

Chapter 12

Contributions to Education Policy Research

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Since Educational Testing Service (ETS) was established in 1947, research has been a prominent gene in the organization's DNA. Nine days after its first meeting, the ETS Board of Trustees issued a statement on the new organization. "In view of the great need for research in all areas and the long-range importance of this work to the future development of sound educational programs, it is the hope of those who have brought the ETS into being that it may make fundamental contributions to the progress of education in the United States" (Nardi 1992, p. 22). Highlighting the important role of research, ETS's first president Henry Chauncey recalled, "We tried out all sorts of names. 'Educational Testing Service' has never been wholly satisfactory because it does leave out the research side" (Nardi 1992, p. 16).

As part of its nonprofit mission, ETS conducts and disseminates research to advance quality and equity in education. Education policy research at ETS was formally established with the founding of the Education Policy Research Institute (EPRI) some 40 years ago, and since then ETS research has focused on promoting equal educational opportunity for all individuals, including minority and educationally disadvantaged students, spanning infancy through adulthood. The major objectives of this work are to provide useful and accurate information on educational opportunity and educational outcomes to the public and to policy makers, to inform the debate on important education issues, and to promote equal educational opportunity for all.

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The purpose of this chapter is to describe ETS's contribution to education policy research. The authors faced three main challenges in accomplishing this goal. First, we had to define what we mean by education policy research. We broadly defined this term to mean work serving to: define the nature of an educational problem that can be addressed by public or institutional policy (e.g., the achievement gap or unequal access to educational opportunities); identify the underlying causes of the problem; or examine the design, implementation, and impact of public or institutional policies or programs designed to address the problem (see, for example, *AERA's Handbook on Education Policy Research* by Sykes et al. 2009).

The second challenge was organizing the work that ETS has conducted. That research has covered three major areas, which were used to select and classify the work described in this chapter. While these areas do not capture the entire scope of ETS's education policy research, they provide important lenses through which to describe that work. The three major areas are:

- Analyzing, evaluating, and informing public policy in educational governance, including school finance; teacher policy; and federal, state, and local education policy.
- Examining differential access to educational opportunity in three areas of long-standing interest to ETS: the gender gap, advanced placement programs, and graduate education.
- Reporting on the educational outcomes of the U.S. population and describing the contexts for these outcomes and for the gaps in outcomes that exist among segments of the population.

The third challenge was selecting from the thousands of research studies that ETS staff have produced over more than half a century. An unfiltered search of ETS ReSEARCHER,¹ a database of publications by ETS staff members, produced nearly 9,000 publications. And while even this database is incomplete, its size is indicative of the scope of the organization's work in psychometrics, statistics, psychology, and education.

Over the past 40 years, the majority of ETS's education policy research was conducted under three organizational structures that operated at different times within the Research and Development division or its predecessors. EPRI was established at ETS in the early 1970s. Its work was expanded in the Education Policy Research division that existed during the 1980s and 1990s. In 1987, the ETS Board of Trustees established the Policy Information Center to inform the national debate on important education policy issues. Hundreds, if not thousands, of projects were conducted and reports produced within these organizational units. The Policy Information Center alone has produced more than 150 policy reports and other publications. These units and their work were heavily supported by internal funds, made possible by the organization's nonprofit status and mission. The organization's financial

¹The ETS ReSEARCHER database (http://1340.sydneyplus.com/Authors/ETS_Authors/portal.aspx) is available to anyone interested in additional contributions made by the organization to education policy research and to research in measurement, psychology, statistics, and other areas.

commitment to education policy research has been, and continues to be, substantial.

Given this voluminous output, the authors applied the definition of education policy research and the areas described above to assemble what should be considered only a sample. That is, the work described here is reflective of this large body of work, but necessarily incomplete.

Many of ETS's other activities that are education-policy related and contribute to the field of education are not within the scope of this chapter. Some of this important work serves clearinghouse and collaboration functions. An important example includes the networking activities of the Policy Evaluation and Research Center, which collaborates with organizations such as the Children's Defense Fund and the National Urban League and its affiliates to convene a variety of stakeholders around issues related to the achievement gap. These conferences have focused on the particular challenges facing women and girls, the special circumstances of young Black males, issues related to the community college system, and the importance of family factors in students' success in school.

ETS has also had many long-standing relationships with important organizations such as Historically Black Colleges and Universities, the ASPIRA Association, and the Hispanic Association of Colleges and Universities. ETS researchers, in collaboration with the American Association of Community Colleges, examined a number of challenges faced by community colleges in effectively managing both their academic and vocational functions in the context of rapidly changing economic and demographic patterns and the rapid expansion of nondegree, credentialing, and certification programs (Carnevale and Descrochers 2001). A second example is the Commission on Pathways through Graduate School and into Careers, led by the Council of Graduate Schools and ETS, which resulted in two important reports that identified the major enrollment, retention, and financial issues facing graduate education in the United States (Wendler et al. 2010, 2012).

ETS's policy research has had influence at several levels. It has played important roles in the development of government and institutional policy, in debates about how U.S. students are achieving and the context around student learning, in school and classroom practice, in assessing the status of the nation's human capital, in the shape of internal ETS programs and services, and in the lives of individuals that have been the focus of ETS's work.

In the next section, the first of three major areas, education policy and governance, is reviewed.

12.1 Education Policy and Governance

Over the years, ETS research in this area has covered school finance and governance, teacher policy, and monitoring education policy developments. Each of these areas will be briefly illustrated.

12.1.1 *School Finance and Governance*

In 1965, University of Chicago sociologist James Coleman led a team that produced the Coleman report, which shed light on unequal schooling conditions and educational opportunities in the United States (Coleman et al. 1966; see also Barone and Beaton, Chap. 8, this volume). At the same time, scholars began to examine how states' funding of elementary and secondary education contributed to these inequities and to raise questions about the constitutionality of these funding systems. ETS researchers played a major role in the subsequent school finance reform movement of the 1970s and 1980s. ETS undertook groundbreaking research on the design and effects of federal, state, and local finance systems—research that laid the foundation for challenges to the constitutionality of state school finance formulas, for the design of alternative funding formulas, and for the development of tools to assist policy makers and the public in its quest to create more equitable funding structures.

Joel Berke, the first director of EPRI, provided the statistical analyses relied upon by both majority and minority justices in the landmark U.S. Supreme Court decision in *Rodriguez vs. San Antonio*. When a closely divided Court ruled that school funding inequities did not violate the Equal Protection Clause of the 14th Amendment of the U.S. Constitution, school finance reformers turned to the education clauses of state constitutions and state courts for relief. Berke and his colleagues worked with attorneys, education groups, and commissions in several states to analyze the allocation of state and local education funds under existing formulas, to assess options for change, and to examine the effects of court-ordered reform systems. For example, a series of reports titled *Money and Education*, issued between 1978 and 1981, examined the implementation of New Jersey's Public School Education Act of 1975, which used a new formula designed to address the wealth-based disparities in education funding declared unconstitutional by the New Jersey Supreme Court (Goertz 1978, 1979, 1981). These reports, along with a follow-up study in the late 1980s, found that although the state increased its education funding, the law fell far short of equalizing expenditures between poor and wealthy communities. These analyses, along with expert testimony by ETS researcher Margaret Goertz, contributed to the New Jersey Supreme Court's 1990 decision in *Abbott v. Burke* to declare the law unconstitutional as applied to the state's poor urban school districts.

ETS staff also worked with policy makers to design new funding formulas in response to court-ordered change. For example, they assisted the New York City Board of Education and the United Federation of Teachers in designing formula adjustments that would address the special financial and educational needs of large urban school systems. The research culminated in *Politicians, Judges, and City Schools* (Berke et al. 1984), a book written to provide New York policy makers with reform options, as well as a better understanding of the political, economic, and social context for reform and of the trade-offs involved in developing a more equitable school finance system.

In addition to policy makers, ETS research has targeted the public. With support from the National Institute of Education and in collaboration with the American Federation of Teachers, ETS researchers sought to demystify the subject of school finance as a way of encouraging informed participation by educators and the general public in school finance debates. While describing school funding formulas in detail, *Plain Talk About School Finance* (Goertz and Moskowitz 1978) also showed that different school finance equalization formulas were mathematically equivalent. Therefore, the authors argued, the selection of a specific formula was secondary to value-laden political decisions about student and taxpayer equity goals for the system, as well as to how to define various components of the formulas (e.g., wealth, taxpayer effort, and student need) and establish the relationships among the components. Building on their analysis of the mathematical properties of school finance formulas, ETS researchers developed the School Finance Equalization Management System (SFEMS), the first generalizable computer software package for financial data analysis and school finance formula simulations (Educational Testing Service 1978a, b). With technical assistance and training from ETS staff, SFEMS was used by nearly a dozen state education agencies and urban school districts to build their capacity to analyze the equity of their state funding systems and to simulate and evaluate the results of different funding approaches.

The wave of legal and legislative struggles over school funding continued throughout the 1980s, and by 1985 more than 35 states had enacted new or revised education aid programs. ETS researchers took stock of this activity in light of the education reform movement that was taking shape in the early 1990s, calling for national standards and school restructuring. *The State of Inequality* (Barton et al. 1991) provided plain talk about school finance litigation and reform, as well as describing how differences in resources available to schools are related to disparities in educational programs and outcomes. The report detailed the disparity in education funding nationally and within states, reviewed data reported by teachers on the connection between instructional resources and student learning, and reviewed a new wave of court rulings on school funding.

School finance research such as that described above focused on disparities in the allocation of resources within states. ETS researchers, however, were among the first to explore disparities *within* school districts, a current focus of school funding debates and policy. In the early 1970s, ETS researcher Joan Baratz examined the implementation of the *Hobson v. Hansen* decision in Washington, DC, which called for the equalization of per-pupil expenditures for all teachers' salaries and benefits within the district. This remedy was designed to address disparities in spending and staffing between schools enrolling many Black and low-income students versus those enrolling many White and affluent students. Baratz (1975) found a significant reduction in the disparity in allocation of all professional staff among the schools as a result of funding equalization. Changes in resources generally involved exchanging highly paid classroom teachers for lower paid teachers, adding teachers in low-spending schools with high pupil/teacher ratios, and redistributing special subject teachers.

A decade later, ETS researchers conducted a congressionally mandated study of school districts' allocation of Title I resources (Goertz 1988). Because most prior research had focused on the distribution of federal funds to local school districts and the selection of schools and students for Title I services, federal policy makers were concerned about the wide range in per-pupil Title I expenditures across school districts and its impact on the delivery of services to students. The ETS study found that variation in program intensity reflected a series of district decisions about how to best meet the needs of students. These decisions concerned program design (e.g., staffing mixes, case loads, settings), type of program (e.g., prekindergarten, kindergarten, bilingual/English as a second language, basic skills replacement), availability and use of state compensatory education funds, and the extent to which allocation decisions reflected differences in student need across Title I schools.

As it is today, the proper organization of responsibility among federal, state, and local governments was a central issue in policy debates in the 1980s about how best to design programs for students with special educational needs. In July, 1981 a team led by ETS researchers began a congressionally mandated study of how federal and state governments interacted as they implemented major federal education programs and civil rights mandates. The study described how states responded to and were affected by federal education programs. Based on analyses of the laws, on case studies conducted in eight states, and interviews with more than 300 individuals at state and local levels, study results portrayed a robust, diverse, and interdependent federal/state governance system. Among the findings was the identification of three broad factors that appeared to explain states' differential treatment of federal programs—federal program signals, state political traditions and climate, and the management and programmatic priorities of state education agencies (Moore et al. 1983).

The topic of school finance was revisited in 2008 when ETS cosponsored a conference, "School Finance and the Achievement Gap: Funding Programs That Work," that explored the relationship between school finance and academic achievement, highlighted programs that successfully close gaps, and examined the costs and benefits of those programs. While much of the discussion was sobering, evidence supporting the cost effectiveness of prekindergarten programs as well as achievement gains made by students in a large urban school district offered evidence that achievement gaps can be narrowed—if the political will, and the money, can be found (Yaffe 2008).

12.1.2 Teacher Policy

While concern about the quality of the nation's teaching force can be traced back to the early twentieth century, during the past 30 years there has been a growing amount of evidence and recognition that teacher quality is a key factor in student achievement. From publication of *A Nation at Risk* in 1983 (National Commission on Excellence in Education [NCEE] 1983), to the National Education Summit in 1989, to the formation of the National Commission on Teaching and America's

Future in 1994, and the No Child Left Behind (NCLB) Act in 2001, teacher quality has remained squarely at the top of national and state education agendas. ETS policy research has responded to the central issues raised about teacher education and teacher quality at various junctures over this period.

12.1.2.1 Research on the Teacher Education Pipeline

Among the areas of education policy that drew significant attention from state policy makers in response to the perceived decline in the quality of the U.S. education system was a focus on improving the preparedness of individuals entering the teaching profession. In the early 1980s, these policies focused on screening program applicants with tests and minimum grade point averages, prescribing training and instruction for those aspiring to become teachers, and controlling access into the profession by requiring aspiring teachers to pass a licensing test or by evaluating a beginning teacher's classroom performance. While the level of state activity in this area was clear, little was known about the substance or impact of these policies. *The Impact of State Policy on Entrance Into the Teaching Profession* (Goertz et al. 1984) identified and described the policies used by states to regulate entrance into the teaching profession and collected information on the impact of these policies.

The study developed and described a *pipeline* model that identified the various points at which state policies can control the entry of individuals into the teaching profession and illustrated the relationships among these points. Next, the study collected information from all 50 states to identify the points of policy intervention and types of policies in effect in each state. In-depth case studies were also conducted in four states to provide details about the political environment and rationale behind the policies, the extent of coordination across policies, and the impact of the policies on teacher supply and equity. While the necessity of screens in the teacher supply pipeline was apparent, the study found that the approaches used by most states were inadequate to address the issues of equity, coordination, and accountability. For example, the study found that screening people out of teaching, rather than developing the talents of those who want to become teachers, is likely to reduce the socioeconomic and racial/ethnic diversity of the nation's teaching force at the very time that schools were becoming more diverse in the composition of their students. The study made recommendations to improve the quality of teachers coming into the profession while recognizing the importance of maintaining a sufficient supply of teachers to staff the nation's increasingly diverse classrooms.

Another movement that took hold during the 1980s in response to criticism directed at traditional teacher education programs was alternate routes to teaching. While these alternate routes took a variety of forms, The Holmes Group (a consortium of education deans from 28 prominent research universities) along with the American Association of Colleges for Teacher Education endorsed the idea of a 5-year teacher education program leading to a master's degree. The idea was that in addition to courses in pedagogy, teachers should have at least the equivalent of an undergraduate degree in the subject they intend to teach. Like the problem, this

remedy was not entirely new. In an attempt to understand the likely impact of such an approach, ETS researchers set out to learn about the decades-old master of arts in teaching (MAT) programs, sponsored by the Ford Foundation in response to concerns about the quality of American education generated by the launching of Sputnik. These MAT programs sought to attract bright liberal arts graduates, prepare them for teaching by giving them graduate work in both their discipline and in pedagogy and by providing them with internships in participating school districts.

After searching the Ford Foundation's archives, the researchers put together profiles of the programs and surveyed nearly 1000 MAT program graduates from 1968 to 1969 to see what attracted them to the programs and to teaching, what were their careers paths, and what were their impressions of their preparation. Remarkably, 81% of the MAT program graduates responded to the survey. Among the results: Eighty-three percent entered teaching and one third who entered teaching were still teaching at the time of the survey. Among those who left teaching, the average time teaching was 5 years. Many of the former teachers pursued education careers outside of the classroom. The study, *A Look at the MAT Model of Teacher Education and Its Graduates: Lessons for Today*, concluded that the MAT model was a viable alternative to increase the supply and quality of the nation's teachers, although more modern programs should be designed to recognize the changing composition of the nation's school population (Coley and Thorpe 1985).

A related focus of ETS research during this period was on finding ways to increase the supply of minority teachers. Declining numbers of minority teachers can be attributed to the limited number of minority students entering and completing college, declining interest in education careers, and the policy screens identified in the study described earlier, including the teacher testing movement. *Characteristics of Minority NTE Test-Takers* (Coley and Goertz 1991) sought to inform interventions to increase minority representation in teaching by identifying the characteristics of minority students who met state certification requirements. The study was the first to collect information on candidates' demographic, socioeconomic, and educational background; education experience in college and graduate school; experiences in teacher education programs; career plans and teaching aspirations; and reasons for taking the certification test. The data analyses focused on determining whether successful and unsuccessful National Teachers Examination (NTE) candidates differed significantly on these background and educational characteristics. Four implications drawn were noteworthy. First, many of the minority candidates were the first generation in their families to attend college, and institutions must develop support programs geared to the academic and financial needs of these students. Second, in general, many low socioeconomic status (SES) students who succeeded in college passed the test. Colleges can and do make a difference for disadvantaged students. Third, recruiting and training policies should reflect the large number of minority students who take various routes into and out of teaching. Last, because only half of successful minority candidates planned to make teaching their career, changes to the structure of the teaching profession should be considered, and the professional environment of teaching should be improved to help retain these students.

A recent study by ETS researchers found that minorities remain underrepresented in the teaching profession and pool of prospective teachers (Nettles et al. 2011). The authors analyzed the performance of minority test takers who took ETS's *PRAXIS*[®] teacher-certification examinations for the first time between 2005 and 2009 and the relationship of performance with test takers' demographic, socio-economic, and educational backgrounds, including undergraduate major and undergraduate grade point average (UGPA). They also interviewed students and faculty of teacher education programs at several minority-serving colleges and universities to identify challenges to, and initiatives for, preparing students to pass *PRAXIS*. The report revealed large score gaps between African American and White teacher candidates on selected *PRAXIS I*[®] and *PRAXIS II*[®] tests, gaps as large as those commonly observed on the SAT and *GRE*[®] tests. Selectivity of undergraduate institution, SES, UGPA, and being an education versus a noneducation major were consistently associated with *PRAXIS I* scores of African American candidates, particularly in mathematics. Recommendations included focusing on strengthening candidates' academic preparation for and achievement in college and providing students with the other skills and knowledge needed to pass *PRAXIS*.

ETS research has also informed the debate about how to improve teacher education by examining systems of teacher education and certification outside the United States. *Preparing Teachers Around the World* (Wang et al. 2003) compared teacher education in the United States with the systems in high-performing countries, systematically examining the kinds of policies and control mechanisms used to shape the quality of the teaching forces in countries that scored as well or better than the United States in international math and science assessments. The researchers surveyed the teaching policies of Australia, England, Hong Kong, Japan, Korea, the Netherlands, and Singapore. While no one way was identified that the best performing countries used to manage the teacher pipeline, by and large, they were able to control the quality of individuals who enter teacher education programs through more rigorous entry requirements and higher standards than exist in the United States. One of the most striking findings was that students in these countries are more likely to have teachers who have training in the subject matter they teach. And while much has been made in the United States about deregulating teacher education as a way to improve teacher quality, every high-performing country in the study employed significant regulatory controls on teaching, almost all more rigorous than what is found in the United States.

12.1.2.2 Research on the Academic Quality of the Teaching Force

ETS researchers have tracked the quality of the nation's teaching force in several studies. *How Teachers Compare: The Prose, Document, and Quantitative Literacy of America's Teachers* (Bruschi and Coley 1999) took advantage of the occupational data collected in the National Adult Literacy Survey (NALS) to provide a rare look at how the skill levels of teachers compare with other adults and with adults in other occupations. The results of this analysis were quite positive. America's teachers, on

average, scored relatively highly on all three literacy scales and performed as well as other college-educated adults. In addition, the study found that teachers were a labor-market bargain, comparing favorably with other professionals in their literacy skills, yet earning less, dispelling some negative stereotypes that were gaining ground at the time.

In related work to determine whether the explosion of reform initiatives to increase teacher quality during the 1990s and early 2000s was accompanied by changes in the academic quality of prospective teachers, ETS research compared two cohorts of teachers (1994–1997 and 2002–2005) on licensure experiences and academic quality. *Teacher Quality in a Changing Policy Landscape: Improvements in the Teacher Pool* (Gitomer 2007) documented improvements in the academic characteristics of prospective teachers during the decade and cited reasons for those improvements. These reasons included greater accountability for teacher education programs, Highly Qualified Teacher provisions under the NCLB Act, increased requirements for entrance into teacher education programs, and higher teacher education program accreditation standards.

12.1.2.3 Research on Teaching and Student Learning

ETS policy research has also focused on trying to better understand the connection between teaching and classroom learning. ETS researchers have used the large-scale survey data available from the National Assessment of Educational Progress (NAEP) to provide insight into classroom practice and student achievement. *How Teaching Matters: Bringing the Classroom Back Into Discussions About Teacher Quality* (Wenglinsky 2000) attempted to identify which teacher classroom practices in eighth-grade mathematics and science were related to students' test scores. The research concluded that teachers should be encouraged to target higher-order thinking skills, conduct hands-on learning activities, and monitor student progress regularly. The report recommended that rich and sustained professional development that is supportive of these practices should be widely available.

ETS researchers conducted a similar analysis of NAEP data to identify teachers' instructional practices that were related to higher science scores and then examined the extent to which minority and disadvantaged students had access to these types of instruction. In addition to providing a rich description of the eighth-grade science classroom and its teachers, *Exploring What Works in Science Instruction: A Look at the Eighth-Grade Science Classroom* (Braun et al. 2009) found that two apparently effective practices—teachers doing science demonstrations and students discussing science in the news—were less likely to be used with minority students and might be useful in raising minority students' level of science achievement.

12.1.2.4 Research on Understanding Teacher Quality

Along with the recognition of the importance of teacher quality to student achievement have come a number of efforts to establish a quantitative basis for teacher evaluation. These efforts are typically referred to as value-added models (VAMs) and use student test scores to compare teachers. To inform the policy debate, ETS published a report on the topic. *Using Student Progress to Evaluate Teachers: A Primer on Value-Added Models* (Braun 2005) offered advice for policy makers seeking to understand both the potential and the technical limitations that are inherent in such models.

Also related to teacher evaluation, ETS partnered with several organizations as part of the National Comprehensive Center for Teacher Quality (NCCTQ) to produce reports aimed at improving the quality of teaching, especially in high-poverty, low-performing, and hard-to-staff schools. One effort by ETS researchers lays out an organizational framework for using evaluation results to target professional development opportunities for teachers, based on the belief that teacher accountability data can also be used to help teachers improve their practice (Goe et al. 2012). To help states and school districts construct high-quality teacher evaluation systems for employment and advancement, Goe and colleagues collaborated with NCCTQ partners to produce a practical guide for education policy makers on key areas to be addressed in developing and implementing new systems of teacher evaluation (Goe et al. 2011).

Work on teacher quality continues as ETS researchers grapple with policy makers' desire to hold teachers accountable for how much students learn. Studies that examine a range of potential measures of teaching quality, including classroom observation protocols, new measures of content knowledge for teaching, and measures based on student achievement, are ongoing. The studies investigate a wide range of approaches to measuring teaching quality, especially about which aspects of teaching and the context of teaching contribute to student learning and success.

12.1.3 Monitoring Education Policy Developments

Much of the Policy Information Center's work has focused on reporting on education policy developments and on analyzing the educational achievement and attainment of the U.S. population, as well as identifying and describing a range of factors that influence those outcomes. In monitoring and describing the changing education policy landscapes that evolved over the decades, the Center sought to anchor data on achievement and attainment to relevant educational reform movements. A sample of that work is provided next.

The decade of the 1980s that began with the publication of *A Nation at Risk* (NCEE 1983) witnessed extensive policy changes and initiatives led by governors and state legislatures, often with strong backing from business. *The Education Reform Decade* (Barton and Coley 1990) tracked changes at the state level between

1980 and 1990 in high school graduation requirements, student testing programs, and accountability systems, as well as sweeping changes in standards for teachers. Changes at the local level included stricter academic and conduct standards, more homework and longer school days, and higher pay for teachers. By the decade's end, 42 states had raised high school graduation requirements, 47 states had established statewide testing programs, and 39 states required passing a test to enter teacher education or begin teaching (Coley and Goertz 1990).

Against this backdrop often referred to as the *excellence movement*, the report provided a variety of data that could be used to judge whether progress was made. These data included changes in student achievement levels, several indicators of student effort, and success in retaining students in school. Data were also provided regarding progress toward increasing equality and decreasing gaps between minority and majority populations and between males and females. Some progress in closing the gaps in achievement, particularly between White and Black students, as well as modest progress in other areas, prompted this November 15, 1990, headline in *USA Today*: "Reforms Put Education on Right Track" (Kelly 1990). Then-ETS President Gregory R. Anrig noted at the press conference releasing the report, "The hallmark of the decade was a move toward greater equality rather than a move toward greater excellence" (Henry 1990, p. 1).

One of the more tangible outcomes of the education-reform decade was the near universal consensus that the high school curriculum should be strengthened. The National Commission on Excellence in Education recommended that all high school students should complete a core curriculum of 4 years of English; 3 years each of social studies, science, and mathematics; 2 years of a foreign language; and one-half year of computer science. Progress toward attaining this new standard was tracked by two ETS reports. *What Americans Study* (Goertz 1989) and *What Americans Study Revisited* (Coley 1994) reported steady progress in student course-taking between 1982 and 1990. While only 2% of high school students completed the core curriculum in 1982, the percentage rose to 19 in 1990. In addition, 40% of 1990 high school graduates completed the English, social studies, science, and mathematics requirements, up from 13% in 1982. The 1994 report also found that the level of mathematics course-taking increased in advanced sequences and decreased in remedial ones.

Along with changes in what students study, the explosion of state testing programs that occurred in the 1970s carried over and expanded in the 1980s with the excellence movement. Perhaps the most notable change was the growth of elementary and secondary school testing across the states. As the 1990s began, there were increasing calls to broaden educational assessment to include performance assessment, portfolios of students' work, and constructed-response for which students had to come up with an answer rather than fill in a bubble. By the 1992–1993 school year, only Iowa, Nebraska, New Hampshire, and Wyoming did not have a state testing program.

Testing in America's Schools (Barton and Coley 1994) documented the testing and assessment changes that were occurring across the country. The report used information from NAEP, a study from what was then the U.S. General Accounting

Office, and a survey of state testing directors conducted by the Council of Chief State School Officers to provide a profile of state testing programs in the early 1990s, as well as a view of classroom testing. The report noted that while the multiple-choice exam was still America's test of choice, the use of alternative methods was slowly growing, with many states using open-ended questions, individual performance assessments, and portfolios or learning records.

As the 1990s drew to a close, President Clinton and Vice President Al Gore called for connecting all of America's schools to the *information superhighway*, federal legislation was directing millions of dollars to school technology planning, and a National Education Summit of governors and business leaders pledged to help schools integrate technology into their teaching. Amid this activity and interest *Computers and Classrooms: The Status of Technology In U.S. Schools* (Coley et al. 1997) was published to meet a need for information on how technology is allocated among different groups of students, how computers are being used in schools, how teachers are being trained in its use, and what research shows about the effectiveness of technology. The report made headlines in *The Washington Post*, *USA Today*, *The Philadelphia Inquirer*, and *Education Week* for uncovering differences in computer use by race and gender. Among other findings were that poor and minority students had less access than other students to computers, multimedia technology, and the Internet.

While publications such as *Education Week* now take the lead in describing the policy landscape, there are occasions when ETS research fills a particular niche. Most recently, for example, information on pre-K assessment policies was collected and analyzed in *State Pre-K Assessment Policies: Issues and Status* (Ackerman and Coley 2012). In addition to information on each state's assessments, the report focused on reminding policy makers about the special issues that are involved in assessing young children and on sound assessment practices that respond to these challenges. In this area, ETS contributes by keeping track of important developments while at the same time providing leadership in disseminating tenets of proper test use.

12.2 Access to Educational Opportunities Along the Education Pipeline

ETS's mission has included broadening access to educational opportunities by groups other than the White middle-class population that had traditionally—and often disproportionately—enjoyed the benefits of those opportunities. Increasing access to graduate education, particularly for underrepresented groups, requires improving educational opportunities from early childhood through high school and college. Over the years, ETS researchers have studied differential access to quality education at all points along the educational pipeline. For example, ETS research on early childhood education has included seminal evaluations of the impact on

traditionally underserved groups of such educational television programs as Sesame Street and The Electric Company (Ball and Bogatz 1970; Ball et al. 1974), and improving the quality of early childhood assessments (Ackerman and Coley 2012; Jones 2003). Other researchers have focused on minority students' access to mathematics and science in middle schools (see, for example, Clewell et al. 1992), and individual and school factors related to success in high school (see, for example, Ekstrom et al. 1988). ETS research on the access of underrepresented groups to higher education has also included evaluations of promising interventions, such as the Goldman Sachs Foundation's Developing High Potential Youth Program (Millett and Nettles 2009). These and other studies are too numerous to summarize in this chapter. Rather, we focus on contributions of ETS research in several areas of long-standing interest to the organization—gender differences, access to advanced placement courses in high school, and access to graduate education.

12.2.1 *The Gender Gap*

Much has been written about the gender gap. ETS has traditionally tracked the trajectories of scores on its own tests, and multiple reports have been dedicated to the topic. A 1989 issue of *ETS Policy Notes* examined male-female differences in NAEP results and in SAT and *PSAT/NMSQT*[®] scores (Coley 1989). An entire volume by Warren W. Willingham and Nancy Cole was devoted to the topic in the context of test fairness (Willingham and Cole 1997). And a 2001 report deconstructed male-female differences within racial/ethnic groups along with course-taking data, attempting to understand gender differences in educational achievement and opportunity across racial/ethnic groups (Coley 2001). The consensus from much of this work has been that the causes of the male-female achievement gap are many, varied, and complex.

In 1997, then-president of ETS Cole authored a report titled *The ETS Gender Study: How Males and Females Perform in Educational Settings* (Cole 1997). The report was based on 4 years of work by multiple researchers using data from more than 1500 data sets, many of them large and nationally representative. The collective studies used 400 different measures that cut across grades, academic subjects, and years and involved literally millions of students.

Although the study yielded many important and interesting findings, Cole chose to focus on several that were contrary to common expectations. Among them were the following:

- For many subjects, the differences between males and females are quite small, but there are some real differences in some subjects.
- The differences occur in both directions. In some areas, females outperform males, and in others the opposite is true.

- Dividing subjects by component skills produces a different picture of gender differences than those found for academic disciplines more generally.
- Gender differences increase over years in school. Among fourth-grade students, there are only minor differences in test performance on a range of school subjects. The differences grow as students progress in school and at different rates for different subjects.
- Gender differences are not easily explained by single variables such as course-taking or types of test. They are also reflected in differences in interests and out-of-school activities.

Cole concluded that "...while we can learn significant things from studying group behavior, these data remind us to look at each student as a unique individual and not stereotype anyone because of gender or other characteristics" (Cole 1997, p. 26).

Over the years, ETS researchers have sought to determine what factors contribute to the underrepresentation of women in the fields of science, technology, engineering, and mathematics (STEM), going back to elementary and secondary education. Marlaine E. Lockheed, for example, conducted studies of sex equity in classroom interactions (Lockheed 1984) and early research on girls' participation in mathematics and science and access to technology (Lockheed 1985; Lockheed et al. 1985). Building on this and related work, Clewell et al. (1992) identified what they determined were major barriers to participation by women and minorities in science and engineering: (a) negative attitudes toward mathematics and science; (b) lower performance levels than White males in mathematics and science courses, and on standardized tests; (c) limited exposure to extracurricular math- and science-related activities, along with failure to participate in advanced math and science courses in high school; and (d) lack of information about or interest in math or science careers. Making a case for developing interventions aimed at the critical middle school years, they offered descriptions and case studies of ten intervention programs, then relatively recent phenomena, that the authors considered successful, along with a series of recommendations derived from the programs.

12.2.2 Access to Advanced Placement®

Providing high school students access to advanced coursework has long been considered an important means of preparing students for future success. This preparation is particularly important for minority students, who score, on average, lower than nonminority students. ETS researchers studied the characteristics of minority students with high SAT scores and found that these students tended to excel in advanced coursework in high school, including advanced placement courses (Bridgeman and Wendler 2005).

The College Board's *Advanced Placement Program®* (AP®) is a collaborative effort between secondary and postsecondary institutions that provides students

opportunities to take freshman-level college courses while still in high school. The need for such opportunities is particularly acute for students from low-income families and students from racial/ethnic minorities. ETS researchers used a novel approach to examine data on AP program activity by merging AP-participation data from the College Board with a national database containing information on all U.S. high schools. By matching students with their high schools, the researchers were able to view AP program participation and performance in the context of high school characteristics, including such factors as school size, locale, and socioeconomic status. The unique view provided by *Access to Success: Patterns of Advanced Placement Participation in U.S. High Schools* (Handwerk et al 2008) was illuminating.

The report showed that while most students attended a high school at which the AP program was available, few students actually took an AP exam even after taking an AP course, and only a fraction of those who did take a test scored high enough to qualify for college credit or placement. In addition, patterns of participation for low-income and underrepresented minority students, and for students attending small, rural high schools, were particularly diminished.

The study concluded by identifying changes that could improve access to AP courses by schools and school districts. For more students to reap the benefits of AP program participation, the authors suggested that public schools make greater efforts to broaden their programs and to create a culture of academic rigor within their schools. The analyses demonstrated that students from underrepresented groups in particular were more likely to participate in the AP program in schools that offered more rigorous programs.

12.2.3 Access to and Participation in Graduate Education

In 1982, the then-called Minority Graduate Education Committee of the GRE Board took measures to address what it labeled “the severe underrepresentation of minority students in graduate education” (Baratz-Snowden et al. 1987, p. 3). In doing so, the Committee specified four critical stages in the graduate education process that a research agenda should address: preadmission, admission, enrollment, and retention/completion. The request resulted in a detailed research agenda and funded studies to address gaps in knowledge about the graduate education pipeline. Researchers were aided by a database, developed specifically for the purpose of studying talent flow, which contained responses from the GRE General Test background questionnaire for individuals taking the test between 1982 and 1993. This information included test takers’ undergraduate majors, intended areas of graduate study, parents’ education, undergraduate courses taken and grade-point averages, and whether test takers changed majors. Using this database, ETS researchers investigated the flow of minority students through the education pipeline from high school through graduate school (Brown 1987; Grandy 1995), the effects of financial aid on minority graduate school enrollment (Ekstrom et al. 1991; Nettles 1987; Wilder and Baydar

1990), and minority student persistence and attainment in graduate education (Clewell 1987; Nettles 1990; Thomas et al. 1992; Zwick 1991).

A comprehensive report issued in April 1994 summarized what had been learned about minority students in the upper portion of the education pipeline, such as their rates of completing high school, college, and graduate education; research findings that helped to explain the data; and suggestions for future research (Brown et al. 1994). This report concluded that the pipeline for Black and Hispanic students leading to completion of graduate and/or professional degrees grows narrower the higher the level. For example, while high school and college completion rates rose for African-American students, participation in undergraduate and graduate education differed markedly among minority groups, including in the types of institutions they attended and the fields of study they pursued. While the number of minority graduate students also grew, they remained a small proportion of total graduate enrollments, and even fewer minority students persisted to receive doctoral degrees. Minority graduate students were also heavily concentrated in the field of education and underrepresented in STEM fields.

Brown et al.'s (1994) synthesis also identified several factors that potentially explained the underrepresentation of minority students. These factors included a lack of minority recruitment programs at the graduate school level, a mismatch in academic interests between minority students and faculty, lack of financial aid, and unsupportive institutional climate. The level of undergraduate debt did not appear to affect enrollment in graduate school. The type of financial aid a graduate student received, however, did appear to affect both time to degree and integration into the academic life of a department. Minority students were more likely to receive grants and fellowships than hold the teaching and research assistantships that would give them access to mentoring and apprenticeship opportunities.

A qualitative study of minority students who did persist through doctoral study found that persisters came from low socioeconomic backgrounds, had been high achievers in high school, had supportive major advisers, were pursuing doctoral degrees to fulfill a desire for knowledge, and completed their doctoral study in spite of wanting to leave their programs to avoid experiencing failure (Clewell 1987). Institutional factors that supported persistence included institution-wide services for minority students beyond the level of the individual department, early identification of minority applicants, support services focused on these students' needs, and monitoring the effectiveness of such efforts.

Finally, ETS researchers conducted one of the largest surveys of American graduate students, collecting data from more than 9000 students in 21 of the nation's major doctorate-granting institutions and representing 11 fields of study. This decade-long project resulted in the publication of *Three Magic Letters: Getting to Ph.D.* (Nettles and Millett 2006). The authors' findings shed light on multiple factors that are critical to the progression of the doctoral degree, particularly adequate institutional funding and availability of engaged and accessible faculty mentors.

12.3 Reporting and Understanding Educational Outcomes

Enhancing educational opportunities for all individuals, particularly minority and educationally disadvantaged populations, requires an understanding of the educational achievement and attainment levels of the nation's population. Helping the public and policy makers to get a comprehensive view of the nation's educational achievement and attainment outcomes and how they differ across population groups has been a major focus of ETS's policy research, at both the elementary and the secondary education level and for the adult population. This section describes some of that work.

12.3.1 *Elementary and Secondary Education*

The achievement gap has deep roots in American society, and the nation's efforts to address it have a long history. Expectations for addressing the gap increased with the *Brown v. Board of Education* desegregation decision in 1954 and with the passage of the Elementary and Secondary Education Act of 1965 (ESEA), which focused on the inequality of school resources and sought to target more aid to disadvantaged children. The Civil Rights Act of 1964 sparked optimism for progress in education and in society at large. Reauthorizations of ESEA, such as the NCLB Act, required that achievement data from state assessments be disaggregated by population group to expose any uneven results, for which schools were to be held accountable.

In closing the achievement gap, there have been a few periods of progress. The ETS report, *The Black-White Achievement Gap: When Progress Stopped* (Barton and Coley 2010), documented the period starting from the 1970s until the late 1980s when the gap in NAEP reading and mathematics scores narrowed significantly and sought to understand what factors may have coincided with that narrowing. The report noted the irony that the very children born in the mid-1960s, when the landmark legislation was created, were the ones for whom progress slowed or stopped. While some of the progress is credited to changes in the education and income levels of minority families relative to White families, the reasons for most of the gap closure remain largely unexplained. The authors identified a number of factors that may have contributed to stalled progress, including the decline of minority communities and neighborhoods and stalled intergenerational mobility out of seriously disadvantaged neighborhoods. In dedicating the report to the late Senator Daniel Patrick Moynihan, the authors acknowledged his prescient warning on the deteriorating condition of low-income Black families nearly a half century ago.

Two other ETS reports helped increase understanding of how home, school, and environmental factors affected student achievement and contributed to the achievement gaps that exist across our population. When *Parsing the Achievement Gap: Baselines for Tracking Progress* (Barton 2003) and *Parsing the Achievement Gap II*

(Barton and Coley 2009) were released, they received considerable media attention and stimulated much debate about what actions to take.

The first report identified 14 life conditions and experiences that research had established as correlates of educational achievement and then gathered and examined data to determine whether these 14 factors differed across racial/ethnic or socioeconomic groups. For example, if research documents that low birth weight adversely affects a child's cognitive development, is there a greater incidence of this condition in minority or lower income populations? The 14 correlates comprised school-related factors, such as teacher experience, school safety, and curriculum rigor, as well as factors experienced before and outside of school, such as the number of parents in the home, television watching, and hunger and nutrition. The results were unambiguous—in all 14 correlates, there were gaps between minority and majority student populations. And for the 12 correlates where data were available, 11 also showed differences between low-income and higher income families.

The second report (Barton and Coley 2009) updated the first synthesis to see whether the gaps identified in the correlates narrowed, widened, or remained unchanged. In brief, the update concluded that while a few of the gaps in the correlates narrowed and a few widened, overall, the gaps identified in the first report remain unchanged. Both reports took care to emphasize that the correlates include school experiences as well as out-of-school experiences and cautioned that any effort to close the achievement gap would have to focus on both areas.

As the first decade of the 2000s was drawing to a close, ETS researchers made another effort to help policy makers, educators, and parents better understand that raising student achievement involves much more than improving what goes on in classrooms. Enhancing that understanding was critical given that a presidential election was on the horizon and that a debate in Congress was ongoing about the reauthorization of the NCLB Act. In *The Family: America's Smallest School* (Barton and Coley 2007), ETS researchers made the case that the family and home are where children begin learning long before they start school and where they spend much of their time after they enter school. The report took stock of the family's critical role as a child's first school, examining many facets of the home environment and experiences that foster children's cognitive and academic development. These facets included the number of parents in the home, family finances, early literacy activities, the availability of high-quality childcare, and parents' involvement with school.

12.3.2 The Literacy of the Nation's Adults

The education and skills of a nation's adult population represent the human capital that will allow it to compete in a changing labor market, both domestically and internationally (see Kirsch et al., Chap. 9, this volume). ETS's work in large-scale adult literacy assessments began in 1984 and continues today. One of these surveys, the NALS, provided a breakthrough in assessing the literacy of U.S. adults (Kirsch et al.

1990). While earlier studies tried to count the number of people unable to read or write in the nation, NALS profiled the literacy of adults based on their performance across a wide variety of tasks that reflects the types of materials and demands encountered in daily life, such as reading a bus schedule, filling out a job application, or balancing a checkbook. The definition of literacy used in NALS enabled researchers to profile the entire population in their use of printed and written information to function in society, to achieve one's goals, and to develop one's knowledge and potential. NALS rated adults' prose, document, and quantitative literacy in terms of five levels. In prose literacy, for example, someone scoring at Level 1 can read a short text to locate a single piece of information, while someone at Level 5 is able to make high-level inferences or use specialized background knowledge.

The NALS results indicated that nearly 40 million Americans were estimated to perform at Level 1 on all three scales, able only to perform simple routine tasks involving uncomplicated texts and documents. Another 50 million were estimated to be at Level 2, able to locate information in text, to make low-level inferences using printed materials, or to perform single-operation mathematics. Low literacy proficiency was not spread out uniformly among the population, however. Background information on demographics, education, labor market experiences, income, and activities such as voting, television watching, and reading habits that NALS collected from respondents enabled ETS researchers to connect individual characteristics with literacy skills.

The skills gaps revealed by NALS occurred at a time in our history when the rewards for literacy skills were growing, both in the United States and across the world. *Pathways to Labor Market Success: The Literacy Proficiency of U.S. Adults* (Sum et al. 2004) reviewed the literacy skills of the employed population in the United States and other countries and explored the links between the occupations, wages, and earnings of workers and their skills. Analyses revealed that low proficiency scores were associated with lower rates of labor-force participation and large gaps in earnings. Moreover, workers with higher skill levels were also more likely to participate in education and training, contributing to the gap between the haves and have-nots.

Literacy skills are not only connected with economic returns, but with other outcomes as well. Data show that these skills are associated with the likelihood of participating in lifelong learning, keeping abreast of social and political events, voting in national and local elections, and other important outcomes. *Literacy and Health in America* (Rudd et al. 2004) found that literacy was one of the major pathways linking education and health and that literacy skills may be a contributing factor to the disparities that have been observed in the quality of health care that individuals receive.

Results from NALS and from international literacy surveys conducted by ETS also provided a comparative perspective on the U.S. population. Despite its high ranking in the global economy, results from *The Twin Challenges of Mediocrity and Inequality: Literacy in the U.S. From an International Perspective* (Sum et al. 2002) found that the United States is average when the literacy skills of its adults are compared to those of adults in 20 other high-income countries, but is leads in the mag-

nitude of the difference between those at the top and bottom of the skill distribution. These findings are supported by the results of school-age surveys such as NAEP, Trends in International Mathematics and Science Study (TIMSS), and Programme for International Student Assessment (PISA). It appears that other countries, recognizing the important role that human capital plays in social and economic development, have invested in the skills of their populations and have begun to catch up to the United States. All of this information was brought together with the release of *America's Perfect Storm: Three Forces Changing America's Future* (Kirsch et al. 2007).

America's Perfect Storm described three forces that are coming together to potentially create significant consequences: inadequate skill levels among large segments of the population, the continuing evolution of the economy and the changing nature of U.S. jobs, and a seismic shift in the demographic profile of the nation. As part of their analyses, given current skill levels and future demographic patterns, the authors estimated that the distribution of prose, document, and quantitative literacy in 2030 will shift in such a way that over the next 25 years or so the better educated individuals leaving the workforce will be replaced by those who, on average, have lower levels of education and skills. This downward proficiency shift will occur at a time when nearly half of the projected job growth will be concentrated in occupations requiring *higher* levels of education and skills. The authors argued that if our society's overall skill levels are not improved and if the existing gaps in achievement and attainment are not narrowed, these conditions will jeopardize American competitiveness and could ultimately threaten our democratic institutions.

12.4 Conclusion

ETS's nonprofit mission has supported a program of education policy research that has spanned nearly four decades. From studies that documented the promise of television as an educational tool, to analyses of state school finance systems that resulted in more equitable distribution of money for schools, to expanding the public's and policy makers' understanding of the achievement gap among America's students, ETS research has contributed a wealth of information on educational opportunity and educational outcomes to inform the policy debate in the United States. Of paramount importance has been a focus on enhancing educational opportunity for all individuals, especially for minority and disadvantaged groups.

The breadth and scope of this work have posed challenges to adequately summarizing it within a single chapter. The approach chosen by the authors was to produce a sampler organized around three broad themes selected to illustrate important areas of ETS's work. As such, this chapter is necessarily incomplete. At best, and in line with the authors' modest intentions, the chapter gives a flavor for the breadth and depth of the work undertaken since the establishment of a policy research unit at ETS in the early 1970s.

As the organization continues to contribute to the education policy debate, it is the hope and expectation of the authors that the work will continue to be of high quality, and relevant to the decision making needs of the public it serves.

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