The Supply of and Demand for Special Education Teachers:

A Review of Research Regarding the Chronic Shortage of Special Education Teachers

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There is a critical shortage of special education teachers in the United States. This shortage is chronic and severe and exists in every geographic region of the nation. This article provides an analysis of factors influencing the supply of and demand for special education teachers. Initially, the magnitude of this shortage is addressed, considering variances that exist by personnel type, locality, and job description. This is followed by an analysis of trends in the supply of and demand for special education teachers, considering factors such as student enrollment, production of teacher education programs, and the reserve pool. Finally, illustrative examples of strategies used by specific states and districts to resolve shortage problems are provided. The article concludes with a list of priorities for future research.

Information available from professional organizations, such as the ERIC Clearinghouse on Disabilities and Gifted Education (ERIC; 2001), the National Education Association (NEA; 2001), and the National Governor's Association (NGA; 2000), and data from the research literature (American Association for Employment in Education [AAEE], 2000; Boe, Cook, Bobbitt, & Terhanian, 1998; Carlson, Brauen, Klein, Schroll, & Willig, 2002; Carlson, Schroll, & Klein, 2001; U.S. Department of Education [USDOE], 2000, 2001) indicate that there is a severe, chronic shortage of fully certified special education teachers in the United States. This article provides a review of the literature regarding this shortage. In the sections that follow, the data sources that were used to examine the special education teacher shortage are initially described and critiqued. This is followed by a description of the magnitude of the special education teacher shortage, including a review of shortages by location, job description, and diversity of personnel. Trends in the demand for special education teachers are then reviewed, followed by a summary of trends in the supply of these teachers and factors that influence that supply. State and local policies that are being used to address the teacher shortage are then briefly reviewed. The final section includes a summary of findings from available research and recommendations for future research, with a particular emphasis on research that will inform policymakers as they seek to resolve supply and demand imbalances.

Data Sources Relative to Supply and Demand

Although data from several sources were used in the investigations cited in this article, the most frequently used data come from three primary sources: the U.S. Department of Education Office of Special Education Programs' data on the shortage of certified teachers, the National Center for Education Statistics' Schools and Staffing Survey (SASS) and companion Teacher Follow-Up Survey (TSF), and the American Association of Employment in Education's (AAEE) data on regional and national teacher shortages. Each of these data sources will subsequently be described and critiqued.

U.S. Department of Education, Office of Special Education Programs

Each year since 1976–1977, states have been required to report data on personnel who teach students with disabilities for the *Annual Reports to Congress* (data are also provided for related services personnel, but this review addresses only teachers). These data provide a valuable source of information regarding personnel in special education. Currently, each state is required to provide a count of personnel on December 1 of each year. Data reported include age groups of students served (3–5 and 6–21) and personnel classifications

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(employed–fully certified, employed–not fully certified). States are provided definitions by the Office of Special Education Programs for the classifications:

Employed–Fully Certified. Such personnel are employed or contracted to provide special education and related services and have appropriate state certification or licensure for their position, including personnel categories that do not require certification or licensure, if the staff meet existing state standards or requirements for the position held.

Employed–Not Fully Certified. These personnel are employed or contracted on an emergency, provisional, or other basis; do not hold standard state certification or licensure for the positions to which they are assigned; or do not meet other existing state requirements for the position, including long-term substitutes.

Many changes have been made in the data that states are required to collect, resulting in a lack of compatibility of much of the data collected over the years. For example, from 1982 to 1993, personnel were reported by type of disability served. Beginning in 1993, states were given the option of reporting personnel categories for teachers either by disability conditions (Option 1) or by a personnel classification taxonomy of their choice (Option 2). This change was influenced by the wide range of categorical classifications systems used across states and the difficulty in translating state data into the federal categorical system. In 1994–1995, Option 1 was removed, and states were required to report on teachers by area of specialization using their own taxonomy. Thus, it is no longer possible to aggregate data across states by disability condition.

Another major change in reporting requirements relates to the personnel categories used to describe teachers. From 1993 to 1998, states reported data in five categories: employed–fully certified, employed–not fully certified, vacant, retained–fully certified, and retained–not fully certified. Beginning in 1998–1999, the reporting requirement was changed to include only employed–fully certified and employed–not fully certified. Thus, data are no longer collected regarding vacant positions or certification status of retained teachers.

Several factors related to data collection are important to note when interpreting data from the *Annual Reports to Congress*. OSEP offers the following considerations for analysis/interpretation of data that are relevant to this discussion (see Note 1):

- Data collected from 1976 through 1982 are not compatible with data in subsequent years.
- Variations in state data from year to year may be the result of changes in state data-collection and data-reporting procedures. The data notes provided in each *Annual Report to Congress* help in explaining year-to-year and state-to-state differences.

In sum, data from the *Annual Reports to Congress* provide valuable information regarding the national or overall shortage of certified teachers in the United States. The reliability of these data is supported by the stability of the data over time (*20th Annual Report to Congress,* 1998, pp. III-1–III-23), as well as the comparability of the findings from these data with other data sources (see, e.g., Boe, Cook, Bobbitt, & Terhanian, 1998). In contrast with national data, comparisons of state-to-state data should be conducted only after careful consideration of data notes provided in *Annual Reports to Congress* that describe changes that have occurred in how states collect data, as well as technical problems with data collection in particular states.

National Center for Education Statistics Data

The U.S. Census Bureau administered surveys for the National Center for Education Statistics (NCES) to nationally representative samples of teachers (among others) for both the Schools and Staffing Survey and the Teacher Follow-Up Survey. These two surveys were administered in tandem during the following school years: 1987–1988 (SASS), 1988–1989 (TFS), 1990–1991 (SASS), 1991–1992 (TFS), 1993–1994 (SASS), and 1994–1995 (TFS). (More recent versions of the SASS and TFS were conducted by the NCES during 1999–2000 and 2000–2001, respectively, but these data have not yet been analyzed.) Initially, a random sample of schools was selected to represent the United States. A random sample of teachers from each school was then selected and administered the SASS. During the following year, the TFS was administered to the same teachers in the same schools, or if the teachers had departed the schools, they were given a questionnaire requesting information regarding their departure (Ingersoll, 2001). The response rate for the surveys was 86% or higher. The number of special education teachers who were surveyed for the SASS ranged from 4,307 to 5,288, whereas 518 to 639 special education teachers were administered the TFS.

The reliability of the SASS and TFS surveys is well established (Kalton, Winglee, Krawchuk, & Levine, 2000). However, Boe, Bobbitt, and Cook (1997) pointed out four main limitations of these data. First, the data are subject to sampling errors, as well as measurement and recording errors. These errors become more of an issue as the sample size of a given survey decreases, or when small subsamples (e.g., teachers who departed the profession) of the overall data set are used for analyses. Second, the SASS and TFS do not provide longitudinal data but, rather, are a cross-sectional analysis of teachers over a 2-year period. Boe et al. noted that the data provide national probability samples and thus can be used to reveal trends in national data over time. Third, the national data from the SASS and TFS provide little information regarding local variations and thus offer little practical guidance for local decision-makers. Finally, the SASS and TFS are self-report surveys and are subject to bias, recall error, and selective nonresponse.

In spite of these limitations, the SASS and TFS provide "excellent sample surveys with high response rates" (Boe et al.,

1997, p. 374). Furthermore, these data represent "the largest and most comprehensive data source available on staffing, occupational, and organizational aspects of schools, and was specifically designed to remedy the lack of nationally representative data on these issues" (Ingersoll, 2001, p. 11).

American Association for Employment in Education

The 24th American Association for Employment in Education (AAEE) study of teacher supply and demand was conducted in 2000. As part of this study, deans or directors of teacher education at all institutions preparing teachers that are listed in the *Higher Education Directory* (HED; Rodenhouse, 1998) were sent surveys in May 2000. Participants responded to the survey in each teaching field in which they prepared teachers. For the most recent survey, 1,267 surveys were distributed and 454 were returned, for a response rate of 36%.

The AAEE survey was designed to collect information regarding employment opportunities for education professionals in 62 teaching, support, and administrative fields. Likert-type questions are used to determine the extent to which a shortage or surplus of teachers exists in a given teaching or related area. Data are collected in 11 geographic regions of the United States, aggregated by region and nationally.

Two methods were used to ensure the reliability of the AAEE survey data. First, data were compared over the last 5 years to ensure the stability of the data over time. These data revealed that the respondents' perceptions regarding shortages or surpluses of personnel remained very stable over time, with a median correlation of .92. A second method used to ensure the reliability of responses was an investigation of the test–retest reliability of the survey. This investigation resulted in correlations ranging from .70 to .90 (Towner-Larsen, 1998), indicating moderate to high reliability for the survey.

It is important to note that although the respondents to this survey were likely to be very well informed regarding job opportunities for teachers in their states or local areas, their reports were nonetheless based on self-reports. A second weakness of these data was the low response rate. There may have been systematic bias in the responses, and the authors of this investigation did not address the representativeness of the sample of respondents. These limitations strongly suggest that these data should be interpreted with caution.

Magnitude of the Shortage

Data available from professional organizations (ERIC, 2001), the U.S. Department of Education (1998, 1999, 2000, 2001), and the professional literature (AAEE, 2000; Boe, Cook, et al., 1998; Carlson et al., 2002; Carlson et al., 2001; see Note 2) indicate that there is a severe, chronic shortage of special education teachers in the United States. Ninety-eight percent of the nation's school districts report special education teacher shortages (ERIC, 2001; Fideler, Foster, & Schwartz, 2000). A survey completed by the American Federation of Teachers (1999) showed that special education is the area with the greatest shortage of teachers in the 200 largest cities in the United States.

The AAEE lists five areas of special education—emotional/behavioral disorders, multicategorical, severe/profound disabilities, learning disabilities, and mild/moderate disabilities (these terms are those used by AAEE)—as the teaching fields with the greatest shortages nationally (AAEE, 2000). All other areas of special education rank in the top 15 shortage areas nationally, including mental retardation (ranked 6th tied), visual impairment (9th tied), hearing impairment (11th), dual certificate (special education and general education, 13th), and early childhood special education (15th). General education teaching fields that rank in the top 15 include mathematics education (6th tied), physics (8th), bilingual education (9th tied), chemistry (12th), and computer science education (13th). The special education teacher shortage is not a recent development. According to data available from the U.S. Department of Education (1998, 2000), more than 30,000 special education positions in the United States have been filled each year throughout the 1990s by uncertified personnel (see Note 3).

In the most recent data available from the U.S. Department of Education (2003), 47,532 individuals filling special education positions (approximately 11.4% of all teachers) during the 2000–2001 school year lacked appropriate special education certification. This represents an increase of approximately 23% from the 1999–2000 school year—the largest increase in the number of uncertified teachers since these data have been reported. Data from *Annual Reports to Congress* (U.S. Department of Education, 1998) suggest that special educators have an average caseload of nearly 17 students (Carlson et al., 2001). This ratio indicates that a shortage of 47,532 teachers resulted in approximately 808,000 students in 2000–2001 being taught by personnel who were not fully certified. Projections for the future show the situation worsening. The Council for Exceptional Children (CEC) predicts that the United States will need more than 200,000 special education teachers to fill open positions by 2005 (Kozleski, Mainzer, Deshler, Coleman, & Rodriguez-Walling, 2000); the Bureau of Labor Statistics (1999) projects that between 1998 and 2008, there will be a need for more than 135,000 special education teachers. Regardless of this lack of agreement about how many teachers will be needed in the relative near term, there are no indications that the shortage of fully certified personnel will abate in the near future.

Shortage Variances

Shortages by Location

As noted previously, the national percentage of uncertified special education personnel was approximately 11% during the 2000–2001 school year (USDOE, 2003). However, special education personnel shortages vary greatly by state. Con-

necticut and Massachusetts reported that all special education teachers for children ages 6 to 21 were fully certified in 2000–2001 (USDOE, 2003). At the other extreme, Colorado, California, New York, Hawaii, Louisiana, and Delaware reported that teachers who were not fully certified in their main teaching assignments filled 21.6%, 23.6%, 25.2%, 27.6%, 31.2%, and 31.8% of the special education teaching positions for this same age group, respectively.

Data from the AAEE (2000) further support these findings. AAEE data reveal that shortages exist in all special education teaching fields in the West and the Rocky Mountain, Great Plains/Midwest, and Alaska regions. Shortages exist in 6 to 9 of the 10 special education teaching fields in the Northwest, South Central, Southeast, Great Lakes, and Middle Atlantic regions. Only the Northeast region does not have considerable shortages in the majority of special education teaching fields. This region has some shortage in 8 of the 10 special education fields, and a balance between supply and demand in the other two fields (early childhood special education and visual impairment).

Recent research has shown that the variation in hiring difficulties among schools (for all teachers, not just special education teachers) is greater within states than it is across states (National Commission on Teaching and America's Future, 1997). Similar differences exist at the school level, as some schools within a district have waiting lists of qualified applicants, while other schools in the same district have difficulty finding any qualified applicants. In a review of research related to inequality of access to competent teachers, Darling-Hammond and Sclan (1996) concluded that minority and low-income students in urban settings are most likely to find themselves in classrooms staffed by teachers who are not certified for their teaching assignment. Similarly, Ingersoll (2001) found that high-poverty public schools (student poverty levels equal to or greater than 50% of enrollment) had higher teacher turnover rates than wealthier public schools (poverty enrollment below 15%). The limited data that are available in special education regarding this issue reveal that shortages are more severe in high-poverty school districts (Carlson et al., 2002). Moreover, it is likely that the same factors that lead to teacher shortages among general education teachers—funding inequities, inequities in the labor market, working conditions, and distribution of local power (Darling-Hammond & Sclan, 1996)—would produce disproportionate shortages of special education teachers.

Shortages by Job Description

The type of special education position can also affect teacher turnover and subsequent demand for teachers. The AAEE (2000) lists emotional/behavioral disorders as the teaching field with the greatest shortage nationally, followed closely by multicategorical, severe/profound disabilities, learning disabilities, and mild/moderate disabilities (terms are those used by the AAEE). Considerable shortages exist in the emotional/behavioral disorders category in 10 of the 11 regions of the United States. Multicategorical, severe/profound disabilities, learning disabilities, and mental retardation also have shortages in all geographic regions except one, while mild/moderate disabilities experiences considerable shortages in 9 of 11 regions; early childhood special education and dual certificate, in 7 of 10 regions (data are not available for all certificates in all 11 regions); and visual impairment and hearing impairment, in 6 of 10 regions.

Over the last 3 years, increasing shortages have been evidenced nationally in the areas of emotional/behavioral disorders, learning disabilities, mental retardation, and visual impairment, while teacher shortages in other areas of special education have remained level. It is important to note that although the area of behavioral disorders has the greatest shortages nationally, the teacher shortage in this area is not substantially different from the shortages in the areas of multicategorical, severe/profound disabilities, learning disabilities, and mild/moderate disabilities, which rank second, third, fourth, and fifth nationally as fields with a "considerable shortage" (p. 7) of teachers (AAEE, 2000).

Shortages of Diverse Personnel

Although 38% of the students with disabilities in the United States are culturally and linguistically diverse (CLD; USDOE, 2000), only 14% of those currently teaching in special education and 14% of those in the teacher education pipeline are from historically underrepresented groups (Kozleski et al., 2000). Moreover, some evidence indicates that the number of special education teachers from diverse backgrounds is declining (Olson, 2000; Shipp, 1999). In 1978, 12% of America's teachers were African American; in 1993 that number declined to 9%, despite an increased enrollment of African American students in colleges and universities (Shipp, 1999). As recently as 1996, more than 40% of the nation's schools had no teachers of color on their faculty (Riley, 1998). These data are more compelling when disaggregated by race and ethnicity. Seventeen percent of the nation's public school children are African American, compared to 8% of their teachers. The corresponding percentages for teachers and students are 14% and 4% for Hispanics/Latinos, 5% and less than 1% for Asian/Pacific Islanders, and 1% and less than 1% for American Indian and Alaska Natives (Fenwick, 2001). Clearly, the diversity of teachers does not reflect the general population, or that of the students with whom they work.

The existence of diversity in the teaching force of the future is tenuous. Olson (2000) noted that if current trends continue, by the year 2009, 40% of the students but only 12% of the teaching force will be from diverse backgrounds. Fenwick's (2001) predictions are even more extreme, as she estimates that only 5% of the teaching force will be non-White by the year 2005. According to AAEE (1999), 64.7% of colleges and universities anticipate no change in the number of diverse teacher candidates graduating from their programs.

The small number of CLD teacher education students is not surprising, given the barriers these individuals face within the educational system. Inequalities in public education, fueled by inadequately staffed schools in high-poverty areas and low teacher expectations, all too often result in these students' being ill prepared for college (Michael-Bandele, 1993). Increasing tuition rates and lack of financial support further discourage potentially college-bound students from CLD backgrounds (Ford, Grantham, & Harris, 1997). The result of these factors is a large number of students who are inadequately prepared for college studies, have limited access to higher education, and subsequently have less success in higher education.

Family perceptions, regardless of income level, negatively affect the special education teaching pipeline. Students and parents from lower income backgrounds must concentrate their efforts on daily survival and so have difficulty conceiving of long-term goals that include college and a career (Gordon, 1994). Minority students from middle- and upper-income families cite reasons similar to those of their majority peers for avoiding a teaching career: student discipline problems, the perceived lack of public respect for teaching as a profession, an inability to relate to kids from impoverished urban neighborhoods, poor working conditions, low salaries, and better opportunities in other fields (Gordon, 1994). Parents from all income levels encourage careers in fields such as business, medicine, or law and actively discourage careers in education (Cartledge, Gardner, & Tillman, 1995; Gordon, 1994; Su, 1996). As diversity is increasingly valued in other professions (Mangan, 2002), CLD students are aggressively recruited by disciplines considered more prestigious than education, and many of these professions offer greater financial incentives (Dilworth, 1990; Ford et al., 1997). The result is that teaching is not viewed as a favorable career (Wald, 1996). Evidence from the American Council on Education (1999) supports this notion. CLD individuals earned nearly 20% of all bachelor's degrees awarded in 1997; however, individuals from diverse backgrounds earned only 13.5% of all education degrees that year, as compared to 20.7% of all degrees in business, 21.9% in the social sciences, 17.3% in the health professions, 25.2% in the biological and life sciences, and 21.6% in engineering.

Conclusions

It is clear that there is a dire shortage of CLD teachers in special education. Although some research is available suggesting that CLD individuals are more likely to be recruited into special education through alternative certification programs (Shen, 1998), more research is needed to explore approaches that may be used to recruit CLD teachers into the profession. Indeed, unless measures are taken in the near future to address this shortage, it is likely to get much worse in the coming years (Fenwick, 2001; Olson, 2000) and to further exacerbate an overall shortage of certified teachers in special education. For more detailed information regarding the shortage of diverse personnel and related areas of needed research, see Tyler, Yzquierdo, Lopez-Reyna, and Flippin (this issue).

Trends in the Demand for Special Education Teachers

Three factors are the primary determinants of the demand for special education teachers: student enrollment, teacher caseload, and teacher attrition. A range of data is available, primarily from federal agencies, regarding current and projected student enrollment in special and general education. In addition, much research has appeared in the professional literature over the last 10 years to provide insight into the issue of attrition of special education teachers. Much less is known about caseloads and how they influence the demand for special education teachers. In the following sections, research on student enrollment and teacher caseload, and the influence these factors may have on the demand for special education teachers, is reviewed. This is followed by a discussion of the influence teacher attrition has on the demand for special education teachers, as well as factors that influence teacher attrition in special education. Finally, research addressing the possibility of retaining special education teachers who otherwise would choose to leave their teaching assignments or leave the profession altogether is reviewed.

Student Enrollment

The population of individuals between the ages of 3 and 21 years in the United States grew significantly through the 1990s (USDOE, 1998, 1999, 2000, 2001). Between 1992 and 1999, the nation's student population grew by 6.8%, from 68.86 million to 73.55 million. During the same period, the number of students with disabilities ages 3 to 21 grew at a much more rapid rate. In 1992–1993, 5.08 million students with disabilities between the ages 3 and 21 were identified. This number increased by 20.3%, to 6.11 million, in 1998–1999. Thus, the number of students with disabilities grew at a rate almost 3 times greater than the overall student population. In 1992–1993, students with disabilities accounted for 7.38% of all students. By 1998–1999, this proportion had risen to 8.3%. The growth in demand for special education teachers was also great during this time but did not keep pace with the rate of growth in student enrollment. In 1992–1993, there were 357,521 teaching positions for students with disabilities ages 3 to 21 in public schools. By 1998–1999, this figure had increased by 8.0%, to 386,133. This growth rate in teaching positions is about 40% of the rate of enrollment growth for students with disabilities during this 6-year period. Thus, the disproportionate growth rate of students identified with disabilities has been a significant factor in the increasing demand for special education teachers in the United States. It is anticipated that this disproportionate growth will continue over the next decade, thus continuing to affect the increasing demand for special education teachers.

For the present decade (until 2010), the National Center for Educational Statistics forecasts that public school enrollment will remain virtually unchanged (NCES, 2001). However, the population at different grade levels will rise and fall during this time. For example, enrollment in Grade 1 is projected to increase through 2005, decrease in 2006, and then increase through 2010. In contrast, enrollment in Grade 8 is projected to increase through 2003 and then decrease through 2010. These changes will require a redistribution of special education teachers across grade levels but will have little impact on the overall demand for special education teachers in the United States.

In spite of the fact that little change is expected in the overall student population in the United States over the next decade, the population will vary considerably in different regions and from state to state within regions. For example, in the Northeast, all states are expected to experience enrollment declines during the next 10 years, ranging from −.9% (New Hampshire) to −7% (Maine; NCES, 2001). In contrast, all of the states in the West are expected to experience enrollment increases, ranging from +1% (Oregon) to +16% (Idaho). In the South, 7 states are expected to experience increases, ranging from +.4% (Maryland) to +7% (Georgia), and 10 states are expected to experience decreases in student enrollment, from −.6% (North Carolina) to −8% (West Virginia). In the Midwest, 10 states are expected to decline in enrollment, from −.5% in Kansas to −7% in North Dakota, while 2 states are expected to remain unchanged (Illinois) or increase (Indiana by +.3%). Regionally, these changes are expected to result in overall declines in student enrollment in the Northeast (−7%), Midwest (−4%), and Southeast (−1%), while states in the West increase in enrollment (+5%). If these enrollment projections hold, changes in overall student enrollment over the next decade should have little impact on teacher demand in the United States at large. However, differences in enrollment growth in different regions of the country will likely result in significant changes in the demand for special education teachers from state to state and region to region.

When considering enrollment projections, it is important to consider the previously noted growth rate of students with disabilities, which was almost 3 times greater than the growth rate of the entire school-age population. This is a long-term trend in special education, as enrollments in special education programs have increased for more than 20 years at a greater rate than for general education. For example, between 1977 and 1995, the general education population decreased by 2%, whereas the population of students with disabilities increased by 47% (Russ, Chiang, Rylance, & Bongers, 2001). If the proportion of students identified with disabilities continues to increase as it has since 1992, the result by 2010 will be an additional 1,256,000 students with disabilities. According to the *22nd Annual Report to Congress* (USDOE, 2000), this level of growth would result in the need for approximately 80,000 additional special education teachers by 2010. The Bureau of Labor Statistics (1999) projects that between 1998 and 2008 the number of special education teaching positions in public and private schools in the United States will grow by 33.7%, requiring an additional 135,793 special education teachers.

Further research is needed to fully explore this issue, but available data support the perspective that the number of special education teaching positions in the United States will continue to grow over the next decade. This demand could also be influenced by teacher caseloads, which have been the focus of concern for many professionals in recent years (Russ et al., 2001).

Teacher Caseloads

Although teacher caseloads have a significant effect on the demand for teachers, as well as a significant influence on the quality of services delivered to students with disabilities (Russ et al., 2001), little research has been conducted on this topic. State guidelines for caseloads (i.e., student-to-teacher ratios) for special education vary dramatically across the United States (National Association of State Directors of Special Education [NASDSE], 2000). This inconsistency occurs because caseload is not addressed in federal law but instead is left to state education agencies and state legislatures. Some states have prescriptive regulations for caseloads, while others do not (NASDSE, 2000). States with prescriptive guidelines typically use a combination of criteria to determine caseloads, such as type of program (e.g., resource, self-contained), type of staff (e.g., resource specialist, speech–language therapist), disability label, and grade level. States that do not use these criteria typically include a regulatory statement such as "The caseload allows the teacher to meet the individual needs of each student."

Several initiatives have been aimed at reducing general education class sizes. For example, the U.S. Department of Education included an initiative to reduce the national average class size in Grades 1 to 3 to 18:1, as part of the 1999 Education Appropriations Act (NASDSE, 2000). This initiative sought to improve educational achievement for students both with and without disabilities by enhancing the student–teacher ratio. Several states, including California, Georgia, Indiana, Nevada, and Washington, have begun initiatives to reduce class sizes, especially at the early elementary level. Indeed, reduction of class sizes is so strongly supported in the United States that more than 50% of states have an initiative to reduce class sizes (Russ et al., 2001; Wexler et al., 1998).

Although general education class sizes are being reduced, evidence exists that special education caseloads are increasing. In a review of special education teachers' caseloads, McCrea (1996) found that the maximum student–teacher ratio in special education was usually 15:1, identical to the ratio reported in the *20th Annual Report to Congress* (USDOE, 1998). However, in the *22nd Annual Report to Congress* (USDOE, 2000), this ratio had risen to about 16:1. A recent Study of Personnel Needs in Special Education (SPeNSE) found that the

average caseload for special education teachers, Grades K through 12, was 17:1 (Carlson et al., 2001). The study also found that waivers for class size/caseload regulations (i.e., waivers so caseload standards could be exceeded) were commonplace: 10,849 waivers to exceed caseload standards were sought by administrators in 1999–2000. Although these data must be interpreted with caution, they suggest that the caseloads of special education teachers in the United States may be increasing to very near the 18:1 ratios of primary general education classrooms in many states.

Available data do not provide a clear picture regarding the impact caseloads have had or will have on the demand for teachers over the next decade. This is an area in which more research is needed to fully understand how caseloads are determined from state to state, how caseloads differ across the United States, how caseloads are influenced by teacher shortages, and how differences in caseloads influence outcomes for students with disabilities.

Teacher Attrition

The departure of special educators from the teaching profession (*exit attrition*) is a major contributing factor to teacher demand (Boe, Bobbitt, Cook, & Barkanic, 1998; Ingersoll, 2001). Ingersoll argued that teacher shortages are primarily the result of a revolving door—"where large numbers of teachers depart their jobs for reasons other than retirement" (p. 5) and found that the annual number of teachers leaving exceeds the number of new teachers recruited. To support this perspective, Ingersoll analyzed data from SASS (available through 1993–1994). He reported an overall teacher exit attrition and migration (moving from one teaching position to another) rate of 15% in 1988–1989, 13.2% in 1991–1992, and 14.3% in 1993–1994. In addition, Ingersoll found that special education teachers were more likely to either leave the profession or migrate to another position than general education teachers.

Boe, Bobbitt, Cook, and Barkanic (1998) provided further analysis of these data, addressing special education teachers in more detail. These researchers found that in 1993–1994, 84.8% of all special education teachers remained in special education, as compared to 92.4% of all general education teachers. Boe and his colleagues found that in 1993–1994 exit attrition from the teaching profession was 6.3% for special education teachers and 6.6% for general education teachers. However, a significantly greater proportion of special education teachers transferred to general education (8.8%) than did general education teachers to special education (1%). Thus, when transfers to general education are added to the proportion of special education teachers who left teaching, this results in a total attrition rate of 15.1%, as compared to 7.6% in general education.

To provide a more stable measure of teacher attrition over time, Boe et al. (1998) examined SASS data from 1987–1988, 1990–1991, and 1993–1994. For these three time periods combined, the investigators found that 6.1% of special education teachers left the profession per year, compared to 5.7% of general education teachers. In addition, 7.4% of special education teachers switched each year to general education positions, while 0.7% of general educators switched to special education. These figures result in a total annual attrition rate of 13.5% for special education and 6.4% for general education.

Although the proportion of special education teachers who transfer to general education is significantly higher than transfers from general education to special education, these transfers result in a smaller net loss of teachers for special education than might be anticipated, because there are 9 times more general educators than special educators. For example, in the 3 years combined (1987–1988, 1990–1991, and 1993–1994) Boe et al. (1998) found that when 60,022 special educators switched to general education, 44,375 general educators switched to special education. Thus, while the proportion of transfers differs significantly, the overall impact on demand for special education was an annual loss of slightly more than 5,000 teachers.

Although these data reveal that teacher attrition is a serious problem affecting the demand for special education teachers, the most recent data available are from the 1994–1995 school year. More recent data are needed to determine whether these trends continued through the remainder of the 1990s. It is also important to determine the extent to which special education teachers transferred into general education and how often general educators moved into special education, as these trends could have changed significantly in the latter part of the 1990s with the increased use of inclusive programs across the United States (McLeskey, Henry, & Hodges, 1998).

Factors Affecting Teacher Attrition

As noted previously, special education teachers enter the field and subsequently depart in large numbers for positions in general education, or they leave the field altogether, thus creating a revolving door into and out of the profession (Boe, Bobbitt, Cook, Barkanic, & Maislin, 1999; Darling-Hammond, 2001; Ingersoll, 2001). Many reasons why special education teachers leave teaching are similar to those of general education teachers. For example, attrition for both groups follows a *U*-shaped distribution associated with teaching experience. Relatively high attrition rates are seen at the beginning and at the end (retirement) of teachers' careers (Boe, Barkanic, & Leow, 1999; Ingersoll, 2001; Miller, Brownell, & Smith, 1999; Singh & Billingsley, 1996). Additional, specific variables contribute to attrition for both groups (Billingsley, 2003; Billingsley, Gersten, Gillman, & Morvant, 1995; Boe, Barkanic, & Leow, 1999; Brownell, Smith, McNellis, & Lenk, 1997; Darling-Hammond, 2001; Darling-Hammond & Sclan, 1996; Gersten et al., 2001; Ingersoll, 2001; Miller et al., 1999; Singh & Billingsley, 1996), including the following:

A. Employability—teachers with more employment opportunities outside of teaching are more likely to depart;

B. Personal decisions—teachers depart for reasons unrelated to work, such as health considerations, pregnancy, and moves to another city or state;
C. Level of education and certification status—teachers who are better prepared to teach are less likely to depart teaching;
D. Salary—teachers in higher paying jobs are more likely to stay in teaching;
E. Mentoring—teachers who have high-quality mentoring programs when they enter teaching are less likely to depart;
F. Decision-making power—teachers who are involved in decision making in their school are less likely to depart;
G. Administrative support—teachers who have strong administrative support are less likely to depart;
H. School climate—teachers who work in a more collaborative, supportive school climate are less likely to depart;
I. Job design—teachers whose jobs involve limited paperwork, provide a reasonable caseload, provide resources to support students (e.g., paraprofessionals), and/or provide time for collaboration and curriculum development are less likely to depart.

For a more comprehensive list, see Billingsley (2003); for a more extensive discussion of issues related to the attrition/retention of special education teachers, see Billingsley (this issue).

To provide insight into the reasons teachers leave special education and, in turn, ways in which they might be retained, Boe et al. (1997) studied 19,500 special education teachers who left teaching in 1988–1989. Of those studied, about 3,000 were unqualified for their positions, 3,500 advanced to administration or other specialized positions, 4,000 retired or became disabled, and 2,500 planned to return to teaching within 1 year. The vast majority of these teachers, who accounted for two of every three special education teachers who left education, were not reasonable candidates for retention efforts. However, the 6,500 teachers who left the profession for reasons other than those listed above (such as employment outside of education or homemaking/childcare) might have been candidates for retention efforts. Moreover, Singer (1993) has shown that as many as one third of the teachers who leave special education teaching positions do later return to teaching.

In addition to teachers who left the profession, an additional 18,900 special education teachers transferred from special to general education during this time (Boe et al., 1997). These teachers may also be candidates for retention, although some evidence (Billingsley, 1993; Billingsley & Cross, 1991; Singer, 1992; Singer, 1993) has indicated that it may be difficult to retain these teachers in special education unless teaching conditions are improved. Particular concerns expressed by teachers who transfer to general education include a lack of administrative support, excessive paperwork, and student factors (e.g., lack of progress made by students; Billingsley & Cross, 1991).

Boe et al. (1997) suggested that a critical issue in retaining these teachers could well be efforts to make special education teaching more appealing, using strategies such as increasing resources, improving the qualifications of special education teachers through professional development, and increasing salaries. Based on these data on teacher attrition, Boe et al. concluded that although efforts to reduce attrition from special education are important, reducing attrition alone does not "have sufficient power to upgrade and stabilize the qualifications of the teaching force in special education" (p. 383). These authors further suggested that "policymakers in special education should also consider actions that will increase the yield of qualified recruits from major sources, such as from teacher preparation programs and the reserve pool" (p. 383). However, considering that the data Boe and his colleagues had to use in their 1997 publication is well over 10 years old and that IDEA requirements have increased job demands for special education teachers since then, new research efforts are warranted regarding this factor, which relates so closely to supply-and-demand issues.

These data reveal that attrition from special education teaching positions each year is a major contributor to the demand for special education teachers in the United States, as significant numbers of special educators depart the profession or move to general education teaching positions (Boe, Bobbitt, Cook, & Barkanic, 1998). The following section describes sources of supply for special education teachers used to fill these positions.

Trends in the Supply of Special Education Teachers

Almost all of the 30,000 open public school special education teaching positions are filled by the beginning of each school year (USDOE, 1998). Only about 1% remain vacant during any given year (USDOE, 2000). However, persons not fully certified fill many of these positions. Boe, Cook, et al. (1998) reported that an average of 9% to 10% of all special education teachers are less than fully certified in the area of their primary assignment. The most recent data from the U.S. Department of Education indicate that the shortage of fully certified special education teachers has increased to 47,532, or 11.4% of all special education teachers (U.S. Department of Education, 2003). This chronic shortage of fully qualified special education teachers exists in every region of the United States (AAEE, 2000).

In this section, four sources of supply of teachers are addressed. Initially, the production of new, traditionally prepared teachers is described. Next, the reserve pool (i.e., teachers who are certified but not currently teaching) is discussed. This

is followed by a discussion of the increasing number of persons who are entering teaching after completion of alternative teacher certification programs and a review of data regarding the entry of uncertified teachers into the profession as they are hired to fill vacant positions. Finally, factors affecting the supply of special education teachers are reviewed.

Teacher Education Programs

Data from the 1993–1994 SASS (the most recent data available) revealed that approximately 40% of all beginning teachers were recent graduates of teacher education programs (Boe, Cook, Paulsen, Barkanic, & Leow, 1999). Teacher education programs are thus a major source of beginning special education teachers. In response to the shortage of special education teachers during the 1990s, the production of teachers by these programs increased 21%, from 16,697 graduates in 1993 to 20,274 graduates in 1998 (NCES, 2001). In spite of this growth, evidence remains that these numbers are too few to fill the available teaching positions with fully certified teachers or to keep up with the continuing growth of the field (Boe, Cook, et al., 1996; Boe, Cook, et al., 1999; USDOE, 1998). For example, the shortage of fully certified teachers in special education remained steady at 9% to 10% throughout the 1990s (USDOE, 1998), in spite of the growth in the production of teachers.

It is informative to compare special education to elementary education, an area where there is a balance to surplus of teachers in the United States (AAEE, 2000). These data should provide insight into the extent of the shortage of teachers in the pipeline in special education. Data from a national study of the surplus or shortage of general and special education teachers from preparation programs (Boe, Cook, et al., 1999) found that for every general education elementary school teaching position that was available for entering teachers in 1993–1994, 1.68 teachers graduated from preparation programs (see Note 4). In contrast, for every entering-teacher position available in special education, only .86 teachers were prepared. This level of production has resulted in a surplus of elementary teachers in many parts of the United States and, as noted previously, shortages of special education teachers (AAEE, 2000; USDOE, 1998).

These data suggest that the production of teachers in special education preparation programs would have to increase significantly to adequately address the teacher shortage. For example, a level of production in elementary education that is approximately twice as great as in special education has produced a balance to surplus of elementary teachers across the country, suggesting the need to significantly increase the production of special education teacher preparation programs.

In sum, the limited number of graduates of teacher preparation programs in special education programs in the United States remains a significant, contributing factor to the shortage of fully certified teachers in special education. As noted in the *20th Annual Report to Congress* (USDOE, 1998), "It appears that graduates from teacher preparation programs must serve as the major source of supply [of special education teachers] in the future. Yet the current level of production of such teachers nationally is far from adequate" (p. III-19). Research is needed to explore this issue, especially in light of the increasing numbers of teachers who are graduating from alternative programs (Rosenberg & Sindelar, 2000).

The Reserve Pool

A large proportion of teachers who fill open positions in special education each year are from a reserve pool of teachers that consists of experienced teachers who are not currently teaching and graduates of teacher preparation programs who delayed entry into the profession for 1 or more years (Boe et al., 1996). Data regarding the size of the reserve pool in special education are very limited. Boe et al. noted that returning experienced teachers are the main source of supply for the reserve pool. In 1987–1988, experienced teachers not currently working in the profession made up two thirds of all newly hired special education teachers. By 1990–1991, this proportion had declined to approximately 50%, and by 1993–1994, only one third of new hires in special education were experienced teachers returning to the profession from the reserve pool (USDOE, 1998). Data have recently become available from the 1999–2000 SASS. Preliminary analyses of these data reveal that the available reserve pool for beginning teachers has rebounded to some degree, as approximately 42% of new teachers are returning experienced teachers (E. Boe, personal communication, September 17, 2003).

Trends in general education seem to match those in special education. For example, between 1988 and 1994, the percentage of new teachers hired from the reserve pool dropped from 33% to 23% (Baker & Smith, 1997), suggesting that this source for new teachers was becoming significantly depleted. However, similar to the trend in the supply of special education teachers, more recent data reveal that this source has rebounded, and approximately 40% of new teachers who entered general education in 1999–2000 were experienced teachers returning to the profession (E. Boe, personal communication, September 17, 2003).

In sum, available data suggest that the reserve pool seemed to decline significantly during the early 1990s in both general and special education. However, at the end of the decade, preliminary evidence suggested that this pool was rebounding. Further research is needed to determine factors that influence this reserve pool of potential teachers (Darling-Hammond & Sclan, 1996) and why an apparent rebound in supply from this source has occurred.

Alternative Teacher Education Programs

A small but growing source of certified special education teachers is alternative teacher education programs (Rosenberg & Sindelar, 2000). In response to both teacher shortages and

concerns about the quality of graduates of traditional teacher preparation programs, many state education agencies have developed teacher education programs that offer an alternative to traditional university-based, 4- or 5-year teacher education programs (Zeichner & Schulte, 2001). Some alternative programs were designed to provide older, nontraditional students, who may already have a bachelor's degree, a means for entering the profession (Rosenberg & Sindelar, 2000; Zeichner & Schulte, 2001). Little, however, is known about the content or actual production rates of these programs. Available evidence suggests that great variability exists across programs generically referred to as "alternative certification" programs.

In 1983, only eight states had alternative teacher certification programs (Zeichner & Schulte, 2001). By 2001, 45 states and the District of Columbia reported having some form of alternative programs (Feistritzer, 2001). Although there is evidence that as many as 27% of newly certified teachers in one state are graduates of these programs (Huling, Resta, & Rainwater, 2001), most evidence points to small but growing numbers of graduates of alternative programs nationally. For example, approximately 5% of teachers receiving certificates in California and 15% in Texas were recent graduates of alternative programs (Huling et al., 2001). Feistritzer estimated that more than 150,000 persons have been certified through alternative programs over the last 20 years.

One particularly encouraging feature of alternative certification programs is their success in recruiting and training CLD teachers (Shen, 1998). Some reports estimate that CLD teachers represent up to 40% of those alternatively certified; indeed, several states have reported that alternative certification is a primary or significant means of attracting teachers from diverse backgrounds (Cornett, 1990; Stoddart, 1990).

Limited data are available regarding the number of teachers who have received certification in special education through alternative means. Data from SPeNSE (2002) have indicated that approximately 7% of all special education teachers earned their certification through an alternative route, as compared to 4.5% of their general education counterparts. These investigators also reported that the number of teachers in special education who have been certified through alternative routes is apparently increasing, as approximately 10% of teachers who had been teaching fewer than 5 years were certified through one of these alternative routes. Finally, it is noteworthy that teachers in classrooms that are often considered the most difficult to staff (i.e., classrooms for students with emotional/ behavioral disorders) were found to have been certified most often through alternative routes (12%).

Although the preceding information suggests that a relatively small proportion of special education teachers have been certified through alternative routes, the rapid growth in the number of alterative programs suggests that more teachers will be generated through theses routes in the future. This is an area of teacher supply and demand that deserves further study, as very little is known about this emerging approach to addressing the teacher shortage.

Uncertified Persons Entering Teaching

Boe et al. (1996) distinguished between two types of special education teacher shortages: a *quantity* shortage versus a *quality* shortage. A quantity shortage is defined simply as the number of persons needed to fill open teaching positions. Approximately 99% of all special education teaching positions are filled each year, indicating a very small quantity shortage. In contrast, a quality shortage exists when school districts cannot fill all positions with professionals possessing the qualifications they are seeking. The primary indicator of quality for entering teachers is full certification in the area of the primary teaching assignment.

From the late 1980s until the mid 1990s, a severe and chronic quality shortage of special education teachers existed (USDOE, 1998). During that time, 9% to 10% of all special education teachers were not fully certified. This problem continued with the 2000–2001 school year, as 47,532 individuals teaching in special education classrooms lacked teacher certification in their primary teaching assignment (USDOE, 2003).

Entering teachers significantly affect the quality shortage (Boe, Cook, et al., 1998). For example, in 1990–1991, 31.8% of all individuals newly assigned to special education teaching positions were not fully certified, while only 7.8% of continuing special education teachers were uncertified. This level of quality shortage was almost twice as great for special education as it was for general education. More recent data, reported by Carlson et al. (2002), reveal that this trend has continued, as 29% of beginning special education teachers (in their first 3 years of teaching) were not certified for their main teaching assignment. Baker and Smith (1997) believed that "imbalances in supply and demand are often resolved through adjustments in teacher qualifications" (p. 33). It is clear that these adjustments have occurred across the United States in special education, as large numbers of teachers with temporary or emergency certificates have been hired to teach students with disabilities each year.

Although much research evidence is available to document a quality shortage of special education teachers, little is known about the extent to which these teachers lack the skills to perform their jobs (Smith-Davis & Billingsley, 1993). For example, in some states, teachers may be certified in an area of special education but not in the area of their teaching assignment and still might be included among teachers classified as uncertified. In other settings, persons who lack a college degree may be hired as permanent substitutes and are listed as uncertified. Obviously the teachers in these two examples bring vastly different qualifications to their teaching positions. More research is needed regarding just what the quality shortage of special education teachers means and how this shortage might influence outcomes for students with disabilities.

Factors Affecting the Supply of Special Education Teachers

Two primary factors influence the supply of new teachers from preparation programs. These factors are the limited yield

of teachers from the total number of graduates and the large number of teachers already employed when they graduate from a preparation program. In addition, some evidence suggests that conditions of teaching in special education influence the number of teachers who choose to enter the profession. Each of these issues is subsequently addressed.

In 1998, 20,274 newly certified teachers graduated from teacher preparation programs in special education. It is important to note that not all of these prospective teachers were available to fill the approximately 30,000 special education teaching positions that were vacant in 1998. The primary reason this was the case is that a significant proportion of graduates of teacher education programs do not enter teaching (Boe, Cook, et al., 1999; Henke, Geis, Giambattista, & Knepper, 1996; Hirsch, Koppich, & Knapp, 2001). For example, Boe, Cook, et al. found that approximately 46% of all graduates of teacher education programs in 1993 entered teaching upon graduation. An additional 27% of previous graduates of teacher education programs entered teaching for the first time (i.e., were delayed entrants) in 1993, resulting in a total yield of 73% from all teacher education programs. Some researchers have found that significant numbers of prepared teachers fail to enter the field. For example, Henke et al. found that approximately 55% of all education majors had entered teaching 2 years after graduation, while Hirsch et al. (2001) reported the proportion of teacher education graduates who entered teaching at 60%.

When special education teachers were the focus of study, 59% of graduates of teacher education programs in special education entered the teaching profession in the year following graduation (Boe, Cook, et al., 1999). This figure was somewhat higher than the yield of all education programs (46%) or elementary education programs (45%) but was comparable to the yield of secondary education programs (58%).

A second factor that effectively reduces the yield of teachers entering the profession is the relatively large number of graduates of degree programs in special education who continue in a teaching position upon graduation. (Boe, Cook, et al., 1999). Boe et al. found that in 1993, approximately 35% of all graduates of special education programs were already teaching when they completed their teacher preparation programs. However, only 20% of elementary education program graduates, 26% of secondary education graduates, and 21% of all teacher education program graduates were already teaching before completing their preparation programs. Thus, a much larger proportion of special educators were hired before they were prepared. Most likely, these teachers were students in master's level teacher preparation programs, received their degrees as they became fully certified, and continued in their teaching positions after graduation.

The shortage of special education teachers being prepared by colleges and universities influences the teacher shortage in two important ways. First, and most obvious, there are simply not sufficient numbers of certified teachers available (or willing) to fill teaching positions in special education. For example, Boe, Cook, et al. (1998) examined the SASS data from the early 1990s and found that approximately one third of all individuals entering teaching positions in special education were not fully certified, thus intensifying the quality shortage of fully certified teachers in special education classrooms. A second way this shortage of new teachers in the pipeline contributes to the ongoing shortage of special education teachers relates to the fact that uncertified teachers leave the profession at a much higher rate than do fully certified teachers (Boe, Bobbitt, et al., 1999; Miller et al., 1999). For example, Boe et al. found that uncertified teachers were 3 times more likely to leave their teaching position than were fully certified teachers. Thus, hiring large numbers of uncertified teachers each year further adds to the "revolving door," with teachers moving in large numbers into and out of special education teaching positions.

A final consideration regarding teachers in the special education pipeline relates to factors that influence the limited number of prospective teachers who make decisions to enter special education teacher preparation programs. As previously noted, evidence from a national study suggests that twice as many prospective teachers enter elementary programs, per available position, as enter special education (Boe, Cook, et al., 1999). These data strongly suggest that elementary education teaching positions are more appealing than special education teaching positions. Teachers in the field provide further evidence for this contention, as special education teachers are 10 times more likely to transfer to general education as are general educators to special education (Boe, Bobbitt, et al., 1998).

Related to these findings, it is important to note that insufficient numbers of prospective teachers are attracted to special education, despite many incentives available from the U.S. Department of Education and from state education agencies across the nation. For example, many states have grants or forgivable loan programs for preservice students who prepare for careers in special education and teach for a given number of years (Hirsch et al., 2001). In addition, the U.S. Department of Education provides grants to colleges and universities to attract people into the profession. Obviously, these incentives have not been great enough to attract sufficient numbers of people into special education preparation programs to make up for the losses due to attrition and to fill new positions that are regularly created to teach the growing number of students with disabilities.

State and Local Policies and Practices Addressing the Teacher Shortage

As filling teacher vacancies has become more challenging and teacher shortages have increased across the nation, administrators from state departments of education, school districts, and other education agencies have implemented a variety of strategies directed at resolving this problem. To this point, no research has been conducted regarding the effectiveness of these approaches. Indeed, publications are only now begin-

ning to appear that describe these strategies in any detail (Hirsch et al., 2001; Wilson, Darling-Hammond, & Berry, 2001), and those that are described are predominantly used to attract teachers in general, and not special education teachers in particular.

Hirsch et al. (2001) provided a detailed description of approaches that are used by states and local education agencies to attract teachers to the profession or retain them once they are teaching. These approaches include the following:

- offering college scholarships, forgivable loans, alternative certification programs, and "future teacher" programs in high schools and community colleges;
- offering enticement by way of salaries and benefits (e.g., bonuses, lowered state tax rates, assistance with housing costs);
- reducing barriers related to the hiring process through strategies such as installing uniform hiring approaches and creating Web sites where hiring districts post openings or where applicants can post resumes and applications;
- luring retired teachers back to the classroom by allowing these teachers to draw full pensions and full salaries;
- offering incentives, such as financial bonuses and moving expenses, when redistributing teachers to critical shortage areas;
- creating strategies to maximize the mobility of teachers through the portability of pensions, reciprocity of licensing, and credit for years' experience; and
- creating programs to help districts to prepare their own, including local education agency preparation programs that are developed in cooperation with the state education agency or institutions of higher education.

Some states have developed systematic efforts to attract and retain certified teachers (Hirsch et al., 2001; Wilson, Darling-Hammond, & Berry, 2001). For example, Connecticut developed and implemented reform measures that have effectively eliminated their teacher shortage (Wilson et al., 2001). These measures included

- school funding equity across the state's poor and wealthy districts;
- high standards for teacher preparation program tied to districts' practices;
- a teacher induction program;
- scholarship programs for in-state high school graduates to attend teacher education programs in the state; and
- ongoing professional development for teachers.

California has also developed a comprehensive approach to addressing the teacher shortage, although a teacher shortage persists in that state (Hirsch et al., 2001). Measures used included

1. disseminating information about teaching as a career, requirements for teaching credentials, traditional and alternative preparation programs, and school districts in need of teachers;
2. conducting outreach activities in high schools in hopes of developing interest in teaching at an early age;
3. providing block grants to low-performing schools, to be used to recruit and retain teachers;
4. providing reductions in state taxes for teachers who serve at least 4 years;
5. increasing beginning-teacher salaries;
6. providing bonuses for national board–certified teachers;
7. providing financial incentives to teacher interns;
8. funding fellowships for prospective teachers who are willing to teach in low-performing schools;
9. funding loan forgiveness programs for teachers; and
10. increasing funds for teachers' retirement accounts.

Some local education agencies have developed their own programs or added to state programs by offering signing bonuses, moving expenses, salary supplements, higher beginning salaries, and many other incentives to fill positions with certified teachers. Some anecdotal evidence suggests these programs may be effective, but, as with statewide programs, empirical data are lacking regarding the effectiveness of these strategies.

There seems little doubt that state and local recruitment and retention programs are expensive, requiring the expenditure of education funds that are in short supply. It is possible that these strategies result in the redistribution of teachers to locales with more incentives, creating shortages in less aggressive school districts and states. In a more positive light, some of these strategies may result in teachers who might not otherwise teach (i.e., teachers from the reserve pool) entering the profession and the pipeline of teachers entering the profession from preparation programs being expanded. Hirsch et al. (2001) added an additional note of caution regarding recruitment and retention strategies used by states and local education agencies, suggesting that they may result in a lower quality of teachers.

In sum, although state and local recruitment and retention programs may be effective, empirical data are lacking regarding which of these strategies are effective, which are the most cost-effective, and which attract teachers to special education. Research investigations are needed to examine these issues, to ensure that funds are expended on effective and efficient methods for drawing individuals into the teaching pro-

fession and to ensure that highly qualified teachers staff classrooms.

What We Know About Teacher Supply and Demand

As the preceding information reveals, we know a great deal about the supply of and demand for special education teachers in the United States. Available data inform us in the following ways:

1. *The shortage of special education teachers is chronic and long-term and will get worse*. The most recent data available indicate that during the 2000–2001 school year, 47,532 individuals filling special education positions were not fully certified (approximately 11% of all teachers in special education; USDOE, 2003). This shortage has existed for at least the last 15 years (USDOE, 1998). Furthermore, the number of uncertified teachers increased by approximately 23%—from 1999 to 2001—the largest increase since the U.S. Department of Education has been reporting these data. Trends suggest that the need for new teachers will continue to grow at a rapid pace over the next 10 years, requiring an additional 135,000 to 200,000 teachers over the next decade (Bureau of Labor Statistics, 1999; Kozleski et al., 2000) and likely increasing the teacher shortage.

2. *There is a severe shortage of culturally and linguistically diverse teachers in the workforce, and this shortage is likely to get worse*. Currently, 38% of students identified with disabilities are from CLD backgrounds, whereas only 14% of their teachers are from similar backgrounds (USDOE, 2000). Olson (2000) predicted that if current trends continue, by 2009, 40% of students and 12% of teachers will come from diverse backgrounds. This situation exists in part because of poor educational opportunities for CLD students during their elementary and secondary education years that create barriers for college attendance. Another contributing factor is the lure of professions outside of education that have better working conditions and better pay than education.

3. *The shortage of special education teachers is pervasive across geographic regions and localities in the United States*. Although some states and localities do not face shortages, most do (AAEE, 2000; Carlson et al., 2002). For example, 98% of the nation's school districts report special education teacher shortages (ERIC, 2001), special education is the area of greatest shortage in the largest 200 cities (American Federation of Teachers, 1999), shortages are greatest in high-poverty schools (Carlson et al., 2002), and considerable teacher shortages exist in 10 of the 11 geographic regions of the United States (AAEE, 2000).

4. *The shortage of special education teachers is greater than teacher shortages in any other area, including mathematics and science (AAEE, 2000)*. The area with the greatest shortage of teachers nationally is emotional or behavioral disorders, followed by multicategorical, severe/profound disabilities, learning disabilities, and mild/moderate disabilities, in that order. Moreover, all 10 areas of teacher certification in special education rank in the top 15 shortage areas nationally (AAEE, 2000). Other teaching areas ranking in the top 15 are mathematics education (ranked 6th), physics (8th), bilingual education (9th), chemistry (12th), and computer science education (13th).

5. *Reducing teacher attrition is necessary if the teacher shortage is to be successfully addressed*. The most recent available data reveal that more than 13% of special education teachers leave the profession or transfer to general education classrooms each year. This means that every 4 years, more than half of all special education teachers depart. "It is as if we were pouring teachers into a bucket with a fist-sized hole in the bottom" (NCTAF, 2003, p. 8). The level of attrition from the profession must be addressed if the shortage of fully certified special education teachers is to be ameliorated.

6. *The teaching conditions in special education (Kozleski et al., 2000) are a major factor contributing to the teacher shortage*. These conditions contribute to an attrition rate in special education that averages more than 13% per year—twice as great as attrition in general education (Boe, Bobbitt, et al., 1998). Furthermore, the attrition rate of special educators transferring to general education is more than 10 times greater than that of general educators transferring to special education. Major factors contributing to this high attrition rate include job design, role overload, and student characteristics (Billingsley, 2003; Gersten et al., 2001; Kozleski, Mainzer, & Deshler, 1999).

7. *Insufficient numbers of new teachers are being prepared to meet the ongoing demand*. Although the production of teachers in special education increased during the 1990s, the most recent available data indicate that .86 teachers are prepared for each available position in special education, while more than twice as many teachers are produced for each available position in elementary general education (Boe, Cook, et al., 1999). Thus, the limited production of teachers by preparation programs remains a significant contributing factor to the shortage of fully certified teachers in special education in the United States.

In sum, it is obvious that we are facing pervasive, chronic shortages of special education teachers in many parts of the United States. If we are to successfully address these shortages, research is needed to provide a deeper understanding regarding why the shortages exist and what may be done to address them. Specific topics that begin to address this need are described in the following section.

What We Need to Learn More About

As the preceding information reveals, we know much about the demand for and supply and shortage of special education teachers in the United States. However, there are also many things we do not know. For example, the data we have pro-

vide a *general* picture of supply and demand and related teacher shortages, but little rich, detailed information is available that could provide insight into why the shortages exist and what may be done about them. Furthermore, the preponderance of the data that are currently available come from the early to mid-1990s' SASS and TFS and may not accurately portray the current teacher shortage and related issues such as attrition. There is a need for more current data. In the section that follows, recommendations for future research are provided that would begin to address the need to update our database and provide rich information regarding teacher supply, demand, and shortage issues in special education.

How do we attract more teachers to special education? Far more teachers are attracted to elementary education than there are available positions for. Incentives are available to bring teachers into special education, yet the limited production of teacher education programs persists. Research is needed to more fully understand why prospective teachers do not enroll in special education and what can be done to attract more teachers to the profession.

Why do so many teachers transfer from special to general education? Special education teachers leave the profession of teaching in roughly the same numbers as general educators. However, far more special educators transfer to general education than vice versa. If similar proportions of teachers transferred in both directions, the teacher shortage in special education would be largely solved. We must find out why so many teachers transfer out of special education, and what can be done to keep teachers in special education as well as to encourage general educators to transfer into special education. More specifically, we need to find out what the conditions of teaching in special education and general education are that differentially influence teacher attraction to and retention in the profession and which state and local policies influence these conditions.

How do we attract more CLD individuals to special education? The shortage of CLD teachers in special education is currently critical and is likely to get even worse in the near future unless we identify how to draw these individuals into the profession and methods for keeping them employed once they are in the profession. A rich source of potential data to address this issue is the grants that have been funded by the U.S. Department of Education, Office of Special Education Programs.

What strategies are effective in retaining well-qualified teachers? Many issues related to this question merit investigation, including whether systematic induction procedures are effective, whether professional development activities help retain teachers, and whether different kinds of teacher preparation influence retention. In addition to these issues, it is important to examine issues related to the conditions of teaching, and how these conditions might be changed to increase the retention of special education teachers.

A related question is, *What large-scale, systemic strategies used by state and local education agencies are effective in attracting teachers to the profession and retaining them once they are teaching?* At present, very expensive strategies, such as incentive programs for teachers, induction programs, school reform, teacher professional development, and a range of other strategies (Hirsch et al., 2001; Wilson et al., 2001), are being used to draw teachers into the profession and retain them. Many states are also attempting to expand the pipeline for teachers entering the profession through alternative certification programs. It is important to examine the extent to which these strategies produce high-quality teachers, reduce the teacher shortage, and attract teachers to less desirable schools and/or teaching roles, especially in special education.

Still another important question is, *How qualified are the teachers who are categorized as uncertified in a given state?* The answer to this question needs to include information regarding whether these "uncertified" teachers are partially certified in special education, certified in another area of education, certified in special education but not in the area of their primary teaching assignment, or lacking preparation to teach altogether. This information will provide insight into the level of preparation these teachers have for addressing the needs of students with disabilities and will likely provide insight into options for addressing the shortage of uncertified teachers.

A final critical question to address is, *What policy initiatives have states used to address teacher supply and demand, and which of these initiatives have been most effective?* States have amended a variety of policies concerning teacher certification, teacher education program approval, the makeup of teacher caseloads, and the like. In addition, many states have approved alternative paths to teacher certification. It is important to understand the effectiveness of these and other policy changes that have been made in states in an effort to improve the quality and increase the quantity of teachers available for students with disabilities. The resulting information will provide insight into how the teacher shortage might be influencing student performance, as well as strategies that could be used to reduce the shortage.

In addition to these questions, there is a need to update data regarding the teacher shortage in special education, using the recently released SASS database (updated in 1999–2000) and the TFS (updated in 2000–2001). Data currently available from the U.S. Department of Education Title II reports (http://www.title2.org/) should be included in these analyses. These data will tell us if the teacher shortage in special education has changed significantly in the last several years, if disproportionate numbers of special education teachers continue to transfer to general education, the extent to which the reserve pool continues to provide certified teachers, and so forth.

In sum, the available data starkly reveal that, in most of the United States, we face shortages of qualified people willing to work for the salaries we offer, under the working conditions that exist in classrooms. Unless these conditions are addressed, there seems to be little hope that the shortage of fully certified teachers in the profession will be significantly

reduced in the near future. Future research should provide insight into how special education can be made more attractive to future teachers, as well as more appealing as a profession that current teachers wish to remain in or transfer into. It is highly unlikely that there will be easy or inexpensive answers to these questions; however, until we have the necessary information, we can only guess at reasonable alternatives for addressing the teacher shortage. The research questions described in this article provide a beginning for addressing this need and for ultimately ensuring that a well-qualified teacher is provided for every student with a disability in the United States.

NOTES

1. For additional information regarding the technical aspects of these data, see http://www.IDEAdata.org/documents.html#datahistory.
2. To obtain the information provided here, the ERIC databases were searched from January 1990 to August 2001 using the following subject headings: *supply, demand, special education, teacher, teacher shortage,* and *special education personnel*. A hand search of relevant literature was also conducted, ensuring a thorough coverage of available information. Reviews of databases from Westat, the Office of Special Education Programs (including Annual Reports to Congress), the Bureau of Labor Statistics, and the National Center for Education Statistics served as the source for much of the data reported herein. Finally, information and data were obtained from the Web sites of several professional organizations, including the American Association for Employment in Education; American Council on Education; American Federation of Teachers; Council for Exceptional Children; National Association of State Directors of Special Education; National Commission on Teaching and America's Future; National Education Association; and National Governor's Association. It is noteworthy that after reviewing the preceding information, it became apparent that the best data available regarding teacher supply and demand came from three data sources. These data sources were NCES's SASS and TFS surveys, OSEP's *Report to Congress* data, and AAEE's annual surveys of teacher shortages. Although other data sources were used for information regarding specific issues (e.g., teachers in the pipeline), investigations that used these three data sources were primarily used when the supply of and demand for teachers was addressed in this review.
3. It is important to note that determining the shortage of special education teachers in the United States is more complex than it initially appears. Different types of vacancies reflect a range of different skills held by those teaching students with disabilities. An unfilled position can mean that no teacher was available or that a long-term substitute teacher assumed teaching responsibilities for a class of children. Most children with disabilities have a teacher, but many of these teachers are uncertified. A great range of qualifications exists among those who are uncertified: Some have no degrees; some have college degrees in other concentrations (e.g., English, drama, home economics); and still others have degrees in special education but are certified to teach children with another type of disability (i.e., are certified to teach children with learning disabilities but are actually teaching children with visual disabilities). Regardless of the level of training (or lack thereof), all of these teachers are considered uncertified.
4. The net graduates excluded those who were continuing teachers (already employed while finishing school).

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