ASKING THE RIGHT QUESTIONS:
MINNESOTA TEACHER SUPPLY AND DEMAND

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We welcome your reactions, suggestions, and comments. Please contact the Center for School Change, 234 Humphrey Center, 301 19th Avenue South, Minneapolis, Minnesota 55455, (612) 626-1834.

EXECUTIVE SUMMARY

Does Minnesota face a shortage of public school teachers during the next decade? That is the question this report was designed to help answer. Researchers examined data about the number of public school teachers projected to retire and to leave teaching before retirement. The number of people leaving teaching was compared with the number of teachers who are being prepared in Minnesota. The report concludes:

- Minnesota currently does not face an overall teacher shortage.
- Projected supply does not match the demand for some specific curricular areas, such as special education, math and science.
- As the state's enrollment becomes more racially diverse, districts are expressing a desire to hire more teachers of color. Supply of such teachers does not appear to meet the demand.
- Some districts in Minnesota may encounter greater challenges in attracting teachers than other districts.
- Changes in state policy can have a dramatic impact on the teacher demand/supply situation. For example, if the state decides to significantly reduce elementary class sizes, this will increase the demand for elementary teachers.
- The state loses almost twice as many teachers to attrition as to retirement - that is, almost twice as many teachers leave the profession for reasons other than retirement.

The report recommends:

- The state should examine ways it can create incentives to attract teachers in "high demand" areas, including those teaching certain subjects, and those representing certain racial/ethnic groups.
- The state should conduct research on the financial impact of projected retirements. This information should be available to state and district decision-makers so they can make the best possible choices about how the additional resources created by retirements are used.
- The state should examine reasons teachers leave the profession other than retirement.
- The state should analyze information it already has about patterns of teacher retirement and early leaving, gather additional information and publicize the findings.
- The state should regularly gather information from school districts about their needs in particular teaching areas and publish this data.
- The state should complete a five-year projection on the need for teachers in certain curricular areas. This data should be shared with colleges of education and with prospective teachers.

INTRODUCTION

Will we have enough effective teachers to replace those who are leaving the profession? This is an extremely important question facing Minnesota and the nation. Many parents, policy-makers and educators wonder whether there will be an adequate supply of qualified teachers to fill vacancies caused by retirements. Superintendents have contacted the State Board of Teaching about shortages they are already seeing in areas such as science, math and industrial arts.[1] Minnesota's urban districts are concerned because they do not have enough applicants to fill current teacher openings -- especially teachers of color. Minnesota's economy is booming, resulting in record low unemployment of 2.5% (1.5% in the metro area). And retirements will continue to climb during the next ten years. Yet national statistics show that only 60% of new teachers get hired.[2]

Is a teacher shortage really imminent in Minnesota? Minnesota policy-makers, parents and educators want an answer to this question. In this report, the Center for School Change addresses these four critical issues:

- What does national research show about teacher shortages?
- How many public school retirements will there be in Minnesota and will these retirements disproportionately affect specific teaching areas (elementary, math, science, etc.)?
- How many new teachers are being produced in Minnesota's teacher preparation programs (the primary source of new teachers in the state) and what are their licensure areas?
- Is there a mismatch between the demand created by retirements and the supply of new teachers from Minnesota's teacher preparation institutions?

In the first section of the report, we briefly examine the national teacher supply and demand situation. Section Two focuses on Minnesota teacher retirement patterns over the next ten years. Of course teachers leave the profession for reasons other than retirement. We briefly consider the impact of these additional losses to the state's teaching force. The third section describes the number of teachers produced by Minnesota's higher education system and the supply of teachers from other states. This section also discusses the need for additional teachers of color. Section Four brings together supply and demand for new teachers. Our research shows that currently supply and demand do <u>not</u> match. Finally, we offer some recommendations.

Throughout this report, information relating to Minnesota refers to public school teachers only.

During the next decade, schools across the United States will be hiring a projected 2,000,000 teachers. The need for these teachers is fueled by an increase in the number of students nationally, accompanied by large numbers of teachers leaving the profession -- for retirement and other reasons.[3] According to the National Center for Education Statistics (NCES), student enrollment will reach 54.3 million by 2007 (up from 50 million in 1995). The U.S. Census Bureau projects a 15% overall population growth (from 1990 - 2005) with elementary school populations increasing 12% and high school populations increasing by 28%.[4] Consequently, the number of teachers nationally will rise to over 3.3 million, up from 2.5 million in 1982.[5] Government projections forecast a 21% growth in the demand for teachers overall -- with some areas higher, such as special education at 59%, and some areas lower, such as elementary education at 10%.[6] Growth in students and teachers will be largest in the West, South and larger cities on both coasts.[7] By comparison, student enrollments in Minnesota are expected to drop slightly during the same period (from approximately 846,610 students in 1998 to 836,713 in 2008).[8]

Nationally, one quarter of all teachers are 50 years old or older. Approximately 52% of Minnesota's public school teachers are over 45.[9] All areas of the economy are expected to feel the effects of the large baby boom generation moving into retirement. Education is no exception. National researchers predict that bilingual education, vocational education and states like California, Michigan and New Jersey (with the largest proportion of teachers over 50) will be hit hardest by the retirement wave during the next decade.[10]

Over the next ten years our nation will continue to become more diverse, increasing the need to diversify the teaching force. At the national level teachers of color make up only 13% of the teaching force while students of color make up 33% of the student body.[11] By 2010, the Census Bureau estimates 40% of all students will be of color.[12] In Minnesota, 2.5% of public school teachers and 13.5% of public school students are of color.[13]

Defining the Problem

Some state and national policy-makers are deeply concerned about the potential for massive teacher shortages in the years to come. However, researchers at the national level argue that "these shortages are largely a problem of distribution rather than of absolute numbers." [14] [15] Both the National Commission on Teaching and America's Future and the National Association of State Boards of Education (NASBE) Study Group on Teacher Development, Supply and Demand agree that "for the most part states are preparing sufficient and in many cases, overly abundant *numbers* of teachers. In fact each year nearly twice as many teachers are prepared in teacher preparation programs as actually enter teaching."[16] In addition, many states have a large pool of people holding valid teaching licenses who are currently not teaching. (In Minnesota, about 45,000 people fit this description.)[17] According to analyses by Linda Darling-Hammond, this group of teachers re-entering the profession accounts for one sixth of all new hires nationally.[18]

So, the problem is far more complicated. Shortages are already being experienced on a local level, even though plenty of teachers are being produced overall. NASBE contends "Teachers are largely *un*representative of the diverse populations they serve and often *un*prepared to accept teaching positions in the subjects and communities where they are most needed."[19] Nationally shortages are showing up in low-income urban and rural schools and in certain teaching areas such as math, science and special education. For example, in 1994, more than 50% of schools nationally with vacancies in bilingual education, special education, or English as a Second Language, physical science or foreign languages -- and more than 40% of schools with vacancies in mathematics -- had difficulty filling positions.[20] "As a consequence, even with an overabundance of qualified teachers, over a quarter of all teachers enter the teaching force without proper qualifications in their major field of teaching."[21]

Supply of "Qualified" Teachers

What are "proper qualifications"? One important indicator of teacher quality (and supply) is whether or not a teacher's training matches his or her teaching assignment. Richard Ingersoll, the author of several U.S. Department of Education studies on out-of-field teaching, found the following: 25% of all secondary math students are being taught by teachers who do not have at least a college minor in mathematics, 54% of all history students are taught by teachers who do not have at least a college minor in history, and 41% of all secondary students enrolled in physical science classes (chemistry, physics, earth science or space science) are taught by teachers who do not have at least a college minor in any of these sciences. [22]

Teachers without appropriate preparation disproportionately end up teaching in low income schools with large minority populations. According to the National Commission on Teaching and America's Future, "on virtually every measure teachers' qualifications vary by the status of the children they serve." Only 8% of public school teachers teaching in low poverty schools taught without a minor, whereas, 70% of secondary teachers in high poverty schools taught without a minor in their teaching area.[23]

A 1999 report from the National Center for Education Statistics paints a rosier picture of the out-of-field teaching situation. This study looked at the number of teachers who had a minor or major in their "main" teaching assignment. "Main teaching assignment" is defined as the field in which a teacher taught the most courses. For example, if a teacher is assigned to two sections of chemistry, one of physics and one of biology, her main assignment is chemistry. This study looked at whether that teacher holds a major or minor in chemistry. The study found that 86% of English/language arts teachers had a major or minor in their main teaching assignment; 96% of foreign language teachers, 89% social studies teachers, 82% of mathematics teachers and 88% of science teachers. Low-income and high minority schools were examined separately and the percentages were slightly lower but generally in the 70-80% range. The study points out that this way of looking at out-of field teaching understates the problem. In the example provided earlier, the teacher is actually teaching out-of-field half the time if she only holds a major in chemistry.[24]

Some authorities believe that a person may be qualified to teach a subject even if he or she does not hold a minor or major in a teaching area. The teacher may have life experiences or other training that has not resulted in a college degree which makes him or her a well-qualified teacher.

Nationally, out-of-field teaching is exacerbated by low supply of certain types of teachers. Two-thirds of the nation's school districts do not require their new hires to hold a minor in their teaching area. However in Minnesota, almost all districts do. This is not considered a serious problem for most of Minnesota, where over 80% of teachers in most fields have both full certification and a major in the field they teach.[25]

Teachers Leaving the Profession

High non-retirement attrition represents a much greater loss to the teaching profession than retirements. Retention of teachers is an important issue nationwide. Estimates are that one-third of all beginning teachers leave the profession in the first five years and those rates climb to 50% in high poverty areas. According to the National Center for Education Statistics, teacher attrition rates nationally (including retirement) were 6.6% in 1994. This is an increase over the 1989 rate of 5.6%. [26] [27]

Two and half times the number of people are leaving the profession for reasons other than retirement than are leaving to retire. Teachers gave the following reasons for leaving: 27% retired, 31% left for family or personal reasons, 24% were dissatisfied with teaching or sought out another career, and 18% left for miscellaneous other reasons including health, additional education and school staffing actions.[28] Such high attrition rates, especially in the early years of teaching, require schools and districts to expend a lot of energy trying to develop teachers who eventually leave. Some of these teachers may not be effective in the classroom and may be better off finding another profession. However, such high non-retirement attrition contributes significantly to shortages in certain teaching areas and geographic regions.

Teacher Preparation

Teachers leave the profession before retirement for many reasons. One of these reasons is inadequate preparation. A January 1999 survey conducted by the National Center For Education Statistics found that less than half of American teachers feel that they are "very well prepared" to meet the challenges of teaching. The percentage of teachers who feel "very well prepared" in certain areas is lower. Only 20% feel confident using modern technology and only 28% feel qualified to use student performance assessment techniques. Among those teaching students with disabilities, only 20% feel well prepared to handle the needs of their students. Similarly, only 20% of teachers working with culturally diverse students and limited English-speakers feel very well prepared to meet the special needs of these students.[29]

A study conducted by the Center for School Change in December of 1998 reached similar conclusions. That study, which summarized the results of a survey completed by over 1,100 Minnesota public school administrators, found that many new teachers knew their subject area well, but did not know how to teach it. In addition, administrators felt many new teachers were "not at all prepared" or "not very well prepared" to work with parents, community agencies, special needs students or ESL students. [30]

Concern about the supply of teachers has been coupled with a renewed concern about quality of teacher preparation. Historically, teacher shortages have led to a lowering of standards for teachers entering the profession -- an "easing of licensure requirements" to attract more candidates into the field.[31] Many states have been reluctant to increase requirements when they perceive a shortage situation. However, some national researchers contend that the raising of standards has historically had the opposite effect -- attracting more people to teaching instead of fewer.[32]

Raising standards can also positively affect student achievement. Research based on the National Assessment of Educational Progress has shown that "after controlling for student characteristics like poverty and language status, the strongest predictor of state-level student achievement in reading and math... was each state's proportion of well-qualified teachers (teachers with full certification and a major in the subject they are teaching)." Minnesota is listed as one of these high achieving states.[33] But Minnesota can do better. According to Minnesota school administrators, many teachers graduating from Minnesota's teacher preparation programs do know their subject matter well but do not have all the skills necessary to perform well in today's classroom.[34]

National Impact on Minnesota

Teacher shortages in areas of the country with high growth and aggressive policies to reduce class size will impact Minnesota. Competition for well-qualified teachers will only intensify over the next decade. More and more districts are developing incentives to attract teachers – signing bonuses of up to $20,000, financial assistance for homebuyers and bumps on the salary scale.[35] [36]

Minnesota has traditionally exported teachers. Moreover, about a third of Minnesota's teachers have come from other states.[37] However, as other states increase various incentives to attract teachers, Minnesota may not be able to count on a significant number of people moving to Minnesota to teach. The state may also face the prospect of more college graduates leaving to take teaching positions in other states.

SECTION TWO
TEACHER RETIREMENT PATTERNS DURING THE NEXT DECADE

How many Minnesota public school teachers will leave the profession in the next decade? This section looks at a projection for the number of teachers (as full-time equivalents) retiring by subject area during the next ten years (1998-2008). A table summarizing retirement projections can be found on page 13. The impact of teachers leaving the profession before retirement is also considered.

Methodology

The primary data used for these analyses was obtained from the Minnesota Department of Children, Families and Learning's (DCFL) Staff Automated Reporting System (STAR) database. STAR is updated annually utilizing data from district-maintained data collection systems. For this report, we used the most recent database (1997-98) for all teachers currently teaching (51,818 full time equivalents-FTEs). The primary data fields used in these analyses were teacher age, years of service, teaching assignment and assignment FTE.

In order to project when these teachers might retire, we worked with the actuarial consultant for the Minnesota Teacher Retirement Association (TRA), Buck Consulting. This organization provided the most recent criteria they are using within their system to project retirements. While these criteria are most likely more accurate at predicting reality, they were just finalized in late 1998 and have not yet been approved by the state of Minnesota.

The primary eligibility criteria used by the state's teacher retirement systems is the "Rule of 90." Under this rule, a teacher is eligible to receive full retirement benefits when the combination of his or her age and years of service equals "90." Buck Consulting used historical data to determine how many teachers are likely to retire in the first year that they reach the Rule of 90 and in subsequent years. For those teachers that are likely to never reach the Rule of 90, a probability based on age has been calculated. For example, it is estimated that 5% of 55 year olds who will never reach the Rule of 90 decide to retire anyway, 60% of 65 year olds, etc. STAR data on years of service and age were used to divide teachers into two categories -- those that will reach the Rule of 90 in the next ten years and those that won't. Years of service included time as a teacher, an administrator or other educational employee. The appropriate probabilities were then applied to each group to determine the number of projected FTE's retiring by assignment area for each year 1998-2008.

Limitations

The projections outlined in Table 2.2 on page 13 must be considered carefully. They are limited in the following ways.

Accuracy of Data

The STAR database is only as accurate as the data provided by school districts. DCFL does not have the resources to confirm the accuracy of this data and school districts have little incentive to spend extra time ensuring that what they provide is completely accurate. However, STAR is currently the only statewide source of assignment data. Minnesota's teacher retirement associations do not collect data on teaching assignment.

Years of Service Overstated

The years of service in the STAR database reflect some time which may not be counted toward the Rule of 90 by the retirement associations. For example, time spent working in certain educational employment classifications or time spent working as a teacher in another state may not be eligible. These years are, however, counted in the STAR database. In order to gauge the magnitude of this problem, we compared our overall retirement projections to statewide TRA overall projections. The number of people we projected to be retiring overall was within 5% of the number TRA projected.

Teachers Who Enter Late in Life

A small number of teachers enter or re-enter the teaching profession late in life. They may start teaching and retire within a 5-year period. These teachers are not reflected in our analyses. We used only teachers that were teaching in 1997-98, assuming that most "new" teachers would not be eligible for the Rule of 90 or in the retirement age range (55 or over) within the next ten years.

Retirements Expressed as Full Time Equivalents (FTEs)

Our data is reported by full time equivalents (FTEs). The actual number of people retiring in any given area of teaching would be greater. In many areas (particularly rural areas), a teacher may teach three or more subjects -- social studies, English (communications), and drama (arts). In Table 2.2 that teacher would not show up as a whole person in any one of those teaching categories, rather as .5 in Social Studies, .25 in Communication and .25 in Arts. An alternative way to look at it would be that the school is losing one social studies teacher, one communication teacher and one arts teacher. When a teacher teaching three subjects retires, it may be more of a challenge to replace that person than to replace a 100% time communication teacher.

TRA Criteria Used Statewide

The statewide TRA does not represent teachers in Minneapolis, St. Paul or Duluth. Teachers in each of those cities are represented by separate retirement associations. We contacted each of those retirement associations to see if we could compare the criteria used to project retirements by the statewide TRA with the criteria they use. Minneapolis did not provide us projection criteria. Numbers provided by the other two systems were similar, but not exactly the same, for Rule of 90 retirees (i.e. 40% retiring in the first year for St. Paul and Duluth, compared to 45% for statewide TRA).

St. Paul and Duluth TRA's also use an age-related probability for predicting retirements among members who are not eligible for the Rule of 90. Probabilities by age vary slightly for each retirement association. For example, St. Paul and Duluth predict 40% of 64 year olds not eligible for the Rule of 90 will retire, whereas statewide TRA predicts 45% of these members will retire. Based on these conversations, we applied the Buck Consulting criteria statewide.

Early Retirement Incentives

Some districts have instituted early retirement incentive systems. Early retirements prompted by these programs are not accounted for in our analysis. To the extent that these programs result in teachers eligible for the Rule of 90 retiring before they reach eligibility, our numbers understate the number of retirees in a given year. The retirement associations, also, do not account for these incentive programs when making their projections.

Results: Retirements

As shown in Figure 2.1, the overall trend is an increase in public school teacher retirements during the next ten years. We estimate total teacher retirements to be 19,820 FTEs during that period. If administrators and pupil personnel (counselors, librarians, psychologists, social workers and nurses) are added, the number rises to 23,276.

Figure 2.1: Overall Number of Public School Teacher Retirements in Minnesota by FTE, 1998-2008

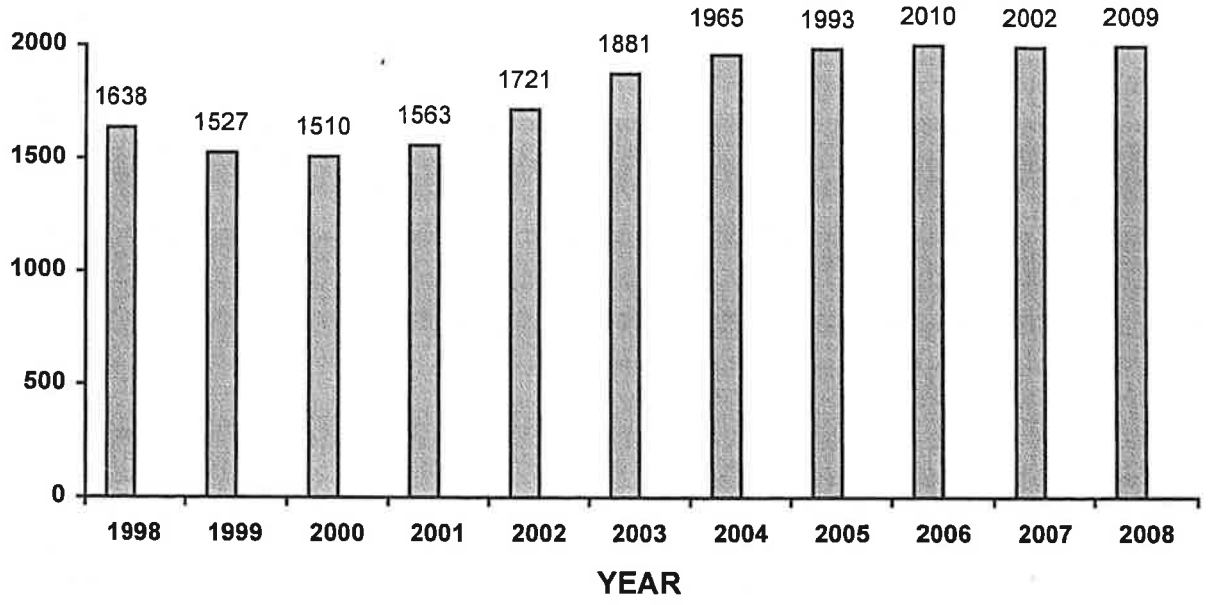


Table 2.2 summarizes the number of FTEs retiring in each teaching assignment area. Some areas were grouped together for ease of reporting and others, where concern has been expressed, were broken out more finely. The category "Middle School" represents only those teachers working exclusively with 5th and 6th grade students in a middle school setting; all other middle school teachers are listed by subject area (See Appendix A for more detail on each teaching category).

Table 2.2: Distribution of Estimated Retirements by Assignment in Minnesota, 1998-2008

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	Total
Arts	28	29	31	31	35	39	41	41	42	41	42	401
Communications	128	117	116	123	138	152	158	159	156	154	151	1552
Elementary	489	457	454	478	528	586	618	630	635	631	635	6141
Family Education	107	95	92	94	103	112	117	120	122	124	124	1212
Health and P.E.	80	77	76	79	88	100	104	106	108	106	106	1028
Home Economics	17	17	17	18	19	22	23	24	25	24	25	231
Industrial Arts	29	30	32	33	36	39	40	40	40	38	37	392
Language: ESL/Bi-Bi	6	7	7	7	8	9	10	12	12	13	14	103
Language: French	3	3	3	4	5	6	6	7	7	7	7	57
Language: Others	9	9	9	9	9	10	11	10	10	10	10	106
Language: Spanish	13	11	12	13	14	16	17	18	18	18	19	170
Mathematics	122	107	105	103	109	116	117	117	114	111	109	1230
Middle – General	32	37	38	39	44	47	49	48	47	46	45	470
Music	65	60	57	56	61	65	69	72	74	73	74	727
Other Teachers	38	37	35	36	39	42	43	42	42	41	40	434
Pre-K and K	41	38	39	39	44	48	52	53	55	56	57	523
Science: Chemistry	21	18	16	15	15	15	15	14	13	13	12	167
Science: Others	81	77	71	71	74	78	78	77	75	74	73	829
Science: Physics	8	8	7	7	7	7	7	7	7	6	6	77
Social Studies	125	115	110	112	123	130	130	126	123	119	116	1329
Special Education	165	152	153	165	189	206	220	233	245	256	268	2254
Vocational Ed.	30	28	29	30	34	35	38	39	40	40	40	383
Total	**1638**	**1527**	**1510**	**1563**	**1721**	**1881**	**1965**	**1993**	**2010**	**2002**	**2009**	**19820**

Table 2.3 shows additional detail for the first year of analysis (1998-99). The "1997-98 All Teachers" columns represent the number of FTEs teaching in each category in 1997-98. For example, in 1997-98 there were 1,055 FTEs teaching the "Arts. The "Meeting Rule of 90 Column" lists the number of FTEs meeting the Rule of 90 in each teaching area in 1998-99. The "Estimated Retirements" columns show how many actual FTEs are predicted to retire using our criteria for both Rule of 90 eligibles and those who will likely never be eligible.

Table 2.3: Teaching Staff and Estimated Retirements by Assignment in Minnesota, 1998-99

	All Teachers 1997-98	Meeting Rule of 90 1998-99	Estimated Retirements 1998-99
	Total FTEs	Total FTEs	Total FTEs
Arts	1055.5	44.7	28
Communications	3450.9	222.6	128
Elementary	15304.9	815.4	489
Family Education	3507.9	176.3	107
Health and P.E.	2682.5	129.2	80
Home Economics	589.9	26.7	17
Industrial Arts	829.8	48.6	29
Language: ESL/Bi-Bi	430.9	6.7	6
Language: French	190.2	4.3	3
Language: Others	265.9	14.9	9
Language: Spanish	682	16.1	13
Mathematics	2686.5	222	122
Middle – General	1075.4	51.2	32
Music	2105.1	107.7	65
Other Teachers	882.1	69.3	38
Pre-K and K	1636.8	62.3	41
Science: Chemistry	278.7	41	21
Science: Others	1985.1	144.7	81
Science: Physics	144.2	16.1	8
Social Studies	2684.9	229.6	125
Special Education	8428.8	220.7	165
Vocation Ed	919.9	50	30
Total	**51817.9**	**2720.1**	**1638**

Are certain teaching categories over-represented in retirements? Table 2.4 attempts to answer this question. The "% of FTEs Retiring 1998-99" column represents the percentage of all teaching FTEs in each category that are projected to retire in 1998-99. For example, in 1998-99 we estimate that 2.7% of all FTEs teaching in the "Arts" will retire. The "% of FTEs Retiring 1998-2008" column represents the percentage of all teaching FTEs in each category that are projected to retire cumulatively over the next ten years. Over the next decade, for example, we project that 37.9% or a total of 401 FTEs teaching in the "Arts" will retire.

Overall, we project that 3.1% of all teaching FTEs will retire in 1998-99 and that 38.2% of all teaching FTEs will retire in the next decade. For the calculations in Table 2.4, we assumed a constant 1997-98 teaching FTE level and distribution over the next ten years. As Table 2.4 indicates, some teaching areas will experience a greater loss from retirements than others. The physical sciences and mathematics take a particularly hard hit with 59.9% of FTEs teaching chemistry retiring between now and 2008, 53.4% of physics FTEs retiring, and 45.8% of mathematics FTEs retiring. Other areas with higher than average retirements include industrial arts (47.5%), communications (45%), social studies (49.5%) and "other teachers" which includes coaching, business instruction, and drivers education (49.3%).

Table 2.4: Percentage of Teaching FTEs Retiring in 1998-99 and 1998-2008

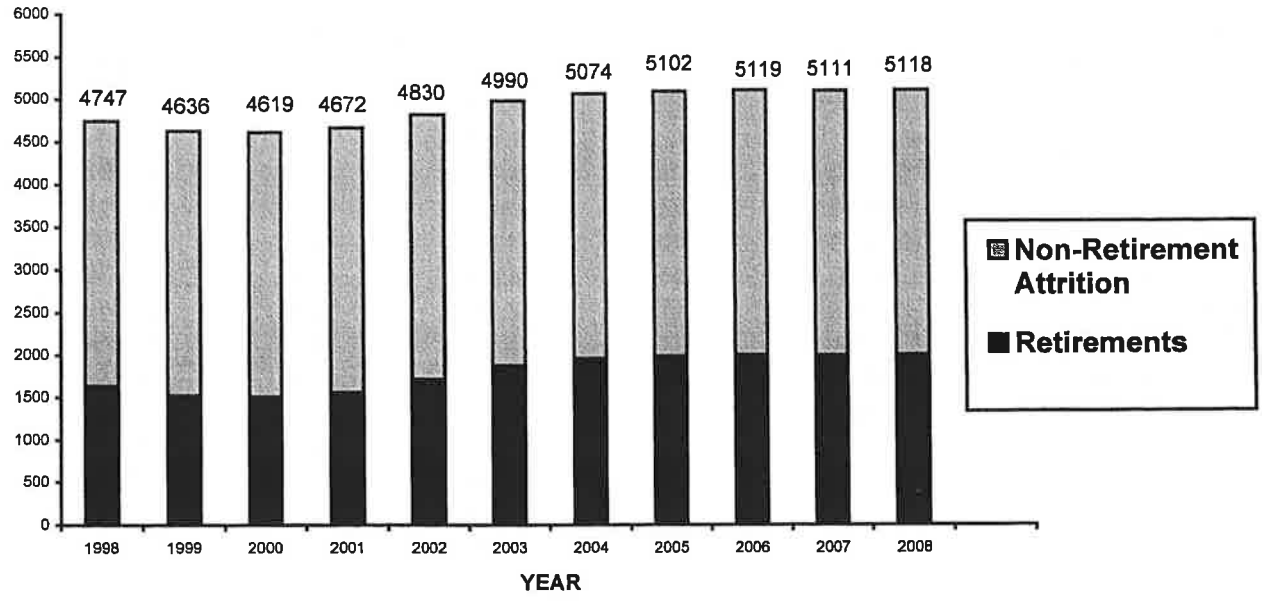
	Total Teaching FTEs 1997-98	Total FTEs Retiring 1998-99	% of FTEs Retiring 1998-99	Total FTEs Retiring 1998-2008	% of FTEs Retiring 1998-2008
Arts	1055.5	28	2.7%	401	37.9%
Communications	3450.9	128	3.7%	1552	45.0%
Elementary	15304.9	489	3.2%	6141	40.1%
Family Education	3507.9	107	3.1%	1212	34.5%
Health and P.E.	2682.5	80	3.0%	1028	38.4%
Home Economics	589.9	17	2.9%	231	39.2%
Industrial Arts	829.8	29	3.5%	392	47.5%
Language: ESL/Bi-Bi	430.9	6	1.4%	103	24.4%
Language: French	190.2	3	1.6%	57	30.5%
Language: Others	265.9	9	3.4%	106	39.9%
Language: Spanish	682	13	1.9%	170	24.8%
Mathematics	2686.5	122	4.5%	1230	45.8%
Middle – General	1075.4	32	3.0%	470	43.9%
Music	2105.1	65	3.1%	727	34.5%
Other Teachers	882.1	38	4.3%	434	49.3%
Pre-K and K	1636.8	41	2.5%	523	31.9%
Science: Chemistry	278.7	21	7.5%	167	59.9%
Science: Others	1985.1	81	4.1%	829	41.8%
Science: Physics	144.2	8	5.5%	77	53.4%
Social Studies	2684.9	125	4.7%	1329	49.5%
Special Education	8428.8	165	2.0%	2254	26.7%
Vocational Ed.	919.9	30	3.3%	383	41.6%
Total	**51817.9**	**1638**	**3.1%**	**19820**	**38.2%**

Non-retirement Attrition

Of course retirement is only one of many reasons teachers leave the profession. Unfortunately, data on the number of Minnesota teachers leaving the profession for other reasons is not currently available. Analyses of this type were not within the scope of this research project. In addition, there are privacy questions about public release of data collected by the DCFL that describes why people left teaching. According to staff at the DCFL, recent rulings by the Minnesota Attorney General's Office prohibit the public release of this information. The most current national data on this subject comes from the federal report *Characteristics of Stayers, Movers and Leavers: Results from the Teacher Follow-up Survey: 1994-95.* According to this report, the annual attrition rate for public school teachers nationally was 6.6% (between the 1993-94 school year and the 1994-95 school year). [38] When broken down by region, the Midwest had a somewhat higher rate of 8.2%.[39] These rates include retirees, which represented 27.1% of those leaving the profession.[40] So, just over a quarter of the teachers who leave do so because they are retiring and three-quarters leave for other reasons.

If the Midwest rate of attrition (8.2%) is reduced by the percentage accounted for with retirements (27.1%) we arrive at an estimated Midwest non-retirement attrition rate of 6%. In Table 2.4 we show retirement and non-retirement attrition rates combined. For this table, we assumed the FTE level for teachers would remain constant for the next ten years. A 6% non-retirement attrition rate applied to the 51,818 FTEs results in a total non-retirement attrition loss of 3,109 FTEs per year total. In 1998, for example, 1,638 FTEs are predicted to retire and 3,109 FTEs are predicted to leave teaching for reasons other than retirement. This results in overall attrition for 1998-99 of 4,747 FTEs.

Figure 2.4: Combined Number of Retirements and Non-retirement Attrition in Minnesota, 1998-2008



SECTION THREE
SUPPLY OF NEW TEACHERS

This section describes the number of teachers being prepared by Minnesota colleges and universities. Table 3.1 on page 19 summarizes the number of individuals who graduated in the 1997-98 academic year from 25 colleges and universities.

Methodology

The data used for this section was obtained from the Minnesota State Board of Teaching in February 1999. In November 1998, the State Board of Teaching asked Deans at Minnesota's Colleges of Education to indicate the number of individuals who graduated from their programs and the licensure areas they completed in the 1997-98 academic year (see appendix A for the list of categories). Additionally, the participants were asked to provide numbers, if available, for the 1996-97 academic year. To account for individuals who pursued multiple licensure programs, an unduplicated count of individuals who completed all programs was requested for each academic year. The State Board of Teaching received information about 1997-98 from 25 of 26 colleges and universities that offer a program leading to teacher certification. The only non-respondent was a private college with a small teacher preparation program.

About half (13) of the colleges and universities provided numbers for the 1996-97 academic year. Since the data for the 1996-97 academic year was not uniformly collected, these numbers are not used in our analysis. Only the 1997-98 data were used.

Limitations

The results outlined in this section should be carefully considered in light of the following limitations.

Data Incomplete
The results may be slightly under-represented in certain licensure programs since one college did not complete the survey.

Interpretation of Questions
Survey respondents may have interpreted differently the request "Please indicate the number of individuals who graduated in the 1997-98 year having completed each of the licensure programs listed." They may have reported the number of individuals who are currently licensed teachers and have returned for additional endorsements. Second, some respondents may have reported the total number of traditional graduates in the survey and left the number of non-traditional graduates (e.g. weekend programs, experiential programs) unaccounted. Some may have reported both.

Furthermore, respondents may have reported certain licensure categories differently. Some respondents did not specify what areas the category "Middle School" may represent. Thus, we interpreted that category as teachers who will work exclusively with 5th and 6th grade students in a middle school setting.

Grouping of Licensure Areas

Some programs were grouped together for ease of reporting. For instance, the category "Special Education" represents many areas including emotional/behavioral disorders, speech/language pathology, and specific learning disabilities. The breakdown of these categories is described in Appendix A. Vocational education and administration licensure programs were not included in the survey.

Other Supply Factors

Many factors influence the supply of teachers. Such factors include the number of individuals who leave the profession within the first five years and beyond; pursue other occupations immediately upon graduation; leave Minnesota to teach in another state; take teaching positions in private schools; or pursue other assignment areas. These influences, and others, are not accounted for in our analysis.

Results: Supply

Table 3.1 displays the number of duplicated and unduplicated individuals who completed Minnesota teacher preparation programs in 1997-98. Duplicated counts refer to the number of individuals who completed programs. Some individuals may be counted in multiple licensure areas. Unduplicated counts refer to the actual number of individuals who completed teacher preparation programs. For example, one student may have completed a program in both elementary education and special education. This student would be counted twice in the duplicated count, but only once in the unduplicated count.

The gray sections indicate areas where the data was not reported or what was reported is unusable. Moorhead State University provided a higher unduplicated count than duplicated count. Both the University of Minnesota at Duluth and Minneapolis did not provide data on unduplicated counts. Thus, the total for the unduplicated counts column is not calculated.

Table 3.1: Number of Duplicated and Unduplicated Individuals Who Completed Teacher Preparation Programs in Minnesota, 1997-98

Approved Programs	Duplicated Counts	Unduplicated Counts
Augsburg C.	109	101
Bemidji State U.	522	233
Bethel C.	177	165
Carleton C.	5	4
College of St. Benedict	105	96
College of St. Catherine	198	102
College of St. Scholastica	51	51
Concordia C - Moorhead	196	132
Concordia C. - St. Paul	82	82
Crown C.	153	93
Gustavus Adolphus C.	74	69
Hamline U.	78	79
MaCalester C.	24	18
Mankato State U.	975	972
Moorhead State U.	340	360
North Central Bible C.	12	12
Northwestern C.	105	75
St. Cloud State U.	785	674
St. Mary's U.	35	30
SW State U.	67	61
U of M – Duluth	371	Unavailable
U of M – Morris	119	88
U. of St. Thomas	454	365
Uof M – MPLS	829	Unavailable
Winona State U.	237	205
Total	**6103**	

Note: St. Olaf College did not submit a survey

Table 3.2 shows the number of individuals (with duplicate counts) who have completed each of the licensure programs listed in the survey.

The "Maximum" column indicates the largest number of individuals graduating from one teacher preparation program. This column demonstrates that some colleges and universities have developed specializations. For example, almost half of all "Arts" certifications came from one institution (34 of 88), one quarter of mathematics certifications came from one institution and approximately one-third of all "Family Education" certifications came from one institution. Appendix B contains a listing of all colleges/universities and the number of graduates produced in each certification area.

The "Other" column adds an estimated supply of teachers from states other than Minnesota. According to the Minnesota State Board of Teaching, approximately 33% of new teachers receiving Minnesota teaching licenses are trained by out-of-state teacher preparation programs.[41]

Table 3.2: Estimated Minnesota Teacher Supply, 1997-98

Licensure Programs	Maximum	SUPPLY		
		Minnesota	Other	Subtotal
Arts	34	88	44	132
Communications	85	398	199	597
Elementary - General	218	1759	880	2639
Family Education	116	298	149	447
Health and P.E.	77	348	174	522
Home Economics	5	10	5	15
Industrial Arts	15	38	19	57
Language: ESL/Bi-Bi	54	126	63	189
Language: French	12	34	17	51
Language: Others	8	25	13	37.5
Language: Spanish	21	87	44	130.5
Mathematics	48	166	83	249
Middle - General	47	87	44	131
Music	29	137	69	206
Other Teachers	70	344	172	516
Pre-K and K	83	438	219	657
Science: Chemistry	4	20	10	30
Science: Others	65	264	132	396
Science: Physics	2	4	2	6
Social Studies	49	316	158	474
Special Education	279	1116	558	1674
Vocation Ed.	Unavailable		Unavailable	
Total		**6103**	**3052**	**9155**

The diversity of Minnesota's teaching force has not kept pace with the diversity of the student population. Statewide, students of color represent 13.5% of all public school students and public school teachers of color represent only 2.5%.[42] In urban districts and some suburban and rural districts, this disparity is even larger. We illustrate this disparity in Table 3.3 for selected urban, suburban and rural districts. Many districts throughout Minnesota have indicated a desire to close this gap.

Table 3.3: Percent of Public School Students and Teachers of Color in Selected Districts, 1998-99

School District	Students of Color	Teachers of Color
Anoka	7%	1.5%
Brooklyn Center	39%	3.5%
Duluth	11%	3%
Minneapolis	67%	18%
Osseo	18%	2%*
Red Lake	100%	17%
Rochester	16%	2%
St. Cloud	6%	1%
St. James	19%	0%
St. Paul	61%	13%
Worthington	26%	0%

* Includes all district licensed personnel

SECTION FOUR
SUPPLY AND DEMAND COMPARED

Elements of supply and demand are brought together in this section. As already mentioned, estimates of both supply and demand projected here are limited in a number of ways, but they do provide a rough idea of where shortages may occur and where over-supply may be an issue.

Limitations

Key Assumptions

On the demand side, we assumed an across-the-board 6% non-retirement attrition rate. This rate may not be the same for all teaching areas. To arrive at the 6% non-retirement attrition rate, we assumed a consistent 27.1% retirement rate across all teaching areas. This also may not be accurate. The National Center for Education Statistics report *Characteristics of Stayers, Movers and Leavers* does not provide this data for the Midwest. At a national level, this report describes overall attrition rates (including retirement) for various teaching specialties. These vary from the overall national average of 6.6%, but not significantly. We discuss these variances, where relevant, in the conclusions.

Similar assumptions were made on the supply side. The supply of teachers from outside Minnesota is assumed to be 33% across all teaching areas. Some types of teaching jobs may attract more out-of-state applicants than others.

Supply Considerations

It is also important to note that supply is overstated in that it includes some individuals more than once. As mentioned in Section Three, a teacher who has completed education in multiple licensure areas is counted in each area. On the other hand, supply is understated since it does not include teachers who choose to re-enter the profession once they have left. National research indicates that as many as one-sixth of new hires are teachers re-entering the profession.[43]

It is also important to remember that receiving certification to teach a subject area is not the same thing as applying for a job to teach in that certification area. Some graduates may pursue multiple certifications, but only apply for jobs in one area of certification and only in certain geographic locations. Supply, as discussed in this report, is really only "potential" supply.

This report does not address supply and demand issues for private schools. An unaccounted for percentage of new teachers generated each year by Minnesota's teacher preparation institutions will take teaching positions in private schools.

Statewide Data

These data were all run on a statewide basis. In this report, we can not draw conclusions about how supply and demand may be spread over regions of the state. National research and anecdotal evidence suggests that the number of teachers interested in teaching in specific regions may vary – i.e. more applicants for teaching positions in certain affluent suburban districts and fewer applicants for rural or urban postings.

Supply and Demand Combined

In Table 4.1 below, supply and demand projections are combined for a one-year period. This table shows, for example, that according to the best information available there is a one-year surplus of 41 "Arts" teachers and 262 "Communications" teachers. Table 4.1 also shows a lack of chemistry, physics, mathematics and industrial arts teachers.

Table 4.1: Supply and Demand Combined – 1998-99 Demand and 1997-98 Supply

	DEMAND			SUPPLY			
	Retirements 1998-99	Attrition	Subtotal	Minnesota 1997-98	Other	Subtotal	Supply-Demand
Arts	28	63	91	88	44	132	41
Communications	128	207	335	398	199	597	262
Elementary - General	489	918	1407	1759	880	2639	1232
Family Education	107	210	317	298	149	447	130
Health and P.E.	80	161	241	348	174	522	281
Home Economics	17	35	52	10	5	15	-37
Industrial Arts	29	50	79	38	19	57	-22
Language: ESL/Bi-Bi	6	26	32	126	63	189	157
Language: French	3	11	14	34	17	51	37
Language: Others	9	16	25	25	13	37.5	13
Language: Spanish	13	41	54	87	44	130.5	77
Mathematics	122	161	283	166	83	249	-34
Middle - General	32	65	97	87	44	131	34
Music	65	126	191	137	69	206	15
Other Teachers	38	53	91	344	172	516	425
Pre-K and K	41	98	139	438	219	657	518
Science: Chemistry	21	17	38	20	10	30	-8
Science: Others	81	119	200	264	132	396	196
Science: Physics	8	9	17	4	2	6	-11
Social Studies	125	161	286	316	158	474	188
Special Education	165	506	671	1116	558	1674	1003
Vocation Ed.	30	55	85		Unavailable		
Total	**1638**	**3108**	**4746**	**6103**	**3052**	**9155**	**4496**

CONCLUSIONS

Given the caveats mentioned, we reached the following findings and conclusions:

1. **Minnesota currently does not face an overall teacher shortage.**

   Overall supply of teachers outstrips overall demand by 4,496 in 1998-99, the first year of comparison. Each year thereafter, for the next nine, the overall number of retirements increases, shrinking the difference between supply and demand. This assumes supply remains constant over the same period. By 2008, the difference shrinks slightly to 4,038.

   A surplus of elementary educators contributes significantly to this discrepancy.

2. **Projected supply does not match the demand for some specific curricular areas, such as special education, math and science.**

   Physical Sciences and Mathematics are two areas where chronic shortages have existed at the national level for many years. It is not surprising that a potential shortage showed up in our analysis, as well. Potential Minnesota shortages in these two areas may be acerbated by higher than average retirements (see page 15). While the FTE level may be small, graduates with skills in these areas have many options. It may be especially hard to attract them to teaching in a booming economy. The shortage may also be particularly acute in rural areas where a school may not need a full-time chemistry teacher, but a teacher with multiple licensure areas to cover several different courses. While it may seem intuitive that more teachers would leave these assignments for the lucrative opportunities in the private or research sector, data in the *Characteristics* report do not back-up this commonly held belief. In fact, for teachers of chemistry (nationally) the overall attrition rate is actually low at 1.6%.[44] For mathematics teachers the overall attrition rate is 6.9%, slightly higher than average. These rates are from 1994-95, however, and may have climbed since then.

   Industrial Arts is another area where shortages have been reported in Minnesota, especially in rural areas of the state. Our analysis confirms a potential shortage in this category of instruction. A strong economy is likely affecting supply of industrial arts teachers, as well. Again, higher than average Minnesota retirement rates affect this teaching category.

   Home Economics teachers may also be in short supply based on our analyses.

   Special Education is an area of considerable concern at the national level. Serious shortages have been reported across the nation and demand is expected to increase dramatically during the next decade. Yet, our one-year analysis shows a surplus of 1,003. While some "potential" surplus may actually exist in Minnesota, the reality is much different.

While many people are graduating with certification in the special education areas outlined in Table 5.1 below, school districts across the state of Minnesota are having difficulty filling special education positions. According to a September 1998 survey of Special Education Directors conducted by Dr. Barbara Troolin (Special Education Director for South Washington County School District), districts in all areas of the state entered the 1998-99 school year with unfilled special education positions. Forty-five of 87 special education directors from all regions of the state responded. With only half of the directors reporting, over 80 special education teaching FTEs had not been filled, due to lack of qualified candidates, as the school year began. Respondents reported that the most difficult positions to fill were in the area of Emotional/Behavioral Disorders. In at least one case, a Minnesota school district is currently offering a signing bonus to experienced special education teachers.

Table 5.1: Number of Individuals Graduating from Minnesota Teacher Preparation Programs with Certification in Special Education, 1997-98

Special Education	
Developmental/Adapted Physical Education	177
Early Childhood/Special Education	84
Emotional/Behaviorally Disorders	342
Deaf/Hard of Hearing	25
Mild to Moderately Handicapped	63
Mildly Handicapped	3
Moderate to Severely Handicapped	31
Physically Handicapped	5
Speech/Language Pathologist	64
Specific Learning Disabilities	319
Visually Impaired	3
Total	**1116**

Respondents also indicated that they were having difficulty keeping special education teachers. The 45 directors responding reported that 216 staff had left in the last year. Many of them took positions in general education, but other reasons for leaving included increased paperwork, difficulty dealing with parents, increased caseloads and stress/burn-out. This level of attrition is in line with the national average of 6.3% for special education teachers.[45]

Shortages in the special education area may be exacerbated by predicted increases in demand and an increasing number of retirements as the decade progresses.

Shortages in Other Curricular Areas may develop over time. Retirements generally increase over the next ten years and some curricular areas, which are borderline in our first year of analysis, may develop shortages later. Table 2.2 on page 13 shows how projected

retirements rise and fall in particular curricular areas over the next decade and Table 2.4 on page 15 shows how the percentage of teaching FTEs retiring varies by subject area.

3. **Some districts in Minnesota may encounter greater challenges attracting teachers than other districts.**

   Regional issues of supply and demand are beyond the scope of this report (as discussed on page 22), but anecdotal evidence was offered by some respondents to a teacher preparation quality survey conducted by the Center for School Change in December 1998. Administrators in various areas of the state commented on the number of applicants they receive for each posted position. Some districts reported receiving only one or two applicants and others had hundreds. Research conducted by the National Commission on Teaching and America's Future found similar trends.[46]

4. **As the state's enrollment becomes more racially diverse, districts are expressing a desire to hire more teachers who are racial minorities. Supply of such teachers does not appear to meet demand.**

   Table 5.2 shows the growing diversity of Minnesota school districts in urban, suburban and rural regions of the state. Unfortunately, the diversity of Minnesota's teaching force in districts throughout the state has not kept pace. It is important to note that teachers of color are not only needed in Minnesota's urban core, but in schools all over the state.

Table 5.2: Percent of Public School Students and Teachers of Color in Selected Districts, 1998-99

School District	Students of Color	Teachers of Color
Anoka	7%	1.5%
Brooklyn Center	39%	3.5%
Duluth	11%	3%
Minneapolis	67%	18%
Osseo	18%	2%*
Red Lake	100%	17%
Rochester	16%	2%
St. Cloud	6%	1%
St. James	19%	0%
St. Paul	61%	13%
Worthington	26%	0%

* Includes all district licensed personnel

5. **Changes in state policy can have a dramatic impact on the teacher supply/demand situation. For example, if the state decides to significantly reduce class sizes this will increase demand for elementary and kindergarten teachers.**

   Minnesota has been an exporter of elementary educators for many years. Our analysis confirms that Minnesota currently prepares far more elementary teachers than are being hired

by school districts in this state. However, federal, state and local efforts to reduce class sizes could have a dramatic affect on demand for elementary teachers. These efforts are usually targeted at early grades and could quickly place this category into the shortage range. According to a DCFL estimate, 2,500 more elementary teachers would be needed to achieve a proposed Minnesota class size of 17 in grades K-3.[47]

The current supply of Pre-Kindergarten and Kindergarten teachers also appears to exceed demand by about 518 in the coming year. Class size reduction initiatives could also have a major impact on this supply/demand situation. Day care providers and preschools may also provide additional demand for teachers in this category.

6. **The state loses nearly twice as many teachers to non-retirement attrition as to retirement – that is, almost twice as many teachers leave the profession for reasons other than retirement.**

   This is one of the findings that was unexpected. It raises serious policy questions about who is leaving and why. Some of these teachers may be leaving for the right reasons – teaching is not a good fit for them. But some of these teachers may be among the best. Many of these teachers may not have had adequate preparation, do not get the kind of support they need in early years of teaching, have difficulty with their working environment, have more economically lucrative offers or a host of other problems not related to their interest in or ability to teach.

   We estimate that approximately 3,100 teachers leave Minnesota public schools each year for reasons other than retirement. Some number of these teachers will return to the profession later in life, but many will not. National researchers, such as Richard Ingersoll, focussing on shortages of "qualified" teachers point to non-retirement attrition as one of the most important causes of shortages. Ingersoll says "In short, recruiting more teachers will help little if large numbers of teachers continue to leave…Improving these conditions [of teaching] would decrease turnover, which would quickly eliminate the so-called shortages."[48] High non-retirement attrition results in schools constantly recruiting, hiring and training new staff to fill positions – a time consuming task that takes away from other efforts to improve educational outcomes for students.

7. **The financial impact may be quite large as more experienced/more expensive teachers retire and beginning/less expensive teachers replace them.**

   We estimate close to 20,000 teachers, most of them on the high end of the salary schedule, will retire in the next ten years. Many of the teachers replacing them will be new to the profession. Salary schedules vary from district to district, but the difference between the top of the salary schedule and the bottom can be $25,000 or more. Most districts in the state will experience some level of financial windfall. These additional funds could be used in a number of ways – increasing salaries overall; increasing salaries to attract candidates in certain curriculum areas; implementing mentorship or other programs to reduce teacher attrition; or reducing class sizes.

RECOMMENDATIONS

1. **The state should examine ways it can more effectively attract and retain teachers needed to meet current and projected demands.**

   - The state should consider ways to create incentives which will attract teachers in "high demand" areas, including those teaching certain subjects, and those representing certain racial groups. An in-depth examination of the issues surrounding special education should be conducted. The special education area appears to be unique in several ways: the number of people revoking licenses in this area, the number of teachers moving to other kinds of teaching, the large number of people receiving certification versus the small number applying for positions, and the magnitude of predicted increases in demand.

   - The state may wish to survey principals about the characteristics of teachers who leave the profession, compared to those who stay. For example, do principals believe, overall, that those who are leaving the profession are more or less effective than those who stay?

   - The state should examine ways it can retain a higher percentage of teachers who enter the profession. For example, the state should consider research about the potential benefits of mentoring programs. Such programs can help reduce the number of teachers who leave in the first five years.

   - The state should continue efforts to improve teacher preparation. Teachers who enter the profession with the skills necessary to succeed in today's classrooms are more likely to stay in the profession.

2. **High quality, accessible data is needed urgently.**

   - The state should examine information it already has about patterns of teacher retirement and early leaving, gather additional information and publicize the findings.

   - The state should regularly gather information from school districts about their needs in particular teaching areas and publish this data.

   - The state should complete a five-year projection on the need for teachers in certain curricular areas.

   - This data should be shared with colleges of education and with prospective teachers.

   - The state should conduct research on the financial impact of projected retirements. This information should be available to state and district decision-makers so they can make the best possible choices about how the additional resources created by retirements are used.

ENDNOTES

[1] Michael Tillmann, Acting Executive Director, Minnesota State Board of Teaching.

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[4] Chris Pipho, "A 'Real' Teacher Shortage," *Phi Delta Kappan,* (November 1998), p. 181.

[5] National Center for Education Statistics, *Projections of Education Statistics to 2007.* Washington D.C.: U.S. Department of Education, 1997.

[6] Chris Pipho, "A 'Real' Teacher Shortage," *Phi Delta Kappan,* (November 1998), p. 181.

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[8] Minnesota Department of Children Families and Learning. Bob Porter, Education Funding Team.

[9] Center for Policy Studies. 1998. St. Paul, Minnesota.

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[11] Linda Darling-Hammond, *Doing What Matters Most: Investing in Quality Teaching*, National Commission on Teaching and America's Future (November 1997), p. 15

[12] Chris Pipho, "A 'Real' Teacher Shortage," *Phi Delta Kappan,* (November 1998), p. 181.

[13] Minnesota Milestones Report. Minnesota Planning, p. 39.

[14] Linda Darling-Hammond, *Doing What Matters Most: Investing in Quality Teaching*, National Commission on Teaching and America's Future (November 1997), p. 16.

[15] "The Number Game: Ensuring Quantity and Quality in the Teaching Force," A Report of the National Association of State Boards of Education Study Group on Teacher Development, Supply, and Demand (October 1998), p. 5.

[16] "The Number Game: Ensuring Quantity and Quality in the Teaching Force," A Report of the National Association of State Boards of Education Study Group on Teacher Development, Supply, and Demand (October 1998), p. 5.

[17] Linda Owen, "How Serious is Teacher Pinch? That Depends," *Saint Paul Pioneer Press* (February 16, 1999) p. 1A.

[18] Linda Darling-Hammond and E.M. Sclan. Who Teaches and Why: Dilemmas of Building a Profession for twenty-first Century Schools. In *Handbook for Research on Teacher Education.* New York: NY: Macmillan Library Reference USA. 1996.

[19] "The Number Game: Ensuring Quantity and Quality in the Teaching Force," A Report of the National Association of State Boards of Education Study Group on Teacher Development, Supply, and Demand (October 1998), p. 6.

[20] Linda Darling-Hammond, *Doing What Matters Most: Investing in Quality Teaching*, National Commission on Teaching and America's Future (November 1997), p. 16.

[21] "The Number Game: Ensuring Quantity and Quality in the Teaching Force," A Report of the National Association of State Boards of Education Study Group on Teacher Development, Supply, and Demand (October 1998), p. 5.

[22] Richard M. Ingersoll, "Putting Qualified Teachers in Every Classroom," *Education Week*, (June 11, 1997) p. 60.

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[26] "The Number Game: Ensuring Quantity and Quality in the Teaching Force," A Report of the National Association of State Boards of Education Study Group on Teacher Development, Supply, and Demand (October 1998), p. 7.

[27] National Center for Education Statistics, *Characteristics of Stayers, Movers, and Leavers: Results from the Teacher Followup Survey: 1994-95.* (May 1997), p. 5.

[28] National Center for Education Statistics, *Characteristics of Stayers, Movers, and Leavers: Results from the Teacher Followup Survey: 1994-95.* (May 1997).

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[30] Joe Nathan, Stella Cheung, and Debra Hare. *Improvements Are Needed: Minnesota Principals, Superintendents and Parent/Community Advocates Assess Teacher Preparation.* Center for School Change (December 1998), p. 5.

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[32] "The Number Game: Ensuring Quantity and Quality in the Teaching Force," A Report of the National Association of State Boards of Education Study Group on Teacher Development, Supply, and Demand (October 1998), p. 5.

[33] Linda Darling-Hammond, *Doing What Matters Most: Investing in Quality Teaching*, National Commission on Teaching and America's Future (November 1997), p. 29.

[34] Joe Nathan, Stella Cheung, and Debra Hare. *Improvements Are Needed: Minnesota Principals, Superintendents and Parent/Community Advocates Assess Teacher Preparation.* Center for School Change (December 1998), p. 5.

[35] S.L. Wykes, "Some Teachers Signing Bonuses Up to $20,000." Saint Paul Pioneer Press. (Monday, February 1, 1999) p. 2B.

[36] Linda Darling-Hammond, *Doing What Matters Most: Investing in Quality Teaching*, National Commission on Teaching and America's Future (November 1997), p. 18.

[37] Don Krukow, Licensing Division, Minnesota Department of Children, Families & Learning.

[38] National Center for Education Statistics, *Characteristics of Stayers, Movers, and Leavers: Results from the Teacher Followup Survey: 1994-95.* (May 1997). p. 4.

[39] National Center for Education Statistics, *Characteristics of Stayers, Movers, and Leavers: Results from the Teacher Followup Survey: 1994-95.* (May 1997). p. 8.

[40] National Center for Education Statistics, *Characteristics of Stayers, Movers, and Leavers: Results from the Teacher Followup Survey: 1994-95.* (May 1997). p. 13.

[41] Don Krukow, Licensing Department, Minnesota Department of Children, Families & Learning.

[42] Minnesota Milestones Report 1998. Minnesota Planning. p. 39.

[43] Linda Darling-Hammond and E.M. Sclan. Who Teaches and Why: Dilemmas of Building a Profession for twenty-first Century Schools. In *Handbook for Research on Teacher Education.* New York: NY: Macmillan Library Reference USA. 1996

[44] National Center for Education Statistics, *Characteristics of Stayers, Movers, and Leavers: Results from the Teacher Followup Survey: 1994-95.* (May 1997). p. 4.

[45] National Center for Education Statistics, *Characteristics of Stayers, Movers, and Leavers: Results from the Teacher Followup Survey: 1994-95.* (May 1997). p. 4.

[46] Linda Darling-Hammond, *Doing What Matters Most: Investing in Quality Teaching*, National Commission on Teaching and America's Future (November 1997), p. 18.

[47] Linda Owen, "How Serious is Teacher Pinch? That Depends," *Saint Paul Pioneer Press* (February 16, 1999) p. 6A.

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APPENDIX A

Teaching Categories

Demand Categories	Supply Categories
Art	Art
Communications	English/Language Arts, Media Generalist, Speech, Speech/Theater Arts, Theater Arts, Reading (Elementary Remedial), Reading (Secondary Remedial), Reading (Secondary Developmental)
Elementary	Elementary
Family Education	Adult Basic/Continuing Education, Family Education/Early Childhood, Family Education/Parent Educator
Health and P.E.	P.E., Health Education, Family Life
Home Economics	Home Economics
Industrial Arts	Industrial Arts
Language: ESL/Bi-Bi	ESL/Bilingual/Bicultural Education
Language: French	French
Language: Others	Chinese, Hebrew, Japanese, Latin, Norwegian, Russian, German
Language: Spanish	Spanish
Mathematics	Mathematics
Middle - General	Middle - General
Music	Instrumental Classroom, Vocal and Classroom
Other Teachers	Business Education, Coaching, Driver Education
Pre K and K	Pre-Kindergarten Teacher, Pre-Kindergarten Associate, Kindergarten
Science: Chemistry	Chemistry
Science: Others	Earth Science, Life Science, Science (5-9), Physical Science
Science: Physics	Physics
Social Studies	Social Studies
Special Education	Special Education: Developmental/Adapted Physical Education, Early childhood/Special Education, Emotional/Behaviorally Disordered, Deaf/Hard of Hearing, Mild to Moderately Handicapped, Mild Handicapped, Moderate to Severely Handicapped, Physically Handicapped, Speech/Language Pathologist, Specific Learning Disabilities, Visually Impaired, Other
Vocation Ed.	No category

APPENDIX B

Minnesota Teacher Preparation Matrix, 1997-98

Approved Programs	Art	Communications	Elementary	Family Education	Home Economics	Industrial Arts	Language: ESL/Bi-Bi	Language: French	Language: Spanish	Languages: Other	Mathematics	Middle	Music	Other Teachers	PE and Health	PreK and K	Science: Chemistry	Science: Physics	Science: Other	Social Studies	Special Education	Total
Augsburg C.	1	4	71	0	0	0	0	0	3	2	1	0	7	0	12	1	2	0	1	4	0	109
Bemidji State U.	7	18	153	1	0	9	0	0	3	0	14	21	15	45	30	83	1	0	27	17	78	522
Bethel C.	1	9	55	14	0	0	0	0	2	0	7	4	4	0	5	21	0	0	0	11	44	177
Carleton C.	0	1	0	0	0	0	0	0	1	0	2	0	0	0	0	0	0	0	0	1	0	5
College of St. Benedict	1	4	63	0	0	0	0	1	2	1	2	0	3	8	0	0	0	0	5	15	0	105
College of St. Catherine	3	6	118	12	0	0	0	4	3	0	1	0	0	0	0	49	0	0	2	0	0	198
College of St. Scholastica	0	12	26	0	0	0	2	0	0	0	2	0	1	0	0	0	1	1	2	4	0	51
Concordia C - Moorhead	4	21	50	12	0	0	0	2	7	7	7	0	15	2	30	17	4	0	8	10	0	196
Concordia C. - St. Paul	2	1	53	3	0	0	0	0	0	0	0	1	0	0	3	14	0	0	1	4	0	82
Crown C.	0	5	14	116	0	0	0	0	0	0	0	0	0	0	3	12	0	0	0	3	0	153
Gustavus Adolphus C.	1	6	41	0	0	0	0	0	1	0	3	0	8	0	8	0	0	0	2	4	0	74
Hamline U.	0	5	19	0	0	0	34	1	2	0	2	0	1	0	2	0	2	0	2	8	0	78
MaCalester C.	1	2	9	0	0	0	0	0	0	0	0	0	0	0	0	6	0	0	2	4	0	24
Mankato State U.	8	85	218	19	5	15	20	2	21	1	16	47	9	70	77	83	1	2	21	47	208	975
Moorhead State U.	8	20	74	0	0	3	5	0	0	0	9	0	3	31	20	21	0	0	8	20	118	340
North Central Bible C.	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	9	0	0	0	0	0	12
Northwestern C.	3	3	43	0	0	0	7	0	0	0	7	0	1	5	8	23	0	0	0	5	0	105
St. Cloud State U.	4	53	181	62	0	0	0	0	8	2	8	0	12	50	64	0	0	0	32	30	279	785
St. Mary's U.	0	4	20	0	0	0	0	0	2	0	0	0	3	0	0	3	0	0	0	3	0	35
SW State U.	0	2	29	12	0	0	0	0	0	0	2	0	2	1	14	0	0	0	1	4	0	67
U of M - Duluth	7	16	92	7	1	0	4	2	6	2	13	8	14	50	22	0	3	0	28	22	74	371
U of M - Morris	0	13	43	0	0	0	0	2	3	0	8	0	8	15	0	10	2	1	5	9	0	119
U. of St. Thomas	0	41	134	1	0	0	0	8	11	3	11	0	1	3	16	61	4	0	45	49	66	454
Uof M - MPLS	34	54	152	39	4	11	54	12	10	6	48	6	29	27	20	24	0	0	65	34	200	829
Winona State U.	3	13	98	0	0	0	0	0	2	1	3	0	1	37	14	1	0	0	7	8	49	237
Total	88	398	1759	298	10	38	126	34	87	25	166	87	137	344	348	438	20	4	264	316	1116	6103