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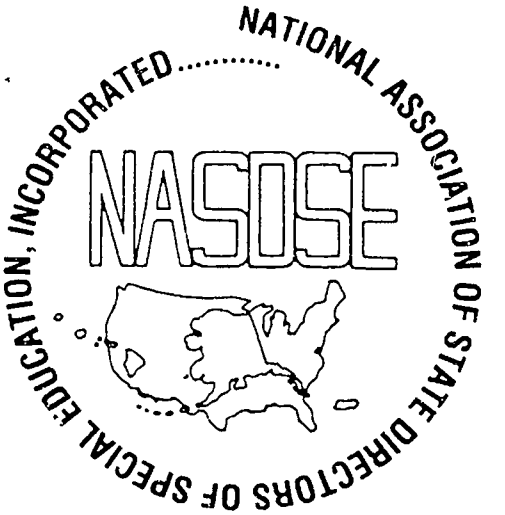
ABSTRACT

This report offers a perspective on state supply and demand data collection efforts concerning special education personnel. The report includes: (1) an overview of federal data requirements; (2) national data on special education and related services personnel as reported in the U.S. Department of Education's "Fifteenth Annual Report to Congress on the Implementation of the Individuals with Disabilities Education Act"; (3) a review of selected literature on the collection of state personnel supply and demand data; (4) a description of a recent effort to collect state projection methodology from several states; and (5) a concluding section that notes possible next steps regarding special education personnel supply and demand. The report concludes that many states are struggling with federal data requirements and are reevaluating their data collection and projection procedures. The report also notes that Westat, Incorporated, will calculate a 5-year demand projection figure for total teachers and for related services by type, which states can use for the 1993-94 data submission. An appendix contains individual descriptions of supply/demand projection methodology used in Florida, Kansas, Maryland, Michigan, New York, Ohio, and Wisconsin. (JDD)

A Report on the Personnel Supply and Demand Data Collected by States

Networking System for Training Education Personnel



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A Report on the Personnel Supply and Demand Data Collected by States

As part of its workscope, the *Networking System for Training Education Personnel* (NSTEP) is to "collect and disseminate information on states' processes for supply/demand data collection." The importance of this information was reinforced by NSTEP's Data Collection Task Force which recommended a review and update of current state projection models and dissemination of these and other potential models to SEA personnel.

The report is intended to provide a perspective on current state supply and demand data collection efforts as well as to provide a framework for discussion of future activities regarding this topic. It is the product of collaborative work between NSTEP and the *Clearinghouse for Professions in Special Education* at the Council for Exceptional Children and the National Association of State Directors of Special Education. The report is divided into five sections: (1) an overview of the federal data requirements; (2) the most recent national data on special education and related services personnel as reported in the *Fifteenth Annual Report to Congress* (subsequently referred to as ARC, 1993); (3) a review of selected literature on the collection of state personnel supply and demand data; (4) a description of a recent effort to collect state projection methodology from 12 states; and (5) a concluding section that offers a discussion of possible next steps regarding special education personnel supply and demand. Appendix A contains individual descriptions of supply/demand projection methodology for participating states.

The Federal Data Requirements for Personnel

New personnel data requirements were introduced with the passage of the *Individuals with Disabilities Education Act Amendments of 1990* (IDEA). In Section 1418(b) of the Act, States are required to report the number and type of personnel that are employed in the provision of special education and related services to children and youth with disabilities by disability category served, as well as those professionals providing early intervention services. Beginning in FY 1993, States are to report data addressing current and projected special education and related services needs, and data on the number of personnel who are employed on an emergency, provisional, or other basis, who do not hold appropriate State certification or licensure.

The requirements in Section 1418 are linked to the state plan provisions in Section 1413(a)(3)(A) that direct states to develop and maintain a system for determining, on an annual basis--

> (I) the number and type of personnel, including leadership personnel, that are employed in the provision of special education and related services, by area of specialization, including the number of such personnel who are employed on an emergency, provisional, or other basis, who do not hold appropriate State certification and licensure; and

(II) the number and type of personnel, including leadership personnel, needed, and a projection of the numbers of such personnel that will be needed in five years, based on projections of individuals to be served, retirement and other leaving of personnel from the field, and other relevant factors;

(ii) the development and maintenance of a system for determining, on an annual basis, the institutions of higher education within the State that are preparing special education and related services personnel, including leadership personnel, by area of specialization, including--

(I) the numbers of students enrolled in such programs, and

(II) the number who graduated with certification or licensure, or with credentials to qualify for certification or licensure, during the past year; and

(iii) the development, updating, and implementation of a plan that--

(I) will address current and projected special education and related services personnel needs, including the need for leadership personnel; and

(II) coordinates and facilitates efforts among State and local education agencies, institutions of higher education, and professional associations to recruit, prepare, and retain qualified personnel, including personnel from minority background, and personnel with disabilities;...

Supply and Demand Data in the *Fifteenth Annual Report to Congress*

For the 1990-1991 school year, states reported a total of 297,490 special education teachers providing services to the approximately 4,400,000 students with disabilities ages 6-21 that were served under Chapter 1 (SOP) and Part B of the IDEA (ARC, 1993). This figure represents a 2.4 percent increase over the 1989-90 school year. The number of special education teachers reported by states is broken down by category of disability, and as might be expected, states reported the largest number of teachers (96,000) in the category of learning disabilities. Personnel for students ages 3-5 were not reported according to disability category; however, the total number of special education teachers for this age group was reported to be 15,192--a 7.1 percent increase from 1989-90.

The number of staff, other than teachers, employed to serve students with disabilities ages 3-21 was reported to be 295,822--a comparable figure to the number of special education teachers employed. This represents an 8.4 percent increase from the previous year; in fact, the growth rate for these staff has increased by at least six percent for the three years previous to 1990-91. The largest category of other instructional staff was "teacher aides" with 162,043 personnel--over half (55 percent) of the total number of personnel employed.

States must also provide Office of Special Education Programs (OSEP) with data on the number of teachers and other staff that are currently *needed* to provide services. This latter category includes staff "needed due to vacancies or to replace staff that are not fully certified or adequately trained" (ARC, 1993, p. 36). In 1990-91, states reported a need for 26,934 teachers,

a figure that represents a 2.4 percent increase from 1989-90. It is worth noting, however, that according to the ARC "about one out of four of the teachers reported in this shortage are reported by the State of New York" (p. 38). Particularly needed are teachers to serve students with specific learning disabilities (8,168), students in cross-categorical programs (5,062), and students with serious emotional disturbance (4,488). States reported needing a total of 2,577 teachers for students age 3-5, an 8.5 percent *decrease* for 1989-90.

For students age 3-21, states reported needing approximately 15,000 personnel other than teachers. The largest category was again, teacher aides, with 6,413 (over 40 percent) reported as needed. Other staff reported to be in demand included psychologists (1,297), physical therapists (848), and occupational therapists (815).

Issues in State Data Collection on Personnel

Definitions of personnel data elements. OSEP contracted with Westat to complete an analysis comparing state and federal definitions of special education and related services personnel (Beller-Simms & O'Reilly, 1992). The study found that definitions of personnel serving students with disabilities varied widely both among states, and between the definitions used by states and the federal government. However, Westat found more similarity between state and federal definitions for teachers than for related services personnel. For special education teachers, some states employed a general definition of teacher rather than separate definitions by category of disability. Other states did not define teacher categories at all, but counted all teachers of students with disabilities within the cross-categorical data category. In some instances, counts of teachers were combined for certain categories, such as deaf and hard of hearing, while other categories were kept separate. All too often, Beller-Simms and O'Reilly found it difficult to determine exactly how state personnel data were analyzed to meet federal reporting requirements; for example, whether teachers were counted in certain disability categories based on the disability of the students or upon the certification of the teacher.

There are a number of factors that negatively affect the comparability of related services personnel data among states and between states and the federal requirements: (a) these data may not be maintained by special education, but by some other department; (b) some types of personnel (e.g., vocational teachers) serve both regular and special education and it is difficult to calculate the time spent with each group; (c) states vary in their treatment of contacted personnel, and (d) the availability of data on personnel vacancies varies widely.

All these factors influence the quality and comparability of the personnel data maintained by states and reported to the federal government. It severely affects the validity of national and/or regional analyses or projections of personnel supply and demand in special education or the related services. Standardization of data definitions would assist in the analysis of factors associated with personnel shortages or surpluses, and in long term planning.

Analysis of personnel data systems. In Spring 1992, NASDSE and Westat conducted a survey designed to obtain information on states' personnel data collection systems. The survey had been recommended by a special task force convened by OSEP to issue recommendations concerning strategies for meeting the new personnel data reporting requirements. The survey was sent to all 50 states, the District of Columbia, and the 7 non-state jurisdictions. Surveys were returned from 48 of the 50 states, the District of Columbia, the Commonwealth of the Northern Marianas, and the Republic of Palau. The survey specifically addressed three areas regarding special education personnel data: (a) state personnel data collection systems, (b) procedures for projecting personnel demand, and (c) availability and utility of specific data elements. States were also asked to provide documentation for OSEP to review in order to determine a mechanism for describing personnel demand that is "meaningful both on a national level and across states" (O'Reilly & Wiles, 1992, p. 2).

The results of the survey indicated that states differed in the process used to collect personnel data and the extent to which the data collection process had been computerized. States did, however, use the same process to obtain information on both teachers and related services personnel. Most states (71 percent) indicated that special education personnel were part of a larger state data base that includes general education personnel. Also, most states indicated that the SEA was responsible for collecting information on early childhood staff (working with ages 3-5) and that this information was kept in the same data base as the personnel working with school-aged children[1]. Over three-quarters of the states maintain data at the individual staff level[2].

Demand data for projecting need. In the 1992 survey, 24 states (just under 50 percent) reported that they had a projection methodology in place. At that time the majority of the states making staff projections did so for teachers (96 percent) at the state-level (88 percent). Far fewer states projected need for other special education personnel, such as related services personnel, administrators, or paraprofessionals. Of these states, most reported that the same projection procedure was used for both special and general education; seven states reported a separate procedure for calculating special education projections. These seven states were Florida, Illinois, Maryland, Michigan, New York, Ohio, and Wisconsin. These were also the only states to provide NASDSE and Westat with documentation regarding projection methodology.

The survey also examined whether or not data elements required by the IDEA Amendments of 1990 were already a part of state data systems. In general, states were not

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[1] Most states (approximately 64 percent) indicated that the SEA was *not* the agency responsible for collecting information on early intervention (infants and toddlers ages 0-2).

[2] A more recent analysis of personnel data systems conducted by Beller-Simms (1994) described typical components of state data bases include data on certification, social security (or identification) number for personnel, level of educational attainment, job title, and district/school identification. The report includes a state-by-state comparison regarding types of personnel data collected.

collecting the types of personnel demand data that were most useful for projecting future need within the state (O'Reilly & Wiles, 1992). For example, most states (85 percent) indicated that data on teacher demand by certification categories would be useful, but only half of those states indicated that they could match students with teachers according to staff certification categories. Also, 84 percent of states reported that teacher demand by teaching assignment would be useful, but only two-thirds of these states actually had the data necessary to determine demand according to teacher assignment.

As mentioned above, the third section of the 1992 survey dealt with the availability of data elements newly required by the IDEA amendments of 1990, including the projection of personnel demand. NASDSE and Westat determined that the following data elements were likely to be needed in order to meet those requirements (although the exact elements will vary depending on the projection methodology):

- number employed who are fully certified;
- number employed who are less than fully certified;
- number of vacant positions;
- number of contracted positions (related services personnel only);
- number of retained staff (or new hires) who are fully certified;
- number of retained staff (or new hires) who are less than fully certified; and
- actual student/staff ratios.

O'Reilly and Wiles (1992, p. 10) concluded that "the majority of states currently have available all of the data elements needed to meet the new data reporting requirements **for teachers**, and for projecting special education teacher demand using **a simple projection methodology** [emphasis added]." On a less optimistic note, the results of the survey indicated that fewer states had the necessary data elements for related services staff. The data on related service personnel were also hard to interpret due to the varying definitions and categories of related services across states. O'Reilly and Wiles noted that some related services personnel require licensure in all states (e.g., occupational or physical therapists) while other types of certification (e.g., work study coordinators) differ among states.

Supply data for projecting need. Much of the O'Reilly and Wiles study focused on the collection of demand data elements to be used in the projection of need or for other purposes. But, personnel supply data issues also exist. In particular, the need to develop an effective collaborative relationship with institutions of higher education (IHEs) that will facilitate the collection of accurate and reliable data on students preparing to work in special education or the related services. This type of supportive, cooperative relationship between the SEA, IHE's and the LEAs has been difficult to achieve in many states. Without reliable data on the supply of personnel "in the pipeline" the validity of projection figures is in doubt.

Another issue in collecting supply-side data has been to determine exactly which data elements (perhaps beyond those required in IDEA) might be necessary to collect in order to make accurate projections. A work group of SEA and OSEP representatives met in 1992 to discuss the federal data requirements and make recommendations. For example, in their discussion of the requirement that states report on an annual basis, by area of specialization, the number of students enrolled in programs for the preparation of special education and related services personnel (34 CFR 300.383(c)(1)), the work group proposed that the following additional data elements might provide a clearer picture of supply:

- the number of students enrolled, by program, by year, and anticipated program completion dates
- the number of students enrolled in graduate programs who already hold certification in the area in which they are enrolled
- the number of students enrolled in graduate programs who are attending part time while continuing to work in some area of special education
- the number of students enrolled in graduate school who hold certification in some area of special education who are seeking new endorsements (e.g., administrative credentials)
- the number of students enrolled in dual certification programs
- the number of in-state and out-of-state students enrolled in programs
- a historic perspective of the number of students graduating from programs that accept positions in special education within the state
- demographic and ethnographic data on students enrolled in programs (National Association of State Directors of Special Education, 1993)

Updating State Personnel Projection Methodologies

Although the literature reviewed above was written several years ago when the requirements to project the need for personnel were first initiated, states are still experiencing difficulty in fulfilling this requirement. Simple projection figures currently are generated by all states, but SEA staff remain frustrated by issues related to the validity, reliability, and utility of these figures, both at the state and national levels. In order to further refine their data systems, States continue to request examples of projection methodology developed by other states. Since these descriptions had not been collected formally since 1992 (O'Reilly & Wiles, 1992), NSTEP and Clearinghouse staff sought to update and expand, where possible, this information.

In addition to updating the descriptions collected by O'Reilly and Wiles, NSTEP and Clearinghouse staff initiated activities aimed at determining other states that have developed or were developing models for collecting supply and demand data and projecting need for personnel.

Several sources of information were reviewed in order to ascertain which states may have projection methodology that could be summarized and disseminated to interested parties:

NSTEP needs assessment: NSTEP asked states to report their information needs in the area of federal data collection. The most frequent response by CSPD coordinators was for "a strategy for supply/demand projection" (20 states). Some states did indicate, however, that they had developed (or were developing) a projection model or that they "had no needs in this area."

Search of the State Policy Database: Project FORUM at NASDSE currently operates an electronic state policy database that contains state special education regulations, state special education statutes, and state plans. As of May 11, 1994, the database contained some or all of the documents for 33 states. The database allows for electronic searches on key words, and a search of the content of state plans for information regarding states' data collection on personnel supply and demand was conducted. The search revealed nine states that addressed supply and demand projection; however, in most instances, this consisted of convening a task force on the issue or implementing other "planning procedures".

Informal Interviews with SEA Personnel: In April and May 1994, staff from the Clearinghouse on Professions in Special Education conducted informal telephone interviews with SEA personnel from 10 states on their supply and demand data collection efforts. The purpose of the interviews was to collect information on the status of the states' projection methodology and to develop a sense of whether states perceived themselves as collecting information on supply and demand beyond what is required for federal reporting purposes.

The cumulative evidence from these three sources indicated that 12 states held promise for having information regarding personnel supply, demand, and/or projection methodology that could be used as models by other states. The identified states were California, Florida, Illinois, Kansas, Kentucky, Maryland, Michigan, New York, Ohio, South Carolina, Utah, and Wisconsin.

The states on this list that had participated in the O'Reilly and Wiles survey were sent descriptions of their state supply/demand procedures along with a feedback form. They were asked to verify and/or add to the information provided in the descriptions using the feedback form. The states that participated in the earlier survey were Florida, Illinois, Maryland, Michigan, New York, Ohio, Wisconsin. The other states (California, Kansas, Kentucky, South Carolina, and Utah) were also asked to send accompanying information on (a) their data collection information and forms, (b) their data collection procedures and strategies, and (c) their projections models and formulae.

Based on the responses received from targeted states as of September 1994, difficulties continue in the area of special education personnel supply/demand projection. Some states were in the process of discussing and revising their procedures. California, Kentucky, and South Carolina, for example, indicated that their procedures were being reformulated, and it would be

premature to send supply/demand information at this time. Utah reported using data collection methodology that did not deviate significantly from current federal requirements. Illinois indicated that the earlier 1992 description was no longer accurate and their description was withdrawn. Nevertheless, the majority of states that participated in the NASDSE/Westat survey indicated that their procedures had not changed significantly since 1992. Appendix A provides an updated state-by-state description of the personnel supply/demand projection methodology from these states (i.e., Florida, Maryland, Michigan, New York, Ohio, Wisconsin) in addition to a description of projection methodologies used in Kansas. The Kansas description was prepared based on materials shared by SEA personnel with Clearinghouse staff.

Closing Statements

Supply/Demand data requirements are contained in IDEA in Section 1418, *Evaluation*, and in Section 1413, *State Plans*. Based on the information gathered in this report, many states are struggling with these requirements and have convened task forces or advisory groups that are currently re-evaluating states' procedures in special education personnel supply/demand data collection and projection procedures.

For states engaging in this process, the descriptions of the projection methodologies provided in Appendix A of this report may be of assistance. Each state has unique considerations regarding special education personnel supply and demand, and each state has different human and fiscal resources to dedicate to the special education supply/demand problem. Nevertheless, the descriptions provided here may provide a "starting point" for states engaged in redesigning their projection methodology. We urge interested persons to contact the staff identified for each state description with individual questions or comments. In addition, we ask that states share with NSTEP their projection methodology as it is developed.

Lastly, the role of OSEP in assisting states to project the need for special education and related services personnel has been clarified. Recently, both Westat and OSEP (F. E. O'Reilly, personal communication, July 19, 1994; S. Brown, personal communication, September 12, 1994) have indicated that Westat will calculate a five-year demand projection figure for **total teachers** (not by category) and for **related services by type** beginning next year for the 93-94 data submitted under the requirements of the IDEA, Section 1418 (b)(1). For the projection requirements under Section 1413 (i.e., state plan), states can either use the Westat projection figure or calculate their own. It should be noted that the Westat projection figure is for personnel demand only--a supply figure will not be provided by Westat. CSPD coordinators need to be aware that the Westat demand projection figure will be available for use by the states.

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APPENDIX A

State Descriptions of Personnel Projection Methodology

FLORIDA

Florida annually projects teacher demand by subject field in three program areas: general education, special education, and vocational education. Three indices are used to gauge the demand for new teachers: (a) the number of fall vacancies, (b) the annual number of teachers terminating employment, and (c) the number of out-of-field teachers. The number of additional teachers needed each year also depends upon enrollment growth. Projections of teacher demand are based on four data sources: (a) teacher/student ratios computed from the Florida Department of Education's student and teacher information database which provides information on the current number of teachers and students for each course; (b) overall termination rates computed from teacher termination data; (c) termination rates by fields estimated based on vacancies by subject field as reflected in a fall teacher vacancy survey; and (4) long-range projections of full-time equivalent enrollments for grades K-6 and 7-12 made by the Deputy Commissioner's Office.

Each year's projection is based on the number of teachers employed during the prior year. Using this number, estimates are made of the number of teacher terminations by subject field for that year and the number of teachers needed because of enrollment increases (or decreases for particular grade levels). The sum of these items equals the number of additional teachers needed.

$$D_n = (T_{n-1} * TR) + EA_E$$

D_n = Teacher shortage in Year n
T_{n-1} = Number of teachers employed in Year n-1
TR = Teacher termination rate
EA_E = Adjustment due to change in enrollment

Teacher supply is primarily measured by the number of graduates of Florida teacher education programs. Statistics on the number of Florida teacher education graduates are based on an annual survey of projected graduates. Since 1983, the 28 Florida institutions with teacher education programs have been annually surveyed on the number of students completing Florida-approved teacher education programs. The survey, which also requests that the institutions project the number of graduates for the following three years, covers only those graduates seeking initial certification. Data is collected by subject field in three program areas: general education, special education, and vocational education.

Trend data since 1965 is also available for baccalaureate degrees in education granted at the nine state universities. These data differ from the teacher education program data in that not all education baccalaureate recipients have completed an approved program. These data provide indication of teacher supply trends at a slightly earlier point in the process.

Critical shortage areas are partially determined through examination of the ratio of the number of new teachers needed to the number of graduates of teacher education programs. It is important to note that recent graduates of teacher education programs constitute only one component, albeit

an easily measurable one, of the potential Florida teacher pool. Other sources of new teachers include experienced teachers returning to education, out-of-state teachers, and teachers completing requirements through alternative preparation programs.

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KANSAS

Note. The following description reflects the supply/demand projection methodology that is currently being discussed in Kansas as part of the state's goals for CSPD.

The state-wide system for projecting supply/demand on an annual basis and for five-years into the future contains several components. These are listed below.

1. The population of students with disabilities will be projected for five years into the future. This will be accomplished by calculating prevalence rates for Kansas in each category of disability using data from the *Annual Report to Congress*. Also, the resident population of all persons between the ages of birth to 21 years will be projected for five years into the future using birth rate statistics provided by the Kansas Association of School Boards and the Kansas Department of Vital Statistics. These projections will include the number of regular education students at each grade level, K to 12, and the number of individuals from birth to five years of age. The projected number of students with disabilities will be calculated by multiplying the prevalence rates times the resident population for each of the next five years.

2. The supply and demand for personnel will be projected five years into the future. First, the number of personnel needed to provide services for the estimated number of students will be calculated based on current student/staff ratios. In addition, the attrition rate for personnel will be calculated. The sources for new hires will also be determined by examining (1) the number of personnel from other states; (2) the number of personnel, trained in Kansas, who return after an absence; and (3) the number of newly trained personnel provided by Kansas IHEs. Finally, the number of personnel in the Kansas IHE pipelines will be determined.

3. An annual supply/demand report for each or the next five years will be developed using the data sources listed above.

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MARYLAND

Since 1985, the Maryland State Board of Education has made annual declarations of teacher certification areas and geographic regions of the state characterized by chronic teacher shortages. The Maryland State Department of Education annually releases teacher supply and demand reports which provide the data upon which the declarations are made. Two-year projections (one-year projections prior to 1991) of supply and demand for new teachers are also provided.

There are four phases to the production of the annual supply and demand reports. The first phase consists of the collection and interpretation of actual personnel data for the base (previous) year by certification areas for each school system. These data are obtained from each school system's personnel records.

Next, the personnel needs of each school system for the coming school year are projected. These projections are based upon survey forms sent to personnel directors requesting estimates of projected vacancies by teaching field. The cumulative needs of all 24 school systems are combined to arrive at state totals.

For the third phase, the supply of teachers from four major sources are evaluated, including: (a) beginning teachers who are recent graduates of Maryland institutions of higher education; (b) beginning teachers who are recent graduates of out-of-state institutions of higher education; (c) experienced teachers from Maryland who are returning to teaching; and (d) experienced teachers from out-of-state. The in-state sources of supply are compiled from data reported by the deans and directors of teacher education at 21 Maryland colleges and universities. The out-of-state supply reflects the results of a statistical estimate of expected supply based on past trends.

These supply and demand data are compared for each certification area to determine if discrepancies exist. Discrepancies refer to differences between projected demand (position vacancies) and projected supply (number of graduates of teacher education programs and experienced teachers who are expected to become new hires). Data are analyzed for the state as a whole, not by school system. Finally, supply and demand data and other relevant information are studied by region to determine which school systems meet the criteria for geographic regions of shortage.

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MICHIGAN

Michigan employs two models to project special education personnel supply and demand, a market-based model and a prevalence model. The Market-Based Model uses the child count data to predict demand for special educational personnel. The Prevalence Model uses student data and the child count data to predict demand.

Market-Based Model

Using the market-based formula, if supply is greater than demand (determined by subtracting the sum of the supply data from the sum of the demand data) then a surplus in the workforce exists. If demand data is larger than supply data then a need exists. Some of the variables that affect a market-based approach include retention, retirement, recruitment, vacant funded positions, certification standards, pre-service training, and emergency approved positions. Market demand is simply the number of vacant funded positions. The most common definition of need in this model (while not the most accurate) is whether existing positions are filled with uncertified (or emergency approved) personnel or do the positions remain vacant.

From a market-based perspective, current need is the difference between the number of certified staff filling funded positions and the actual number of funded positions. Typically, positions for which certified staff cannot be found are filled with staff who do not meet state requirements. However, other variables such as attrition and staff growth must also be considered. Four demand variables (G,A,T,V) and three supply variables (OS,IS,AP) are used in this model to build a projection. The formula is as follows:

$$\textbf{Demand } (D) = \sum_{n} G + \sum_{n} A + \sum_{n} T + \sum_{n} V$$

G = Growth over prior year (if any)
A = Attrition (including retirement)
T = Temporary/Emergency approved
V = Vacant funded positions

$$\textbf{Supply } (S) = \sum_{n} IS + \sum_{n} OS + \sum_{n} AP$$

IS = In-state trained (remove those moving out of state)
OS = Out-state trained being hired
AP = Active pool which includes:

- special education teachers on leave planning to return
- general education teachers with spec. ed. endorsement
- recent graduates who are not yet employed

Using the market-based formula, if supply is greater than demand (determined by subtracting the sum of the supply data from the sum of the demand data) than a surplus in the workforce exists. If the number of teachers in demand is larger than the supply of teachers, then a need exists.

$$\text{If } S > D \text{ then } \sum_{n} S - \sum_{n} D = \text{Surplus}$$

$$\text{If } D > S \text{ then } \sum_{n} D - \sum_{n} S = \text{Need}$$

A problem with this model is the difficulty in establishing figures for the active pool. Over time, not all graduates from IHEs are able to secure employment in special education, not all special education personnel on leave return to the profession, and not many general education teachers (with special education endorsements) wish to return to special education. An interval value must determine when individuals are removed from the active pool and placed in a reserve pool. Caution is needed. When the size of the active pool cannot be determined, the formula may produce extremely inaccurate projections of the supply or demand.

Prevalence Model

Work force supply or demand from a prevalence-based perspective is based on the difference between the number of certified teachers who are employed based upon identification rates of the school population with disabilities. From a prevalence-based perspective, personnel supply or demand is determined independently of the number of funded positions. The issues of current uncertified staff or vacancies are also not relevant. Using this perspective, a need for or a surplus of teachers can be determined by comparing the student head count to the number of students per teacher required in state rules/regulations. The formula used for this model is based on prevalence by impairment area:

$$\frac{\text{Actual \# of Students by Impairment Area}}{\text{Maximum \# Allowed by Rule Per Staff}} = \text{Projected Staff}$$

When projected staff is larger than existing staff (by endorsement area) then a surplus exists. When projected staff is smaller than existing staff then a need exists.

Projected Staff - Existing Staff by Endorsement Area = Need or Surplus Staff

Even though a state's delivery system may be structured around discrete classifications, frequently students are not placed in categorical programs based on their label but may be placed in programs based upon their actual educational needs. For this reason, a second approach should also be used that includes the number of students receiving special education in their primary

educational placement (rather than by their impairment area). This number may then be compared to the number of staff assigned to that program **as measured by FTE.** Using the results of this model's formula to make comparison within a program often produces better measures of work force demand or supply.

$$\frac{\text{Actual \# of Students for Program}}{\text{Maximum \# Allowed in Program}} = \text{Projected Staff}$$

Projected Staff - Existing Staff by FTE in Endorsement Area = Need or Surplus Staff

This formula can more easily be used to forecast supply and demand. Using a simple spreadsheet, one can examine various scenarios of personnel need and surplus very easily. This model only projects overall state supply or demand and may not be sensitive to trends in particular rural or urban districts. However, a more serious problem with this model is the high number of variables that can affect an accurate projection. These variables include: deviations or waivers to the number of students in programs, the use of consultant or collaborative teaching approaches which lower student/teacher ratios, special education reform movements (e.g., inclusive education), and programmatic trends such as generic labels for students as well as funding issues.

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Reference

Parshall, L. (1994). Special education workforce. *Proceedings of the Eighth Annual Conference on the Management of Federal/State Data Systems* (pp. 35-41). Rockville, MD: Westat.

NEW YORK

Note. The New York Office of Special Education Services is currently developing a new data collection instrument (PD-6) which will be sent to school districts this year. This will provide the NYS Education Department with local, regional and statewide data on the number of special education and related services staff who are permanently, provisionally and temporarily certified in each appropriate certification or licensure area as well as projections for future needs.

Beginning in 1989, the New York State Department of Education projected the number of teaching positions in kindergarten through Grade 12 for regular day public schools in New York for 1989-90 through 1993-94. For each year thereafter the Bureau of Educational Data Systems (BEDS Office) develops a five-year projection based on data from the current year. Excluded from projections are positions in prekindergarten, nonpublic schools, and Boards of Cooperative Education Services (BOCES). The projections of classroom teachers are based on two underlying assumptions: (1) the number of teachers in all subject areas in the base year (beginning in 1988-89) are adequate to meet the educational needs of the public schools in the state; and (2) the number of teachers needed is largely determined by the number of students enrolled. No assumptions are made concerning future economic, social, or political conditions which might impact on need for teachers.

Separate projections are developed for New York City and for the State exclusive of New York City. These projections are added to arrive at a total New York State projection. Projections are computed for fifteen major subject areas grouped within grade level ranges: elementary, secondary, and elementary/secondary combined.

For each of the two geographic sectors, trends in pupil/teacher ratios for each subject area since 1982-83 are examined. Initial trends suggested that pupil/teacher ratios were approaching minimum point. Hence, for most subject areas, ratios are assumed to remain constant at their current values. For a few high growth subjects, the ratios are projected to decrease slightly for a year, then held constant. Future student enrollment projections are based on actual birth rate data collected from the NYS Department of Economics.

Following the projection of pupil/teacher ratios, the number of general education teachers required for each year in each subject area are computed by dividing the projected enrollment for the appropriate grade level by the projected pupil/teacher ratio for that year. Special education teachers are projected based on the historic ratio of special education teachers to enrollment of ungraded students with disabilities.

A projection of current teachers expected to remain in the profession through the five-year projection period is also undertaken. For these projections, teacher recruitment and retirement information on public school teachers who are members of the NYS Teacher Retirement System is examined. The most recent file of classroom teachers is compared with the file for the prior year to determine the proportion of teachers that appeared on both files. This proportion, or retention rate, is determined for each major subject area for seven age groups. By multiplying each subgroup of teachers in the base year by the appropriate retention rate, the number of

teachers expected to remain in the base year is estimated for each age group within major subject areas. Successive projections for five-year periods are computed by applying the retention rates to preceding projected figures. Finally, for each school year, the number of positions to be filled is obtained by subtracting the number of classroom teachers expected to remain from the projected number of classroom teachers. Additionally, the number of these vacancies to be filled by new teachers (first year) is also projected.

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OHIO

In 1991, the Ohio Department of Education projected the number of educational personnel employed and needed to provide services to students in kindergarten through twelfth grade for 1991-92 to 1995-96. Projections were completed for 37 categories of certificated personnel in special and general education, including some related services staff. Ohio maintains a database with fourteen years of data on all certificated personnel in the state which contains the following: the number of teachers employed; the number of teachers per 1000 students; the number and percent of teachers who held the same position the previous year; the number and percent of teachers who were not employed in the public schools the previous years; the number and a percent of newly-hired teachers; the number and percent of newly-hired teachers without prior teaching experience; and the number and percent of teachers who transferred into the position from another position in the public schools.

These data were used for five-year trend analyses of enrollment and personnel data (1986-87 to 1990-91) and projections were developed for 1991-92 through 1995-96. Trends in the number of teachers employed per 1000 students from 1986-87 to 1990-91 were examined and were projected for five years using a linear regression model. The projected number of teachers employed in each teaching field was then computed from projected enrollment and teacher/student ratios.

The percentage of new teachers[3] hired and the percentage of teachers transferring into a particular teaching field were projected using two- through five-year moving averages[4]. These ratios were used in conjunction with the projected total number of teachers to project the number of new teachers and the number of teachers transferring into each personnel category.

The demand for teachers in each field is defined as the sum of new teachers plus the sum of teachers transferring into that field. Supply of teachers in each field is defined as the sum of all new four-year provisional certificates issued by the Ohio Department of Education in that field. The percentage of supply as a function of total teachers is projected using two- through five-year moving averages. Ohio categorizes the personnel supply and demand through analysis of the supply/demand ratio. The ratio is evaluated as follows: > 3.0 = Considerable Surplus; > 2.0 = Some Surplus; 1.2 - 2.0 = Balanced; 1.0 - 1.2 = Some Shortage; and < 1.0 = Considerable Shortage.

[3] Defined as any teacher who did not teach in Ohio's public schools the preceding year.

[4] The specific interval used in each projection was selected based on a subjective judgement as to which average appeared to best describe the future.

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Reference

Bowers, G. R. (1991). *Ohio teacher supply and demand, 1991*. Columbus, OH: Ohio Department of Education.

WISCONSIN

Note. The following projection methodology was developed by the University of Wisconsin at Whitewater for the State of Wisconsin Department of Public Instruction.

Since 1979, Wisconsin has projected special education personnel demand as part of an annual comprehensive assessment of special education service needs. These projections, conducted by the Wisconsin Handicapped Needs Assessment Project, commenced with an analysis of the certification/employment data file of the Wisconsin Department of Public Instruction to identify the sources of newly-hired special education teachers by certification area. The four major areas that represent possible sources of new hires were: teachers trained out-of-state; experienced teachers returning or transferring; teachers newly trained in-state; and teachers on newly-issued emergency licenses. The number and relative percentage of teachers from these sources were computed. The potential for increasing the number of students from each source was evaluated. The number of teachers trained out-of-state and the number of returning teachers seemed to be primarily influenced by factors beyond the control of the state. These factors included the relocation of the primary income earner, economic issues, and the enrollment of their young children in school. Also, the restrictive nature of certification standards in some areas of special education limited the availability of teachers trained out-of-state. The date on emergency licenses indicated which certification areas were in particular need of additional personnel.

It was concluded that the most effective way to reduce teacher shortages was by increasing the number of teachers prepared in-state. A projection of additional teacher trainees needed for each certification area was computed by relating the proportion of newly prepared teachers who secure teaching positions to the additional teachers needed as determined by the number of newly-issued emergency licenses in a given certification category. This relationship can be expressed as follows:

$$N = \frac{E}{(H/C)}$$

where: N = Number of Additional Teacher Trainees Needed;
E = Number of Newly-Issued Emergency Licenses;
H = Number of Newly-Hired Inexperienced Teachers; and
C = Number of Certifications Awarded the Prior Year.

It is important to note that this model only projects the number of additional teachers needed if there is a shortage of teachers indicated by the issuance of emergency licenses. Its accuracy depends on the stability of the student population and consistent levels of teacher preparation. Furthermore, there are several limitations to the sole use of emergency licenses to accurately

project teacher needs. The teacher need in some isolated rural areas may be primarily due to the lack of employment opportunities for the spouses of certified teachers. This would be particularly true for low incidence disabilities. The model assumes that newly trained teachers could obtain positions if they desired them. If there is an overproduction of teachers in certain categories, the projected employment ratio cannot be used to project need, since there is no need.

Related services staff data were collected for the first time in 1990. Data were collected on the FTE of personnel employed and the number of students earning certification as School Psychologists, School Counselors, Occupational Therapists, and Physical Therapists. Sufficient data for statistical projection are not available.

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Reference

Wisconsin Handicapped Needs Assessment Project. (1990). *Comprehensive assessment of service needs for special education in Wisconsin. 1990.* Madison, WI: Wisconsin Department of Public Instruction.