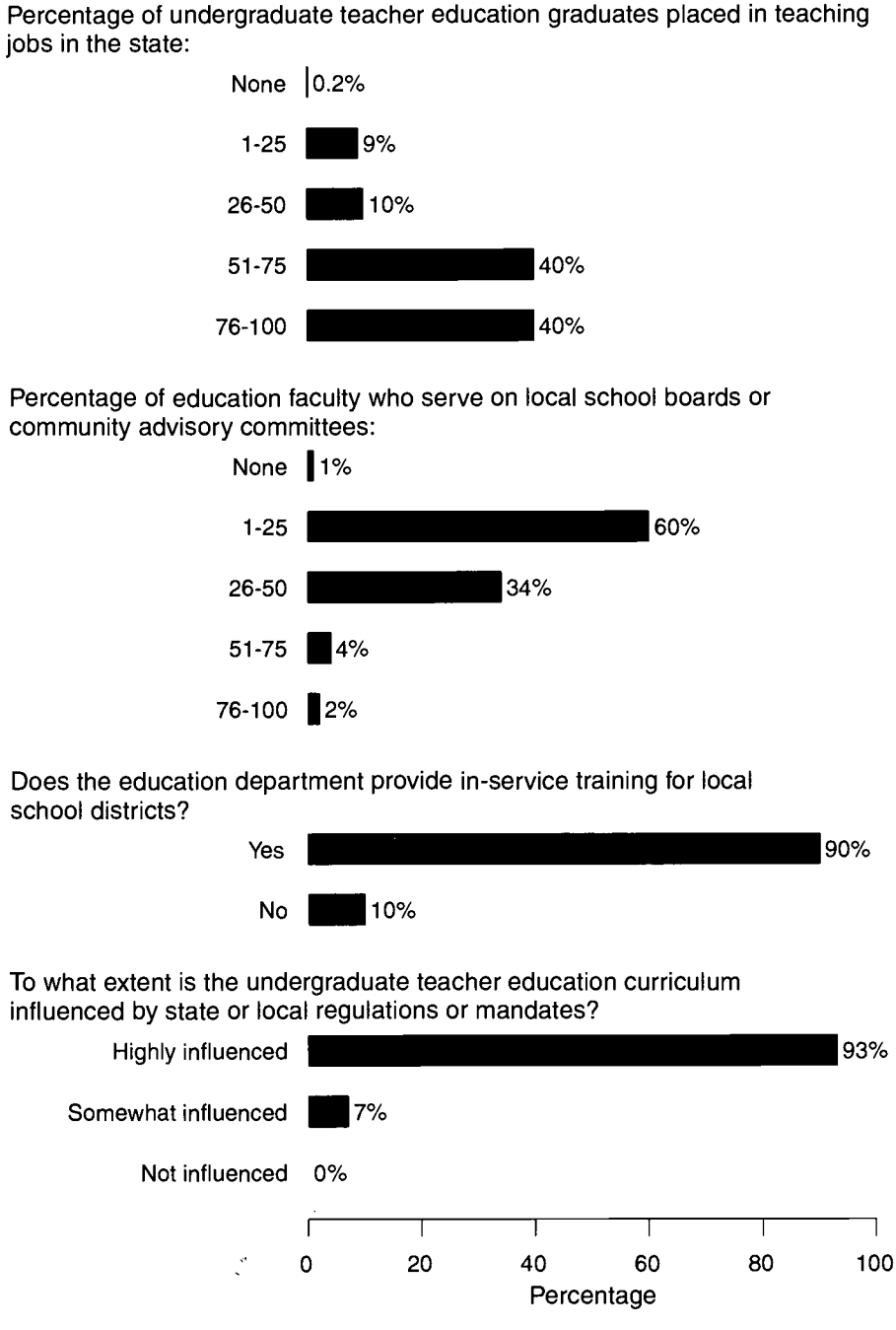


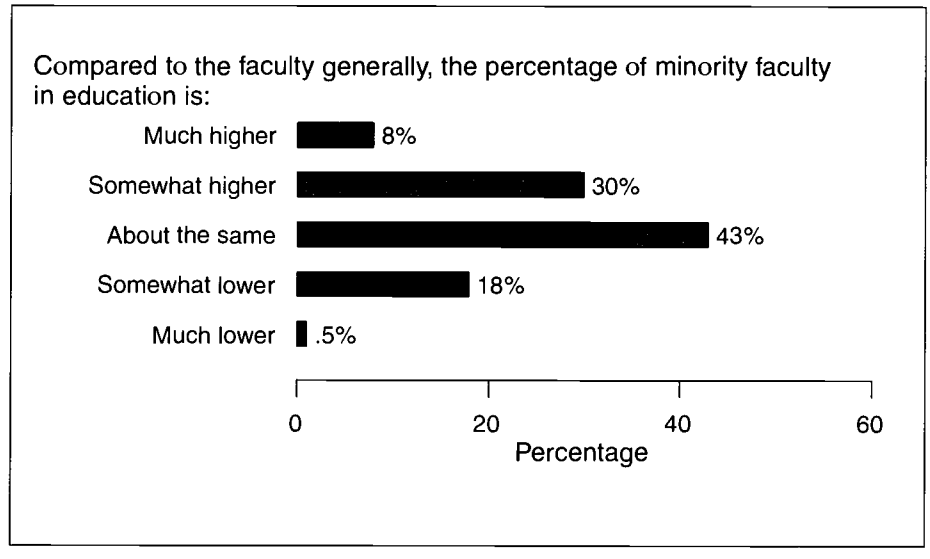
Figure 6
Involvement of Education School in the Local Community



similar inside and outside SCDEs, with another 38 percent of deans reporting that the percentage of minority faculty in SCDEs was actually higher than in other departments. Fewer than 1 in 5 deans reported minorities to be less well represented in their departments than in other departments.

In sum, the questionnaire provides a snapshot of the characteristics of SCDEs. SCDEs tend to comprise between 6 percent and 15 percent of the fiscal effort and student bodies of postsecondary institutions. Their students tend to be as traditional as students in other departments. Their faculty tend to include as many minority professors as faculty in other departments. The question that these findings raise is how the tendency of SCDEs to approach their typical characteristics in these various respects is related to the performance of their students on Praxis II. Measuring this relationship raises the same statistical issues as with comparing the test performance of students at various TEIs; to attribute differences in Praxis II scores to the characteristics of SCDEs, the background characteristics of their students need to be taken into account. The next chapter shows how this can be accomplished.

Figure 7
Minority Representation in the Faculty



Chapter Four: How Characteristics of Education Schools Are Related to Licensure Examination Scores

Linking characteristics of TEIs and SCDEs to Praxis II scores raises a host of methodological issues. These include the need to take into account the possible influence of the background characteristics of prospective teachers on test performance; the need to use large-scale data; the multistep nature of the teacher preparation process; the need to deal with multiple measures of the phenomenon of interest; and the multilevel nature of school effects. Fortunately, a statistical technique known as multilevel structural equation modeling (MSEM) can address each of these issues. An explanation of these problems and the proposed solutions follows.

To accurately gauge the impact of school characteristics on licensure test results, it is necessary to disentangle the impact of schools from the impact of students attending them. To some degree, the average licensure score of a TEI reflects the caliber of students who entered the institution in the first place; more selective institutions probably generate higher scores, purely by virtue of the capabilities of their students. Measuring the impact of an institution on licensure scores really means measuring the value added by the institution above and beyond the background characteristics of its students. The data to be analyzed here need to include student background characteristics, and the statistical techniques need to take into account the influence of these characteristics in isolating the influence of school characteristics.

It is also important that data be large-scale in nature. This study requires sufficient numbers of students to capture the variety of backgrounds that might influence test scores; there need to be sufficient numbers of schools to distinguish between the impact of different school characteristics, such as between the size of a school and the percentage of its students who are undergraduates, and there need to be sufficient numbers of states to ensure that the results are not idiosyncratic to the policy environment of a particular state.

Further, the method pursued in this study needs to develop a flow chart of influences on Praxis II scores. The links between TEIs, SCDEs, and Praxis II scores presumably involve a multistep process. Not only do TEI and SCDE characteristics influence Praxis II scores, but, presumably, they influence one another. Certain TEIs are probably more likely to have certain types of SCDE housed within them. An innovative TEI may directly influence licensure scores, or it may make the SCDE more innovative, which in turn may lead to better scores. Also, the background characteristics of students may influence their choice of a TEI; perhaps more affluent students are more likely to attend the more effective TEIs. Thus, the method for this study needs to specify how background characteristics of students influence the type of TEI attended, which then influences the type of SCDE and, ultimately, test performance.

Studies of this nature also have to be able to handle multiple measures of the phenomenon of interest; to use only a single measure of the phenomenon will make it highly subject to error. For instance, local involvement is measured through four questionnaire items, namely responsiveness to state and local mandates, in-service training for school districts, placing graduates in jobs in-state, and faculty participation on school boards. Using just one of these items rather than all four might tap into some phenomenon other than local involvement, thus producing misleading results. If responsiveness to state and local mandates was used by itself and found to have a positive impact on test scores, this relationship could be attributable to local involvement, but could just as easily be attributable to the content of these mandates. Thus, the method for this study needs to take into account multiple measures in trying to characterize a given phenomenon.

Finally, this study needs to take into account the multilevel nature of its data. The study is attempting

to link a characteristic of students, their licensure scores, to characteristics of institutions that are aggregations of students. This mixture of students and schools raises many thorny methodological issues. For instance, there are 152 institutions and 40,000 students. Is the size of the sample 152 or 40,000? Addressing this issue requires the use of statistical techniques that are sensitive to the multilevel nature of the data.

Fortunately, these problems can be addressed by applying the technique of multilevel structural equation modeling (MSEM) to the data base discussed above. The data include measures of student background, and MSEM can take these measures into account in measuring the impact of school characteristics on Praxis II scores. The data are large-scale, with 40,000 students from 152 schools in most Southeastern states. MSEM develops flow charts of the student characteristics, school characteristics, and test scores; it incorporates multiple measures for the phenomena of interest; and it takes into account the multilevel nature of the data.[6]

Using MSEM, this study measured relationships among TEI characteristics, SCDE characteristics, and Praxis II scores in three steps. First, TEI characteristics were related to Praxis II scores, taking into account student background. The TEI characteristics used were whether the school was public or private, its size, and the percentage of students who were undergraduates. The student background characteristics used here were prior test performance, as measured from the multiple measures of SAT verbal scores, SAT mathematics scores, and scores on the six Praxis I assessments; and socioeconomic status, as measured from the educational levels of the mother and father. A composite Praxis II score was generated from the six assessments described in the preceding chapter. Second, SCDE characteristics were related to Praxis II scores. Since only 66 percent of the prospective teachers attended SCDEs whose deans responded to the questionnaire of SCDE characteristics, this model drew on only those 26,000 students (although, as mentioned earlier, statistical analyses indicated that the results would have been similar with all 40,000 students). The SCDE characteristics used here were local involvement (measured from in-state job placements, responsiveness to state and local regulations, faculty participation in school boards, and in-service training of local school districts); traditional college experiences (measured from whether students lived on campus, were enrolled full-time, and were aged 24 or less); the scope of the SCDE (measured from the percentage of students who majored or minored in education and the percentage of the institution's budget devoted to the SCDE); and whether there were more or less minority faculty in the SCDE than in the institution as a whole. Praxis II scores and the background characteristics of students were measured as in the first step. Finally, TEI characteristics were related to SCDE characteristics to assess the likelihood that certain types of TEI would have certain types of SCDE associated with them. The 66 percent subsample was again used here, and the same measures of student background, TEI characteristics, and SCDE characteristics were used.

The first step, relating TEI characteristics to Praxis II scores, reveals that two of the three characteristics have an impact (Figure 8; see also Appendix, Table 1). The figure shows the impact of the three TEI characteristics and the two student background characteristics on licensure scores. The numbers should be understood as measuring the impact of each characteristic relative to the others; the higher

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[6] The models are similar to most structural equation models (SEMs) in that they combine path and measurement models. Factor models construct variables representing the phenomena of interest from a series of measures in the observed data. The path models then relate these constructs to one another. These models differ from standard SEMs, however, in that they are multilevel. The covariance matrix is partitioned into between- and within-school components. Then the between-school matrix is used to gauge school effects. For full a discussion of MSEM, see Muthen (1994). Two software packages were used for this analysis, AMOS 3.6 and STREAMS 1.8. For a discussion of the software, see Gustafsson & Stahl (1997).

Figure 8
Relationship between Characteristics of Teacher Education Institutions and Praxis II Scores

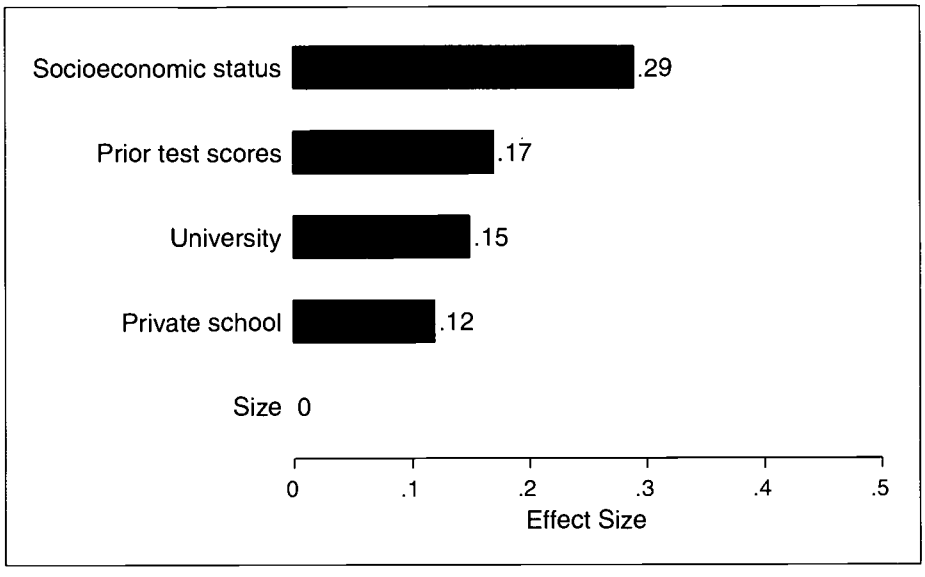
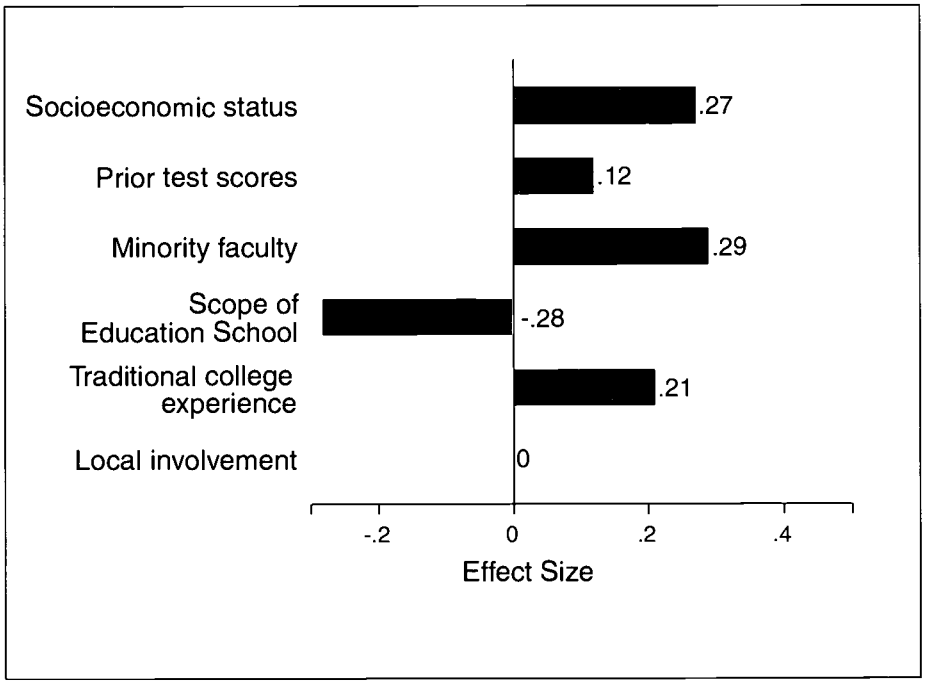


Figure 9
Relationship between Characteristics of Schools, Colleges, and Departments of Education and Praxis II Scores



the number, the greater the impact. The background characteristics have the greatest impact. Students who had high levels of test performance prior to taking Praxis II also performed well on Praxis II; and students from affluent backgrounds outperformed students from less affluent backgrounds. Clearly, it was important to take these characteristics into account as they proved to be highly influential. Nonetheless, certain characteristics of TEIs proved influential above and beyond these student background characteristics. Students attending universities outperformed students from similar backgrounds who attended college, and students who attended private institutions outperformed students from similar backgrounds who attended public institutions. The number of students enrolled at the institution, however, proved not to have an impact on licensure scores.

The second step, relating SCDE characteristics to Praxis II scores, reveals that 3 of the 4 characteristics have an impact (Figure 9; see also Appendix, Table 2). This figure shows the relative impact of the four SCDE characteristics and two student background characteristics on licensure scores. Again, prior test scores and socioeconomic status substantially influence Praxis II scores. Among the SCDE characteristics, the ethnic composition of the faculty has the strongest influence. The more diverse the faculty, the better prospective teachers perform on

their licensure tests. The traditional college experience also appears to have a positive effect on Praxis II scores; students enrolled in SCDEs with predominantly traditional students outperform their counterparts in SCDEs with predominantly nontraditional students. Interestingly, the greater the scope of the SCDE, the lower the licensure scores of its teacher candidates. Local involvement proved unrelated to Praxis II scores.

The third step, relating TEI characteristics to SCDE characteristics, reveals substantial inequities in access to effective SCDE and TEI characteristics. Back in the first step, which had related TEI characteristics to Praxis II scores, the tendency of students from various social backgrounds to attend institutions with those TEI characteristics was also measured (Appendix, Table 1). It found that more affluent students were more likely to attend private institutions and universities, precisely the institutions most conducive to high licensure scores. The third step, linking TEI characteristics to SCDE characteristics, found a similar phenomenon occurring (Appendix, Table 3). Affluent students were more likely to be exposed to diverse faculty and engage in traditional college experiences. While this model found no link between TEI characteristics and the SCDE characteristics of faculty diversity and traditional college experiences, it did find links to the scope of SCDEs. Private and smaller institutions tended to have smaller scopes to their SCDEs, a practice conducive to higher licensure scores. Since private and smaller institutions were more likely to be attended by affluent students, affluent students would thus also have greater access to SCDEs of small scope. Thus, in all cases, more affluent students had a greater chance to be exposed to the TEI and SCDE characteristics most conducive to high Praxis II scores.

In summary, it appears that two characteristics of TEIs and three of SCDEs have an impact on licensure tests. Private institutions outperform public ones; universities outperform colleges; SCDEs with diverse faculty outperform those that are overwhelmingly White; SCDEs with predominantly traditional students outperform those with fewer traditional students; and SCDEs that are a relatively small part of the overall institution outperform those that are a large part. In addition, the three steps in the analysis reveal differences in exposure to these characteristics, based on the economic resources of the students; affluent students are more likely to attend TEIs and SCDEs with these characteristics. And this is the case even taking into account prior test performance, meaning that for two students of similar ability, the more affluent one will attend the more effective institution and SCDE.

These results are rich with implications for the policy debates on teacher education and its impact on teacher quality. Before turning to these policy implications, however, it is worthwhile to note some shortcomings of this study and suggest directions for further research.

Chapter Five: Implications for Educational Policy and Future Research

While this study breaks new ground in linking TEI and SCDE characteristics to Praxis II scores for a large sample of prospective teachers and institutions, much remains to be done. First, a national study of the impact of teacher education needs to be undertaken. Because this study relied on Praxis II scores as a measure of teacher effectiveness, it focused on prospective teachers from the region of the country where Praxis II has been most widely administered, namely the Southeast. Thus generalizations from this study are limited to that region. To generalize to TEIs outside of the Southeast will require collecting data that represent the entire United States, which means not only collecting information on the characteristics of TEIs and SCDEs from around the country, but also finding measures of teacher effectiveness that are available in all regions.[7]

Second, better measures of teacher effectiveness need to be used. The Praxis II scores used here represent some of the knowledge possessed by prospective teachers. Yet this knowledge may not necessarily translate into effective classroom practices. It would be better to measure teacher effectiveness either from an evaluation of the classroom practices of established teachers, or the impact of those practices on students, particularly their academic performance. For instance, it would be important to identify links between TEIs and scores on Praxis III, which does assess classroom practices, as well as to measure the impact of Praxis II scores on the test performance of K-12 students. Even within the realm of Praxis II assessments, the current study does not utilize scores on subject-specific tests such as biology or mathematics. As the pool of prospective teachers who have taken these tests grows, the link between scores on them and TEI and SCDE characteristics should be studied.

Third, more detailed information about SCDEs needs to be collected and related to teacher effectiveness. The current study chose a few important issues in SCDEs about which to collect data. But many issues remain, such as the use of technology, mentoring of student teachers, and the content of particular professional knowledge courses. Any of these may also have an impact on teacher effectiveness, and this impact should be gauged. Further, information about SCDEs may explain the mechanisms underlying this study's findings. For instance, additional information might explain why traditional college students perform better on Praxis II.

Fourth, richer measures of student background need to be collected. This study included SAT scores, a measure of precollege ability, for about a quarter of the prospective teachers. Subsequent research should increase the percentage of students with precollege scores by collecting ACT scores.[8] Further, the measures of socioeconomic status used here, mother's and father's education, should be supplemented with information about the parents' occupations, income, and possessions in the home. It would also be worthwhile to study the impact of gender, ethnicity, and the primary language in the home on Praxis II scores.

Finally, it needs to be understood that the findings presented here regarding the effectiveness of certain institutions and programs

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7 The differences between the demographics of the Southeast and the U.S. as a whole are not substantial, which makes drawing some inferences from this region legitimate. For instance, the Southeast is 51.3% female, as opposed to 51.1% for the U.S. as a whole, and it is 68% White as opposed to 73% for the U.S. as a whole. There are substantial differences in SAT scores between the Southeast and other regions of the country, but these may be attributable to the relatively small numbers of students taking the SAT in the Southeast (Data from Nettles & Perna, 1997).

8 It should be noted that the same results were obtained for all three steps of the analysis, regardless of whether SAT scores were included, suggesting that missing precollege measures for three-quarters of the students was adequately addressed through their scores on Praxis I.

are based on a relative rather than an absolute definition of effectiveness. When a characteristic of an institution or program is identified as "effective" in this study, it simply means that prospective teachers exposed to this characteristic score higher on the Praxis II examinations than those not exposed to it. Just because these prospective teachers are scoring higher than others does not necessarily mean that they are scoring high enough to make them effective teachers and thus make it possible to conclude that the institution is producing effective teachers. Drawing such a conclusion would require scoring test results in a manner that distinguished effective teachers from ineffective ones according to some external criterion. In the absence of such an external criterion, it is nonetheless legitimate to infer that because certain teachers are scoring higher than others, their corresponding institutions are more effective than others. It is thus possible to learn from this study what makes some institutions better than others, but not whether any of them meet an absolute standard of goodness.

With these issues kept in mind, the central conclusion of the study is that the effectiveness of TEIs in preparing teachers varies greatly. Some policymakers, such as the signers of the Thomas B. Fordham Foundation Manifesto, contend that TEIs are largely ineffective. Others, such as the members of the National Commission on Teaching and America's Future, contend that TEIs are largely effective. This research suggests that the reality is somewhere in the middle. Some institutions are more effective than others, and the most effective ones represent a substantial minority of institutions. Private institutions seem to be more effective than public ones. Yet these private institutions represent neither a few exceptional cases, as opponents of TEIs might think, nor are they typical, as supporters of TEIs might think. Rather, they represent about one-fourth of institutions nationwide. Similarly, universities seem to be more effective than colleges, and universities too constitute a substantial minority of institutions. Thus effective TEIs are neither a few deviant cases nor are they the norm.

The fact that TEIs are neither uniformly effective nor ineffective has implications for using these institutions to improve teacher quality. Critics of TEIs, because they view these institutions largely as failures, propose reducing their scope as much as possible. In their view, policymakers should encourage alternate certification, whereby prospective teachers need not attend such institutions at all, and have to meet only the most minimal requirements for a license. Supporters, because they view these institutions as largely successful, propose increasing their scope as much as possible. In this view, TEIs should increase course requirements, moving from four-year to five-year programs. And prospective teachers should not be able to evade these requirements, either by pursuing alternate certification or by attending institutions that lack rigorous requirements. The only appropriate alternative to certification by an undergraduate teacher education program is certification by the same program at the postbaccalaureate level; and institutions that lack rigorous requirements should simply be closed. But if TEIs are neither uniformly effective nor uniformly ineffective, the strategy for improving them becomes much different. The effective institutions can provide models of good practice, and ineffective institutions can be reformed to conform to this practice. Public institutions should emulate private ones, and colleges should emulate universities. The fact that so many TEIs are effective makes this reform strategy eminently feasible. Ineffective TEIs will not be pursuing utopian visions of teacher education attainable in only the most ideal circumstances; rather, they will seek to learn from their neighboring institutions, which educate the same pool of prospective teachers to better effect.

The findings regarding the characteristics of effective SCDEs make it possible to identify some of the practices that should be emulated by ineffective institutions. First, in keeping with the view of the critics that professional knowledge is overvalued and

content knowledge is undervalued, this study finds that the scope of SCDEs can have a negative impact on teacher effectiveness. Institutions with larger percentages of education majors and more money spent on SCDEs actually perform less well than those with fewer education majors and less money spent on SCDEs. This finding suggests that the role of SCDEs in preparing teachers should be somewhat limited. Assuming that professional knowledge courses are taught primarily in SCDEs, this finding implies that teacher candidates should have less exposure to professional knowledge and more exposure to content knowledge. This finding holds true for both elementary and secondary teachers, as students going into both types of teaching were included in the sample, and the Praxis II tests included elementary education as well as the core battery.[9] Second, in keeping with the view of supporters that TEIs are the key site for teacher preparation, this study finds that prospective teachers perform better on Praxis II examinations when they receive a traditional college experience. Having older students taking a few highly focused courses, the streamlined approach touted by TEI critics, seems to be less successful than having college-age students live on campus and take a complete academic program full-time. This is not to say that policymakers should turn their backs on prospective teachers who, because of their age and experience, are not appropriate for college-based teacher preparation; but for those who are appropriate, college-based teacher preparation can produce more effective teachers than other sites.

Various findings also have a bearing on the issue of equitable access to high-quality teacher preparation, an issue not sufficiently touched upon by supporters and critics of TEIs alike. The study found that affluent students have greater access to effective TEIs and SCDEs than do students from less advantaged backgrounds. It is the affluent prospective teachers who can afford private institutions and universities, and can afford the full college experience, including living on campus and being enrolled full-time. And it is the affluent students who are more likely to attend institutions that limit the scope of SCDEs, increasing student exposure to the academic disciplines. Less advantaged students are deprived of these opportunities, and consequently are less well prepared to be teachers; some may not be able to pass their licensure tests, and many that do may not be ready to teach effectively. The lower quality of teacher preparation of less advantaged students is of major consequence for urban school systems, because such systems disproportionately recruit teachers from such backgrounds. Thus the learning gap for teachers is passed on as a learning gap for students. Disadvantaged urban students are more likely to be taught by teachers who were systematically underprepared by TEIs.

In conclusion, this study suggests a reform strategy that draws elements from both critics' and supporters' approaches. First, institutions of higher education are appropriate as sites for teacher preparation. The fact that so many of the institutions are effective suggests that it is not necessary to go elsewhere. Further, the study shows that prospective teachers benefit from a traditional college experience. Second, TEIs need to place greater emphasis on preparation in content areas and less on preparation in professional knowledge. While some professional knowledge preparation is undoubtedly necessary, this study discovered some institutions with more than 25 percent of their students were either majoring or minoring in education. Students attending these institutions may just not have enough exposure to the relevant content knowledge to be comfortable with it in the classroom.

[9] The finding could also be interpreted as meaning that students at institutions with large proportions of education majors and minors and who financial resources are largely committed to SCDEs have less access to rigorous courses taught by faculty in the departments of academic disciplines, and that this lack of access lowers student performance on Praxis II.

Third, until all TEIs operate at a high level, policy-makers need to facilitate greater access to high-quality TEIs for students from less advantaged backgrounds. This could be accomplished through scholarships or other incentives for low-income students planning to go into teaching.

Finally, future reform efforts need to be based on research that links teacher preparation practices to teacher effectiveness and other desired outcomes. All too often, policy prescriptions are produced without relying on such information. Many policymakers call for greater attention to the inputs of teacher education programs, such as more money or licensing requirements, without knowing much about the consequences of these inputs for outcomes, such as teacher effectiveness. Other policymakers call for greater attention to the outputs of teacher education programs, such as teacher effectiveness, but without considering the resources needed by TEIs to produce these outputs. Ideally, policymakers should be attentive to both inputs and outputs and the links between them. They should focus on the fact that the purpose of TEIs is to produce the most effective teachers possible, and then invest in those inputs that research demonstrates are systematically related to that outcome. Failure to do so may lead policymakers down blind alleys, leaving our TEIs unreformed, and thus ill-equipped, to meet the key educational challenge of the 21st century: to prepare an adequate number of high-quality teachers.

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APPENDIX

TABLES

Table 1: Relationship between Teacher Education Institutions (TEIs) and Praxis II Scores

	Praxis II Scores	Private vs. Public Control	Pct. of Graduate Students	Size of Schools
Prior Test Scores	.17**	-.07	.23**	.23**
Socioeconomic Status	.29**	.17**	.13**	.21**
Private vs. Public Control	.12**			
Pct. of Graduate Students	.15**			
Size of Schools	.03			

*p<.10; **p>.05

Table 2: Relationship between Schools, Colleges, and Departments of Education (SCDEs) and Praxis II Scores

	Praxis II Scores	SCDE Scope	Traditional Experience	Local Involvement	Minority Faculty
Prior Test Scores	.12**	.02	.10	-.29*	.12
Socioeconomic Status	.27**	-.20	.18**	-.06	.24**
SCDE Scope	-.28**				
Traditional Experience	.21**				
Local Involvement	.09				
Minority Faculty	.29**				

*p<.10; **p>.05

Table 3: Relationship between Teacher Education Institutions (TEIs) and Schools, Colleges, and Departments of Education (SCDEs)

	Minority Faculty	SCDE Scope	Traditional Experience
Prior Test Scores	.05	.17	.02
Socioeconomic Status	.25**	.12	.36**
Private vs. Public Control	-.08	-.57**	.21
Pct. of Graduate Students	.07	.23	.23
Size of Schools	.05	-.24**	.19

*p<.10; **p>.05

Note: Numbers presented in all tables are standardized coefficients based upon maximum likelihood estimation of multilevel structural equation models.

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