Analyzing the Demand for Instructional Personnel
in the Virginia Public School System: 1999-2000

by

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Abstract

Converging demographic, societal, and political conditions are raising concerns among educational policy makers regarding Virginia's capacity to meet the demand for high quality instructional personnel. The variables affecting demand include shifts in student enrollments, efforts to meet Virginia Standards of Accreditation, retirement rate, efforts to increase diversity in instructional positions, efforts to reduce staffing ratios, increased technology in the classroom, legislative mandates, competition for instructional personnel, salary and other quality of life issues, rising licensure standards, and non-public school pupil enrollment.

This research is a quantitative study that combines descriptive and correlational research methods. One purpose of this study is to aggregate and summarize data from Virginia school districts that will provide important information for educational policy makers. The second purpose is to create a paradigm that will quantify and rank order the variables that affect the demand for educators in Virginia. The third purpose of this study is to place school districts into groupings according to variables that influence demand for instructional personnel. The k-means cluster analysis procedure was utilized for this purpose.

The Virginia Public School Systems' Instructional Personnel Profile: 1999-2000, a survey commissioned by the Virginia Department of Education, was sent to the 132 Virginia public school districts. A total of 126 school districts responded. This survey provided the data used in this study. This survey was developed because there is no uniform, statewide system to collect demographic data for PreK-12 instructional personnel in Virginia.

The results find that Virginia is experiencing shortages of instructional personnel. Special education, mathematics, science, and technology endorsement areas are expected to experience

the most critical shortages. Competition from other Virginia school districts, retirement, efforts to reduce teacher to pupil ratios, and salaries are reported as the variables that most influence demand for personnel. Virginia public school districts are clustered into two groups using the *k*-means cluster analysis procedure.

Dedication

       In loving memory of my father, Raymond Y. Perry, and my sister, Katherine Jane Perry, who instilled and modeled the values that continue to shape my life. I also dedicate this document to my daughter, Emali Rose Perry, my mother, Rose Perry, my sister, Vivian, and my brothers, Bill, Dan, and Pat. My family has supported and loved me unconditionally. I love them dearly.

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It is impossible to acknowledge individually everyone who contributed to the life-long process that has culminated in the completion of this document. I would be required to name every extended family member, friend, colleague, mentor, teacher, and professor who has enriched my life. I would be required to name the thousands of students whom I have had the privilege of instructing, and who taught me so much more in return. I cannot single out individuals for acknowledgement here for fear of diminishing the contributions of all those whom I might fail to recognize. I deeply appreciate the contributions of all.

To everyone, thank you for helping me get to this place. I will strive to honor your investment.

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CHAPTER I

Introduction

This dissertation is a quantitative study that combines descriptive and correlational research methods. The study is based on a population survey, commissioned by the Virginia Department of Education, entitled the *Virginia Public School Systems Instructional Personnel Profile, 1999-2000.* Data were collected at the school district level and aggregated at the state level. This chapter presents the background of the study, details the problem of the study, states the purpose of the study, and specifies the research questions. The chapter concludes by providing an overview of the methodology used in the study, defining terms specific to this study, and noting the limitations of the study.

Background

This study was originally conceived as a projection of the supply and demand of instructional personnel in Virginia's public elementary and secondary educational system, 2000-2005. The broad parameters of the initial proposed study were first articulated in the 1998 Virginia Education Association (VEA) Delegate Assembly as New Business Initiative 14 (NBI 14), "VEA Study of the Future Demand of Teachers." The delegates charged the VEA to "…conduct a study to determine the number of licensed personnel necessary to meet future demand resulting from increased student population and the retirement of current instructional personnel over the next five to ten years."

The Virginia Department of Education (VDOE) also had recognized the need for inquiry into the area of instructional personnel supply and demand. Development of a district level survey had been initiated, through contract number 99-0505-09 with the Virginia Tech Center for Teacher Education. As the initial research into this study progressed, other interested stakeholders emerged and the scope of the proposed VDOE study expanded. This research study was influenced by formal and informal discussions involving the Virginia Department of Education, Virginia Education Association, Virginia Association of School Personnel Administrators, Virginia Tech Center for Teacher Education, Virginia Tech Center for Survey Research, Department of Educational Leadership and Policy Studies in the Virginia Tech College of Human Resources and Education, and the National Center for Educational Statistics.

Participation in the planning discussions does not imply that the entities named above endorse the instrument, the methodology, the findings, or the recommendations of this study.

Statement of the Problem

      An adequate supply of skilled and dedicated teachers and administrators is necessary to maintain a high quality system of public education for all students in Virginia. Converging demographic, societal, and political factors are raising concerns among educational policy makers regarding Virginia's capacity to meet the anticipated increased demand for high quality instructional personnel.

      Initial investigation into the topic of instructional personnel supply and demand in Virginia revealed a paucity of accessible and mergeable data necessary to complete a meaningful study of this issue. As one example, there exists no current, comprehensive demographic database for Virginia instructional personnel. The mounting apprehension that Virginia may be facing a looming crisis in the form of severe shortages of instructional personnel is based largely on anecdotal evidence resulting from informal discussions among administrators responsible for staffing instructional personnel.

      The Virginia Department of Education (VDOE) maintained a comprehensive database until 1985-86 through the compilation of the Teacher Daily Attendance Report (TDAR). This report was discontinued when the VDOE budget was reduced during an economic recession in Virginia (R. Salmon, personal communication, September 12, 1999).

      One would expect the Virginia Retirement System (VRS) to yield readily accessible information on the demographics of instructional personnel. However, these data were corrupted for this purpose as instructional and non-instructional personnel are grouped together as a result of their identical rate of contribution to the retirement system. At this writing there has been devised no system to sort the instructional personnel from the non-instructional personnel. To complicate the matter further, endorsement areas are not reported in the VRS database.

      The VDOE Division of Licensure is responsible for granting licenses in all instructional personnel endorsement areas. However this divisiont does not maintain an updated comprehensive list of instructional personnel because the hiring of instructional personnel is a function of the local school district. There is no state-mandate requiring the annual reporting of staffing demographics (T. Elliott, personal communication, May 12, 1999). The current activity

status of license holders cannot be determined. Likewise, the state that granted the initial license to the individual cannot be determined.

There is no reporting in Virginia, except on an ad hoc basis, of the number of teachers and administrators being prepared by Virginia educator preparation programs (B. Latham, personal communication, January 14, 2000). Although Virginia can ascertain the number applicants for licensure, several national studies have concluded that a range of 25-40% of all education graduates do not apply for teaching positions (ASCUS, 1996; Choy, Henke, Medrich, Horn, & Liebermann, J., 1993; Darling-Hammond, 1994; Ingersoll & Bobbitt, 1995).

The condition of the data contained in the various data sets may serve the purposes of the agencies that maintain these databases. However, critical pieces of data on instructional personnel are missing from the extant databases or are not retrievable. This situation precludes the ability to merge these data sets in a manner that will yield the reliable and collated data necessary to assess the current staffing situation. The condition of the extant data also makes it very difficult to project accurately the future instructional personnel needs in Virginia.

Converging demographic and political factors are raising concerns among policy makers regarding Virginia's capacity to meet the anticipated increased demand for high quality instructional personnel. The literature, as will be discussed in Chapter II, reveals that there are a variety of factors that influence staffing of instructional personnel. The variables include, but are not limited to:

- increase or decrease in student enrollments via migration or fertility rates
- intensified local efforts to attain success in meeting prescribed Standards of Quality and Learning
- recent legislation that allows for early retirement of educators at 50 years of age with 30 years of experience
- efforts to increase the number of minorities in teaching and administrative positions
- efforts to reduce staffing ratios
- increased integration of technology into the classroom
- tax reduction plans
- increased demand for instructional personnel in adjoining states that will affect the migration of teachers across Virginia's borders

- low employment rates that increase external competition for practicing and prospective educators
- salary and other quality of life issues that affect the attrition and migration rate of educators
- rising standards for those seeking to enter the education profession
- rising licensure standards
- alternative licensure measures
- home school pupil enrollment
- private school pupil enrollment
- and heightened public expectation for our schools and students to perform at world class levels.

Instructional personnel demographic data, specific to endorsement area and locality, must be collected and analyzed in order to determine the ability of the supply pipeline to meet the anticipated increase in demand for qualified instructional personnel. The demographic, societal, and political factors that contribute to the demand, recruitment, retention, and attrition of instructional personnel must also be identified and analyzed for their impact on the local school districts. Ideally, these data would be collected at the employee level and aggregated at the school level. Resource constraints prohibit this methodology and force the collection and aggregation of data at the district level. Until the data gaps are filled, the collection and aggregation of data must occur at the district level.

Purpose of the Study

One purpose of this study is to collect, aggregate and summarize data from school districts that will provide important information for Virginia educational policy makers. This need for this information is critical as the Commonwealth ponders the proper course to an adequate supply of qualified instructional personnel to serve all students in Virginia.

The second purpose of the study is to create a paradigm that will quantify and rank order the factors that affect the supply and demand of teachers in Virginia. Policymakers may use this paradigm to prioritize intervention strategies and aid in resource allocation.

The third purpose of this study is to develop a statistical model, utilizing cluster analysis and related methodologies, which will place school districts into groupings according to their similar characteristics. This methodology may be utilized to identify statistical trends and

groupings. Intervention strategies could thus be delivered in a more timely and effective manner. This methodology has not been widely used to analyze educational data and may yield some useful methodological findings.

Research Questions

A review of the literature, and input solicited from a panel of experts that included district superintendents and personnel administrators, VDOE personnel and educational researchers determined the final research questions. The research questions addressed by this study are:

1. What are the number and the employment status of instructional personnel positions specific to each endorsement area and school district for school year 1999 - 2000?
2. What is the perception among personnel administrators for anticipated demand of instructional personnel positions specific to endorsement area and school district?
3. What is the paradigm of demographic, societal, and political factors that influence the staffing of instructional personnel positions in Virginia?
4. Can the school districts in Virginia be classified into discrete groups reflecting similarities among the districts relative to the impact that demographic, societal, and political factors have on the staffing of teacher and administrator positions?

Overview of Methodology

This study is an analysis of selected components of a study commissioned by the Virginia Department of Education titled the *Virginia Public School Systems' Instructional Personnel Profile: 1999-2000*. The author, as a subcontractor to the Virginia Tech Teacher Education Center, developed the instrument, coordinated, and analyzed this study.

A review of the literature, and input solicited from a panel of experts that included district superintendents and personnel administrators, VDOE personnel, educational researchers and National Center for Educational Statistics (NCES) staff determined the final research questions. The literature review and the expert panel input also determined the variables to include in the survey instrument, the relationships between the variables that must be studied, and the methodology to best capture the information.

The data collection from the instrument was solicited in two waves with a post card reminder mailed after the first wave and prior to the second wave. The survey was mailed to one

Personnel Administrator in each of the Virginia's 133 public school districts on November 3, 1999. The districts had the option to respond electronically via a web-based electronic survey instrument that was activated when the surveys and introductory letters were mailed (Appendix C). The data collected from both response options, and both mailings, were collated into a single file for analysis. Follow-up phone calls were placed to all non-respondents to encourage participation. All outgoing and return mailings were proofed and tracked. Responses were examined before being entered into the database. Districts with responses that failed to meet successive approximation parameters were contacted to rectify discrepancies in the reported data.

A summary of the research questions and the corresponding methodology used to study the research question follows. The statistical software package, SPSS 9.0, was used for all analysis and output generation.

1. What are the number and the employment status of instructional personnel positions specific to each endorsement area and school district for school year 1999 - 2000? There are no data currently collected on the total number and the dispersion of instructional personnel positions in Virginia or whether these positions are vacant or filled. Data were collected by the direct questioning of the respondents as to the employment situation of each endorsement area. A matrix with endorsement areas on the Y axis, and variables on the X axis that include total number of positions, number of positions requiring new-hires and number of open positions filled. The perceptions of demand for instructional personnel were validated through the use of multiple data sources and checks for consistency of response. These data are reported using frequency distributions and descriptive statistics.

2. What is the perception among personnel administrators for anticipated demand of instructional personnel positions specific to endorsement area and school district? Data were collected by the direct questioning of the respondents as to the projected employment situation for each endorsement area. Successive approximation of responses for the items that pertain to the perceptions of demand for instructional personnel served to validate the consistency of these perceptions internally. These data were analyzed and reported utilizing frequency distributions and descriptive statistics. Additionally, a summation of the aggregated responses yielded scores that allowed the endorsement areas to be rank-ordered according to the perceived supply of instructional personnel on a statewide basis.

3. What is the paradigm of the demographic, societal, and political factors that influence staffing of instructional personnel positions in Virginia? Variables possibly having an impact on the supply and demand of instructional personnel were identified from the literature and the expert panel review. Respondents were asked to assign values to these variables relative to their impact on staffing instructional personnel in their district. A summation of the aggregated responses yielded scores that allowed the variables to be rank-ordered according to their influence on the staffing of instructional personnel on a statewide basis.

4. Can the school districts in Virginia be classified into discrete groups reflecting similarities among the districts relative to the influence that demographic, societal, and political factors have on the staffing of teacher and administrator positions? The groups were constructed from the districts' responses to the 14 items identified in research question number three. A planning model was developed by utilizing the k-means cluster analysis methodology to place the districts into groupings that reflected similarities between the districts in the demographic, societal, and political factors that influenced staffing of teacher and administrator positions. This procedure is detailed fully in Chapter III. Cluster membership output was generated to ascribe the districts to discrete clusters. Cluster center output for the variables was generated so that each cluster could be described based on the cluster center of each variable.

Definition of Terms

For the purposes of this study, the following definitions apply.

1. Administrator – includes principals and assistant principals only

2. Full-Time Equivalent – FTE indicates a full-time equivalent position. This is based on the individual's assignment as a proportion of the full-time instructional day. Whole numbers are not required, e.g. one and ½ full-time positions equal 1.5 FTE.

3. Teacher – includes librarians, counselors, school psychologists, visiting teachers, reading specialists, vocational evaluators, and speech-language pathologists, but excludes substitutes.

4. Public School District – includes city and county educational systems directed locally by designees of a Board of Education with funds allocated by a Board of Supervisors, City Council, or Town Council. Each district has a District Superintendent. The districts are publicly funded from local, state, and federal sources.

5. <u>Newly-Hired</u> – term applied to teachers or administrators who either entered employment in the district in the 1999-2000 school year, or changed positions within the district resulting in a reclassification from teacher to administrator or alternatively from administrator to teacher.

<u>Limitations of the Study</u>

This study was based on the reporting of data and the perceptions of personnel administrators in the Virginia public school system in response to the *Virginia Public School Systems' Instructional Personnel Profile 1999-2000* survey (Appendix E), 126 districts of the 132 total districts had responded. The first wave of the survey was distributed November 3, 1999. This study is limited to teachers and building administrators employed in public school districts as defined for the purposes of this study. Supervisory and Central Office personnel are not included in the data. Teachers and administrators employed in non-public schools are not reflected in the data.

Ideally, these data would be collected at the employee level and aggregated at the school level. Resource constraints prohibit this methodology and force the collection and aggregation of data at the district level. Until the data gaps are filled, the collection and aggregation of data must occur at the district level. With no consistent statewide demographic methodolgy currently in use, districts gathered and reported demographic data in a variety of ways. In some instances precise data were not available, in these cases the districts reported their best estimates.

Personnel administrators were asked to forecast the future demand for instructional personnel in specific endorsement areas for their district. This represents a limitation that is mitigated partially by the fact that the responding personnel administrators were the most knowledgeable available source of personnel information at the district level. However, it should be noted that, in some districts, the responsibility of completing this survey was delegated to personnel who may not have the experience to reflect accurately employment practices of their district.

CHAPTER II

Review of the Literature

Introduction

The purpose of this review is to link the extant literature to the conceptualization of this study. The review will examine the conditions that exist in Virginia that necessitate this study. Virginia policy makers require demographic data to make informed decisions regarding instructional personnel demand issues. The literature review also will substantiate the variables included in this study and will suggest the study of possible relationships among the several variables that make them factors affecting the demand for instructional personnel in Virginia public school districts.

Virginia Context

The Virginia Department of Education recognized a pressing need for inquiry into the area of instructional personnel supply and demand. Development of a district level survey had been initiated in 1998, through contract number 99-0505-09 with the Teacher Center at Virginia Tech. It is the expansion and extension of this contract for the 1999-2000 school year that provided the impetus and the financial support for this study. The broad parameters of a similar proposed study were articulated in the 1998 Virginia Education Association Delegate Assembly as New Business Initiative 14 (NBI 14), "VEA Study of the Future Demand of Teachers." The delegates charged the VEA to "…conduct a study to determine the number of licensed personnel necessary to meet future demand resulting from increased student population and the retirement of current instructional personnel over the next five to ten years." An exchange of communication between Virginia Education Association (VEA) President, Ms. Cherie James (Appendix A), and Dr. Paul Stapleton (Appendix B), then Virginia Superintendent of Public Instruction, underscores their common concern regarding the supply of instructional personnel in Virginia's public school system.

The Virginia Department of Education (VDOE) maintained a comprehensive database until 1985-86 through the compilation of the Teacher Daily Attendance Report (TDAR). This report was discontinued when the VDOE budget was reduced during an economic recession in Virginia, forcing a restructuring of priorities to maximize the utilization of remaining resources (R. Salmon, personal communication, September 12, 1999).

Virginia instructional personnel supply and demand. Virginia's efforts to accurately analyze or project instructional personnel supply and demand is hampered by the lack of a comprehensive demographic database for the public education workforce (see preceding section). It should be noted that even a state supply and demand profile can be accompanied by substantial surpluses and shortages of well-qualified teachers at the local level because of varying conditions of work, compensation, and quality of life among the districts (National Education Association, 1987).

One of the most recent and comprehensive studies of the Virginia public education workforce highlights and acknowledges this difficulty. Educator Supply and Demand in Virginia (1994) was a cooperative effort involving many partners. The VDOE and the Virginia Council of Higher Education provided time and expertise to the project. The Southern Regional Education Board (SREB) and Data and Decisions Analysis, Inc. received the contract to perform this study which was funded by the Commonwealth of Virginia and the United States Department of Education, National Center for Education Statistics (preface). This report concluded, "between the years 1994 and 2002, the supply of teachers and the need for teachers (demand) will be roughly in balance…there will be as many teachers as are needed by the schools in the state" (SREB, 1994, p. 4). The authors wisely included two important caveats. One caveat stated, "Forecasts included in this report are statewide. There will be local variation from district to district" (SREB, 1994, p. 4). The other caveat was, "Educator supply and demand are early warning devices that should prove wrong if policy actions are taken to alleviate anticipated problems" (SREB, 1994, p. 4). One might add that policy actions also could be taken that exacerbates existing problems. See the later section of Chapter II titled 1999 Virginia General Assembly Instructional Personnel–Related Legislation for examples of public policy action that may alleviate or exacerbate existing educator supply and demand issues.

A report released by the VDOE entitled Results from the Teacher Supply and Demand Survey (1993) revealed one consistent statewide shortage in the field of special education. Shortages were especially pronounced in the areas of emotionally disturbed, hearing impaired, severely and profoundly handicapped, speech-language disorders, and visually impaired. It is not surprising that there were, and still are, considerable shortages in the areas of hearing and

visually impaired as there are no institutions in Virginia that prepare educators in these special needs endorsement areas.

Preparation and experience of Virginia instructional personnel. The last comprehensive study published by the VDOE regarding the supply of Virginia's school personnel and the associated demographics was conducted in 1985-1986 (VDOE, 1987). Among other interesting data, this study reported that 58% of all new teachers in Virginia received their most recent degrees from out-of-state institutions. An independent study conducted concurrently reported 45.1 % of new-hires and 44.1% of returning teachers received their degrees from out-of-state institutions (Cross & Culver, 1986, table 8a).

Snyder, Hoffman, and Geddes (1998) reported that almost two-thirds (64.4%) of Virginia's teachers possess a Bachelor's degree, 31.3 % have earned a Master's degree, 2.4% have earned an educational specialist degree, and 0.5% have earned a Doctorate. They found that the teaching workforce in Virginia is generally well-experienced with 26.1% having 20+ years experience, 37.5% having 10-20 years of experience, and 10% having less than 3 years of experience.

Virginia instructional personnel turnover. Teacher turnover in Virginia was last reported by the VDOE for the 1989-1990 school year. This report, titled Survey of Teacher Contract Terminations reported an overall 6.1% turnover rate. In 1996, the Virginia Education Association released a report indicating that the Virginia average rate of teacher turnover was 6.3% (Virginia Education Association, 1996).

In 1998, the Virginia Department for Personnel and Training conducted the Public School Teacher Compensation Study. A questionnaire on teacher turnover and recruitment was sent to 134 school districts. The districts were asked to indicate the total number of teachers for the 1995-96 school year. Of the teachers thus identified, districts were asked to indicate those individuals who were not returning for the 1996-97 school year and categorize their reason for not returning. The districts also were asked to identify the most critical areas for retention and recruitment of teachers. One hundred fourteen districts responded. This study indicated a lower teacher turnover rate (5.9%) than the 10.76% turnover rate for individuals employed by the Commonwealth of Virginia. The reason most cited (47.9%) for leaving the teaching profession

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was "other", which included retirement, death, family responsibilities, medical, and relocation. Spousal transfer (26%) was the next most common reason reported for leaving the teaching profession. Spousal transfer as a major reason for teacher turnover may be a function of the fact that 81% of the teachers in Virginia are female (National Education Association, 1999).

According to the Public School Teacher Compensation Study (1998), approximately 90% of the districts indicated that turnover was not a significant problem, while 61% reported that recruitment was not a problem. Of the districts that reported a recruitment problem, the reason most cited was an inadequate pool of qualified applicants in their geograhical area. The most prevalent problem in recruitment and retention was in the special education endorsement area, with 78% of the districts reporting staffing problems. Foreign languages (29%) and science (21%) were the next most critical areas where shortages were reported. Many districts also reported a problem in recruiting technology education teachers.

Virginia certification standards for instructional personnel. "State adopts highest standards for teachers…minimum test score requirements will be tops in the nation… becoming a teacher will become harder than ever under the new standards adopted by the State Board of Education" (Roanoke Times, June 26, 1999, p. B4). This article quoted Virginia State School Board president, Kirk T. Schroeder as follows, "We're now ensuring that teachers are qualified to teach in their subject areas in the classroom."

Virginia has had a testing requirement as part of the certification requirement for all entry-level teachers since July of 1981. The standard for certification were raised in July of 1986 as entry–level teachers were required to meet established cut-scores on the National Teachers Examination (NTE) before receiving a teaching certificate. The standards will be raised again in July of 2000 with the following addition to the Code of Virginia, "…every teacher seeking initial licensure (must) take a professional teacher's examination as prescribed by the board" (Chapter 1037, HB 2701, Code of Virginia §22.1-298, B.1, approved May 7, 1999). The State Board of Education prescribed that all teachers who are not endorsed currently must take the Praxis I and Praxis II examinations to be fully certified as teachers in Virginia.

House Bill 2263 (HB2263) amends Chapter 1035, § 22.1-298 of the Code of Virginia pursuant to the regulations governing teacher licensure. Requirements include: (a) every teacher seeking initial licensure must take a professional teacher's examination as prescribed by the

Board; (b) every teacher seeking initial licensure, after July 1, 2002, must complete study in methods for communication between schools and families and must complete study for increasing family involvement in student learning and the Standards of Learning; (c) every teacher seeking initial licensure on or after July 1, 2000 must complete study in attention deficit syndrome and gifted education, including the use of multiple criteria to identify gifted students; (e) every teacher seeking initial licensure after July 1, 2000 with endorsements as teachers of the blind and visually impaired demonstrate minimum proficiency in Braille (also SB 1307); (f) every teacher seeking initial licensure or license renewal on or after July 1, 2003 must demonstrate proficiency in the use of educational technology for instruction; and (g) every teacher seeking initial licensure who graduates from Virginia institutions of higher education shall, after July 1, 2002, only be licensed as instructional personnel by the Board of Education if the endorsement areas offered at such institutions have been assessed by a national accrediting agency or by a state approval process, with the final accreditation by the Board of Education.

Imbedded in § 22.1-298 is a very important caveat that will allow school districts to circumvent, at least on a temporary basis, the above regulations. The Board of Education, notwithstanding any provision of law to the contrary, may issue a provisional license valid for a maximum of three years, to anyone who does not meet the requirements of this section or any other requirement for licensure imposed by law. This provision potentially allows the local school districts to indefinitely fill positions with unqualified personnel as long as the positions are filled with new personnel every three years.

A study undertaken in 1986 found that when teacher supply was defined as the number of new applicants with scores above the NTE cut-off score, "demand is dramatically higher than the supply in several areas. These areas are mathematics, the sciences, and special education" (Cross & Culver, 1986, p. 6). In addition, " it is also clear from these analyses that the failure rates vary considerably from one test to another and are much higher among graduates of historically black institutions" (p. 1).

Instructional personnel salaries in Virginia. The VDOE reports that the 1997-98 average annual salary of Virginia principals was $62,535. Assistant principals earned an average of $52,971 while classroom teachers averaged $36,428 per year (VDOE, 1999b).

A report, Virginia's Educational Disparities, released in January 1999 by the Virginia Education Association (VEA) highlights the disparity in teacher salaries among Virginia public school districts. Alexandria, the district with the highest average teaching salary, pays an average of $43,604, while Highland, the district with the lowest average salary, pays $26,078 (VEA, 1999, p. 3). In this critical area of teacher salaries, VEA computes the state average as $35,536. The national average teacher salary for 1998-99 was computed to be $40,582 (Rankings and Estimates, NEA 1999)

The Public School Teacher Compensation Study (1998) noted that the adjusted average entry-level salary for Virginia public school teachers ($24,774) was 14.4 % higher than adjusted average entry-level salary of private industry ($21,649) and 22.0% above the adjusted average ($20,297) for Virginia entry-level state employees (Public School Teacher Compensation, House Document No. 7, 1998. The authors of the study caution that three factors should be considered when adjusting salaries to reflect the number of days worked (average of 200 days for teachers vs. 234 days for other occupations). First, state law determines the length of the school year. Second, the shorter work year for teachers may attract some to the profession. Third, teachers have different career advancement opportunities than individuals in other occupations.

Virginia public school student enrollment. Student enrollment is a major contributor in determining the demand for teachers. State mandated teacher/pupil staffing ratios require districts to adjust staffing based on changes in student enrollment and student demographics. Fertility rates and demographic shifts due to student migration affect student enrollment. In Fall Membership Projections for Virginia's Public School Divisions, 1998-2002, Spar, Sakurada, and Martin (1998) anticipate that the current rapid growth in student membership will soon begin to slow. According to this report, the student enrollment in Virginia's public schools stood at 1,106,700 for the 1997-98 school year. Enrollment trends vary between districts and grade level. Enrollment in the elementary grades currently stands at 604,000. Elementary enrollment is projected to begin falling in the 2000-01 school year and continue to decline thereafter. The middle school enrollment is expected to grow slightly for the next five years when it is projected that approximately 274,000 students will be attending Virginia public schools in 2002-03 school year. High school enrollment is projected to increase from its current level of 215,000 to 229,000 in the 2002-03 school year.

Drop-out rate. The Virginia Department of Education reported that 16,014 public school students dropped-out during the 1997-98 school year. This was computed to be a 3.8% drop-out rate (VDOE, 1999c).

Home schooling in Virginia. The rapid increase of home schooling in Virginia impacts student enrollment in the public schools. In 1984-85, the total home instruction enrollment in Virginia was 503. In 1998-99, the total home instruction enrollment in Virginia numbered 14,826. (VDOE, 1999a).

Ethnic diversity of Virginia's public school students and teachers. Virginia's student population is becoming more diverse. The 1999-2000 Fall Membership: Division Summaries by Ethnic Group (November 18, 1999) reports a total of 1,133,994 students (VDOE, 1999b). Of this total 2903 (.25%) are American Indian, 43836 (3.87%) are Asian, 308,621 (27.2%) are Black/ not Hispanic, 49,294 (4.35%) are Hispanic, 729,313 (64.3%) are White/ not Hispanic.

Efforts to increase ethnic diversity in the teaching force may impact district recruitment and retention practices for instructional personnel. The "Citizen's Advisory Task Force" of the Commission on Access and Diversity in Higher Education in Virginia, requested the Virginia Department of Education to conduct a survey to provide current data on school personnel under contract for the 1998-99 school year. The study was completed by the Virginia Tech Center for Survey Research (1999). The survey was distributed on November 13, 1998 with 131 of 132 school districts responding. Total full-time equivalent teaching positions (including counselors and librarians) numbered 84, 283. The percentages by ethnicity: American Indian/Alaskan Native, 0.2%; Asian or Pacific Islander, 0.2%; Black (not Hispanic), 15.3%; Hispanic, 0.9%; White (not Hispanic), 82.9%. Approximately 30.9% of black teachers had between 21 and 30 plus years of teaching experience.

Indications of disparity in Virginia public education. Disparity of funding exists among local school districts of the Commonwealth of Virginia continues to affect the recruitment and retention of teachers in local school districts. A report, Virginia's Educational Disparities, released in January 1999 by the VEA highlights these disparities (VEA, 1999). As discussed

previously, there is great disparity in teacher compensation among Virginia public school districts. Disparity also exists in instructional disbursements per pupil, which includes expenditures for all activities providing direct interaction and/or assistance in the instructional process. Also included under instructional disbursements are costs for classroom instruction and support services such as guidance and media and the administrative costs of the individual schools (compensation of principals, assistant principals, etc.). As such, costs for instructional disbursement per pupil serves as an indication of the resources that the district devotes to support teachers in their instructional mission. The state average for instructional disbursement per pupil was $4,544. However, Alexandria expended an average of $7,201 per pupil while Appomatox averages $3,504 in instructional expenditures per pupil (VEA, 1999).

Retirement effects on the supply of instructional personnel in Virginia. The following statement illustrates the tremendous effect that retirement of personnel is beginning to exert on local school districts. " Schools see a wave of retirements…since the 1993-94 year, principals have changed at 23 of Roanoke's 31 schools and 17 of 28 Roanoke county schools. There have been 22 retirements, 11 transfers, six resignations and one death" (Turner, 1999, September 30, p. B1).

The importance of personnel retirement as a major factor affecting demand for teachers is exacerbated by the fact that Virginia passed legislation allowing teachers to retire with 30 years of service at 50 years of age with unreduced benefits. The Virginia Retirement System (VRS) projects that approximately 40.0% of of instructional personnel, including classroom teachers, will be eligible for unreduced retirement between 1999-2006. This figure is misleading however as " the teacher definition in the retirement code includes all instructional personnel plus aides and secretaries" (Code of Virginia, Chapter 6, § 51.1-124.3), thus distorting the actual teacher retirement projections. In an address delivered September 30, 1999 to the Virginia Association of Colleges for Teacher Education (VACTE) Conference, Dr. Thomas Elliott of the Virginia Department of Education, Division of Teacher Licensure, stated that while Virginia usually needs 4,000 new teachers per year he expected that number to increase to 6,000 in the 2000-2001 school year due to early retirements (author's personal notes).

It will be of interest to see if the early retirement legislation that was passed by the 1999 Virginia General Assembly will affect the ethnic composition of the educator workforce as did

the early retirement provision that was first made available to educators in 1992. The Southern Regional Education Board (1994) reported that in the 1992 there were 2,991 black educators who were 50 years of age or older. Virtually 24% of the total black educator workforce in Virginia fell into this age bracket. The result was that the number of black retirees more than doubled from 1991, when 353 blacks retired, to 1992 when 833 blacks retired. In 1992 it was reported that there were 10,784 white educators 50+ years of age in Virginia. The number of white retirees also doubled from 1,117 retirees in 1991 to 2,249 in 1992. The 1992 combined retirement for black and whites showed an increase of 1,622 over the 1991 total retirements.

In the 1998-99 school year it was reported that 3,449 black (not Hispanic) educators in Virginia had 21 or more years of experience, including 707 who had more than 30 years of experience (Virginia Tech Center for Survey Research, 1999). Figures reported for the white (not Hispanic) educator workforce in Virginia for the 1998-99 school year indicates a total of 17,723 with 21+ years of experience including 2,441 with more than 30 years of experience. It should be noted that the actual figures would be higher except for the fact that four districts reported that they were unable to compile counts for ethnicity by years of experience.

Virginia's support for education. Historically, the citizens of Virginia have voiced support for public education. In the Quality of Life in Virginia: 1998 survey approximately 52.0% felt that not enough funds were being expended for K-12 public schools, while less than 5.0% felt that too much was spent (Bayer, Willis, & Snelson, 1998). Forty-seven percent of the respondents stated that taxes should be raised to provide additional support to public schools. Nearly 73% of the respondents rated Virginia as an "excellent" or "good" place for young people to receive a K-12 education.

The voiced support by Virginia citizens has not been reflected by the fiscal effort generated by the Commonwealth according to a recently released National Education Association (NEA) report titled, Rankings and Estimates: Ranking of the States 1999 and Estimates of School Statistics 2000 (1999). Virginia ranks 12th nationally in terms of total personal income (p. 26, table D-1), 15th in per capita personal income (p. 26, Table D-3), and 14th in both personal income per pupil in fall enrollment and average daily attendance (p. 28, Tables D-7 & D-8).

Despite this wealth, Virginia falls below the national average in every measure of financial effort for K-12 public education. For 1997, Virginia ranked 41st nationally for public school revenue per student in average daily attendance (p. 40, Table F-4), 49th in public school revenue per $1,000 of personal income in 1997 (p. 40, Table F-5) and 49th in state and local revenue for public schools in 1996-97 per $1,000 of personal income (p. 40, Table F-6).

Average salaries for Virginia public school teachers in 1998-99 were computed to be $37,475, well below the national average salary of $40,582 (p. 19, Table C-11 revised).

Local governments largely fund the public education enterprise in Virginia. In 1998-99 the percentage of revenue for public elementary and secondary schools from local governments was 57.2% (p. 41, Table F-8). The percentage of revenue for public elementary and secondary schools from state government, 1998-99, was computed to be 37.5% (p. 42, Table F-10). The percentage of revenue for public elementary and secondary schools from the federal government, 1998-99, was computed to be 5.3% (p. 42, Table F-12).

1999 Virginia General Assembly instructional personnel–related legislation. Federal, state, and local funding decisions affect the education job market. Legislation may influence the instructional personnel profile by constricting or expanding funding and by creating competing requirements for limited resources. Among the more obvious legislative actions that affect the quantity of personnel needed are: altering student to personnel ratios, mandating curriculum, amending personnel licensure requirements, modifying paths to personnel licensure, restructuring salary schedules, and amending retirement requirement and benefit packages.

The 1999 Virginia General Assembly considered at least 189 amendments, bills and resolutions related to education, 56 of the amendments, bills and resolutions failed to gain House and Senate approval, or suffered the Governor's veto (Fairfax County Public Schools, Office of Government Relations, 1999). Of the 133 bills that survived, 26 have intended or unintended consequences relating to the staffing of instructional personnel in Virginia. Though not intended to be exhaustive, the summation presented in Appendix F will serve to illustrate the impact that the various legislative mandates have on the staffing of instructional personnel in Virginia's public school districts.

18

<u>Selected National Studies of Factors Related to Staffing Instructional Personnel</u>

A number of studies have been undertaken by various governmental, university, and private research organizations focusing primarily on the issue of teacher supply and demand at the national level. However, such supply and demand profiles can mask differences among individual states (NEA, 1987). The nature of supply and demand studies necessitates their attention to the factors and issues that influence staffing of instructional personnel. The following overview of relevant studies is not intended to be exhaustive but does highlight some of the most important studies.

<u>Historical perspective of national studies</u>. Teacher supply and demand was not a topic of concern prior to 1900 although teacher supply and demand were seldom balanced (Maaske, 1951). In a review of 117 articles related to teacher supply and demand published between 1924 - 1930, Eliassen and Anderson (1930) found an oversupply of teachers in most content areas. It is interesting to note that among the solutions that were promulgated for the reduction of this oversupply of teachers is one initiative of current interest in Virginia, the raising of standards for teacher selection and certification.

National studies of teacher supply and demand have varied in their focus. While some studies focus on teacher supply and demand issues in specific content areas such as mathematics, science, special and bilingual education (Darling-Hammond, 1984; Feistritzer, 1985; Jensen, 1987; Bowers, 1991). These studies have focused on teacher supply and demand issues relative to the differences which exist between rural and urban settings (Anschutz, 1987; Berry, Noblit, & Hare, 1985; Bruno, 1986; Crawford, 1987; McNergney & Haberman, 1989; Wise, et al., 1987).

<u>National studies focusing on rural and urban issues.</u> Rural and urban school districts face different obstacles when attempting to maintain a qualified teaching workforce. In 1990-91, urban schools were found to have a slightly higher turnover rate than rural/small schools (Ingersoll, Han, & Bobbitt, 1995, p.41). Both rural and urban school districts have negative image problems that hamper recruitment efforts (Jensen, 1987; McNergney & Haberman, 1989).

Bruno (1986) reported that urban school districts may never be able to raise salaries sufficient to outweigh the negative aspects of teaching in inner city schools. The imbalance between the supply and demand of teachers in the inner city may become irreversible unless non-pecuniary benefits are increased (Bruno, 1986).

In a study of the conditions that have influenced the recruitment and retention of teachers in rural areas, Anschutz (1987) found that married teachers who came from a similar environment were their likeliest candidates.

Recruitment and retention. Linda Darling-Hammond (1984) composed an agglomerated version of an advertisement for the recruitment of teachers that captures the essence of the particular difficulties that educational systems face when attempting to recruit and retain a competent workforce.

<div align="center">WANTED</div>

> College graduate with academic major (master's degree preferred). Excellent communication and leadership skills required. Challenging opportunity to serve 150 clients daily, developing up to five different products each day to meet their needs. This diversified job also allows employee to exercise typing, clerical, law enforcement, and social work skills between assignments and after hours. Adaptability helpful, since employers cannot always deliver goods and support services on time. Typical work week 47 hours. Special nature of the work precludes fringe benefits such as lunch and coffee breaks, but work has many intrinsic rewards. Starting salary $12,769, with a guarantee of $24,000 after only 14 years. (p. 1)

This fictional advertisement, albeit inaccurate insofar as current compensation for teachers, accurately reflects the special nature of the skills that are expected of today's educational workforce. Darling-Hammond also asked, "Who would take a job like this?" (p.1). One might add, "How can they be retained after they are hired?" These questions are the basis for numerous national studies undertaken by public and private institutions in the United States. Beyond The Commission Reports: The Coming Crisis in Teaching (Darling-Hammond, 1984) foresaw a looming teacher supply crisis. She analyzed data and suggested changes in the

recruitment and retention and quality of the teaching force, and in the attractiveness of teaching as a profession. She discovered that the pool of highly educated and experienced educators of that timeframe would diminish due to an increasing retirement rate among older teachers and younger teachers leaving for other professions. Darling-Hammond also attributed a diminishing talent pool for the teacher profession to the fact that academically talented women and minorities were no longer restricted to teaching as a professional option and were choosing occupations with better compensation, more opportunities for advancement, and better working conditions. A particularly disturbing aspect of the study revealed that the most highly qualified teachers often are the most dissatisfied. Wells (1993) applied the path analysis procedure on the 1988 School and Staffing Survey data and discovered correlation among variables associated with teacher commitment to remain in teaching. Specifically, Wells found that as tenure in the profession increases, a teacher's salary satisfaction decreases, perception of influence on school policy decreases, perception of control of classroom practices decreases, and commitment decreases.

Quality. Other studies have unearthed troubling information regarding the quality of the teaching force. Vance and Schlechty (1984) found that 28 percent of the lowest quintile of SAT scorers from the 1973 graduating high school class went into teaching and more that one-half planned to stay in teaching. Only 8 percent of the highest quintile entered teaching and approximately 25 percent intended to stay. In an earlier study, Schlechty and Vance (1981) noted an alarming pattern indicating that the best and brightest teachers may be leaving the profession at a more rapid rate than their less talented colleagues. In a 1981 study of North Carolina, where the measure of ability was determined as the teacher's score on the 1973 National Teacher's Exam (NTE), it was found that many more of the top scorers than of the bottom left teaching within 7 years. Among white female teachers, almost two-thirds of the top decile had left, while only approximately one-third of the bottom decile had left (Schlechty & Vance, 1981).

Accountability measures and efforts to impose a "teacher-proof curriculum", such as management by objectives, competency- based education, minimum competency testing were fuelled by the notion that schooling should be based on a factory model where teachers are viewed as semi-skilled, low-paid workers (Wise, 1979). Bureaucratic controls on teaching pedagogy were often used as an acceptable alternative to upgrading the quality of teachers

(Porter, 1979) with negative consequences as teachers viewed these controls as constraints on their classroom decisions (Wolcott, 1979).

Attrition and retention. A Rand Corporation study conducted by Grissmer and Kirby (1987) identified teacher attrition rates as the major component in the determination of demand for new teachers. Most teacher attrition was attributable to personal reasons such as "changes in a person's life and a desire for professional and job advancement" (p. 34). Many education graduates never attempt to enter the teaching profession. Several national studies have concluded that a range of 25-40% of all education graduates do not apply for teaching positions (ASCUS, 1996; Choy, Henke, Medrich, Horn, & Liebermann, 1993; Darling-Hammond, 1994; Ingersoll & Bobbitt, 1995).

There are many reasons for teacher attrition including reduction in force, involuntary transfers, career moves, terminations, retirements, and individual family concerns (Bobbitt, Leich, Whitener, & Lynch, 1994; Ingersoll, Mei, & Bobbitt, 1995). High rates of teacher turnover are of concern because not only may turnover be an indication of dysfunctional schools, but also because high rates of turnover can be disrupt the quality of the total school environment (Coleman & Hoffer, 1987; Bryk, Lee, & Smith, 1990; Kirst, 1989; Ingersoll et al., 1995). Also, research has shown that teacher retention, attrition, and turnover may affect teachers differently depending on their age, experience, gender, race, education, specialty field, and salary (Boe & Gilford, 1992a,1992b; Press, 1998; Towner-Larsen, 1998).

Experience and attrition. A teacher's number of years of teaching experience has proven to be an important factor in determining attrition rates with the most junior and the most senior teachers leaving at far higher rates than the mid-range experience levels. Most teachers that leave the teaching profession prior to retirement do so within the first 9 years of their career (National Center for Education Statistics, 1998). Young, inexperienced teachers tend to have high attrition rates, often as high as 20%. Attrition rates are low for teachers with more than 5 years of experience and teacher attrition naturally increases as teachers near retirement age (Gilford & Tenenbaum, 1990). Although the relationship is not strong, there is evidence that schools with faculties having a larger proportion of advanced degrees experience lower turnover

rates, schools with a high percentage of minority teachers experience higher turnover rates (Ingersoll et al., 1995, p. 41).

Personal reasons for leaving. Teachers may leave the classroom without leaving schools altogether (Choy et al., 1993). About one-half of the teachers who moved within their district did so because of staffing actions. Concurrently, almost one-half of the teachers who moved to another district did so because of a family or personal reasons (p. 40).

In a National Center For Education Statistics report, Characteristics of Stayers, Movers, and Leavers: Results from the Teacher Followup Survey:1994-95 (Whitener et al., 1997) main reasons for base year teachers leaving the profession were imputed. These teachers are termed "base year" because the 1994-95 School and Staffing Survey sample is the "base" for the teachers who were selected for the Teacher Followup Survey. Retirement (27.4%) was the main reason given for leaving the profession. Pregnancy/child rearing was second at 14.3%. Pursuit of another career was third at 12.1%. Family or personal move (10.1%) was given as the fourth main reason for leaving the teaching profession. Other family or personal reasons and better salary or benefits (6.5%) were tied for fifth, and 5.7% cited dissatisfaction with teaching as a career as the reason for leaving the profession.

Of the teachers who cited "dissatisfaction with teaching as a career" as the main reason for leaving the profession, 17.9% gave student discipline problems and poor student motivation to learn (17.6%) as the two main reasons for leaving. However, the categories of inadequate support from the administration and lack of recognition and support from the administration combine for over 29% of the responses for dissatisfied teachers leaving the profession.

Destination. Where did the aforementioned base year teachers go after they left the teaching profession? Over 70% left to become an employee of a private company, business, or individual for wages, salary, or commission. Federal, State, and Local governments employed 21.2% of those teachers who left the profession and 8.4% became self-employed in their own business, professional practice, or farm (Whitener et al., 1997).

<u>Summary of Literature Review</u>

Past studies have indicated that Virginia was facing, or would soon be facing, geographically-localized and endorsement area-specific instructional personnel shortages (Cross & Culver, 1986; SREB, 1994; VDOE, 1993). An examination of the last available Virginia data revealed that perhaps as many as 58% of all newly hired teachers received their most recent degree from out-of-state (VDOE, 1998). In two endorsement areas, visually and hearing impaired, there are currently no teachers prepared in Virginia by degree-granting programs. In 1996-97, the teacher turnover was reported as 5.9%, with spousal transfer, retirement, death, family responsibilities, relocation and medical reasons often cited as the reason for the turnover. Of the 39% of districts who reported recruitment problems, the reason most cited was an inadequate pool of qualified applicants (Virginia Department for Personnel and Training, 1998).

Virginia's standards for teacher certification as measured by minimum test score requirements, are the highest in the nation (Chapter 1037, HB 2701, Code of Virginia § 22.1-298, B.1, 1999). Cross & Culver (1998) reported that failure rates on such exams vary considerably and are much higher among graduates of historically black institutions.

Virginia teacher salaries for 1997-98 were reported to average $36,428 (VDOE, 1999b). This salary is below the reported 1999-99 national average of $40,582 (NEA, 1999).

Virginia pupil enrollment in the elementary grades is projected to begin falling in the 2000-2001 school year, while middle school and high school enrollment are projected to increase (Spar, Sakurada, & Martin, 1998).

In the 1997-98 school year, 16, 014 students dropped out (VDOE, 1999c). This drop out rate was computed to be 3.8%. There is concern that the drop out rate may increase due to the Standards of Learning examinations.

Home schooling is rapidly increasing, from 503 students in 1984-85 to 14,826 in 1998-99 (VDOE, 1999a).

In 1999-2000 the Virginia PreK-12 student population was 64.3% White/not Hispanic, 27.2% Black/not Hispanic, 3.87% Asian, and 0.25% American Indian (VDOE, 1999b). Efforts to increase the ethnic diversity of the teaching force to reflect the diversity of the student population may affect recruitment and retention strategies of Virginia public school districts. In 1998-99,

82.9% of the teaching force was White/not Hispanic, 15.3% were Black/not Hispanic, while Hispanics comprised 0.9%, 0.2% were American Indian/ Alaskan Native, and 0.2% were Asian or Pacific Islander (Virginia Tech Center for Survey Research, 1999).

Disparities in resource allocation across Virginia (VEA, 1999) contribute to the localization of instructional personnel staffing problems and recruitment and retention strategies.

It has been estimated that Virginia may require an additional 2,000 teachers because of early retirement legislation passed in 1999 by the Virginia Assembly (T. Elliott, personal communication, September 30, 1999). Past early retirement legislation has disproportionally affected the black educator workforce (SREB, 1994).

The citizens of Virginia continue to voice strong support for public education (Virginia Tech Center for Survey Research, 1998). Virginia's financial support for public education has not reflected the expressed popular support, falling well below the national average in every measure of financial support (NEA, 1999).

Measures passed by the Virginia General Assembly also affects staffing of instructional personnel. During the 1999 General Assembly there were at least 26 bills passed that have intended or may have unintended consequences for staffing of instructional personnel (Fairfax County Public Schools, Office of Government Relations, 1999).

This review of the literature, research, and legislation suggests that there are a variety of factors that influence demand for instructional personnel in Virginia. The variables include, but are not limited to:

- increase or decrease in student enrollments via migration or fertility rates
- intensified local efforts to attain success in meeting prescribed Standards of Accreditation
- recent legislation that allows for early retirement of educators at 50 years of age with 30 years of experience
- efforts to increase the number of minorities in teaching and administrative positions
- efforts to reduce teacher to student ratios
- increased integration of technology into the classroom
- tax reduction plans
- increased demand for instructional personnel in adjoining states that will affect the migration of teachers across Virginia's borders

- low employment rates that increase external competition for practicing and prospective educators

- salary and other quality of life issues that affect the attrition and migration rate of educators

- rising standards for those seeking to enter the education profession

- rising licensure standards

- alternative licensure measures

- home school pupil enrollment

- private school pupil enrollment

- and heightened public expectation for our schools and students to perform at world class levels.

CHAPTER III

Methods

This dissertation is a quantitative study that combines descriptive and correlational research methods. The purposes are as follows:

1. collect, aggregate and summarize data from school districts that will provide important information for Virginia educational policy makers. The need for this information is critical as the Commonwealth ponders the proper course to achieve an adequate supply of qualified instructional personnel to serve all students in Virginia

2. create a paradigm that will quantify and rank order the factors that affect the supply and demand of teachers in Virginia. Policymakers may use this paradigm to prioritize intervention strategies and to aid in resource allocation, and

3. utilize the *k*-means cluster analysis to place school districts into clusters according to their similar characteristics as pertains to factors that influence the staffing of instructional personnel. The clusters of districts based on similarities within the groups and dissimilarities between the clusters would facilitate targeted intervention strategies.

The purposes of this study were defined by a review of the literature and the input received from a panel of experts that included district superintendents and personnel administrators, VDOE personnel, educational researchers and NCES staff. The literature review and the expert panel input also determined the final research questions, the variables to include in the survey instrument, the relationships among the variables that must be studied, and the methodology to best capture the information.

Instrumentation and Population

This study is an analysis of selected components of a study commissioned by the Virginia Department of Education entitled the *Virginia Public School Systems' Instructional Personnel Profile: 1999-2000*. The author, as a subcontractor to the Virginia Tech Teacher Education Center, developed the instrument, coordinated, and analyzed this study.

The survey instrument was developed to collect data requested by the Virginia Department of Education. The literature review, and repeated input from a panel of experts, resulted in the development of six iterations of the instrument culminating in agreement on the

final instrument (Appendix E). The criteria for the development of the instrument included the: quality and utility of data received; practical ability of the districts to supply the requested data; suitability of instrument for the initiation and maintenance of a statewide database, and; instrument construction to facilitate the districts's and the entry of data into a manageable database. The Virginia Department of Education, Division of Teacher Licensure, the Virginia Tech Center for Teacher Education, and the Virginia Tech Center for Survey Research reviewed and endorsed the final instrument in October 1999.

Through use of the instrument, data were collected in two waves (mailings). The first wave was mailed to one Personnel Administrator in each of the Virginia's 132 public school districts on November 3, 1999. Virginia's then Superintendent of Public Instruction, Dr. Paul Stapleton, encouraged the districts' response in a cover letter that accompanied the survey. The districts had the option to respond electronically via a web-based electronic survey instrument that was activated when the surveys and introductory letters were mailed (Appendix D). The second wave was mailed during the first week of December. The data collected from both response options, and both waves of mailings, were collated into a single file for analysis. Follow-up phone calls were placed to all non-respondents to encourage participation. All outgoing and return mailings were proofed and tracked. Responses were examined before being entered into the database. Districts with responses that failed to meet successive approximation parameters were contacted to rectify discrepancies in the reported data.

<div align="center">Procedure</div>

The research questions and the corresponding methodology used to study the research questions follow. The statistical software package, SPSS 9.0, was used for all analysis and output generation.

Research Question # 1 Methodology

What are the number and the employment status of instructional personnel positions specific to each endorsement area and school district for school year 1999 - 2000? Data were collected by the direct questioning of the respondents as to the employment situation of each endorsement area. A matrix with endorsement areas on the Y axis, and variables on the X axis that include total number of positions, number of positions requiring new-hires and number of

open positions filled. The perceptions of demand for instructional personnel were validated through the use of multiple data sources and checks for consistency of their responses. These data are reported through use of frequency distributions and descriptive statistics.

Research Question # 2 Methodology

What are the perceptions among personnel administrators for anticipated demand of instructional personnel positions specific to endorsement area and school district? Data were collected by the direct questioning of the respondents as to the projected employment situation for each endorsement area. Successive approximation of responses to the survey items that pertain to the perceptions of demand for instructional personnel, served to validate the consistency of these perceptions internally. These data were analyzed and reported utilizing frequency distributions and descriptive statistics. Additionally, a summation of the aggregated responses yielded scores that allowed the endorsement areas to be rank-ordered according to the perceived supply of instructional personnel on a statewide basis.

Research Question # 3 Methodology

What is the paradigm of the demographic, societal, and political factors that influence demand for instructional personnel positions in Virginia? Variables possibly having an impact on the supply and demand of instructional personnel were identified from the literature and the expert panel review. Respondents were asked to assign values to these variables relative to their perceived impact on staffing instructional personnel in their respective school districts. A summation of the aggregated responses yielded scores that allowed the variables to be rank-ordered according to their influence on the staffing of instructional personnel on a statewide basis.

Research Question # 4 Methodology

Can the school districts in Virginia be classified into discrete groups (clusters) reflecting similarities among the districts relative to the influence that demographic, societal, and political factors have on the staffing of teacher and administrator positions? The clusters were constructed from the districts' responses to the 14 variables presented in item number 14 of the Virginia Instructional Personnel Profile survey (Appendix E). The responses were assigned the

following values for computation purposes: greatly increased demand = 5; somewhat increased demand = 4; no impact on demand = 3; somewhat decreased demand = 2; greatly decreased demand = 1. As the responses for this item were already standardized it was not necessary to compute z scores. A four-factor solution planning model was generated by utilizing the k-means cluster analysis methodology to place the districts into groupings that reflected similarities among the districts in the demographic, societal, and political factors that influenced staffing of teacher and administrator positions. Cluster membership output was generated to ascribe the districts to discrete clusters and the variables were evaluated for their contribution to the identity of the cluster. Cluster center output for the variables was generated so that each cluster could be described based on the cluster center of each variable.

Cluster Analysis

Cluster analysis is one of several procedures in multivariate analysis designed to determine whether individuals (or other units of analysis) are similar enough to fall into groups or clusters (Vogt, 1993). Everitt (1974) states that these techniques attempt to solve the following problem. " Given a sample of N objects or individuals, each of which is measured on each of p variables, devise a classification scheme for grouping the objects into g classes" (p.1). Clustering is a good technique to use in exploratory data analysis when the sample is not homogenous (SPSS Base 7.5 Applications Guide, 1997, p. 263).

Everitt (1974) described a cluster that most agrees with an intuitive understanding of the term by suggesting that each entity be considered as a point in a p-dimensional space with each of the p variables represented by an axis of this space. Clusters can then be described as continuous regions of this space containing a relatively high density of points, separated by regions containing a relatively low density of points. Höppner et al., (1999) state that clusters should be partitioned based on (a) the homogeneity within the cluster, i.e. data that belong to the same cluster should be as similar as possible; and (b) heterogeneity between the clusters, i.e. data that belong to different clusters should be as different as possible. " Similarity" has to be specified according to the data.

The SPSS 9.0 statistical package used for this study provides two methods for clustering objects into categories: Hierarchical cluster analysis and k-means cluster analysis (SPSS Base 7.5

Applications Guide, 1997). Hierarchical cluster analysis can be used to cluster either cases or variables while *k*-means cluster analysis can only be used to cluster the cases.

Comparison of *k*-means and hierarchical cluster analysis. The *k*-means cluster analysis method was selected for use in this study because of several features that facilitate the development of a practical and useful model for clustering school districts based on the partition of a given set of data. *K*-means clustering may be used on a large number of cases with relative ease. Hierarchical clustering is best limited to fewer than 200 cases, as a distance matrix is computed with entries for every pair of cases and interpretation of the data through the associated icicle plots and dendograms becomes unwieldy. In the Hierarchical method, once two objects are joined they remain together until the final step. In the *k*-means method the cluster centers are initially formed by assigning each case in turn to the cluster having the closest center, the cluster centers are recomputed at each iteration. The researcher can also specify cluster centers and SPSS will allocate cases to the centers. The *k*-means method also allows additional new cases to be classified by inputting cluster centers.

Because the *k*-means method reports the distance of each case from the cluster center it is possible to determine how closely each case in the cluster is related. Thus, outliers are thus also easily identified through use of *k*-means. Pedhazur and Schmelkin (1991) describe an outlier as an unusual, atypical, data point that stands out from the rest of the data. Identification of outliers is important because their presence can lead to serious distortion of results but may also provide insights into the unexpected processes of the phenomenon being studied.

The *F* statistic. The *k*-means clustering method permits the statistic (*F*) to be determined through the Analysis of Variance (ANOVA) statistical procedure. ANOVA produces a statistic (*F*) on the differences among means (Howell, 1997, p. 565). Vogt (1993) explained this difference as the ratio of the variance between groups (explained variance) to the variance within groups (unexplained variance). Generally the *F* statistic is used for assessing the statistical significance of the relationship between categorical independent variables and a continuous dependent variable. An *F* distribution table must be consulted to determine whether the *F* statistic is significant, see Howell (1997) for examples of *F* distribution tables.

In cluster analysis the *F* statistic cannot be used as a measure of statistical significance because the clusters are formed to characterize differences not similarities, as is the case in other forms of factor analysis. The size of the *F* statistic reported in *k*-mean's ANOVA still is important as it allows for the identification of variables that drive the clustering and also the identification of variables that differ little among the clusters. The variable with the highest *F* statistic will most influence the cluster construct, conversely, the variable with the lowest highest *F* statistic will be the variable that has the least influence (SPSS Base 7.5 Applications Guide, 1997). In this study a low *F* statistic suggests that both clusters rated the variable similarly and therefore did not influence the construct of the clusters. A high *F* statistic suggests that the clusters rated the variable quite differently, and therefore the variable did influence the construct of the clusters.

Clustering the public school districts using k-means cluster analysis. Potentially, the *k*-means method offers the capability to be flexible and practical in the clustering of school districts that have similar factors that influence the staffing of instructional personnel.

Selection and standardization of variables. A review of the literature, and input solicited from a panel of experts which included district superintendents and personnel administrators, VDOE personnel and educational researchers determined the variables for survey item number 14, the object of this cluster analysis (Appendix E). The Euclidean distance matrix is the default distance measure in the *k*-means clustering method (SPSS Base 7.5 Applications Guide, 1997, p. 266). Because variables with large values contribute more to the calculations of distance measures than variables with small values, the variables must be standardized before beginning the *k*-means clustering procedure. Standardization of the values of the variables is easily accomplished by transforming the values to *z* scores using the Descriptives function of SPSS (p. 264). The variables in item number 14 of the Virginia Instructional Personnel Profile Survey (Appendix E) were standardized in the process of developing the survey item, thus it was not necessary to transform the values to *z* scores.

Determination of number clusters to compute. It was determined to attempt to partition the Virginia public school districts into 2, 3, 4, and 5 discrete clusters. Determination of the

number of clusters is largely an intuitive process (Everitt, 1974). A goal of this study is to identify clusters of districts based on reported factors that affect the staffing of instructional personnel for the purpose of the development of intervention strategies designed to address instructional personnel staffing problems. Given the intended application of this exercise, the number of clusters were limited to a number that a state educational agency might find practical for which to develop intervention strategies. The cluster number that optimally meets the criteria of maximum homogeneity within the cluster and maximum heterogeneity between the clusters was selected for the more detailed analyses that are described later.

Reliability. Following the selection of the optimum number of clusters using the k-means method the hierarchical clustering method was employed as a check on the reliability and potential value of the number of clusters selected. Reproducibility and stability of the clusters would indicate the merit of the selected cluster structure.

Cluster membership. Cluster membership is a statistical function of SPSS 9.0 that was assigned and identified the school districts belonging to each cluster. Each district's distance from the ascribed cluster center also is reported, as based on the squared Euclidean distance. As such, it indicated the similarity of the individual district to the cluster to which it was ascribed and aided in the detection of outliers. A prototypical district was then selected for each cluster based on which district fell closest to the cluster center.

Final cluster centers. The means of the standardized variables for each cluster center define the final cluster center (SPSS Base Application Guide, p. 280). As such, these data were the basis for the formulation of a composite narrative description of each cluster.

Analysis of variance (ANOVA). SPSS computes for each individual variable a one-way analysis of variance using the final clusters as groups. Between-cluster mean squares and within-cluster mean squares are calculated for each variable. The ratio of these two mean squares results in the usual ANOVA F statistic. Refer to the earlier section of this chapter for a more detailed discussion of the significance and usefulness of the F statistic.

Summary

This chapter has explained the methods used in this descriptive quantitative study of the current employment status of instructional personnel by endorsement area and public school district. Also discussed were the descriptive statistical methods used to determine the perceived demand for instructional personnel for the 2000-2001 school year and the perceptions of personnel administrators regarding the impact of the various societal, demographic, and political factors on the staffing of instructional personnel.

Cluster analysis was explained in the context of its use in the determination of discrete clusters of school districts based on the reporting of the factors that have influenced staffing of instructional personnel in the individual public school districts. The goal of determining a practical and useful number of clusters influenced the four attempts to derive the optimum number of clusters.

CHAPTER IV

Results

As stated in Chapter I, the study examined the current number and employment status of Virginia instructional personnel specific to endorsement areas and public school districts. The factors associated with the demand for instructional personnel and the possibility of grouping districts based on their reporting of the impact these factors have exerted on staffing instructional personnel also were investigated. The findings are preceded by a caveat for the use of FTE position data. The findings are presented respective to the order of the four research questions posed in Chapter I.

1. What are the number and the employment status of instructional personnel positions specific to each endorsement area and school district for school year 1999 - 2000?

2. What is the perception among personnel administrators for anticipated demand of instructional personnel positions specific to endorsement area and school district? A section on successive approximation is inserted in this section.

3. What is the paradigm of demographic, societal, and political factors that influence the staffing of instructional personnel positions in Virginia?

4. Can the school districts in Virginia be classified into discrete groups reflecting differences among the districts relative to the impact that demographic, societal, and political factors have on the staffing of teacher and administrator positions?

Caveat for Use of FTE Position Data

Some of the FTE position data were received from school districts past the timeframe established that would have allowed for the correction of suspected reporting errors and were thus entered into the database by the Virginia Tech Center for Survey Research as reported by the districts. Refer to the successive approximation section in this report for an additional cautionary statement for the use of these data. Data are almost certain to be underreported due to non-responses from districts and missing data from responding districts.

Number and Employment Status of Instructional Personnel by Endorsement Area

The individual school districts reported the number of instructional personnel and the employment status by endorsement area. The employment status of the endorsement areas was

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determined by asking the districts the total number of FTE positions for the 1999-2000 school year, number of unfilled FTE positions, and number of FTE positions that were filled by unendorsed personnel for the 1999-2000 school year (survey item 15). These data were summed in order to determine the number of FTE positions by endorsement area in Virginia for the 1999-2000 school year. These data also were summed for the purpose of reporting the number of FTE positions that were unfilled or filled with unendorsed personnel. The data as reported are presented in Table 1.

Of the total 132 public school districts in Virginia, 126 responded to this survey. Five of the 126 survey respondents did not respond to survey item 15. This means that the data from a total of 11 school districts are missing from this summary of the number and employment status of instructional personnel by endorsement area.

Districts reported a total of 87,665.5 FTE instructional positions for the 1999-2000 school year. Of this total, 1,055.6 FTE positions were filled by unendorsed personnel. An additional 382 FTE positions were reported as unfilled.

The elementary (PreK-6) endorsement area accounts for 27,024.8 FTE positions with only 94.8 positions filled by unendorsed personnel and 76.5 positions reported as unfilled. The eight special education endorsement areas combine to account for 122 of the 382 total unfilled FTE positions and 440 of the total 1,055.6 FTE positions filled with unendorsed personnel. The data used to describe the employment status of Virginia endorsement areas for the 1999-2000 school year are presented in Table 1.

[1]Table 1

Employment Status of Virginia Endorsement Areas for the 1999-2000 School Year

	Number of FTE positions		
Endorsement area	Total	Unfilled	Unendorsed
Elementary (PreK-6)	27,024.8	76.5	94.8
Middle school (6-8)	7,798.4	20.5	68.0
Art (PreK-12)	1,572.7	5.2	11.5
Computer science	272.4	2.0	11.0
Dance (PreK-12)	9.6	1.2	0.0
English	3,995.9	3.7	28.0
English as second language (PreK-12)	836.0	4.0	10.0
Spanish (PreK-12) [2]	1216.2	10.8	27.0
French (PreK-12) [2]	557	0.3	6.8
German (PreK-12) [2]	179	0.0	2.0
Latin (PreK-12) [2]	235.3	1.0	3.0
Italian (PreK-12) [2]	33.6	0.0	0.0
Russian (PreK-12) [2]	35.4	0.0	0.0
Chinese (PreK-12) [2]	32.6	0.0	0.0
Other Asian languages (PreK-12) [2]	75.8	0.0	1.0
Health/P.E. (PreK-12)	3,413.7	4.2	17.0
History/Social science	3,125.0	5.3	34.7
Library media (PreK-12)	1,790.6	9.4	27.5
Mathematics	3,554.2	17.7	54.0
Algebra I (Add-on endorsement)	270.6	0.0	6.0
Music-Instrumental (PreK-12)	907.1	3.6	7.0
Music-Vocal/Choral (PreK-12)	1,164.6	17.0	6.0
Biology	1,054.7	3.3	14.5
Chemistry	730.2	2.0	11.7
Earth science	923.5	3.5	26.0
Physics	574.1	2.0	11.7
Early childhood special education[3]	1,213.6	7.0	23.0

[1]Data for Fairfax City/County are 1998-1999.

[2] Individual foreign language endorsement area data for Virginia Beach City Schools are extrapolated based on a total 159 reported foreign language teachers allocated to endorsement area by a computed state-wide ratio.

[3]Special Ed. endorsement areas subject to widely divergent district reporting methods.

[4]These areas were often aggregated by the districts and reported as learning disabled.

Table 1, Cont.

Employment Status of Virginia Endorsement Areas for the 1999-2000 School Year[1]

Endorsement area	Number of FTE positions		
	Total	Unfilled	Unendorsed
Hearing impaired (PreK-12) [3]	499.1	4.5	6.0
Learning disabled (K-12) [3, 4]	5,521.0	48.0	234.0
Mental retardation (K-12) [3, 4]	1,845.7	14.0	72.0
Emotionally disturbed (K-12) [3, 4]	1,715.6	23.0	59.5
Severely/Profoundly disabled (K-12) [3]	616.0	2.0	20.0
Visually impaired (PreK-12) [3]	392.3	2.5	1.0
Speech-language pathology (PreK-12) [3]	1,137.6	21.0	24.5
Theater arts	157.4	0.0	0.5
Agricultural education	221.2	3.0	0.0
Business education	1,196.7	4.3	17.0
Health occupations education.	145.6	0.0	5.0
Marketing education	339.8	0.0	6.0
Technology education	827.5	11.0	14.0
Trade and industrial education	669.2	0.0	9.0
Work and family studies	677.2	4.0	6.0
Vocational evaluator	53.0	0.0	2.0
Reading specialist	1,347.8	6.5	25.5
Visiting teacher	126.5	1.0	7.0
School social worker	393.5	0.0	2.0
School psychologist	620.3	3.0	3.0
School counselor	2,982.6	11.5	17.5
Principal and assistant principal	3,572.0	22.5	22.0
Total	87,665.5	382.0	1,055.6

FTE Positions per Virginia Public School District

Data were collated by districts to reflect the aggregated number of total FTE positions, FTE positions unfilled, and FTE positions filled by unendorsed personnel in each of Virginia's Public school districts. These data are reported in Table 2.

Table 2

Employment Status of Virginia School Districts for the 1999-2000 School Year

Public school districts	Number of FTE positions		
	Total	Unfilled	Unendorsed
Accomack County	449.0	7.0	28.0
Albemarle County	983.8	0.0	3.0
Alexandria City	1,050.0	0.0	27.0
Alleghany Highlands	0.0	0.0	0.0
Amelia County	145.0	0.0	9.0
Amherst County	358.3	0.0	23.5
Appomattox County	204.0	0.0	2.0
Arlington County	3,405.0	0.0	27.0
Augusta County	1,107.2	0.0	2.0
Bath County	88.5	1.0	6.5
Bedford City	457.0	0.0	0.0
Bland County	81.0	0.0	0.0
Botetourt County	371.0	0.0	0.0
Bristol City	213.0	1.0	8.0
Brunswick County	232.0	1.0	42.0
Buchanan County	399.0	0.0	0.0
Buckingham County	192.0	0.0	31.0
Buena Vista City	107.8	0.0	1.0
Campbell County	700.0	0.0	29.0
Caroline County	280.0	3.0	8.0
Carroll County	352.0	4.0	20.0
Charles City County	122.6	5.0	12.0
Charlotte County	12.0	0.0	6.0
Chesapeake City	2,953.9	6.0	0.0
Chesterfield County	4,264.3	15.9	16.0
Clarke County	162.0	0.0	2.0
Colonial Beach	50.5	0.0	3.4
Colonial Heights City	295.0	0.0	0.0
Covington City	85.0	0.0	0.5
Craig County	70.5	1.0	1.0
Culpeper County	475.3	2.0	53.0
Cumberland County	108.0	1.0	0.0
Danville City	0.0	0.0	0.0
Dickenson County	260.6	0.0	5.0
Dinwiddie County	351.5	6.0	29.0
Essex County	143.0	0.0	2.0
Fairfax City/County[1]	12,154.9	57.7	25.0
Falls Church City	161.0	0.0	0.0
Fauquier County	781.0	2.0	15.0
Floyd County	171.5	0.0	5.0
Fluvanna County	240.7	0.0	17.0
Franklin City	146.0	0.0	5.0

[1]Figures based on 1998-1999 data.

Table 2, Cont.

Employment Status of Virginia School Districts for the 1999-2000 School Year

Public school districts	Number of FTE positions		
	Total	Unfilled	Unendorsed
Franklin County	556.7	0.0	10.0
Frederick County	866.5	0.0	7.0
Fredericksburg City	197.5	0.0	5.0
Galax City	105.0	0.0	1.0
Giles County	211.1	1.0	1.0
Gloucester County	644.0	2.0	2.0
Goochland County	181.0	1.0	3.0
Grayson County	196.2	0.0	5.0
Greene County	303.0	1.0	4.0
Greensville County	218.1	0.0	2.0
Halifax County	513.0	0.0	3.5
Hampton City	1,763.5	17.5	11.5
Hanover County	1,146.1	0.0	0.0
Harrisonburg City	370.5	0.0	0.0
Henrico County	2,392.0	3.0	1.0
Henry County	942.0	2.0	45.0
Highland County	46.0	0.0	0.0
Hopewell City	345.0	0.0	1.0
Isle of Wight County	466.6	0.0	20.0
King William County	140.0	0.0	5.0
Lancaster County	134.0	3.0	0.0
Lee County	379.3	1.0	4.0
Lexington City	50.0	0.0	0.0
Loudoun County	1,938.0	12.5	0.0
Louisa County	497.0	1.0	9.0
Lunenburg County	156.0	0.0	20.0
Lynchburg City	842.0	1.0	0.0
Madison County	165.7	0.2	19.5
Manassas City	494.3	0.0	3.0
Manassas Park City	171.0	0.0	1.0
Martinsville City	241.5	1.0	0.0
Mathews County	107.6	0.0	0.0
Mecklenburg County	498.0	2.0	16.0
Middlesex County	142.0	0.0	0.0
Montgomery County	800.0	2.0	4.0
Nelson County	195.8	1.0	3.5
New Kent County	201.0	0.0	4.5
Newport News City	2,327.0	14.0	10.0
Norfolk City	2,792.0	49.0	0.0
Northhampton County	202.0	0.0	7.0
Northumberland County	113.5	0.0	0.0
Norton City	67.0	0.0	0.0
Nottoway County	246.0	0.0	22.0
Orange County	326.0	2.0	21.0

Table 2, Cont.

Employment Status of Virginia School Districts for the 1999-2000 School Year

Public school districts	Number of FTE positions		
	Total	Unfilled	Unendorsed
Page County	265.0	0.0	9.0
Patrick County	234.0	0.0	0.0
Petersburg City	504.0	5.0	9.0
Pittsylvania County	0.0	0.0	0.0
Poquoson City	211.0	0.0	4.0
Portsmouth City	1,741.0	1.0	0.0
Powhatan County	290.0	13.0	2.0
Prince Edward County	203.0	8.0	7.0
Prince George County	431.0	0.0	2.0
Prince William County	3,448.4	32.0	2.0
Pulaski County	485.0	0.0	0.0
Radford City	190.2	0.0	0.0
Rappahannock County	0.0	0.0	4.0
Richmond City	1,853.0	63.0	0.0
Richmond County	100.0	0.0	0.0
Roanoke City	1,154.0	0.0	4.0
Roanoke County	1,386.4	0.0	7.0
Rockbridge County	293.3	0.0	21.5
Rockingham County	860.7	0.0	41.5
Salem City	313.5	0.0	0.0
Scott County	289.0	0.0	7.0
Shenandoah County	445.0	3.0	5.5
Smyth County	436.7	0.0	10.8
Southhampton County	230.5	0.0	14.0
Spotsylvania County	1,347.8	0.0	22.0
Stafford County	1,371.0	3.0	0.0
Staunton City	267.5	4.0	0.0
Suffolk City	946.0	7.0	0.0
Surry County	117.0	2.0	6.0
Tazewell County	600.5	1.0	3.0
Virginia Beach City	5,873.2	0.2	131.0
Warren County	0.0	0.0	0.0
Washington County	695.0	0.0	1.0
Waynesboro City	262.0	2.0	5.0
West Point	74.5	0.0	0.0
Williamsburg-James City County	724.0	6.0	0.0
Winchester City	302.9	0.0	1.0
Wise County	600.5	0.0	0.0
Wythe County	353.5	0.0	0.0
York County	834.3	1.0	1.0
Total FTE Positions including all Public School Districts	88,609.6	382.0	1,055.6

Of the total 132 public school districts 126 responded to this survey. However, five of the 126 survey respondents did not respond to survey item 15 (Appendix E). This means that the data from 11 school districts are missing from this summary of the employment status of Virginia school districts for the 1999-2000 school year.

The 121 districts that responded to survey item 15 (Appendix E) reported a total of 88,609.6 FTE positions of which 1,055.6 were filled with personnel unendorsed for the area in which they were teaching. Districts reported 382 FTE positions unfilled for the 1999-2000 school year. Fairfax City/County reported 12,154.9 FTE positions (1998-1999 data). Virginia Beach City was the second largest school district, reporting 5,873.2 FTE positions.

The four districts reporting the largest number of unfilled FTE positions were Richmond City (63), Fairfax City/County (57.7), Norfolk City (49), and Prince William County (32). Virginia Beach City reported 131 FTE positions filled by persons who are unendorsed for the area in which they were teaching. A total of 87 school districts reported having FTE positions filled by unendorsed personnel of which 21 districts reported having more than 20 FTE positions filled by unendorsed personnel.

Estimated FTE Positions, 1999-2000 School Year

School districts were requested to give their best estimates of the projected openings, by endorsement area, in their district for the 2000-20001 school year. The Virginia Department of Education, Division of Teacher Licensure supplied the 49 endorsement areas currently used in Virginia the teachers and administrators. Districts were hesitant to report these projections as evidenced by the fact that 25 of the 126 total survey respondents did not report projected openings for the 2000-2001 school year. These omissions result in the actual number of projected openings to be substantially underreported as aggregated on the statewide endorsement area basis and as aggregated on the district projection for estimated total number of FTE position openings in the 2000-2001 school year.

The data were aggregated by endorsement area on a statewide basis based on the districts' response to survey item 15. The results are presented in Table 3.

Table 3

Estimated FTE Position Openings in Endorsement Areas for the 2000-2001 School Year

Endorsement area	Openings	Endorsement area	Openings
Elementary (PreK-6)	2,565.0	Physics	70.0
Middle school (6-8)	872.0	Early childhood special education	87.5
Art (PreK-12)	102.5	Hearing impaired (PreK-12)	40.2
Computer science	28.5	Learning disabled (K-12)	525.5
Dance (PreK-12)	1.0	Mental retardation (K-12)	153.0
English	339.0	Emotionally disturbed (K-12)	204.3
English as second language (PreK-12)	75.5	Severely/Profoundly disabled (PreK-12)	79.0
Spanish (PreK-12)	128.0	Visually impaired (PreK-12)	12.8
French (PreK-12)	59.5	Speech-language pathology (PreK-12)	90.5
German (PreK-12)	17.0	Theater arts	9.0
Latin (PreK-12)	32.6	Agricultural education	18.5
Italian (PreK-12)	8.0	Business education	102.0
Russian (PreK-12)	8.0	Health occupations education	6.5
Chinese (PreK-12)	8.0	Marketing education	31.0
Other Asian languages (PreK-12)	12.0	Technology education	65.5
Health/P.E. (PreK-12)	183.5	Trade and industrial education	29.5
History/Social science	271.0	Work and family studies	51.5
Library media (PreK-12)	101.0	Vocational evaluator	1.0
Mathematics	329.0	Reading specialist	78.5
Algebra I (Add-on endorsement)	22.0	Visiting teacher	11.2
Music-Instrumental (PreK-12)	43.0	School social worker	18.7
Music-Vocal/Choral (PreK-12)	72.0	School psychologist	34.5
Biology	87.0	School counselor	172.5
Chemistry	74.0	Principal and assistant principal	166.5
Earth science	106.0		
		Total Estimated Openings	7,604.3

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There are estimated to be 7,604 FTE positions open in Virginia for the 2000-2001 school year. The elementary (PreK-6) endorsement area accounts for 2,565 of these openings. The middle school (6-8) endorsement area accounts for 872 open FTE positions. The eight special education endorsement areas combine for 1,192.5 FTE position openings, with the learning disabled (K-12) endorsement area accounting for 525.5 of these open positions.

The data were aggregated by individual district according to the reported estimated total number of FTE position openings for the 2000-2001 school year. The districts' response to the estimated openings per endorsement area were aggregated and summed. The estimates for FTE position openings for the 2000-2001school year are presented in Table 4.

Fairfax City/County, with 1,179 estimated FTE position openings, expects to have the largest number of openings of any Virginia public school district for the 2000-2001 school year. With 657 expected open positions, Prince William County ranks second for expected FTE position openings. Eight public school districts expect to have between 104 and 213 FTE position openings, while seven other public school districts expect to have between 220 and 459 open FTE positions.

Successive Approximation of Responses

Case summaries were computed to ascertain the consistency of the data reported by the districts for the current employment status of the endorsement areas. This was accomplished by the combination of the districts' responses to survey items 1 and 2. This aggregation should yield the total number of teachers and administrator employed as of October 1, 1999. These data were compared to the districts' responses to survey item 15, which requested the total number of FTE positions in the district for the 1999-2000 school year. The resulting data sets should approximate each other. It is readily apparent that the reliability of the responses in some instances are suspect. At least 16 district responses fell outside of the acceptable parameters. These parameters were determined based on the discrepancy of the responses by percentage error or numerical error. Districts with less than 1000 FTE positions were allowed a 10% discrepancy in their response while districts with more than 1000 FTE positions were scrutinized for the impact of the numerical discrepancy on the data. While all reported data were included in this study, readers are urged to view the FTE data in general terms and not definitive.

Table 4

Estimated FTE Position Openings in School Districts for 2000-2001 School Year

Public school districts	Openings	Public school districts	Openings
Accomack County	41.0	Fairfax City/County	1,179.0
Albemarle County	110.0	Falls Church City	9.0
Alexandria City	-	Fauquier County	71.0
Alleghany Highlands	-	Floyd County	-
Amelia County	13.0	Fluvanna County	45.8
Amherst County	44.0	Franklin City	20.0
Appomattox County	20.0	Franklin County	-
Arlington County	-	Frederick County	120.0
Augusta County	105.0	Fredericksburg City	47.0
Bath County	8.5	Galax City	2.0
Bedford City	-	Giles County	11.0
Bland County	-	Gloucester County	-
Botetourt County	33.0	Goochland County	16.0
Bristol City	-	Grayson County	6.5
Brunswick County	50.0	Greene County	38.0
Buchanan County	-	Greensville County	43.0
Buckingham County	21.0	Halifax County	36.0
Buena Vista City	1.0	Hampton City	213.5
Campbell County	104.0	Hanover County	177.0
Caroline County	34.0	Harrisonburg City	13.0
Carroll County	24.0	Henrico County	459.0
Charles City County	27.0	Henry County	4.0
Charlotte County	16.0	Highland County	-
Chesapeake City	-	Hopewell City	44.0
Chesterfield County	456.5	Isle of Wight County	31.0
Clarke County	29.0	King William County	13.0
Colonial Beach	16.0	Lancaster County	19.0
Colonial Heights City	24.0	Lee County	11.0
Covington City	5.0	Lexington City	4.0
Craig County	5.5	Loudoun County	428.0
Culpeper County	41.0	Louisa County	28.0
Cumberland County	23.0	Lunenburg County	156.0
Danville City	-	Lynchburg City	-
Dickenson County	20.0	Madison County	48.0
Dinwiddie County	47.0	Manassas City	30.0
Essex County	15.0	Manassas Park City	22.0

Table 4, Cont.

Estimated FTE Position Openings for 2000-2001 School Year by School District

Public school districts	Openings		Public school districts	Openings
Martinsville City	10.0		Shenandoah County	2.0
Mathews County	10.9		Smyth County	31.0
Mecklenburg County	8.0		Southhampton County	12.0
Middlesex County	32.0		Spotsylvania County	113.0
Montgomery County	85.0		Stafford County	220.0
Nelson County	18.0		Staunton City	29.0
New Kent County	46.5		Suffolk City	32.0
Newport News City	49.0		Surry County	24.0
Norfolk City	346.0		Tazewell County	18.0
Northhampton County	26.0		Virginia Beach City	325.0
Northumberland County	-		Warren County	0.0
Norton City	-		Washington County	18.0
Nottoway County	16.0		Waynesboro City	15.0
Orange County	-		West Point	75.0
Page County	19.0		Williamsburg-James City County	69.0
Patrick County	20.0		Winchester City	31.2
Petersburg City	75.0		Wise County	22.0
Pittsylvania County	-		Wythe County	27.0
Poquoson City	11.0		York County	119.4
Portsmouth City	-		Total Estimated Openings for 00-01	7,604.3
Powhatan County	35.0			
Prince Edward County	27.0			
Prince George County	-			
Prince William County	657.0			
Pulaski County	31.0			
Radford City	8.0			
Rappahannock County	6.0			
Richmond City	-			
Richmond County	15.5			
Roanoke City	-			
Roanoke County	44.0			
Rockbridge County	38.0			
Rockingham County	66.5			
Salem City	28.0			
Scott County	15.0			

Note. Missing values are expressed as dashes (-).

Perceived Supply of Instructional Personnel per Endorsement Area

The personnel administrators were asked to look forward five years and report their perception of the estimated supply of instructional personnel in their district per endorsement area. The data were collected from the districts' responses to survey item 15. The response categories and the values respectively assigned for the data analysis are severe shortage = 1, shortage = 2, adequate supply = 3, excess supply = 4.

The descriptive statistics, including the mean, standard deviation, frequency of response, number of respondents, missing data, and total respondents, are reported Table 5. Table 6 rank orders the endorsement areas respective to the districts' perception of the supply of personnel in each endorsement area and will aid interpretation of Table 5.

Table 5

Perceived Supply of Personnel in Virginia Endorsement Areas

Endorsement Areas	Perceived Supply						
	Severe Shortage	Shortage	Adequate Supply	Excess Supply	Reported	Missing	Total
Elementary (PreK-6)							
Mean = 2.61, SD = .62							
Frequency	3.00	43.00	62.00	5.00	113.00	13.00	126.00
Percent	2.38	34.13	49.21	3.97	89.68	10.32	100.00
Middle school (6-8)							
Mean = 2.20, SD = .73							
Frequency	19.00	55.00	37.00	2.00	113.00	13.00	126.00
Percent	15.08	43.65	29.37	1.59	89.68	10.32	100.00
Art (PreK-12)							
Mean = 2.70, SD = .52							
Frequency	1.00	34.00	75.00	2.00	112.00		126.00
Percent	0.79	26.98	59.52	1.59	88.89	11.11	100.00
Computer science							
Mean = 2.20, SD = .81							
Frequency	22.00	36.00	38.00	2.00	98.00	28.00	126.00
Percent	17.46	28.57	30.16	1.59	77.78	22.22	100.00
Dance (PreK-12)							
Mean = 2.73, SD = .56							
Frequency	2.00	17.00	49.00	2.00	70.00	56.00	126.00
Percent	1.59	13.49	38.89	1.59	55.56	44.44	100.00
English							
Mean = 2.54, SD = .58							
Frequency	3.00	48.00	60.00	2.00	113.00	13.00	126.00
Percent	2.38	38.10	47.62	1.59	89.68	10.32	100.00
English as second language (PreK-12)							
Mean = 2.07, SD = .72							
Frequency	20.00	44.00	26.00	0.00	90.00	36.00	126.00
Percent	15.87	34.92	20.63	0.00	71.43	28.57	100.00

Table 5, Cont.

Perceived Supply of Personnel in Virginia Endorsement Areas

Endorsement Areas	Perceived Supply						
	Severe Shortage	Shortage	Adequate Supply	Excess Supply	Reported	Missing	Total
Spanish (PreK-12)							
Mean = 1.88, SD = .78							
Frequency	40.00	43.00	27.00	0.00	110.00	16.00	126.00
Percent	31.75	34.13	21.43	0.00	87.30	12.70	100.00
French (PreK-12)							
Mean = 2.08, SD = .78							
Frequency	28.00	43.00	37.00	0.00	108.00	18.00	126.00
Percent	22.22	34.13	29.37	0.00	85.71	14.29	100.00
German (PreK-12)							
Mean = 2.14, SD = .83							
Frequency	20.00	22.00	30.00	0.00	72.00	54.00	126.00
Percent	15.87	17.46	23.81	0.00	57.14	42.86	100.00
Latin (PreK-12)							
Mean = 1.93, SD = .92							
Frequency	39.00	14.00	33.00	0.00	86.00	40.00	126.00
Percent	30.95	11.11	26.19	0.00	68.25	31.75	100.00
Italian (PreK-12)							
Mean = 2.34, SD = .86							
Frequency	12.00	15.00	27.00	2.00	56.00	70.00	126.00
Percent	9.52	11.90	21.43	1.59	44.44	55.56	100.00
Russian (PreK-12)							
Mean = 2.37, SD = .89							
Frequency	12.00	11.00	27.00	2.00	52.00	74.00	126.00
Percent	9.52	8.73	21.43	1.59	41.27	58.73	100.00
Chinese (PreK-12)							
Mean = 2.35, SD = .89							
Frequency	12.00	11.00	26.00	2.00	51.00	75.00	126.00
Percent	9.52	8.73	20.63	1.59	40.48	59.52	100.00

Table 5, Cont.

Perceived Supply of Personnel in Virginia Endorsement Areas

Endorsement Areas	Perceived Supply						
	Severe Shortage	Shortage	Adequate Supply	Excess Supply	Reported	Missing	Total
Other Asian languages (PreK-12)							
Mean = 2.37, SD = .89							
Frequency	13.00	11.00	29.00	2.00	55.00	71.00	126.00
Percent	10.32	8.73	23.02	1.59	43.65	56.35	100.00
Health/P.E. (PreK-12)							
Mean = 2.92, SD = .57							
Frequency	1.00	20.00	78.00	13.00	112.00	14.00	126.00
Percent	0.79	15.87	61.90	10.32	88.89	11.11	100.00
History/Social science							
Mean = 2.78, SD = .68							
Frequency	4.00	29.00	66.00	12.00	111.00	15.00	126.00
Percent	3.17	23.02	52.38	9.52	88.10	11.90	100.00
Library media							
Mean = 1.87, SD = .82							
Frequency	44.00	35.00	30.00	0.00	109.00	17.00	126.00
Percent	34.92	27.78	23.81	0.00	86.51	13.49	100.00
Mathematics							
Mean = 1.51, SD = .69							
Frequency	66.00	33.00	12.00	0.00	111.00	15.00	126.00
Percent	52.38	26.19	9.52	0.00	88.10	11.90	100.00
Algebra I (Add-on endorsement)							
Mean = 1.87, SD = .79							
Frequency	34.00	36.00	20.00	1.00	91.00	35.00	126.00
Percent	26.98	28.57	15.87	0.79	72.22	27.78	100.00
Music-instrumental (PreK-12)							
Mean = 2.45, SD = .69							
Frequency	10.00	41.00	54.00	2.00	107.00	19.00	126.00
Percent	7.94	32.54	42.86	1.59	84.92	15.08	100.00

Table 5, Cont.

Perceived Supply of Personnel in Virginia Endorsement Areas

Endorsement Areas	Perceived Supply						
	Severe Shortage	Shortage	Adequate Supply	Excess Supply	Reported	Missing	Total
Music-vocal/choral (PreK-12)							
Mean = 2.51, SD = .61							
Frequency	6.00	40.00	59.00	0.00	105.00	21.00	126.00
Percent	4.76	31.75	46.83	0.00	83.33	16.67	100.00
Biology							
Mean = 2.07, SD = .75							
Frequency	27.00	47.00	34.00	0.00	108.00	18.00	126.00
Percent	21.43	37.30	26.98	0.00	85.71	14.29	100.00
Chemistry							
Mean = 1.73, SD = .76							
Frequency	51.00	39.00	21.00	0.00	111.00	15.00	126.00
Percent	40.48	30.95	16.67	0.00	88.10	11.90	100.00
Earth science							
Mean = 1.67, SD = .77							
Frequency	57.00	33.00	20.00	0.00	110.00	16.00	126.00
Percent	45.24	26.19	15.87	0.00	87.30	12.70	100.00
Physics							
Mean = 1.53, SD = .74							
Frequency	64.00	25.00	15.00	0.00	104.00	22.00	126.00
Percent	50.79	19.84	11.90	0.00	82.54	17.46	100.00
Early childhood special education							
Mean = 1.84, SD = .76							
Frequency	41	44	24	0.00	109	17	126
Percent	32.54	34.92	19.05	0.00	86.51	13.50	100
Hearing impaired (PreK-12)							
Mean = 1.64, SD = .75							
Frequency	52	31	16	0.00	99	27	126
Percent	41.27	24.60	12.70	0.00	78.57	21.43	100

Table 5, Cont.

Perceived Supply of Personnel in Virginia Endorsement Areas

Endorsement Areas	Perceived Supply				Reported	Missing	Total
	Severe Shortage	Shortage	Adequate Supply	Excess Supply			
Learning disabled (K-12)							
Mean = 1.59, SD = .68							
Frequency	59	43	12	0.00	114	12	126
Percent	46.83	34.13	9.52	0.00	90.48	9.5	100
Mental retardation (K-12)							
Mean = 1.61, SD = .69							
Frequency	58	43	13	0.00	114	12	126
Percent	46.03	34.13	10.32	0.00	90.48	9.52	100
Emotionally disturbed (K-12)							
Mean = 1.48, SD = .66							
Frequency	69	35	10	0.00	114	12	126
Percent	54.76	27.78	7.94	0.00	90.48	9.52	100
Severely/Profoundly disabled (K-12)							
Mean = 1.51, SD = .69							
Frequency	65	31	12	0.00	108	18	126
Percent	51.59	24.60	9.52	0.00	85.71	14.29	100
Visually impaired (PreK-12)							
Mean = 1.69, SD = .75							
Frequency	47	34	17	0.00	98	28	126
Percent	37.30	26.98	13.49	0.00	77.78	22.22	100
Speech-language pathology (PreK-12)							
Mean = 1.59, SD = .72							
Frequency	60	34	15	0.00	109	17	126
Percent	47.62	26.98	11.90	0.00	86.51	13.50	100
Theater arts							
Mean = 2.59, SD = .59							
Frequency	3	29	49	1	82	44	126
Percent	2.38	23.02	38.89	0.79	65.08	34.92	100

Table 5, Cont.

Perceived Supply of Personnel in Virginia Endorsement Areas

Endorsement Areas	Perceived Supply						
	Severe Shortage	Shortage	Adequate Supply	Excess Supply	Reported	Missing	Total
Agricultural education							
Mean = 2.19, SD = .81							
Frequency	19	28	32	1	80	46	126
Percent	15.08	22.22	25.40	0.80	63.50	36.51	100
Business education							
Mean = 2.37, SD = .68							
Frequency	12	42	50	0	104	22	126
Percent	9.52	33.33	39.68	0.00	82.54	17.46	100
Health occupations education							
Mean = 2.30, SD = .72							
Frequency	12	33	36	0	81	45	126
Percent	9.52	26.19	28.57	0.00	64.29	35.71	100
Marketing education							
Mean = 2.32, SD = .73							
Frequency	15	35	46	0	96	30	126
Percent	11.90	27.78	36.51	0.00	76.19	23.81	100
Technology education							
Mean = 1.82, SD = .84							
Frequency	51	29	31	0	111	15	126
Percent	40.48	23.02	24.60	0.00	88.10	11.90	100
Trade and industrial education							
Mean = 2.25, SD = .73							
Frequency	16	39	39	0	94	32	126
Percent	12.70	30.95	30.95	0.00	74.60	25.40	100
Work and family studies							
Mean = 2.16, SD = .78							
Frequency	24	42	39	1	106	20	126
Percent	19.05	33.33	30.95	0.79	84.13	15.87	100

Table 5, Cont.

Perceived Supply of Personnel in Virginia Endorsement Areas

Endorsement Areas	Perceived Supply						
	Severe Shortage	Shortage	Adequate Supply	Excess Supply	Reported	Missing	Total
Vocational evaluator							
Mean = 2.47, SD = .68							
Frequency	6	24	35	1	66	60	126
Percent	4.76	19.05	27.78	0.79	52.38	47.62	100
Reading specialist							
Mean = 2.10, SD = .79							
Frequency	27	37	37	0	101	25	126
Percent	21.43	29.37	29.37	0.00	80.16	19.84	100
Visiting teacher							
Mean = 2.19, SD = .72							
Frequency	15	37	31	0	83	43	126
Percent	11.90	29.37	24.60	0.00	65.87	34.127	100
School social worker							
Mean = 2.30, SD = .68							
Frequency	10	38	35	0	83	43	126
Percent	7.94	30.16	27.78	0.00	65.87	34.13	100
School psychologist							
Mean = 2.03, SD = .74							
Frequency	27	48	30	0	105	21	126
Percent	21.43	38.10	23.81	0.00	83.33	16.67	100
School counselor							
Mean = 2.30, SD = .73							
Frequency	18	42	51	0	111	15	126
Percent	14.29	33.33	40.48	0.00	88.10	11.90	100
Principal and assistant principal							
Mean = 2.13, SD = .77							
Frequency	26	45	41	0	112	14	126
Percent	20.63	35.71	32.54	0.00	88.89	11.11	100

Table 6

Ranking by Means of the Perceived Supply of Personnel per Endorsement Area

Endorsement Areas	Mean	Std. Deviation	Reported	Missing
Emotionally disturbed (K-12)	1.48	0.65	114	12
Severely/profoundly disabled (K-12)	1.51	0.69	108	18
Mathematics	1.51	0.69	111	15
Physics	1.53	0.74	104	22
Speech-language pathology (PreK-12)	1.59	0.72	109	17
Learning disabled (K-12)	1.59	0.68	114	12
Mental retardation (K-12)	1.61	0.69	114	12
Hearing impaired (PreK-12)	1.64	0.75	99	27
Earth science	1.66	0.77	110	16
Visually impaired (PreK-12)	1.69	0.75	98	28
Chemistry	1.73	0.76	111	15
Technology education	1.82	0.84	111	15
Early childhood special education	1.84	0.76	109	17
Algebra I (Add-on endorsement)	1.87	0.79	91	35
Library media	1.87	0.82	109	17
Spanish (PreK-12)	1.88	0.77	110	16
Latin (PreK-12)	1.93	0.92	86	40
School psychologist	2.03	0.74	105	21
Biology	2.06	0.75	108	18
ESL (PreK-12)	2.07	0.72	90	36
French (PreK-12)	2.08	0.77	108	18
Reading specialist	2.10	0.79	101	25
Principal and assistant principal	2.13	0.77	112	14
German (PreK-12)	2.14	0.83	72	54
Work and family studies	2.16	0.78	106	20
Agricultural education	2.19	0.81	80	46
Visiting teacher	2.19	0.72	83	43
Middle school (6-8)	2.19	0.73	113	13
Computer science	2.20	0.81	98	28
Trade and industrial education	2.24	0.73	94	32
Health occupations education	2.30	0.71	81	45
School counselor	2.30	0.73	111	15
School social worker	2.30	0.68	83	43
Marketing education	2.32	0.73	96	30
Italian (PreK-12)	2.34	0.86	56	70
Chinese (PreK-12)	2.35	0.89	51	75
Other Asian languages (PreK-12)	2.36	0.89	55	71
Russian (PreK-12)	2.37	0.89	52	74
Business education	2.37	0.68	104	22
Music-Instrumental (PreK-12)	2.45	0.69	107	19
Vocational evaluator	2.47	0.68	66	60
Music-Vocal/Choral (PreK-12)	2.50	0.61	105	21
English	2.54	0.58	113	13
Theater arts	2.59	0.59	82	44
Elementary (PreK-6)	2.61	0.62	113	13
Art (PreK-12)	2.70	0.52	112	14
Dance (PreK-12)	2.73	0.56	70	56
History/Social science	2.77	0.68	111	15
Health/P.E. (PreK-12)	2.92	0.57	112	14

It is readily apparent that the school districts in Virginia statewide perceive that no endorsement area will have an adequate supply of personnel over the next 5 years, with an adequate supply being represented by a mean score of 3. Emotionally disturbed (K-12) with a mean of 1.42 is perceived as the endorsement area having the greatest shortage. Health/P.E. (PreK-12) with a mean of 2.92 is very nearly perceived to have an adequate supply of personnel for the next 5 years.

Paradigm of Demographic, Societal, and Political Factors

The paradigm of the demographic, societal, and political factors that influence the staffing of instructional personnel was constructed by first determining the factors from a review of the literature and input from an expert panel. These factors were presented to the districts as represented in survey item 14. The frequency of responses and their relative percentage of the response are presented in Table 7.

The districts were asked to respond to this survey item by rating the factors relative to their impact on demand for teachers in their district for the 1999-2000 school year. The response categories and the values respectively assigned are GI= Greatly increased demand (5), SI= Somewhat increased demand (4), N= No impact on demand (3), SD= Somewhat decreased demand (2), GD= Greatly decreased demand (1). Descriptive statistics were derived for the districts' responses including the number of respondents, range of response categories, sum of the response, mean of the response, and standard deviation (Table 7).

The means of the district response to survey item 14 were used to create the bar graph presented in Figure 1. This figure visually illustrates the perceived relative impact of the respective factors on staffing instructional personnel.

Table 7

Influence of Demographic, Societal, and Political Factors on Demand for Teachers

| | Impact on demand | | | | | | | |
Demand factors	Greatly increased	Somewhat increased	No impact	Somewhat decreased	Greatly decreased	Reported	Missing	Total
Retirement								
Mean = 4.10, SD = .65								
Frequency	33.00	71.00	20.00	0.00	0.00	124.00	2.00	126.00
Percent	26.19	56.35	15.87	0.00	0.00	98.41	1.59	100.00
Enrollment shift								
Mean = 3.43, SD = .82								
Frequency	14.00	37.00	61.00	12.00	0.00	124.00	2.00	126.00
Percent	11.11	29.37	48.41	9.52	0.00	98.41	1.59	100.00
Accreditation compliance								
Mean = 3.76, SD = .65								
Frequency	15.00	64.00	45.00	0.00	0.00	124.00	2.00	126.00
Percent	11.90	50.79	35.71	0.00	0.00	98.41	1.59	100.00
Ethnic diversity								
Mean = 3.78, SD = .78								
Frequency	27.00	42.00	54.00	0.00	0.00	123.00	3.00	126.00
Percent	21.43	33.33	42.86	0.00	0.00	97.62	2.38	100.00

Table 7, Cont.

Influence of Demographic, Societal, and Political Factors on Demand for Teachers

Demand factors	Impact on demand							
	Greatly increased	Somewhat increased	No impact	Somewhat decreased	Greatly decreased	Reported	Missing	Total
Teacher-student ratio reduction								
Mean = 3.99, SD = .64								
Frequency	25.00	73.00	26.00	0.00	0.00	124.00	2.00	126.00
Percent	19.84	57.94	20.63	0.00	0.00	98.41	1.59	100.00
Technology								
Mean = 3.56, SD = .69								
Frequency	12.00	48.00	62.00	2.00	0.00	124.00	2.00	126.00
Percent	9.52	38.10	49.21	1.59	0.00	98.41	1.59	100.00
Virginia competition								
Mean = 4.39, SD = .72								
Frequency	63.00	48.00	11.00	2.00	0.00	124.00	2.00	126.00
Percent	50.00	38.10	8.73	1.59	0.00	98.41	1.59	100.00
Out-of-state competition								
Mean = 3.63, SD = .73								
Frequency	17.00	44.00	61.00	1.00	0.00	123.00	3.00	126.00
Percent	13.49	34.92	48.41	0.79	0.00	97.62	2.38	100.00

Table 7, Cont.

Influence of Demographic, Societal, and Political Factors on Demand for Teachers

Demand factors	Impact on demand							
	Greatly increased	Somewhat increased	No impact	Somewhat decreased	Greatly decreased	Reported	Missing	Total
Non-educational competition								
Mean = 3.59, SD = .68								
Frequency	12.00	50.00	60.00	1.00	0.00	123.00	3.00	126.00
Percent	9.52	39.68	47.62	0.79	0.00	97.62	2.38	100.00
Cost of living								
Mean = 3.23, SD = .66								
Frequency	5.00	29.00	78.00	11.00	0.00	123.00	3.00	126.00
Percent	3.97	23.02	61.90	8.73	0.00	97.62	2.38	100.00
District salaries								
Mean = 3.97, SD = .99								
Frequency	42.00	49.00	20.00	10.00	2.00	123.00	3.00	126.00
Percent	33.33	38.89	15.87	7.94	1.59	97.62	2.38	100.00
Geographic location								
Mean = 3.56, SD = .97								
Frequency	19.00	51.00	36.00	14.00	3.00	123.00	3.00	126.00
Percent	15.08	40.48	28.57	11.11	2.38	97.62	2.38	100.00

Table 7, Cont.

Influence of Demographic, Societal, and Political Factors on Demand for Teachers

| Demand factors	Impact on demand							
	Greatly increased	Somewhat increased	No impact	Somewhat decreased	Greatly decreased	Reported	Missing	Total
Home schooling trends								
Mean = 3.05, SD = .46								
Frequency	0.00	16.00	97.00	10.00	0.00	123.00	3.00	126.00
Percent	0.00	12.70	76.98	7.94	0.00	97.62	2.38	100.00
Non-public trends								
Mean = 3.07, SD = .44								
Frequency	0.00	16.00	99.00	8.00	0.00	123.00	3.00	126.00
Percent	0.00	12.70	78.57	6.35	0.00	97.62	2.38	100.00
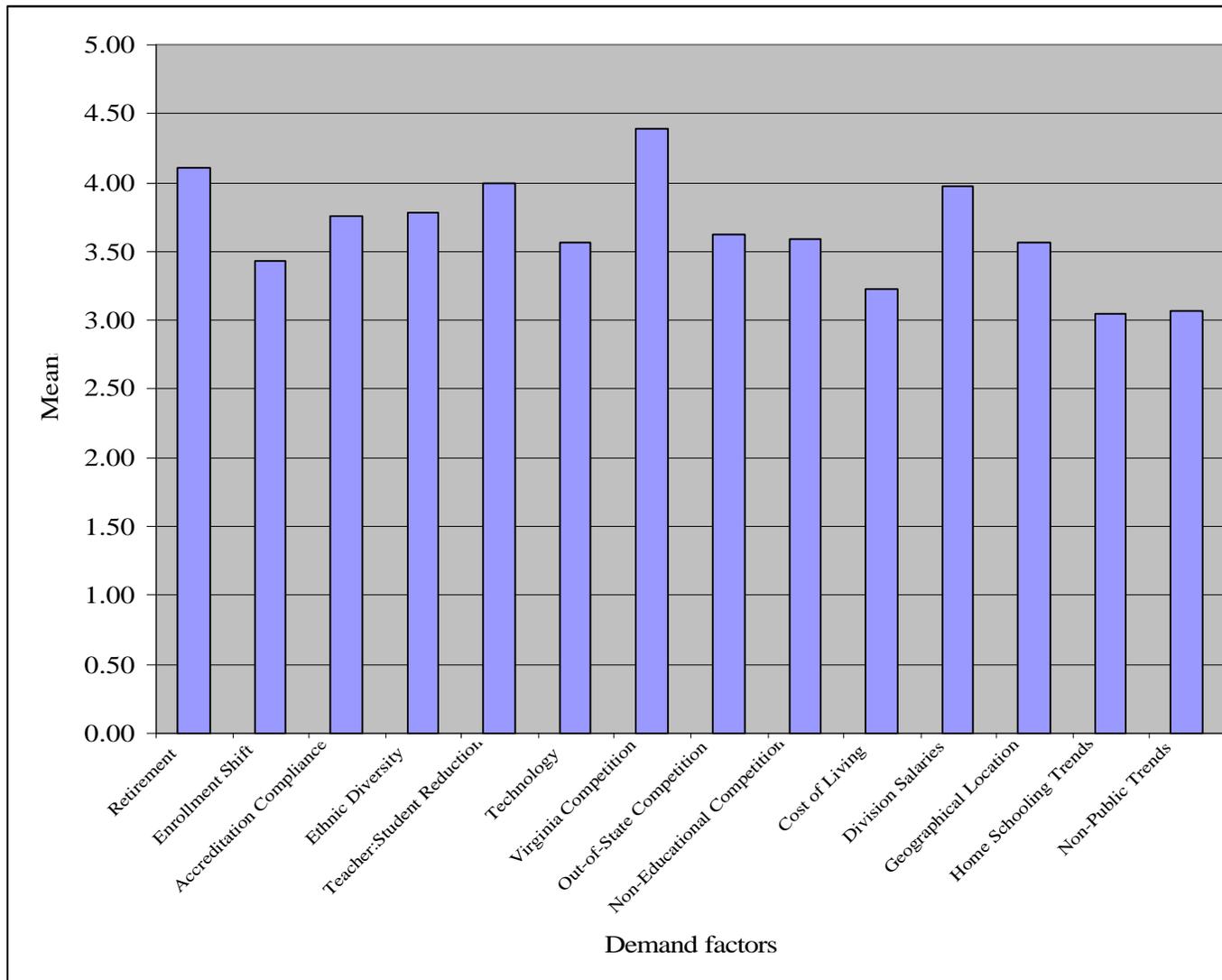
Figure 1. Factors affecting demand for teachers.

The means of the districts' responses are reported here for the purpose of establishing points of reference. The standard deviations for each response are reported in Table 7. As illustrated in Figure 1, competition from other Virginia school districts (mean = 4.39) was perceived as the factor most affecting staffing of instructional personnel. Retirement of personnel had the second greatest impact (mean =4.1). District salaries and district efforts to reduce teacher and pupil ratios were equally reported with Means of 3.97 and 3.99 respectively. Efforts by districts to increase ethnic diversity resulted in a mean of 3.78 while their effort to comply with Standards of Accreditation resulted in a nearly identical mean of 3.76. Respondents reported that the geographic location of the district (mean = 3.56), competition from out-of-state school districts (mean = 3.63), competition from non-educational businesses or industries (mean = 3.59), increased use of technology (mean = 3.56), all had nearly equal impact on staffing instructional personnel. Shifts in student enrollment (mean = 3.43) and cost of living in the districts geographic area had some impact on staffing, while home schooling and non-public schooling student enrollment trends with respective means of 3.05 and 3.07 had negligible impact on staffing needs.

<div align="center">Cluster Analysis</div>

It was determined to attempt to partition the Virginia public school districts into 2, 3, 4, and 5 discrete clusters. This determination of number of clusters is largely an intuitive process (Everitt, 1974). Given the intended application of this exercise, the decision was made to limit the number of clusters to a number that a state educational agency might find practical for which to develop intervention strategies. The cluster number that optimally met the criteria of maximum homogeneity within the cluster and maximum heterogeneity between the clusters was selected for the more detailed analyses that are described below.

Selection of the Two Group Clustering Model

A two-group clustering was determined to be the best partition of the Virginia public school districts. The following examination of the clusters revealed that the clusters were created based on the level of perceived impact that the variables had on demand for instructional personnel in the districts. While districts in both clusters reported that the variables did affect

demand for personnel, the districts assigned to Cluster 1 were affected more severely than the districts that were assigned to Cluster 2.

The two-cluster *k*-means analysis assigned 63 districts to Cluster 1 and 58 districts to Cluster 2. Five districts were not assigned to either cluster due non-response or incomplete responses to the survey item 14 that served as the basis for the cluster analysis (Table 8). The statistical package SPSS 9.0 was used for all cluster analysis procedures employed by this study. The *k*-means cluster analysis was computed four times, once each to determine groupings of 2, 3, 4, and 5. The decision to select the two-group partition of districts was made based on the results of repetitive hierarchical cluster analysis using Euclidean distance measures and initially using the within-groups linking method. The two-cluster *k*-means analysis assigned 67 districts to Cluster 1, 58 districts were assigned to Cluster 2 and 5 districts were not assigned to either cluster.

The groupings of 3, 4, and 5 produced by the *k*-means cluster analysis were not remotely approximated using the within-groups linking method. The two-cluster, *k*-means grouping was most approximated by the hierarchical, within-groups, method (Table. 8), though the approximation rate was disappointing (44.4%). The cluster memberships resulting from Ward's and the furthest neighbor linking methods revealed very close agreement to the within-groups method (Table 8). The agreement rate among the three hierarchical methods was nearly 90%. This close agreement suggests that further research should be directed towards the use of hierarchical cluster analysis methods.

The linking methods described as between-group, nearest neighbor, centroid and median clustering, when applied to affirm the two group *k*-means clustering, resulted in no partition as practically every district was assigned to only one cluster. The cluster memberships assigned by these methods are not included in Table 8.

Table 8

Cluster Membership as Assigned by *k*-means and Hierarchical Cluster Analyses

| Public school districts | Distance from center | Cluster membership | | | |
		k-means	Within-groups	Furthest Neighbor	Ward's
Accomack County	3.742	1	1	1	1
Albemarle County	3.742	1	1	1	1
Alexandria City	3.742	1	1	1	1
Alleghany Highlands	3.000	1	1	1	1
Amelia County	5.000	2	1	1	1
Amherst County	-	-	1	1	1
Appomattox County	3.464	1	1	1	1
Arlington County	3.742	1	1	1	1
Augusta County	3.873	1	1	1	1
Bath County	4.690	2	1	1	1
Bedford City	4.472	1	2	2	2
Bland County	2.449	2	1	1	1
Botetourt County	4.243	1	1	1	1
Bristol City	4.000	2	1	1	1
Brunswick County	3.162	1	1	1	1
Buchanan County	4.123	2	1	1	1
Buckingham County	4.359	1	1	1	1
Buena Vista City	3.317	1	1	1	1
Campbell County	0.000	1	1	1	1
Caroline County	4.000	1	1	1	1
Carroll County	4.899	1	1	1	1
Charles City County	3.742	1	1	1	1
Charlotte County	2.646	1	1	1	1
Chesapeake City	4.472	1	1	1	1
Chesterfield County	2.828	1	1	1	1
Clarke County	4.796	1	1	1	1
Colonial Beach	4.243	1	2	2	2
Colonial Heights City	2.000	2	2	2	2
Covington City	3.000	2	1	1	1
Craig County	3.742	1	1	1	1
Culpeper County	4.472	1	1	1	1
Cumberland County	3.873	1	1	1	1
Danville City	-	-	1	1	1
Dickenson County	3.873	2	1	2	1
Dinwiddie County	4.000	2	1	1	1
Essex County	4.796	1	2	2	2
Fairfax County	3.464	1	1	1	1
Falls Church City	4.359	2	2	2	2
Fauquier County	3.162	1	1	1	1
Floyd County	2.646	2	2	2	2

Table 8, Cont.

Cluster Membership as Assigned by *k*-means and Hierarchical Cluster Analyses

| Public school districts | Distance from center | Cluster membership | | | |
		k-means	Within-groups	Furthest neighbor	Ward's
Fluvanna County	4.123	2	1	1	1
Franklin City	3.464	2	1	1	1
Franklin County	4.359	1	1	1	1
Frederick County	4.000	1	1	1	1
Fredericksburg City	3.464	2	1	1	1
Galax City	3.742	2	1	1	1
Giles County	3.873	1	1	1	1
Gloucester County	3.742	1	1	1	1
Goochland County	3.162	1	1	1	1
Grayson County	4.472	1	1	1	1
Greene County	4.123	2	1	1	1
Greensville County	4.000	1	1	1	1
Halifax County	3.317	1	1	1	1
Hampton City	3.742	1	1	1	1
Hanover County	3.162	1	1	1	1
Harrisonburg City	4.123	2	1	1	2
Henrico County	2.828	1	1	1	1
Henry County	4.796	2	2	2	2
Highland County	4.123	2	1	1	1
Hopewell City	2.828	1	1	1	1
Isle of Wight County	0.000	2	2	2	2
King William County	4.359	1	1	2	2
Lancaster County	4.243	1	1	1	1
Lee County	3.000	2	1	1	1
Lexington City	3.162	2	1	1	2
Loudoun County	3.606	1	2	1	1
Louisa County	3.317	1	1	1	1
Lunenburg County	3.000	2	1	2	1
Lynchburg City	3.162	2	1	1	1
Madison County	3.742	1	1	2	2
Manassas City	4.472	2	1	1	1
Manassas Park City	3.873	1	1	1	2
Martinsville City	3.742	2	1	1	1
Mathews County	4.000	2	1	1	1
Mecklenburg County	3.742	2	1	1	1
Middlesex County	4.000	2	1	1	1
Montgomery County	4.583	2	1	1	1
Nelson County	4.690	1	1	1	1
New Kent County	3.873	1	1	2	1
Newport News City	3.873	2	1	1	1

Table 8, Cont.

Cluster Membership as Assigned by *k*-means and Hierarchical Cluster Analyses

Public school districts	Distance from center	Cluster membership			
		k-means	Within-groups	Furthest neighbor	Ward's
Norfolk City	5.196	2	1	1	1
Northhampton County	3.742	2	1	1	1
Northumberland County	3.742	2	1	1	1
Norton City	4.123	2	1	1	1
Nottoway County	4.899	2	1	1	1
Orange County	3.873	1	1	1	1
Page County	4.359	2	1	2	1
Patrick County	3.606	1	2	2	2
Petersburg City	5.477	2	1	1	1
Pittsylvania County	4.123	1	2	2	2
Poquoson City	2.646	2	1	1	1
Portsmouth City	4.243	2	1	1	1
Powhatan County	4.123	2	1	1	1
Prince Edward County	4.583	1	2	1	1
Prince George County	4.796	1	1	1	1
Prince William County	3.162	1	1	1	1
Pulaski County	3.317	2	1	1	1
Radford City	4.243	1	2	2	2
Rappahannock County	.	-	1	1	1
Richmond City	2.828	1	1	1	1
Richmond County	3.873	2	1	1	1
Roanoke City	3.000	2	2	2	2
Roanoke County	4.472	1	2	2	2
Rockbridge County	4.690	2	1	1	1
Rockingham County	4.583	1	1	2	2
Salem City	3.317	2	1	1	1
Scott County	2.449	2	1	1	1
Shenandoah County	3.742	2	1	1	1
Smyth County	3.464	2	1	1	1
Southhampton County	4.000	1	2	2	2
Spotsylvania County	4.000	2	1	2	2
Stafford County	4.123	1	1	1	1
Staunton City	.	-	1	2	2
Suffolk City	.	-	1	1	1
Surry County	4.472	1	2	2	2
Tazewell County	3.000	2	1	1	1
Virginia Beach City	4.583	2	2	2	2
Warren County	5.385	1	2	2	2
Washington County	3.742	2	1	1	1

Table 8, Cont.

Cluster Membership as Assigned by *k*-means and Hierarchical Cluster Analyses

		Cluster membership			
Public school districts	Distance from center	*k*-means	Within-groups	Furthest neighbor	Ward's
Waynesboro City	4.123	2	1	1	1
West Point	4.123	2	1	1	1
Williamsburg-James City County	3.742	1	-	-	-
Winchester City	2.449	2	-	-	-
Wise County	2.828	2	-	-	-
Wythe County	4.690	2	-	-	-
York County	4.000	1	-	-	-

Note. A dash indicates that district was not assigned to a cluster.

Shifters

The two-cluster *k*-means analysis assigned 63 districts to the cluster labeled 1. The within-groups hierarchical 2-cluster analysis assigned 102 districts to the cluster labeled 1 (Table 8). To effect this change of membership, a total of 51 districts were shifted from Cluster 2 to Cluster 1 when these districts were reanalyzed for approximation using the within-groups hierarchical method (Table 8). This particular movement accounted for 51 (75%) of the 70 total "shifters." This large directional shift prompted the addition of a step to the proposed methodology to include the computation of the variable means for the districts that shifted from Cluster 2 to Cluster 1. A comparison of the variable means for this group of "shifters" with the means of the original Clusters 1 and 2 (as assigned by the *k*-means 2-cluster procedure) indicated the characteristics of the "shifters" which contributed to its migration from Cluster 2 to Cluster 1. Table 9 contains the means computed for the "shifters." This table of means (Table 9) was constructed to facilitate the comparison of the "shifter" means with the means computed for Clusters 1 and 2 and the means of the Campbell County and Isle of Wight, each designated as the prototypical districts for Cluster 1 and Cluster 2, respectively.

A review of the "shifter" column in Table 9 reveals an extremely close approximation for all variables, between or among the means of the "shifter" districts and the means of the Cluster 2 districts. This is an indication that the Cluster 1 and Cluster 2 memberships generated by the *k*-

means cluster analysis may be more properly assigned than the cluster memberships generated by the three hierarchical cluster analysis procedures although there was close approximation of cluster membership between the three hierarchical methods.

Cluster Membership

Table 8 presents the two-cluster memberships as computed through use of the *k*-means cluster analysis procedure. The memberships produced via the within-groups, Ward's and furthest neighbor hierarchical cluster analysis procedure are also presented in Table 8. The two-cluster *k*-means analysis assigned 63 districts to Cluster 1, 58 districts were assigned to Cluster 2 and five districts were not assigned to either cluster (Table 8).

Means Comparison

SPSS 9.0 was used to compute the cluster center from the means for the standardized variables for each cluster. This output reports the means of the standardized variables for each cluster as reported in response to survey item 14 (Appendix E). The means for each cluster define the cluster center. As the means for each variable are reported for Cluster 1 and Cluster 2, a composite profile of the averaged influence of factors that influenced staffing of instructional personnel for each cluster was established. A comparison of the cluster centers for the two clusters will indicate the average difference between the clusters relative to the variables.

The means were constructed from the districts' responses to the 14 variables presented in item number 14 of the Virginia Instructional Personnel Profile survey (Appendix E). The responses were assigned the following values for computation and comparison purposes: greatly increased demand = 5; somewhat increased demand = 4; no impact on demand = 3; somewhat decreased demand = 2; greatly decreased demand = 1. As the responses for this item were standardized earlier, it was not necessary to compute *z* scores.

Campbell County was assigned the "distance from cluster center" value of zero (0) for Cluster 1, which establishes Campbell County is the prototype district for Cluster 1 (Table 8). The Campbell County response to survey item 14 (Appendix E) is presented in Table 9 and serves as the prototype response for Cluster 1 (Table 8).

Isle of Wight was assigned the "distance from cluster center" value of zero (0) for Cluster 2, this denotes that Isle of Wight is the prototype district for Cluster 2 (Table 8). The Campbell County response to survey item 14 (Appendix E) is presented in Table 9 and serves to facilitate the comparison of the two responses. A comparison of the centers for the two prototypes indicates the differences and similarities between the prototypes.

The means for the Cluster 1 and Cluster 2 responses to survey item 14 (Appendix E) also are presented in Table 9. Knowledge of the cluster means allow for the generation of a composite description of each cluster. A comparison of the cluster means will indicate the differences and similarities between the clusters. Additionally, the relationship of the prototypical district to its respective cluster can be examined.

Table 9

Means Comparison for Demand Variables

Demand factors	Cluster 1 ($n = 63$)	Cluster 2 ($n = 58$)	"Shifters" 2 to 1 ($n = 42$)	Prototypical districts	
				Campbell County	Isle of Wight
Retirement	4.03	4.19	4.12	4	4
Enrollment shift	3.75	3.05	3.07	4	2
Accreditation compliance	4.05	3.47	3.50	5	3
Ethnic diversity	4.14	3.38	3.45	5	3
Teacher-student ratio reduction	4.24	3.71	3.71	5	3
Technology	3.83	3.29	3.33	5	3
Virginia competition	4.76	3.97	4.10	5	3
Out-of-state competition	3.90	3.29	3.31	5	3
Non-educational competition	3.84	3.31	3.43	5	2
Cost of living	3.46	2.98	3.00	4	3
District salaries	4.38	3.48	3.69	4	2
Geographic location	4.02	3.10	3.26	5	2
Home schooling trends	3.16	2.93	3.00	4	2
Non-public trends	3.17	2.95	2.98	4	3

Cluster 1 Characteristics.

The two-cluster *k*-means analysis assigned 63 districts to Cluster 1. Campbell County was assigned the "distance from cluster center" value of zero (0) for Cluster 1, this denotes that Campbell County was the prototype district for Cluster 1 (Table 8). The districts comprising Cluster 1 are typified by reporting a greater impact of the variables on the staffing of instructional personnel than the districts that were assigned to Cluster 2. The computed means correspond with the following values: greatly increased demand = 5; somewhat increased demand = 4; no impact on demand = 3; somewhat decreased demand = 2; greatly decreased demand = 1. All means are reported in Table 9.

Cluster means. All means are reported in Table 9. Districts assigned to Cluster 1 reported that competition from other Virginia districts, with a mean of 4.76, created the most demand for instructional personnel. District salaries (4.38) and efforts to reduce teacher student ratios (4.24) increased the demand for instructional personnel. Efforts to increase ethnic diversity (4.14), Compliance to Standards of Accreditation (4.05), retirement (4.03), and geographic location (4.02) all contributed somewhat to increasing the demand for instructional personnel. Cost of living (3.46), enrollment shifts (3.75), competition from non-educational business or industry (3.84), and competition from school districts outside of Virginia (3.90) were perceived to have slight impact on the demand for instructional personnel. Non-public and home schooling enrollment were perceived to have the least impact on demand for personnel, reporting respective means of 3.16 and 3.17.

Prototype means. All means are reported in Table 9. Campbell County was identified as the prototype district for Cluster 1. Campbell County's response to survey item 14 (Appendix E) exceeded the means for the cluster in every variable except retirement where it was nearly identical to the cluster mean. Variables that greatly increased demand for personnel were the district's efforts to comply with Standards of Accreditation, increase ethnic diversity, reduce teacher to student ratios, and increase technology curriculum. Competition from school districts within Virginia and other states, as well as competition from non-educational institutions also was rated as greatly increasing demand for instructional personnel. All other variables were rated as "somewhat increasing demand for instructional personnel."

Cluster homogeneity. Table 10 reports the membership for Cluster 1 in ascending order as measured in distance from the cluster center. Campbell County, the prototype district for Cluster 1, was assigned the value of zero (0). As stated previously, a lower value assigned to a district indicates a closer association with the prototype; conversely, a higher value indicates less association with the prototype. Cluster 1 is a broad grouping of districts when measured in terms of the districts' distances from the cluster center. This is not surprising, as there was only a two-group partitioning of Virginia public school districts. There were no extreme increases in the distance from cluster center between nearest neighbor districts. The distance from cluster center for nearest neighbor districts is generally small, indicating that while the cluster is broad in its membership there is homogeneity within the cluster.

Outliers.). Refer to Table 10 for Cluster 1 membership listed in ascending order based on distance from the cluster center. Outliers are those districts that are the farthest removed from the cluster center. The parameters set for the identification of outliers is largely an intuitive process. A sudden marked increase in the distance from the cluster center between to two distance-ordered districts may indicate the boundary for the outliers. Warren County, the district farthest from the cluster center (5.385) also has the most marked increase in the cluster center distance from its nearest neighbor, Carroll County (4.899

Table 10

Cluster 1 Membership by Ascending Distance from *k*-means Cluster Center

Public school districts	Distance from center	Public school districts	Distance from center
Campbell County	0.000	Stafford County	4.123
Charlotte County	2.646	Botetourt County	4.243
Chesterfield County	2.828	Colonial Beach	4.243
Henrico County	2.828	Lancaster County	4.243
Hopewell City	2.828	Radford City	4.243
Richmond City	2.828	Buckingham County	4.359
Alleghany Highlands	3.000	Franklin County	4.359
Brunswick County	3.162	King William County	4.359
Fauquier County	3.162	Bedford City	4.472
Goochland County	3.162	Chesapeake City	4.472
Hanover County	3.162	Culpeper County	4.472
Prince William County	3.162	Grayson County	4.472
Buena Vista City	3.317	Roanoke County	4.472
Halifax County	3.317	Surry County	4.472
Louisa County	3.317	Prince Edward County	4.583
Appomattox County	3.464	Rockingham County	4.583
Fairfax County	3.464	Nelson County	4.690
Loudoun County	3.606	Clarke County	4.796
Patrick County	3.606	Essex County	4.796
Accomack County	3.742	Prince George County	4.796
Albemarle County	3.742	Carroll County	4.899
Alexandria City	3.742	Warren County	5.385
Arlington County	3.742		
Charles City County	3.742		
Craig County	3.742		
Gloucester County	3.742		
Hampton City	3.742		
Madison County	3.742		
Williamsburg-James City County	3.742		
Augusta County	3.873		
Cumberland County	3.873		
Giles County	3.873		
Manassas Park City	3.873		
New Kent County	3.873		
Orange County	3.873		
Caroline County	4.000		
Frederick County	4.000		
Greensville County	4.000		
Southhampton County	4.000		
York County	4.000		
Pittsylvania County	4.123		

Note. Amherst County, Danville City, Rappahannock County, Staunton City, and Suffolk City were not assigned to either cluster.

Cluster 2 Characteristics

The two-cluster *k*-means analysis assigned 58 districts to Cluster 1. Isle of Wight was assigned the "distance from cluster center" value of zero (0) for Cluster 2, identifying the Isle of Wight as the prototype district for Cluster 2 (Table 8). The districts comprising Cluster 2 are typified by reporting less impact of the variables on the demand for instructional personnel than the districts that were assigned to Cluster 1. The computed means correspond with the following values: greatly increased demand = 5; somewhat increased demand = 4; no impact on demand = 3; somewhat decreased demand = 2; greatly decreased demand = 1. All means are reported in Table 9.

Cluster means. All means are reported in Table 9. Districts assigned to Cluster 2 reported that retirement rate, with a mean of 4.19, most increased demand for instructional personnel. Competition for personnel from other Virginia school districts had the second greatest impact on demand for personnel (3.97). Efforts to reduce teacher student ratios (3.71) increased the demand for instructional personnel. Compliance to Standards of Accreditation (3.47), salaries (3.47), efforts to increase ethnic diversity (3.38), competition from non-educational business or industry (3.31), and competition from school districts outside of Virginia (3.29) were perceived to have slight impact on the demand for instructional personnel. Geographic location (3.10), enrollment shifts (3.05), cost of living (2.98), non-public (2.95) and home schooling (2.93) enrollment had the least impact on demand for personnel.

Prototype means. As indicated above, Isle of Wight was identified as the prototype district for Cluster 2. Isle of Wight's response to survey item 14 (Appendix E) was less than the means for the cluster in every variable except the variables non-public school enrollment trends and cost of living which were nearly identical. Isle of Wight identified no variables that greatly increased demand for instructional personnel. Only retirement rated as somewhat contributing to demand for instructional personnel. Enrollment shifts, competition for personnel from non-educational competition, district salaries, geographic location, and home schooling trends were reported to actually decrease the demand for instructional personnel. All other variables were rated as having no impact on the demand for instructional personnel

Cluster homogeneity. Table 11 reports the membership for Cluster 2 in ascending order as measured in distance from the cluster center. Isle of Wight was assigned the value of zero (0) as the prototype district for Cluster 1. Again, a lower value assigned to a district indicates a closer association with the prototype; conversely, a higher value indicates less association with the prototype. Cluster 2, similar to Cluster 1, is a broad grouping of districts when measured in terms of the districts' distances from the cluster center. This is not surprising, as there was only a two group partitioning of Virginia public school districts and there were no extreme increases in the distance from cluster center between nearest neighbor districts. The distance from cluster center for nearest neighbor districts was generally small, indicating that while the cluster is broad in its membership there is homogeneity within the cluster.

Outliers. Outliers are those districts that are the farthest removed from the cluster center. A sudden marked increase in the distance from the cluster center between to two distance-ordered districts may indicate the boundary for the outliers. Petersburg City, the district farthest from the cluster center (5.477) also has the most marked increase in the cluster center distance from its nearest neighbor, Norfolk City (5.196). Refer to Table 11 for Cluster 2 membership listed in ascending order based on distance from the cluster center.

Table 11

Cluster 2 Membership by Ascending Distance from *k*-means Cluster Center

Public school districts	Distance from center
Isle of Wight County	0.000
Colonial Heights City	2.000
Bland County	2.449
Scott County	2.449
Winchester City	2.449
Floyd County	2.646
Poquoson City	2.646
Wise County	2.828
Covington City	3.000
Lee County	3.000
Lunenburg County	3.000
Roanoke City	3.000
Tazewell County	3.000
Lexington City	3.162
Lynchburg City	3.162
Pulaski County	3.317
Salem City	3.317
Franklin City	3.464
Fredericksburg City	3.464
Smyth County	3.464
Galax City	3.742
Martinsville City	3.742
Mecklenburg County	3.742
Northhampton County	3.742
Northumberland County	3.742
Shenandoah County	3.742
Washington County	3.742
Dickenson County	3.873
Newport News City	3.873
Richmond County	3.873
Bristol City	4.000
Dinwiddie County	4.000
Mathews County	4.000
Middlesex County	4.000
Spotsylvania County	4.000
Buchanan County	4.123
Fluvanna County	4.123
Greene County	4.123
Harrisonburg City	4.123
Highland County	4.123
Norton City	4.123
Waynesboro City	4.123
West Point	4.123
Portsmouth City	4.243

Public school districts	Distance from center
Powhatan County	4.123
Falls Church City	4.359
Page County	4.359
Manassas City	4.472
Montgomery County	4.583
Virginia Beach City	4.583
Bath County	4.690
Rockbridge County	4.690
Wythe County	4.690
Henry County	4.796
Nottoway County	4.899
Amelia County	5.000
Norfolk City	5.196
Petersburg City	5.477

Note. Amherst County, Danville City, Rappahannock County, Staunton City, and Suffolk City were not assigned to either cluster.

ANOVA: Variables that Determined the Cluster Formation

Table 12 reports the results of the One Way Analysis of Variance (ANOVA) that was executed to identify and quantify the variables that influenced the cluster construct. Refer to Table 12 for the F statistics for each variable.

In cluster analysis the F statistic cannot be used as a measure of statistical significance because the clusters are formed to characterize differences not similarities, as is the case in other forms of factor analysis. The size of the F statistic reported in k-mean's ANOVA is still important as it allows for the identification of variables that drive the clustering as well as the identification of variables that differ little among the clusters. The variable with the highest F statistic will be the variable that most influenced the cluster construct, conversely, the variable with the lowest highest F statistic had the least influence on the cluster construct. (SPSS Base 7.5 Applications Guide, 1997. pp. 266, 281). In this study a low F statistic suggests that both clusters rated the variable approximately the same and therefore did not influence the construct of the clusters. A high F statistic suggests that the clusters rated the variable quite differently and therefore the variable did influence the construct of the clusters.

Competition from other Virginia school districts had the highest F statistic, ($F=52.56$). This is reflected in a comparison of the Cluster 1 mean (4.76) and Cluster 2 mean (3.97) for this variable, which is the largest difference between the means of the 14 variables, used in the cluster analysis and ANOVA. Efforts to increase ethnic diversity ($F=36.52$) had the second largest impact on determining cluster membership, followed closely by geographic location of district ($F=34.64$).

Retirement of personnel had the lowest F statistic, ($F=1.76$). This is reflected in a comparison of the Cluster 1 mean (4.03) and Cluster 2 mean (4.19) for this variable which is the smallest difference between the means of the 14 variables studied in the cluster analysis and ANOVA procedures. Local home schooling and non-public schooling enrollment trends had little effect on the formation of the clusters with F statistics of 7.71 and 8.39 respectively.

Table 12

ANOVA *k*-means 2-Cluster Solution

Demand factors	Cluster Mean Square (df = 1)	Error Mean Square (df = 119)	F	Sig.
Retirement	0.753	0.427	1.762	0.187
Enrollment shift	14.558	0.544	26.741	0.000
Accreditation compliance	10.232	0.347	29.492	0.000
Ethnic diversity	17.606	0.482	36.519	0.000
Teacher-student ratio reduction	8.521	0.331	25.707	0.000
Technology	8.556	0.413	20.739	0.000
Virginia competition	19.153	0.364	52.565	0.000
Out-of-state competition	11.298	0.432	26.134	0.000
Non-educational competition	8.512	0.393	21.632	0.000
Cost of living	6.887	0.392	17.575	0.000
District salaries	24.363	0.784	31.060	0.000
Geographic location	25.141	0.726	34.641	0.000
Home schooling trends	1.566	0.203	7.719	0.006
Non-public trends	1.547	0.184	8.396	0.004

Note. The *F* statistics are presented here to indicate the contribution of each variable to the determination of the final cluster members. Ignore the last column. These *F* statistics are not intended to test significance as the clusters are formed to characterize differences (SPSS 7.5 Base User's Guide, p. 281).

Summary of Findings

Number and Employment Status of Instructional Personnel by Endorsement Area

Of the total 132 public school districts, 126 responded to this survey. Five of the 126 survey respondents did not respond to survey item 15, therefore, a total of 11 school districts are missing from this summary of the number and employment status of instructional personnel by endorsement area.

Districts reported a total of 88,609.5 FTE instructional positions for the 1999-2000 school year. Of this total, 1,055.6 FTE positions were filled by unendorsed personnel. An additional 382 FTE positions were reported as unfilled.

The elementary (PreK-6) endorsement area accounts for 27,024.8 FTE positions with only 94.8 positions filled by unendorsed personnel and 76.5 positions reported as unfilled. The eight special education endorsement areas combine to account for 122 of the 382 total unfilled FTE positions and 440 of the total 1,055.6 FTE positions filled with unendorsed personnel.

The four districts reporting the largest number of unfilled FTE positions were Richmond City (63), Fairfax City/County (57.7), Norfolk City (49), and Prince William County (32). Virginia Beach City reported 131 FTE positions filled by persons who are unendorsed for the area in which they were teaching. A total of 87 school districts reported having FTE positions filled by unendorsed personnel of which 21 districts reported having more than 20 FTE positions filled by unendorsed personnel.

Estimated FTE Positions, 1999-2000 School Year

Districts were hesitant to report projections for estimated FTE position openings for the 2000-2001 school year as evidenced by the fact that 25 of the 126 total survey respondents did not report projected openings for the 2000-2001 school year. These omissions result in the actual number of projected openings to be substantially underreported.

There are estimated to be 7,604 FTE positions open in Virginia for the 2000-2001 school year. The elementary (PreK-6) endorsement area accounts for 2,565 of these openings. The middle school (6-8) endorsement area accounts for 872 open FTE positions. The eight special education endorsement areas combine for 1,192.5 FTE position openings, with the learning disabled (K-12) endorsement area accounting for 525.5 of these open positions.

Fairfax City/County, with 1,179 estimated FTE position openings, expects to have the largest number of openings of any Virginia public school district for the 2000-2001 school year. With 657 expected open positions, Prince William County ranks second in the state for expected FTE position openings. Eight public school districts expect to have between 104 and 213 FTE position openings, while seven other public school districts expect to have between 220 and 459 open FTE positions.

Perceived Supply of Instructional Personnel per Endorsement Area

The personnel administrators were asked to look forward five years and report their perception of the estimated supply of instructional personnel in their district per endorsement area. The data were collected from the districts' responses to survey item 15. The response categories and the values respectively assigned for the data analysis are severe shortage = 1, shortage = 2, adequate supply = 3, excess supply = 4.

Emotionally/disturbed (K-12) having a mean of 1.482 is the endorsement area with the greatest perceived shortage. Health/P.E. (PreK-12) with a mean of 2.92 is very nearly perceived to have an adequate supply of personnel for the next 5 years. All eight of the special education endorsement areas fall within the top 13 endorsements as areas of concern. Joining the special education endorsement areas in the top 13 endorsement areas of concern are mathematics, physics, earth science, chemistry, and technology education

Joining Health/P.E. (PreK-12) at the bottom of the list are history /social science, dance (PreK-12), and art (PreK-12) indicating that these endorsement areas are not perceived to have shortages as severe as the other endorsement areas. It should be noted that all endorsement areas are expected to experience some degree of shortage over the next five years.

Paradigm of Demographic, Societal, and Political Factors

The paradigm of the demographic, societal, and political factors that influence the staffing of instructional personnel was constructed by the districts' response to survey item 14 (Appendix E). The districts were asked to respond to this survey item by rating the factors relative to their impact on demand for teachers in their district for the 1999-2000 school year. The response categories and the values respectively assigned are GI= Greatly increased demand (5), SI= Somewhat increased demand (4), N= No impact on demand (3), SD= Somewhat decreased demand (2), GD= Greatly decreased demand (1).

Competition from other Virginia school districts (mean = 4.39) was perceived as the factor most affecting staffing of instructional personnel. Retirement of personnel had the second greatest impact (mean =4.1).

District salaries and district efforts to reduce teacher and pupil ratios were equally reported with Means of 3.97 and 3.99 respectively.

District efforts to increase ethnic diversity (mean = 3.78) and to comply with Standards of Accreditation (mean = 3.76) were nearly identical.

Respondents reported that the geographic location of the district (mean = 3.56), competition from out-of-state school districts (mean = 3.63), competition from non-educational businesses or industries (mean = 3.59), increased use of technology (mean = 3.56), all had nearly equal impact on staffing instructional personnel.

Shifts in student enrollment (mean = 3.43) and cost of living in the districts geographic area had some impact on staffing, while home schooling and non-public schooling student enrollment trends with respective means of 3.05 and 3.07 had negligible impact on staffing needs.

Cluster Analysis

A two-group clustering was determined to be the best partition of the Virginia public school districts. The clusters were created based on the level of perceived impact that the variables had on demand for instructional personnel in the districts. While districts in both clusters reported that the variables did affect demand, the districts assigned to Cluster 1 were impacted more severely than the districts that were assigned to Cluster 2.

The two-cluster k-means analysis assigned 63 districts to Cluster 1 and 58 districts to Cluster 2. Five districts were not assigned to either cluster due to non-response or incomplete responses to the survey item 14 (Appendix E) which served as the basis for the cluster analysis (Table 8).

Districts assigned to Cluster 1 reported that competition from other Virginia districts, with a mean of 4.76, most increased demand for instructional personnel. District salaries (4.38), and efforts to reduce teacher student ratios (4.24) increased the demand for instructional personnel. Efforts to increase ethnic diversity (4.14), Compliance to Standards of Accreditation (4.05), retirement (4.03), and geographic location (4.02) all contributed somewhat to increasing the demand for instructional personnel. Cost of living (3.46), enrollment shifts (3.75), competition from non-educational business or industry (3.84), and competition from school districts outside of Virginia (3.90) were perceived to have slight impact on the demand for instructional personnel. Non-public and home schooling enrollment had the least impact on demand for personnel with respective means of 3.16 and 3.17.

Districts assigned to Cluster 2 reported that retirement rate, with a mean of 4.19, most increased demand for instructional personnel. Competition for personnel from other Virginia school districts had the second greatest impact on demand for personnel (3.97). Efforts to reduce teacher student ratios (3.71) increased the demand for instructional personnel. Compliance to Standards of Accreditation (3.47), salaries (3.47), efforts to increase ethnic diversity (3.38), competition from non-educational business or industry (3.31), and competition from school districts outside of Virginia (3.29) were perceived to have slight impact on the demand for instructional personnel. Geographic location (3.10), enrollment shifts (3.05), cost of living (2.98), non-public and home schooling enrollment had the least impact on demand for personnel with respective means of 2.95 and 2.93.

CHAPTER V

Discussion and Recommendations

The concept of "phronesis" is provided in an 1993 essay by Dr. Elliott Eisner, president of the American Educational Research Association (AERA) (Suppes, Eisner, Stanley, & Greene, 1998). Eisner defined phronesis as "wise practical judgement" (p. 34). Hopefully, this chapter conforms to Eisner's "wise practical judgement."

The discussion, recommendations, and findings presented in this chapter are the result of the review of literature and supported by the findings of this study. The study of instructional personnel demand in Virginia is complicated. Myriad factors influence the demand for instructional personnel. Shifts in policies or priorities or priorities in the societal or political arena likely will affect staffing patterns dramatically. Priorities for allocation of resources may shift on a national, state, local, or personal level. Any study of demand for instructional personnel is confounded by the fact that the data required to conduct a study of this type are based partially on the knowledge and skills of those persons who responded to the questionnaire.

This study identified and quantified the factors that affect the staffing of instructional personnel in Virginia. These data will be useful to Virginia policy makers as strategies are developed and resources are allocated to address the apparent impending shortage of instructional personnel in Virginia. The data, specific to endorsement area and geographic location, will facilitate the development of intervention strategies.

Data Collection

As this study progressed it became increasingly apparent that perhaps the most significant finding was not discovered by examining the data, but by examining what was not included in the data and the reasons for the omission of these data. The need for a statewide, uniform, and continually updated database that contains demographic information on instructional personnel is substantiated by this study. This is demonstrated by the difficulty that the districts had in supplying the requested data in a uniform format. The high response rate for the survey component of this study is attributable directly to the support of the Virginia Department of Education. It is doubtful that a response rate necessary to complete a study of any value would have been forthcoming without the introductory Superintendent's Memorandum

from then State Superintendent for Public Instruction, Dr. Paul Stapleton, or without the contact with the districts by the staff of the Division of Teacher Education and Licensure.

As stated in Chapter I, there is no state mandate requiring the collection of demographic data, nor is funding available to the Virginia Department of Education for the collection of this data. A well-designed and funded study, mandated by the Virginia General Assembly would provide the data that Virginia policy makers need to make informed decisions pertained.

Representative Barnie K. Day introduced House Bill 2287 to the 1999 Virginia General Assembly, which if enacted would have granted localities and school boards authority to improve communications and address workplace issues for local government and school board employees (Workplace issues, 1999). Localities and school boards would have been able to use the information gathered from employees to guide future personnel policy directions. Unfortunately, HB 2287 failed primarily due to its inclusion of language that would have allowed the employers to survey employees on morale issues. However, a measure similar to House Bill 2287, with language restricting the gathering of information to demographic data, might pass House and Senate muster if it were reintroduced. Such a measure would provide the legislative mandate needed to gather demographic data on instructional personnel.

Addressing the Shortage

At least 1,500 FTE positions in Virginia currently are either unfilled or filled with personnel unendorsed in the teaching area in which they are assigned. A minimum of 7,500 FTE positions are projected to become open in the 2000-2001 school year. These figures combine to underscore the merit of the recent attention being accorded the anticipated shortage of instructional personnel.

Competition from other Virginia school districts proved to be the factor that most influenced demand for instructional personnel. Disparity in teacher salaries certainly contributes to this competition as evidenced by the level of impact on demand for personnel that the districts assigned to district salaries. Virginia's instructional personnel salaries are well below the national average. Recent efforts by legislators to raise salaries to the national average would, is successful, assist school districts to recruit and retain instructional personnel. Currently, the ability of wealthy school districts to provide signing bonuses have exacerbated the staffing difficulties of less wealthy Virginia school districts.

Virginia can expect to face more competition from out-of-state school districts as the surrounding states implement strategies to address shortages in their states. The literature reveals that teachers prepared outside of Virginia have in the past contributed perhaps 40% of the teachers in the state. The literature also suggests that approximately 40% of the teachers prepared in Virginia take positions outside of the state. The competition from out-of-state school districts is exemplified in a communication with Dr. Thelma Monk, Director of Instructional Personnel for the Montgomery County, Maryland Public School District (T. Monk, personal communication, February 12, 2000). Monk relates that the beginning salary for teachers is $33,000 plus, an attractive benefits program, mentoring program, and reduced class sizes are additional selling points. There is a staff developer in each of the 124 elementary schools and 20 consulting teachers countywide. Monk is also attempting to secure a relocation allowance for teachers new to the county. The Montgomery County, Maryland Public School District hired approximately 1600 new teachers for the 1999-2000 school year. Monk travels to surrounding states to recruit new teachers. As an indication of the shortage of Spanish teachers in her locale, Monk traveled to Spain to recruit 16 Spanish teachers (T. Monk, personal communication, December 12, 1999).

The dynamics of out-of-state demand for teachers and the resulting impact on Virginia school districts is an important area of investigation and deserves further study. A study that reflects the expected demand for teachers in the surrounding states, the number of teachers produced in those states, the contribution of out-of-state teachers to the educator workforce in each state, and identification of the factors that impel teachers to leave the state where they have completed their teacher preparation program would be extremely valuable to policy makers in the several states. This study would facilitate the development of cooperative strategies between the states that might avert severe interstate competition for teacher such as occurs now between Virginia school districts.

Individuals are rewarded for their efforts with financial and non-financial compensation. Non-financial compensation includes recognition and personal satisfaction with the work that one is performing. There has been a great deal of criticism heaped upon educators by various factions of society. Educators feel increasingly attacked and under-appreciated. Given the level of financial compensation that educators receive, the personal rewards received take on additional impact in the decision-making of individuals as they decide whether to enter and

remain in the education profession. The question is posed, " What person in their right mind, having all the qualities that are demanded for this position, would possibly enter, or remain in, such a low status and low salaried position?"

Efforts to raise the public's perception of the value that should be accorded to educational professionals should affect positively the recruitment and retention of instructional personnel in Virginia. Recruitment campaigns, directed towards high school students, that accentuate the positive non-pecuniary rewards of a career in education, coupled with financial inducements to enter teacher preparation programs have the potential to increase the supply pool of educators.

Retired educators are another potentially valuable source of instructional personnel to add to the educator supply pool. Many educators take advantage of early retirement opportunities and while not wishing to work full-time, may welcome the opportunity to work on an adjunct basis. Another potential source of instructional personnel is individuals who left the teaching force to raise a family. Once children become school age these individuals may be very interested in working on an adjunct basis that allows them to accommodate their children's schedule. Montgomery County, Maryland has had success filling positions by hiring adjunct faculty according to Dr. Thelma Monk, Director of Instructional Personnel for Montgomery County, Maryland Public Schools (T. Monk, personal communication, November 18, 1999). Legislation that facilitates flexible hiring practices, and reduces the financial disadvantages of continuing to work part-time upon retirement, would add experienced educators to the supply pool.

The alternative routes to licensure currently being implemented in Virginia holds some promise to increase the supply of instructional personnel, at least in some geographic and endorsement areas. The pilot program being implemented in Virginia effective July 2000, Career Switcher Alternative Route to Licensure For Military Personnel (Division of Teacher Education and Licensure, 1999), will facilitate the entry of retired military personnel into the teaching profession. This program should especially benefit geographic areas such as Hampton Roads and Norfolk as many military retirees reside in these areas and the school districts in this locale have instructional personnel needs. This program will provide an alternative route to licensure in all endorsement areas except the special education and non-degree technical professional. Individuals without degrees interested in the technical areas would seek licensure through the technical professional license. Individuals seeking an alternative route to teaching special

education would seek the special education conditional license (Division of Teacher Education and Licensure, 1999).

This study does raise concern regarding the ability of the special education conditional license provision to meet the need for personnel in the special education endorsement areas. Special education endorsement areas account for 8 of the top 13 endorsement areas that are perceived to be facing the most critical shortages of instructional personnel. Virginia school districts reported that there are currently 122 unfilled FTE special education positions and 440 FTE special education positions filled by unendorsed personnel. The current proposal for alternative licensure is predicated on the basis that program entrants will possess a baccalaureate degree and have experience in the endorsement area for which they are seeking licensure. It is not intuitive that Virginia will see many special education teachers produced through current proposed models for alternative licensure. Research is required to determine how effectively the proposed alternative routes to licensure will address the personnel needs in the special education endorsement areas. If additional research reveals that the proposed alternative licensure models fail to adequately address special education personnel needs, a review of the various alternative licensure models in use across the nation might identify models that are effective in addressing the demand for special education personnel. Components of the effective models could then be incorporated into Virginia's alternative route to licensure.

Old Dominion University (ODU) currently operates a highly touted alternative licensure program Military Career Transition Program, directed towards preparing military personnel for the classroom. Basinger reports that this program, located next to a large naval base, has produced 1,250 schoolteachers in 12 years of operation. ODU reports that 90% of the graduates of this program have stayed in the teaching profession. The program currently has 800 students enrolled (Basinger, 2000). The Military Career Transition Program has supplied male and minority teachers to the educator supply pool. The math and science endorsement areas in particular have benefited from the addition of teachers prepared in this program. These are important benefits, as the literature and this study have shown the need to increase diversity within the educator workforce and a need to augment the supply of teachers in the math and science areas. Basinger reports that graduates from the Military Career Transition Program are now teaching in 47 states, raising the issue of the number of graduates who remain to teach in Virginia.

Teacher preparation programs located in the higher education institutions across Virginia may be in the position to deliver alternative licensure programs that are designed similar to the ODU Military Career Transition Program. These programs could be delivered in cooperation with participating school districts. Alternative routes to licensure certainly merit further research especially in the identification of the endorsement areas and geographic areas of Virginia that may require particular delivery models. The various models of alternative licensure should be studied to determine which models best deliver the content and pedagogy components required to meet the needs of particular endorsement and geographic areas of Virginia. The development of innovative and practical alternative routes to licensure, utilizing useful components of existing models and developing new components when necessary would greatly benefit the public education system of Virginia. Given the widespread nature of the instructional personnel shortage in Virginia, innovative delivery techniques including the use of distance learning technology and the use of community college campuses should be investigated. Mentoring and other professional development programs for new personnel, important even for new-hires prepared in traditional programs, would be absolutely necessary to reduce the attrition rate of new-hires prepared in alternative route to licensure programs.

Informal discussions with individuals involved in teacher preparation program throughout Virginia indicate anecdotally, that Virginia's teacher education programs are operating at full capacity given the current allocation of resources. Dr. Patricia Kelly, Director of the Virginia Tech Center for Teacher Education, stated that such is the case at Virginia Tech (P. Kelly, personal communication, November 16, 1999). There is no uniform collection of data regarding the output of Virginia's teacher education programs that might ascertain or refute this assumption. A study of the capacity at which Virginia's teacher education programs are operating, including the number of students who are prepared to enter the teaching profession but who do not seek certification to teach in Virginia, is warranted.

Cluster Analysis

Prior use of the cluster analysis procedure as applied in this study is not evident from a review of the literature. Dr. Jimmie Fortune, research advisor for this study, originally suggested the application of cluster analysis as a means to determine if the Virginia school districts could be grouped according to similarities or differences among the districts. Cluster analysis is an ad

hoc methodology. There are no *a priori* assumptions as to the construct of the cluster. These characteristics suggested that cluster analysis might be a particularly useful investigative methodology for the identification of clusters where no clusters, or the characteristics of those clusters, are known to exist. The practical application of the identification of these clusters is to enable educational agencies to develop targeted intervention strategies that address common issues within the clusters. Targeted and focused intervention strategies would facilitate the most efficient allocation of resources.

The cluster analysis methodology employed for this study was developed based on a review of the literature and the input of the study research advisor. The *k*-means cluster analysis procedure was selected for the reasons outlined in Chapter III. The *k*-means procedure was identified in the literature as the most useful cluster analysis procedure for dealing with large databases. The researcher's desire to apply the methodology developed for this study to future studies involving large databases influenced the selection of the *k*-means cluster analysis as the procedure used in this study. As the study progressed the utility of this application of cluster analysis became more apparent.

The cluster analysis methodology employed in this study was successful in partitioning the Virginia public school districts into discrete clusters, answering research question 4 of this study. This study does not suggest that the grouping of the districts derived from this methodology is the best possible clustering solution for Virginia public school districts.

The close approximation of results between the hierarchical cluster procedures used in this study suggest the merit of further research into the application of hierarchical cluster analysis to study issues in education that involve the grouping of cases based on differences between the variables, and similarities within the cluster.

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Appendix A

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February 9, 1999

Mr. Paul D. Stapleton
Superintendent of Public Instruction
Virginia Department of Education
P. O. Box 2120
Richmond, VA 23218

Dear Mr. Stapleton:

In the fall of 1998 we met and discussed working together to develop strategies to improve public education in Virginia.

One topic we discussed was the need for a comprehensive study on teacher supply/demand in the Commonwealth. Ralph Shotwell, VEA Director of Research, and Dr. Richard G. Salmon, Professor, College of Education, VPI & SU, met on several occasions to discuss the scope of such a study. After examining the complexity of the project, Mr. Shotwell and Dr. Salmon decided that this would be an excellent topic for a doctoral dissertation. Mr. Michael L. Perry, a graduate student at VPI & SU, has agreed to undertake the study. The VEA has agreed to provide staff assistance and financial resources for the project to the extent possible.

One of the most critical needs for the study will be the development of a statewide teacher database. Building this teacher database may require surveying all local school divisions or using a stratified random sample of local school divisions. The cooperation of local division superintendents would be essential in obtaining a high response rate for the survey.

Considering the contribution that the development of a well designed database for all teachers in Virginia would make to sound policy decisions by both local and state educational agencies, we hope you will consider endorsing this study through a cover letter to division superintendents. Also, would there be the possibility of receiving any financial assistance or support staff assistance for the study from the Department of Education?

If you believe this is a project on which we can work together, VEA staff and Mr. Perry would like to meet with appropriate staff from the Department of Education for further discussion in the near future. We look forward to working with you.

Sincerely yours,

Cheri W. James
President

David L. Johnson
Executive Director

rh

WE TEACH THE CHILDREN

*AFFILIATED WITH THE NATIONAL
EDUCATION ASSOCIATION*

Appendix B

COMMONWEALTH of VIRGINIA

DEPARTMENT OF EDUCATION

P. O. Box 2120
Richmond, Virginia 23218-2120

PAUL D. STAPLETON
Superintendent of Public Instruction

March 2, 1999

Office: (804) 225-2023
Fax: (804) 371-2099
pstaplet@pen.k12.va.us

Ms. Cheri W. James
President
Virginia Education Association
116 South Third Street
Richmond, Virginia 23219

Dear Cheri:

Thank you and Dave for your letter concerning the need for a comprehensive study of teacher supply and demand in Virginia and the VEA's effort to undertake that initiative.

As you may know, the Department of Education agreed to a contract with the Virginia Tech Center for Survey Research in September 1998 to develop a survey instrument and to conduct a teacher supply and demand survey for our agency. The center has completed the survey instrument; however, the survey itself is on hold while the Department of Education reviews all requests for data from school divisions.

We will be pleased to share with the VEA data that are developed from the department's study. If you would like to discuss the agency's project in more detail, please get in touch with Dr. Thomas A. Elliott, assistant superintendent for teacher education and professional licensure.

I appreciate your letter, and we are always pleased to work with the VEA on projects to improve public education in Virginia.

Sincerely,

Paul D. Stapleton

PDS/HLS/jd

Appendix C

COMMONWEALTH of VIRGINIA

DEPARTMENT OF EDUCATION
P.O. BOX 2120

RICHMOND 23218-2120

October 20, 1999

MEMORANDUM

TO: Michael Perry
        Susan Willis-Walton

FROM: Sandra P. Aldrich
        Byrd Latham

SUBJECT: Superintendent's Memorandum

Enclosed is Supts. Memo 198 providing information about the survey. This will be posted this Friday on the VDOE's Web site and mailed to selected individuals. We still have not received the hard copy of the survey which we need immediately.

Please copy this memo and mail it with the survey. The surveys may be mailed anytime after October 22, 1999. Thank you for all of your work and attention to this project.

SA/sa

Enclosure

c: Thomas A. Elliott
    Byrd Latham
    Patty Pitts

COMMONWEALTH OF VIRGINIA
DEPARTMENT OF EDUCATION
P.O. BOX 2120
RICHMOND, VIRGINIA 23218-2120

INFORMATIONAL

TO: Division Superintendents

FROM: Paul D. Stapleton
          Superintendent of Public Instruction

SUBJECT: Virginia's Public Schools' Instructional Personnel
          Profile 1999-2000

The Virginia Department of Education requests your assistance in
completing a survey on the supply and demand of instructional
personnel in your school division. On behalf of the Department of
Education the survey will be mailed within seven days of receipt
of this memorandum by Virginia Polytechnic Institute and State
University's Center for Teacher Education and Center for Survey
Research. The data from this survey are needed to respond to
requirements of the federal regulation on teacher shortage (34CFR
82.210(b)(11) and 653.40(b)), Virginia's State Improvement Plan
for Special Education, and requests from the General Assembly.
The information from this survey will assist the Department of
Education in addressing issues related to the supply of and
demand for instructional personnel in the Commonwealth.

Please submit the completed survey by electronic transmission or
by U.S. mail no later than December 5, 1999. The access site for
electronic transmission is http://vpave2.ed.vt.edu:8080/perry.
You will be asked for your personal identification number (PIN)
when you enter this site. Your division's four digit PIN is
printed on the bottom, right-hand corner of the last page of the
survey instrument. Instructions for completing the electronic
version of the survey are included on the Web site, and you may
contact the Virginia Tech Center for Teacher Education at (540)
231-5174 for further assistance. By mail, please return the
survey to the Virginia Tech Center for Survey Research, 207 West
Roanoke Street, Blacksburg, VA 24061.

Thank you for your assistance in providing the supply and demand
information. If you have questions, please do not hesitate to
contact Byrd Latham, (804) 225-2104, or Sandra Aldrich, (804)
225-2096,in the Division of Teacher Education and Licensure.

PDS/sa

Appendix D

Welcome to the gateway page for the Virginia Public School Systems' Instructional Personnel Profile survey. Please enter the PIN that was provided with the survey materials, along with your full name, position or job title, and your phone number. Once you press "Submit" on this page, the actual survey form will be displayed. It should look much like the paper survey form you were provided. There is a button at the bottom of the survey form for saving and submitting information. You may feel free to press that button at any time; it will be like saving your work in a document or spreadsheet file. Please be patient. A wait of 15-30 seconds is to be expected as your survey form is generated or regenerated with information from data storage. It is not necessary to enter all the information at once. If you "save" your data, you should be able to come back later to enter additional data or change previous values. Technical problems may be addressed to the technical support staff.
Contact Michael Perry, Virginia Tech Center for Teacher Education miperry2@vt.edu or phone (540)231-8199, if you require additional assistance or information to complete this survey.

Please enter your PIN: [   ]

Please enter your Full Name: [   ]

Please enter your Position or Job Title: [   ]

Please enter your phone number [(###)###-####]: [   ]

Submit   Reset

Note: If you get an error message that says that a page is not available or contains no data, try again in 20 - 30 seconds. This may occur if our web server machine has not been accessed in a while and the hard drive has "gone to sleep" to save energy. Apologies in advance...

Appendix E

Virginia Department of Education
Division of Teacher Education and Licensure
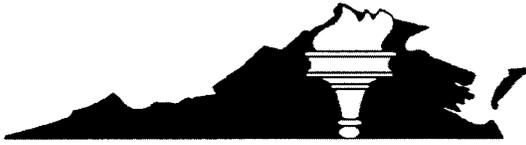
VIRGINIA PUBLIC SCHOOL SYSTEMS' INSTRUCTIONAL PERSONNEL PROFILE: 1999-2000

For the purpose of recording personnel counts on this survey, the following definitions apply:

"FTE" indicates a full-time equivalent position. Whole numbers are not required for these items (e.g., one and ½ full-time positions = 1.5 FTE positions).

"Teacher" includes librarians, counselors, school psychologists, visiting teachers, reading specialists, vocational evaluators and speech-language pathologists, but excludes substitutes.

"Administrator" includes principals and assistant principals only.

1. Please indicate the total number of FTE teachers employed in your school division, as of October 1, 1999.

2. Please indicate the total number of FTE administrators employed in your school division as of October 1, 1999.

3. Please indicate the total number of FTE teachers newly hired in your school division for the current (1999-2000) school year.

4. Please indicate the total number of FTE administrators newly hired in your division for the current (1999-2000) school year.

5. Record the number of personnel in your division fitting the experience categories listed below. If there are no instructional personnel in your division fitting a particular category, please record a zero.

	Teachers newly hired for the 1999-2000 school year	All teachers including new hires	Administrators newly hired for the 1999-2000 school year	All administrators including new hires
a. Less than 25 years employment experience in education in Virginia.				
b. 25-29 years employment experience in education in Virginia.				
c. 30 or more years employment experience in education in Virginia.				

6. Indicate below the number of personnel in your division fitting the appropriate category for each of the past two school years.

	July 1, 1997-June 30, 1998	July 1, 1998-June 30, 1999
a. Total number of FTE teachers newly hired in this time period.		
b. Total number of FTE administrators newly hired in this time period.		
c. Number of teachers in your division who retired.		
d. Number of teachers who left employment in your division for any reason (including retirement).		
e. Number of administrators in your division who retired.		
f. Number of administrators who left employment in your division for any reason (including retirement).		

7. Provide your best estimate of the number of personnel in your division fitting the descriptive categories below. If there are no employees in your division fitting the description, please record a zero.

	Teachers	Administrators
a. Estimate of the number of personnel who left your employment due to the early retirement legislation that became effective July 1, 1999.		
b. Estimate of those who will leave employment in your division for any reason (including retirement) between July 1, 1999 and June 30, 2000.		
c. Estimate of those who will retire from your division between July 1, 1999 and June 30, 2000.		
d. Estimate of the number of personnel you will need to newly hire for the 2000-2001 school year.		

8. Record the number of personnel in your division who were newly hired for the 1999-2000 school year fitting the experience categories listed below. If there are no personnel in your division fitting a particular category, please record a zero.

	Teachers newly hired for the 1999-2000 school year	Administrators newly hired for the 1999-2000 school year
a. Employed the previous year in another Virginia school division.		
b. Employed the previous year in an out-of-state school division.		
c. Re-entering the education profession after an absence from the profession.		
d. New entry into the education profession.		

9. Record the number of new instructional personnel (FTE) hired in your division for the 1999-2000 school year best fitting the categories provided below. If there are no personnel in your division in a particular category, please record a zero.

	Female Teachers	Male Teachers	Female Administrators	Male Administrators
a. Asian				
b. American Indian/Native Alaskan				
c. Black/African American				
d. Hispanic				
e. White/Caucasian (excluding Hispanic)				
f. Multi-racial				

10. Please list the five colleges or universities that prepared the greatest number of your newly hired teachers for the 1999-2000 school year. You may list colleges or universities located within or outside the state of Virginia for this item.

1. _____   Number of teachers supplied: _____
2. _____   Number of teachers supplied: _
3. _____   Number of teachers supplied: _ ____
4. _____   Number of teachers supplied: _____
5. _____   Number of teachers supplied: _____

11. Please indicate the total number of teachers in your division for which each of the following is the highest degree or license held?

	Teachers newly hired for the 1999-2000 school year	All teachers including new hires
a. Bachelor's Degree	_____	_____
b. Master's Degree		
c. Ed.S. (C.A.G.S.)		
d. Doctorate Degree		
e. Technical Professional License		

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12. Indicate the frequency with which the following reasons are cited by teachers who leave your school division. The response categories are as follows:

O=Often   S=Sometimes   R=Rarely   N=Never

------------circle one----------

a. Retirement	O	S	R	N
b. Left teaching position to enter administrative position within your division	O	S	R	N
c. Spouse/partner relocation	O	S	R	N
d. Personal, health or family reasons	O	S	R	N
e. Continue education/further study	O	S	R	N
f. Accepted position in a different school division in Virginia	O	S	R	N
g. Accepted position in an out-of-state school division	O	S	R	N
h. Left education to work in another profession	O	S	R	N

13. How effective would you say the following recruitment practices have been for your school division? The response categories are as follows:

VE=Very effective   SE=Somewhat effective   NE=Not effective   DK=Don't know/Haven't used

------------circle one----------

a. Attending recruitment fairs at colleges and universities within Virginia	VE	SE	NE	DK
b. Attending recruitment fairs at colleges and universities outside the state of Virginia	VE	SE	NE	DK
c. Recruiting student teachers placed in your schools	VE	SE	NE	DK
d. Using the substitute teacher pool	VE	SE	NE	DK
e. Recruiting paraprofessionals with teaching license	VE	SE	NE	DK
f. Supporting paraprofessionals in obtaining licensure	VE	SE	NE	DK
g. Advertising locally	VE	SE	NE	DK
h. Advertising statewide	VE	SE	NE	DK
i. Advertising nationally	VE	SE	NE	DK
j. Advertising in professional or organizational publications	VE	SE	NE	DK
k. Advertising on a school division Web page	VE	SE	NE	DK
l. Advertising on the Department of Education Web page	VE	SE	NE	DK
m. Providing financial support to students entering the education profession	VE	SE	NE	DK
n. Providing cash incentive/signing bonus for signing teaching contract	VE	SE	NE	DK
o. Utilizing personnel recruitment services	VE	SE	NE	DK

14. Please rate the impact of the factors below on the demand, or need, for teachers in your division for the current (1999-2000) school year. The response categories are as follows:

GI=Greatly increased demand   SI=Somewhat increased demand   N=No impact on demand
SD=Somewhat decreased demand   GD=Greatly decreased demand

----------circle one----------

a. Retirement of personnel	GI	SI	N	SD	GD
b. Change or shift in student enrollment	GI	SI	N	SD	GD
c. Efforts to comply with the Standards for Accrediting Public Schools in Virginia	GI	SI	N	SD	GD
d. Efforts to increase ethnic/racial diversity of instructional personnel	GI	SI	N	SD	GD
e. Efforts to reduce teacher to student ratios	GI	SI	N	SD	GD
f. Increased use of technology in the classroom	GI	SI	N	SD	GD
g. Competition for personnel from other Virginia school divisions	GI	SI	N	SD	GD
h. Competition for personnel from out-of-state school divisions	GI	SI	N	SD	GD
i. Competition for personnel from non-educational businesses or industries	GI	SI	N	SD	GD
j. Cost of living in your geographic area	GI	SI	N	SD	GD
k. Salaries in your division	GI	SI	N	SD	GD
l. Geographic location of division	GI	SI	N	SD	GD
m. Local home schooling enrollment trends	GI	SI	N	SD	GD
n. Local non-public schooling enrollment trends	GI	SI	N	SD	GD

15. Please provide the personnel counts and supply estimates requested in this table. **Endorsement Areas**	Please indicate the appropriate number of full-time equivalent (FTE) personnel for **each** listed endorsement area. You are **not** required to enter whole numbers for these items (e.g., one and ½ full-time positions = 1.5 FTE positions). If your answer is zero, please record a zero.				For each listed endorsement area, check the column which best represents your estimate of the supply of teachers in your division over the next five years (check one box per endorsement area).			
	Total number FTE positions in division for 1999-2000 school year	Number of unfilled FTE positions for 1999-2000 school year	Number of FTE positions filled by personnel unendorsed in area for 1999-2000	Estimated FTE position openings for 2000-2001 school year	Severe Shortage	Shortage	Adequate Supply	Excess Supply
Elementary (PreK-6)								
Dance (PreK-12)								
English								
English as Second Language (PreK-12)								
Spanish (PreK-12)								
French (PreK-12)								
German (PreK-12)								
Latin (PreK-12)								
Italian (PreK-12)								
Russian (PreK-12)								
Chinese (PreK-12)								
Other Asian Languages (PreK-12)								
Health/P.E. (PreK-12)								
Algebra I (Add-On Endorsement)								
Music-Instrumental (PreK-12)								
Music-Vocal/Choral (PreK-12)								
Biology								
Early Childhood Special Educ.								
Hearing Impaired (PreK-12)								
Learning Disabled (K-12)								
Mental Retardation (K-12)								
Emotionally Disturbed (K-12)								
Severely/Profoundly Disabled (K-12)								
Visually Impaired (PreK-12)								
Speech-Language Pathology (PreK-12)								
Theater Arts								
Agricultural Educ.								
Business Educ.								
Health Occupations Educ.								
Marketing Educ.								

16. Name of individual completing this survey: _____ 18. Phone Number: _____

17. Position or Job Title of individual completing survey: _____

Appendix F

<u>1999 Virginia General Assembly instructional personnel–related legislation.</u>

The 1999 Virginia General Assembly considered at least 189 amendments, bills and resolutions related to education, 56 of the amendments, bills and resolutions failed to gain House and Senate approval, or suffered the Governor's veto (Fairfax County Public Schools, Office of Government Relations, 1999). Of the 133 bills that survived, 26 had either intended or unintended consequences related to the staffing of instructional personnel in Virginia. Although not intended to be an exhaustive review, the following examples will serve to illustrate the impact that legislative mandates have on the staffing of instructional personnel.

The School Resource Officer Grants Program and Fund (School resource officer grants program and fund, 1999) amends Chapter 512, § 9-6.23 of the Code of Virginia by adding a section numbered 9-171.1. This bill provides $1,000,000 in percentage-matching grants based on the local composite index to employ uniformed school resource officers in middle and high schools. Local education agencies may divert money from local sources to match the available state funds. These diversions could negatively impact local instructional personnel staffing initiatives.

At least six provisions attached to the Budget Bill (Budget bill, 1999) affect state aid to public education and will influence instructional personnel staffing. The budget bill amends Chapter 464 of the Acts of Assembly of 1998, as amended by Chapter 1, Acts of Assembly of 1998, Special Session I, which appropriated public revenue for the two years, 1999 and 2000. The provisions included increases in the average classroom teacher salary of 2.25% for the first year of the biennial budget and 6.0% for the second year. The state appropriated $8, 984,847 from the general fund in the first year of the budget to provide the state's share of adding approximately 450 elementary teachers in addition to those funded through the Standards of Quality and K-3 Reduced Class Size payments. Funds totaling $27,473, 379 were appropriated in the second year of the budget to provide an additional 950 elementary teachers and to continue the support of the 450 teachers who were added the first year. In another action, the General Assembly established percentage matching grants to localities for the purpose of providing quality preschool programs for at-risk four-year-olds unserved by another program. The General Assembly allocated $14,034,500 for incentive payments in the first budget year and

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$14,283,17 in the second year under the provisions of the Standards of Learning remediation program. These payments are based on the state share of the costs toward providing an additional 2 1/2 hours of instruction per week for an estimated number of students in each school division at a 10:1 student to teacher ratio. The state also appropriated $500,000 in the first budget year and $1,000,000 in the second year from the general fund for Clinical Faculty and Mentor Teacher Programs to assist preservice and beginning teachers to make a successful transition into full-time teaching. The Cultural Transition Payments program was provided to support the state share of 9 professional instructional positions per 1,000 pupils in ADM for whom English is a second language. The first year was funded by an appropriation of $3,226,420. Funding for 10 professional instructional positions per 1,000 pupils in ADM was provided for the second year ($3,437,283). Under Vocational Education Instructional Payments, School-To-Work Transition Grants Program, the General Assembly appropriated $75,000 for the first budget year and an additional $75,000 for the second year. An estimated $6,300,000 was appropriated for the first year and $11,900,000 for the second year from nongeneral funds for the School-To-Work Opportunities Act of 1994. The General Assembly appropriated $10,970,997 for each of the two years of the biennium for the Statewide Dropout Prevention Program and requires a local resource commitment of 40% to match the state's 60% contribution (Budget bill, 1999).

House Joint Resolution 566 (HJ566, 1999) establishes a special task force of the Commission of Educational Accountability to recommend linkages between public education and workforce development initiatives designed to assist students to develop good work habits, marketable skills, and set career goals. See also House Bill 2710 (Educational Accountability and Quality Enhancement Act of 1999, 1999) and its identical counterpart Senate Bill 1145. The Educational Accountability and Quality Enhancement Act of 1999, is codified as Chapter 1037, §§22.1-253.13:5, 22.1-293, 22.1-294, 22.1-295, 22.1-298, 22.1-1-303, 22.1-303.1, 22.1-305, and 22.1-305.1 in the Code of Virginia

Senate Bill 817 (Elementary School Character Education Programs, 1999) requires all local school boards to establish elementary school character education programs by amending Chapter 944, §22.1-208.01, Code of Virginia. These programs are

to be developed in cooperation with students, parents, and their respective communities. This provision allows for the State Board of Education to award grants, from appropriated funds, to local school boards for implementation of innovative character education programs.

House Bill 1542 (Virginia Retirement System: Retirement Options, 1999) well may be the 1999 legislative action having the greatest effect on the demand for instructional personnel. By amending the Code of Virginia Chapter 591, § 51.1-124.3, this act allows teachers who are 50 years of age with 30 years of service to retire with full retirement benefits. Teachers are defined for this purpose as any person who is regularly employed full time on a salaried position as a professional or clerical employee of a county, city, or other local public school board. Prior to this legislation, the employee must have been 55 years of age with 30 years of experience to be eligible for full retirement benefits.

The pertinent portion of House Bill 1704 (Retired State Employees and Teachers Health Insurance Credit, 1999) amended the Code of Virginia, Chapter 6 of Title 51.1, by adding § 51.1-606. As defined in § 51.1-124.3, those teachers who rendered at least 15 years of service in the Virginia Retirement System are now eligible for health insurance credits if after terminating service the teacher is employed by a local government that does not elect to provide health insurance credits.

House Bill 1725 (Evaluation of Teachers, 1999) amended and reenacted Chapter 830, § 22.1-253.13:5 of the Code of Virginia, relating to evaluation of teachers. The act requires that each local school board must add performance evaluations, as a part of the license renewal process to (a) professional development that assist teachers and principals in acquiring the skills necessary to work with gifted and handicapped students and to increase student achievement, (b) professional development in educational technology for all instructional personnel, and (c) professional development for administrative personnel to increase proficiency in instructional leadership and management.

House Bill 1726 (Evaluation of certain teachers, 1999) amended Chapter 831, §§ 22.1-295 and 22.1-303 of the Code of Virginia relating to the employment of teachers and directs local school boards to fill positions with instructional personnel qualified in relevant subject areas. Appropriate evaluation processes are to be designed that address

student achievement and the skills and knowledge of the instructional personnel. The act now stipulates that probationary teachers be provided a mentor teacher and that probationary teachers are evaluated annually during the probationary period.

House Bill 2087 (National Teacher Certification Incentive Reward Program and Fund, 1999) amended Chapter 1032 of the Code of Virginia by adding §§ 22.1-299.2 which established the National Teacher Certification Incentive Reward Program. Based on the availability of funds, teachers who obtain national certification shall receive an initial state-funded award of $5,000 and a subsequent award of $2,500 for each year for the life of their certificates. Additionally, such awards will continue to be paid to eligible teachers upon the renewal of their certificates.

House Bill 2263 (Regulations Governing Licensure, 1999) amended Chapter 1035, § 22.1-298 of the Code of Virginia relating to the regulations governing teacher licensure. Requirements include: (a) every teacher seeking initial licensure must take a professional teacher's examination as prescribed by the Board; (b) every teacher seeking initial licensure, after July 1, 2002, must complete study in methods for communication between schools and families and must complete study for increasing family involvement in student learning and the Standards of Learning; (c) every teacher seeking initial licensure on or after July 1, 2000 must complete study in attention deficit syndrome and gifted education, including the use of multiple criteria to identify gifted students; (d) every teacher seeking initial licensure after July 1, 2000 with endorsements as teachers of the blind and visually impaired demonstrate minimum proficiency in Braille (also Proficiency in Braille, 1999); (e) every teacher seeking initial licensure or license renewal on or after July 1, 2003 must demonstrate proficiency in the use of educational technology for instruction; and (f) every teacher seeking initial licensure who graduates from Virginia institutions of higher education shall, after July 1, 2002, only be licensed as instructional personnel by the Board of Education if the endorsement areas offered at such institutions have been assessed by a national accrediting agency or by a state approval process, with the final accreditation by the Board of Education. Imbedded in § 22.1-298 is a very important caveat that will allow school districts to circumvent, at least on a temporary basis, the regulations outlined above. The Board of Education, notwithstanding any provision of law to the contrary, may issue a provisional license

valid for a maximum of three years, to anyone who does not meet the requirements of this section or any other requirement for licensure imposed by law. This provision potentially allows the local school districts to fill indefinitely positions with unqualified personnel, providing that these positions are filled with new personnel every three years.

House Bill 2607 (Virginia Teaching Scholarship Loan Program, 1999) codified the Virginia Teaching Scholarship Loan Program as an amendment to Chapter 753, § 22.1-212.2:1 of the Code of Virginia. This bill focuses on increasing diversity among teachers by providing incentives for at-risk students to pursue teaching careers in areas of critical shortage. At-risk students include students who are not achieving academically to prescribed standards. The program consists of three components: (a) awards to students pursuing teaching degrees in critical shortage areas, (b) awards to assist paraprofessional in becoming fully licensed teachers, and (c) awards to at-risk students. The criteria includes such factors as the needs in teacher endorsement areas at the elementary and secondary levels, underserved geographical regions of the Commonwealth, and school districts with high concentrations of at-risk students.

House Joint Resolution 691 (HJ691, 1999) directed the Commission on Educational Accountability to examine instructional issues dictated by efforts to meet the Standards of Learning and the Standards of Accreditation. See also House Bill 2710 (Educational Accountability and Quality Enhancement Act of 1999, 1999) and its identical counterpart Senate Bill 1145. The Educational Accountability and Quality Enhancement Act of 1999, was codified as Chapter 1037, §§22.1-253.13:5, 22.1-293, 22.1-294, 22.1-295, 22.1-298, 22.1-1-303, 22.1-303.1, 22.1-305, and 22.1-305.1 in the Code of Virginia. The Commission will consider current training requirements and professional development opportunities for educational personnel, teacher contract requirements, length of the school year, in-service training, and other issues deemed appropriate. Implementation of this resolution is subject to the approval and certification by the Joint Rules Committee, which may withhold expenditures or delay the conduct of the study.

Senate Bill 932 (Qualifications of temporarily employed teachers, 1999) amended Chapter 486, § 22.1-302 of the Code of Virginia and requires local school boards to establish employment qualifications for temporarily employed (substitute) teachers.

SB932 also directed the local school boards to ensure that temporarily employed teachers who are engaged as long-term substitutes shall exceed baseline qualifications. The baseline promulgated by the Board of Education requires that temporarily employed teachers must be at least 18 years of age and hold a high school diploma or a general education development (GED) certificate.

Senate Joint Resolution 286 (SJ2860, 1999) directed the Commission on Educational Accountability (SJ498, 1999) to study alternative means to create incentives for Virginia Public School Teachers to achieve national certification through successful completion of the National Teacher's Exam (NTE). Teachers must pass a series of exams and submit a professional portfolio and video documentary of actual classroom presentations for review and approval by the national certification board. The 10-year NTE certification is available through the National Board for Professional Teaching Standards (NBPTS), a non-profit, non-governmental organization. See also House Bill 2710 (Educational Accountability and Quality Enhancement Act of 1999, 1999) and its identical counterpart Senate Bill 1145. The Educational Accountability and Quality Enhancement Act of 1999, was codified as Chapter 1037, §§22.1-253.13:5, 22.1-293, 22.1-294, 22.1-295, 22.1-298, 22.1-1-303, 22.1-303.1, 22.1-305, and 22.1-305.1 in the Code of Virginia.

Senate Joint Resolution 384 requested the State Board of Education to consider the alternative licensure programs established in Texas and New Jersey as a component of its study and development of alternative licensure programs pursuant to Item 129 Q of the 1999 Budget Bill, $50,000 was appropriated for this purpose for the second year of the biennial budget (SJ384, 1999). The Commission on Access and Diversity in Higher Education, pursuant to House Joint Resolution 226 (HJ226, 1998), found that qualified persons are needed in the public schools to fill positions in critical shortage areas such as mathematics, foreign languages, sciences, and special education. There also is a need to increase the number of minorities and males who teach in the Virginia's public schools. The resolution indicated that alternative licensure programs have existed for more than a decade and operate in more than 40 states. Alternative licensure is seen as a means to induce, and license qualified persons, such as retired military personnel, retired college

professors, business persons, persons starting second careers, former government officials, and older Virginians who have teaching expertise.

House Bill 2710 (Educational Accountability and Quality Enhancement Act of 1999, 1999) and its identical counterpart Senate Bill 1145 were entitled the Educational Accountability and Quality Enhancement Act of 1999, was codified in Chapter 1037, §§22.1-253.13:5, 22.1-293, 22.1-294, 22.1-295, 22.1-298, 22.1-1-303, 22.1-303.1, 22.1-305, and 22.1-305.1 in the Code of Virginia and then amended by §§ 22.1-60.1, 22.1-299.2, and 23-9.2:3.4. All pertinent aspects of HB2710 and SB1145 have been reviewed in this chapter's previous discussions of the legislative components to the Educational Accountability and Quality Enhancement Act of 1999.

House Bill 1673 (Pupil-Teacher Ratios in Kindergarten and Grades 2 and 3, 1999) effective July 1, 2000, lowered the pupil to teacher ratios in kindergarten and grades 2 and 3. Codified in Chapter 595, § 22.1-253.13:1 of the Code of Virginia HB1673 reduced the pupil to teacher ratio in grades K-3 from 25:1 to 24:1 on a school district-wide basis and stipulated that no class could exceed 29 students, a reduction from the prior maximum of 30. In classes where the average daily membership (ADM) exceeds 24 students, a full-time teacher's aide shall be assigned to the class. The pupil to teacher ratio in grades 2 and 3 also were reduced from 25:1 to 24:1, with no class being larger than 30. First grade was already capped at a pupil to teacher ratio of 24:1.

House Bill 1895 (Information About the Teaching Profession, 1999) amended and reenacted Chapter 452, §§ 22.1-209 and 22.1-253.13:1, which was currently in effect. HB 1895 requires each local school board to make available to secondary students such employment counseling and placement services as to furnish information leading to all types of employment opportunities. This information shall include, but is not limited to, apprenticeships, the military, career education schools, and the teaching profession. This information also will be infused in the K-12 career education curriculum. Coupled with initiatives such as the Virginia Teaching Scholarship Loan Program, this information may entice more secondary students to view the teaching profession as a viable career option.

House Bill 1975 (Artists in the Classroom Grants Program and Fund, 1999) amended the Code of Virginia, Chapter 994, § 22.1-253.13:1 by adding § 22.1-291.2 which provides for the Artists in the Classroom Grants Program and Fund. The statute

clarifies the Standards of Quality so that school boards must include art, music, and physical education for grades K-12. Additionally, the act requires local school boards to strive to employ only licensed instructional personnel qualified in the relevant subject areas, including teachers with provisional licenses who have professional expertise in the relevant subject areas.

House Bill 1268 (Teacher-student ratios at detention homes, 1999) amended and reenacted Chapter 511, §22.1-209.2 relating to the programs and teachers of regional detention homes, certain local detention homes, and state agencies and institutions and states that the State Board of Education shall promulgate rules and regulations necessary to align these programs to applicable state and federal laws and regulations. The act requires that teacher to student ratios for children with disabilities in education programs in detention homes be based on the average daily attendance (ADA), rather than ADM as calculated by the Department of Education from the previous school year. In situations where the State Board of Education contracts with the relevant state agencies or institutions, the Department of Personnel and Training shall establish teacher salary schedules which are competitive with the salary schedules used by the school divisions in which the agencies or institutions are located. The provisions of this act are not in effect unless enacted by the 2000 Session of the General Assembly.

VITA

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EDUCATION

Doctor of Philosophy, (expected May, 2000)
Educational Leadership and Policy Studies
Virginia Polytechnic Institute and State University (Virginia Tech)
Blacksburg, VA
Dissertation: Analyzing the Demand for Instructional Personnel in the Virginia Public
School System: 1999-2000

Master of Science in Education, 1981, University of Kentucky, Lexington, KY

Bachelor of Science, 1973, Agriculture Education, University of Kentucky, Lexington,
KY

RELATED EXPERIENCE

12/99 – Present   Virginia Tech Center for Teacher Education, Blacksburg, VA
Principal Investigator for Virginia Public School Systems'
Instructional Personnel Profile: 1999-2000

6/98 – Present   Educational Leadership and Policy Studies (ELPS), Virginia Tech,
Blacksburg, VA
Projects Coordinator

6/98 – Present   Corwin Press
Manuscript reviewer, educational leadership

6/96 - Present   Tech Prep Consortium (56 school districts and 4 universities)
Educational Consultant for Nassau County (NYC, NY)

6/97 - 6/98   Economic Development Assistance Center of Virginia Tech,
Blacksburg, VA
Workforce Development Specialist

7/93 - 6/97   Estill County Board of Education, Irvine, KY
District Coordinator for Tech Prep, School to Work, and Southern
Regional Education Board (SREB) initiatives

7/92 - 7/93	Estill County Board of Education, Irvine, KY High School Horticulture Instructor
1/92 - 6/97	Estill County Board of Education, Irvine, KY Adult Horticulture Instructor
1/92 - 7/92	Alternative Learning Center, Irvine, KY Teacher
1/85 - 1/92	Estill Farm Service Inc., Irvine, KY Owner and Operator
6/81 - 1/85	Estill County Board of Education, Irvine, KY Vocational Agriculture and Horticulture Instructor, Estill County High School
6/78 - 6/81	Luthier (and substitute teacher, Estill County Board of Education) Served 18 month structured apprenticeship with Edward F. Rose
6/74 - 6/78	Estill County Board of Education, Irvine, KY Vocational Agriculture Instructor, Estill County High School
5/73-6/74	University of Kentucky Cooperative Extension Agent For 4-H, Garrard County

PROFESSIONAL LEADERSHIP POSITIONS

- Vice Chair, Kentucky Local Labor Market 16 School To Work Council
- Chair, Kentucky Local Labor Market16 One Stop Council
- Education Representative, Bluegrass Area Development District-Private Industry Council, Executive Committee
- Executive Committee Member, Eastern Kentucky University Tech Prep Consortium
- District Business/Education Liaison, Kentucky-Partnership For Reform In Science And Mathematics
- Member, Madison County Area Vocational Center Advisory Board, Executive Committee
- Estill County School District Long Range Strategic Planning Council, Chair Community Involvement
- Member, 21st Century Inc. Estill County-Social/Economic Development Non-Profit Organization
- Member, Irvine Downtown Renovation And Revitalization Council, $6,000,000 Project

PROFESSIONAL AFFILIATIONS

- Virginia Association of School Personnel Administrators
- Educational Policy Institute, Virginia Tech
- Dean's Superintendent Advisory Committee, College of Human Resources and Education, Virginia Tech
- National Center for Research in Vocational Education "Think Tank", ad hoc Virginia Tech funding proposal committee
- American Educational Research Association
- Eastern Educational Research Association
- Southern Regional Council of Educational Administration
- Association of Supervision and Curriculum Development
- Phi Delta Kappa

RECENT AWARDS

Senate of the Commonwealth of Kentucky, on the motion of Senator Dale Shrout. recognized as an "amazing individual who contributed countless hours and tireless effort towards the betterment of the youth of this fine Commonwealth". July, 1999

Kentucky School to Work Hall of Fame. Inducted April, 1999

SELECTED PUBLICATIONS AND PRESENTATIONS

Perry, M. (2000, February). Virginia Public School Systems' Instructional Personnel Profile. Richmond, VA: Commonwealth of Virginia Department of Education, Division of Teacher Education and Licensure.

Perry, M. (1999, May). Staffing Instructional Personnel: Virginia's Public School Experience. Dissertation abstract presented to the "Inquiring Voices" Graduate Student Research Day. Blacksburg, VA.

Perry, M. (May 14, 1999). Staffing Instructional Personnel in Virginia Public Schools, 1999-2000. Abstract describing a proposed Virginia Department of Education collaborative survey. Presented to the Virginia Association of School Personnel Administrators Spring Meeting. Virginia Beach, VA.

Creamer, D., Janosik, S., Zhao, C., Simpson, M., & Perry, M. (1998, winter). Academic program approval and review in the United States and selected foreign countries. Paper prepared for the Commonwealth of Virginia Council of Higher Education, proposal number 98-2016-05. Educational Policy Institute, Blacksburg, VA.

Perry, M. (1998, September). "Connecting": Brain-based learning, instruction, standards, and assessment. Two-day workshop presented to the Oceanside School District Conference Days. Oceanside, NY.

Perry, M. (1998, June). Policy analysis of state agency academic program evaluation practices. Background paper prepared for the Commonwealth of Virginia Council of Higher Education, proposal number 98-2016-05. Educational Policy Institute, Blacksburg, VA.

Perry M. (1998, June). Contextual, Integrated, and Applied Learning: Meeting the NYSED Learner Standards. Two-day turnkey workshop presented to the Nassau County Tech Prep Consortium Summer Institute. Adelphi University, NY.

Perry, M. (1998, February). Team Building Workshop, Oceanside High School. Developed and delivered professional development to administrators, counselors, academic and vocational teachers. Funded by the Nassau County Tech Prep Consortium. Oceanside, NY.

Perry, M., (1998, February). Leading from the front: Is effective technology implementation in schools related to the technology proficiency of school leaders? Paper presented at the Eastern Educational Research Association Conference, Tampa, FL.

Schwarzbach, L. G., Perry, M., & Hoerner J. L. (1998, February). Preparing educational leaders: Leading the preparation for life. Paper presented at the Eastern Educational Research Association Conference, Tampa, FL.

Perry, M., Schwarzbach, L. G., & Hoerner, J. L. (1997, November). Integration of education with the world of work. Paper presented at the Southern Regional Council of Educational Administration Conference, Charleston, SC.

Perry, M. (1997). Pocket change or real change? Keynote address to Comprehensive Services Conference. Martha Washington Inn, Abingdon, VA.

Perry, M. (1997). Making learning meaningful and doable. Keynote address to Patrick County Educators Opening Day. Patrick County Board of Education. Stewart, VA.

Perry, M. (1997, February). Getting started: A Kentucky model. Keynote address to Best Practices Seminar, a Butler-Warren Regional School-To-Work activity. Miami University fiscal agent. Columbus, OH

Perry, M. (1997, January). C.I.A. Training Workshop. Turnkey workshop delivered to the Nassau County Tech Prep Consortium Tech Prep/Goals 2000 Conference. Uniondale, NY.

Perry, M. (1997, revised 1998). <u>Integrated Lesson Plan Outline</u>. Academic/vocational lesson plan outline published by the Nassau County Tech Prep Consortium. New York City, NY.

Perry, M. (1997, July). <u>Portfolios: Boon or Bane?</u> Presentation to the 11th Annual SBEB High Schools That Work Staff Development Conference. Atlanta, GA.

Perry, M. (1995, July). <u>Work-based learning for special needs students.</u> Presentation to the Kentucky Vocational Association, Special Needs Division. Louisville, KY.

Perry, M., Estill County High School Horticulture II Students (1983). <u>Integrating horticulture into the special education classroom</u>: A Curriculum guideline developed for the Kentucky Department of Education. Frankfort, KY