



Public Schools of North Carolina
State Board of Education
Department of Public Instruction

Report to the Joint Legislative Education Oversight Committee

Evaluation of the Mathematics,
Science and Special Education
Teacher Recruitment and Retention
Program

SL 2003-284 Section 7.10 (c)

Date Due December 1, 2004

Addendum to Report #16 in 2004-05 DPI Chronological Schedule

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GENERAL ASSEMBLY OF NORTH CAROLINA
SESSION 2001
SESSION LAW 2001-424
SENATE BILL 1005

(excerpt)

IMMEDIATE ASSISTANCE TO THE HIGHEST PRIORITY ELEMENTARY SCHOOLS

SECTION 29.1. Of funds appropriated from the General Fund to State Aid to Local School Administrative Units, the sum of ten million eight hundred seventy-six thousand four hundred thirty-eight dollars (\$10,876,438) for the 2001-2002 fiscal year and the sum of twelve million two hundred thirty-seven thousand nine hundred thirteen dollars (\$12,237,913) for the 2002-2003 fiscal year shall be used to provide the State's lowest-performing elementary schools with the tools needed to dramatically improve student achievement. These funds shall be used for the 37 elementary schools at which, for the 1999-2000 school year, over eighty percent (80%) of the students qualified for free or reduced-price lunches and no more than fifty-five percent (55%) of the students performed at or above grade level. Of these funds:

- (1) The sum of \$8,062,603 for the 2001-2002 fiscal year and the sum of \$8,062,603 for the 2002-2003 fiscal year shall be used to reduce class size at each of these schools to ensure that no class in kindergarten through third grade has more than 15 students;
- (2) The sum of \$973,455 for the 2001-2002 fiscal year shall be used to pay those teachers at these schools who elect to extend their contracts by five days for staff development, including staff development on methods to individualize instruction in smaller classes, and preparation for the 2001-2002 school year and the sum of \$2,334,930 for the 2002-2003 fiscal year shall be used to extend all teachers' contracts at these schools for a total of 10 days, including five additional days of instruction with related costs for other than teachers' salaries, for the 2002-2003 school year; and
- (3) The sum of \$1,840,380 for the 2001-2002 fiscal year and the sum of \$1,840,380 for the 2002-2003 fiscal year shall be used to provide one additional

instructional support position at each priority school.

No funds from the teacher assistant allotment category may be allotted to the local school administrative units for students assigned to these schools. Any teacher assistants displaced from jobs in these high-priority elementary schools shall be given preferential consideration for vacant teacher assistant positions at other schools, provided their job performance has been satisfactory. Nothing in this section prevents the local school administrative unit from placing teacher assistants in these schools.

Requested by: Senators Dalton, Lucas, Garrou, Carter, Plyler, Odom, Lee; Representatives Boyd-McIntyre, Rogers, Yongue, Hackney, Morgan, Easterling, Oldham, Redwine, Thompson

IMMEDIATE ACTIONS TO ADDRESS TEACHER SHORTAGE

SECTION 29.2.(a) Of the funds appropriated from the General Fund to State Aid to Local School Administrative Units, the sum of two million five hundred thousand dollars (\$2,500,000) for the 2001-2002 fiscal year and the sum of two million five hundred thousand dollars (\$2,500,000) for the 2002-2003 fiscal year shall be used to expand the pool of qualified teachers and to provide recruitment and retention incentives to attract and retain high-quality teachers to low-performing schools and schools with shortages of teachers in certain areas of certification. Of these funds:

- (1) The sum of \$1,000,000 for the 2001-2002 fiscal year and the sum of \$1,000,000 for the 2002-2003 fiscal year shall be used to provide additional scholarship funds for teacher assistants taking courses that are prerequisites for teacher certification programs. Notwithstanding G.S. 115C-468(c) and G.S. 115C-471(1), scholarships shall be awarded in amounts to be determined by the State Board of Education; and
- (2) The sum of \$1,500,000 for the 2001-2002 fiscal year and the sum of \$1,500,000 for the 2002-2003 fiscal year shall be used to provide annual bonuses of one thousand eight hundred dollars (\$1,800) to teachers certified in and teaching in the fields of mathematics, science, or special education at middle and high schools with eighty percent (80%) or more of the students eligible for free or reduced lunch or with fifty percent (50%) or more of students performing below grade level in Algebra

I and Biology. The bonus shall be paid monthly with matching benefits. Teachers shall remain eligible for the bonuses so long as they continue to teach in one of these disciplines at a school that was eligible for the bonus program when the teacher first received the bonus.

SECTION 29.2.(b) In accordance with G.S. 115C-325 and by way of clarification, it shall not constitute a demotion as that term is defined in G.S. 115C-325(a)(4), if:

- (1) A teacher who receives a bonus pursuant to this section is reassigned to a school at which there is no such bonus;
- (2) A teacher who receives a bonus pursuant to this section is reassigned to teach in a field for which there is no such bonus; or
- (3) A teacher receives a bonus pursuant to this section and the bonus is subsequently discontinued or reduced.

SECTION 29.2.(c) The Joint Legislative Education Oversight Committee shall study the effectiveness of providing benefits to part-time teachers as a means to recruit certified teachers back into the classroom. The Committee shall examine the effectiveness of different methods of providing these benefits. The Committee shall also examine the cost of the recruitment effort, including the cost of incorporating existing part-time teachers into the plan. The Committee shall make a report to the General Assembly by April 1, 2002.

SECTION 29.2.(d) The Joint Legislative Education Oversight Committee shall study the potential effectiveness of increasing the size of the Teaching Fellows Program to improve the supply of qualified teachers for the public schools. In its analysis the Committee shall consider the retention of Teaching Fellows in the teaching profession.

Requested by: Senators Dalton, Lucas, Garrou, Carter, Plyler, Odom, Lee; Representatives Boyd-McIntyre, Rogers, Yongue, Easterling, Oldham, Redwine, Thompson

COMPREHENSIVE ASSISTANCE TO CONTINUALLY LOW-PERFORMING SCHOOLS

SECTION 29.3. Chapter 115C of the General Statutes is amended by adding a new section to read:

"§ 115C-105.37A. Continually low-performing schools; definition; assistance and intervention; reassignment of students.

- (a) Definition of Continually Low-Performing

Schools. - A continually low-performing school is a school that has received State-mandated assistance and has been designated by the State Board as low performing for at least two of three consecutive years. If the State Board identifies a school as continually low performing, the school improvement team at that school shall review its school improvement plan to ensure consistency with the plan adopted pursuant to G.S. 115C-105.38(3).

(b) Assistance to Schools That Are Low Performing for Two Years. - If a school that has received State-mandated assistance is designated by the State Board as low performing for two consecutive years or for two of three consecutive years, the State Board shall provide a series of progressive assistance and intervention strategies to that school. These strategies shall be designed to improve student achievement and to maintain student achievement at appropriate levels and may include, to the extent that funds are available for this purpose, assistance such as reductions in class size, extension of teacher and assistant principal contracts, extension of the instructional year, and grant-based assistance.

(c) Intervention in Schools That Are Low Performing for Three or More Years. - The State Board of Education shall develop and implement a series of actions for providing assistance and intervention to schools that have previously received State-mandated assistance and have been designated by the State Board as low performing for three or more consecutive years or for at least three out of four years. These actions shall be the least intrusive actions that are consistent with the need to improve student achievement at each such school and shall be adapted to the unique characteristics of each such school and the effectiveness of other actions developed or implemented to improve student achievement at each such school."

Requested by: Senators Dalton, Lucas, Garrou, Carter, Plyler, Odom, Lee; Representatives Boyd-McIntyre, Rogers, Yongue, Easterling, Oldham, Redwine, Thompson

ADDITIONS TO THE LOCAL SUPERINTENDENT'S PLAN TO IMPROVE A LOW-PERFORMING SCHOOL

SECTION 29.4.(a) G.S. 115C-105.37(a1) reads as rewritten:

"(a1) By July 10 of each year, each local school administrative unit shall do a preliminary analysis of test results to determine which of its schools the State Board may identify as low-performing under this section. The

superintendent then shall proceed under G.S. 115C-105.39. In addition, within 30 days of the initial identification of a school as low-performing by the local school administrative unit or the State Board, whichever occurs first, the superintendent shall submit to the local board a preliminary plan for addressing the needs of that school. school, including how the superintendent and other central office administrators will work with the school and monitor the school's progress. Within 30 days of its receipt of this plan, the local board shall vote to approve, modify, or reject this plan. Before the board makes this vote, it shall make the plan available to the public, including the personnel assigned to that school and the parents and guardians of the students who are assigned to the school, and shall allow for written comments. The board shall submit the plan to the State Board within five days of the board's vote. The State Board shall review the plan expeditiously and, if appropriate, may offer recommendations to modify the plan. The local board shall consider any recommendations made by the State Board."

SECTION 29.4.(b) This section becomes effective when this act becomes law.

Requested by: Senators Dalton, Lucas, Garrou, Carter, Plyler, Odom, Lee; Representatives Boyd-McIntyre, Rogers, Yongue, Easterling, Oldham, Redwine, Thompson

APPROPRIATIONS FOR CONTINUALLY LOW-PERFORMING SCHOOLS

SECTION 29.5. Of funds appropriated from the General Fund to State Aid to Local School Administrative Units, the sum of one million eight hundred seven thousand two hundred fifty-six dollars (\$1,807,256) for the 2001-2002 fiscal year and the sum of one million nine hundred eighty-six thousand six hundred ninety-one dollars (\$1,986,691) for the 2002-2003 fiscal year shall be used to provide the State's chronically low-performing schools with tools needed to dramatically improve student achievement. These funds shall be used to implement any of the following strategies at the schools that have not previously been implemented with State or other funds:

- (1) The sum of \$471,366 for the 2001-2002 fiscal year and the sum of \$471,366 for the 2002-2003 fiscal year shall be used to reduce class size at a continually low-performing school to ensure that the number of teachers allotted for students in grades four and five is one for every 17 students; and
- (2) The sum of \$1,207,595 for the 2001-2002 fiscal year

and the sum of \$1,207,595 for the 2002-2003 fiscal year shall be used to reduce class size at a continually low-performing school to ensure that the number of teachers allotted in grades six through eight is one for every 17 students, and that the number of teachers allotted in grades nine through twelve is one for every 20 students; and

(3a) The sum of \$128,295 for fiscal year 2001-2002 shall be used to extend teachers' contracts at these schools by five days for staff development, including methods to individualize instruction in smaller classes and preparation for the 2001-2002 school year. Of these funds, the sum of \$10,175 shall be used for the extension of contracts of the additional teachers in grades four and five provided in subdivision (1) of this section and the sum of \$118,120 shall be used for the extension of all teachers' contracts at continually low-performing middle and high schools for the 2001-2002 school year; and

(3b) The sum of \$307,730 for fiscal year 2002-2003 shall be used to extend teachers' contracts for a total of 10 days, including five days of additional instruction with related costs for other than teachers' salaries for the 2002-2003 school year. Of these funds, the sum of \$24,405 shall be used for the extension of contracts of the additional teachers in grades four and five provided in subdivision (1) of this section and the sum of \$283,325 shall be used for the extension of all teachers' contracts at continually low-performing middle and high schools for the 2002-2003 school year.

Notwithstanding any other provision of law, the State Board of Education may implement intervention strategies for the 2001-2002 school year that it deems appropriate.

Requested by: Senators Dalton, Lucas, Garrou, Carter, Plyler, Odom, Lee; Representatives Boyd-McIntyre, Rogers, Yongue, Hackney, Morgan, Easterling, Oldham, Redwine, Thompson

EVALUATION OF INITIATIVES TO ASSIST HIGH-PRIORITY SCHOOLS

SECTION 29.6.(a) In order for the high-priority schools identified in Section 29.1 of this act to remain eligible for the additional resources provided in this section, the schools must meet the expected growth for each year and must

achieve high growth for at least two out of three years based on the State Board of Education's annual performance standards set for each school. No adjustment in the allotment of resources based on performance shall be made until the 2004-2005 school year.

SECTION 29.6.(b) All teaching positions allotted for students in high-priority schools and continually low-performing schools in those grades targeted for smaller class sizes shall be assigned to and teach in those grades and in those schools. In grades K-3 in high-priority schools, the maximum class size for the portion of the 2001-2002 school year beginning with January 1, 2002, shall be no more than two students above the allotment ratio in that grade. The maximum class size for subsequent school years in grades K-3 in high priority schools and in grades K-5 in continually low-performing schools shall be no more than one student above the allotment ratio in that grade. The Department of Public Instruction shall monitor class sizes at these schools at the end of the first month of school and report to the State Board of Education on the actual class sizes in these schools. If the local school administrative unit notifies the State Board of Education that they do not have sufficient resources to adhere to the class size maximum requirements, the State Board shall verify the accuracy of the request. If additional resources are determined necessary, the State Board of Education may allocate additional teaching positions to the unit from the Reserve for Average Daily Membership Adjustments.

SECTION 29.6.(c) If a local board of education determines that the local school administrative unit is unable to implement the class-size limitation in accordance with this section for any high-priority school located in the unit, the local board may request a waiver for the school for the 2001-2002 school year. The request shall include the documentation required in G.S. 115C-105.26(a). If the State Board grants the waiver, the State Board shall withdraw the additional teacher positions allotted to the local school administrative unit for the school and reinstate the regular allotment for teacher assistants for the school.

SECTION 29.6.(d) Of funds appropriated from the General Fund to State Aid to Local School Administrative Units, the sum of five hundred thousand dollars (\$500,000) for fiscal year 2001-2002 and the sum of five hundred thousand dollars (\$500,000) for fiscal year 2002-2003 shall be used by the State Board of Education to contract with an outside organization to evaluate the initiatives set forth in this act.

The evaluation shall include:

- (1) An assessment of the overall impact these initiatives have had on student achievement;
- (2) An assessment of the effectiveness of each individual initiative set forth in this act in improving student achievement;
- (3) An identification of changes in staffing patterns, instructional methods, staff development, and parental involvement as a result of these initiatives;
- (4) An accounting of how funds and personnel resources made available for these schools were utilized and the impact of varying patterns of utilization on changes in student achievement;
- (5) An assessment of the impact of bonuses for mathematics, science, and special education teachers on (i) the retention of these teachers in the targeted schools, (ii) the recruitment of teachers in these specialties into targeted schools, (iii) the recruitment of teachers certified in these disciplines into teaching, (iv) student achievement in schools at which these teachers receive these bonuses; and
- (6) Recommendations for the continuance and improvement of these initiatives.

The State Board of Education shall make an initial report to the Joint Legislative Education Oversight Committee regarding the results of this evaluation by December 1, 2002, and annually thereafter. The State Board of Education shall submit its recommendations for changes to these initiatives to the Committee at any time.

GENERAL ASSEMBLY OF NORTH CAROLINA
SESSION 2003
SESSION LAW 2003-284
HOUSE BILL 397

EVALUATION OF INITIATIVES TO ASSIST HIGH-PRIORITY SCHOOLS

SECTION 7.10.(a) In order for the high-priority schools identified in Section 7.9 of this act to remain eligible for the additional resources provided in this section, the schools must meet the expected growth for each year and must achieve high growth for at least two out of three years based on the State Board of Education's annual performance standards set for each school. No adjustment in the allotment of resources based on performance shall be made until the 2004-2005 school year.

SECTION 7.10.(b) All teaching positions allotted for students in high-priority schools and continually low-performing schools in those grades targeted for smaller class sizes shall be assigned to and teach in those grades and in those schools. The maximum class size in grades K-3 in high-priority schools and in grades K-5 in continually low-performing schools shall be no more than one student above the allotment ratio in that grade. The Department of Public Instruction shall monitor class sizes at these schools at the end of the first month of school and report to the State Board of Education on the actual class sizes at these schools. If the local school administrative unit notifies the State Board of Education that they do not have sufficient resources to adhere to the class size maximum requirements and requests additional teaching positions, the State Board shall verify the need for additional positions. If the additional resources are determined necessary, the State Board of Education may allocate additional teaching positions to the unit from the Reserve for Average Daily Membership adjustments.

SECTION 7.10.(c) Of funds appropriated from the General Fund to State Aid to Local School Administrative Units, the sum of five hundred thousand dollars (\$500,000) for fiscal year 2003-2004 and the sum of five hundred thousand dollars (\$500,000) for fiscal year 2004-2005 shall be used by the State Board of Education to contract with an outside organization to evaluate the initiatives set forth in this section. The evaluation shall include:

- (1) An assessment of the overall impact these initiatives have had on student achievement;
- (2) An assessment of the effectiveness of each

individual initiative set for this section in improving student achievement;

- (3) An identification of changes in staffing patterns, instructional methods, staff development, and parental involvement as a result of these initiatives;
- (4) An accounting of how funds and personnel resources made available for these schools were utilized and the impact of varying patterns of utilization on changes in student achievement;
- (5) An assessment of the impact of bonuses for mathematics, science, and special education teachers on (i) the retention of these teachers in the targeted schools, (ii) the recruitment of teachers in these specialties into targeted schools, (iii) the recruitment of teachers certified in these disciplines, and (iv) student achievement in schools at which these teachers receive these bonuses; and
- (6) Recommendations for the continuance and improvement of these initiatives.

The State Board of Education shall make a report to the Joint Legislative Education Oversight Committee regarding the results of this evaluation by December 1 of each year. The State Board of Education shall submit its recommendations for changes to these initiatives to the Committee at anytime.

Evaluation of Teacher Recruitment and Retention Initiative

Charles Clotfelter, Elizabeth Glennie, Helen Ladd, and Jacob Vigdor
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Report for the North Carolina Department of Public Instruction

October 20, 2004

¹ For additional information about this study, please contact Elizabeth Glennie, Box 90545, Duke University, Durham, NC 27708; 919/668-0985.

EXECUTIVE SUMMARY

As in other states, many North Carolina schools face the challenge of hiring and retaining high quality teachers. Recruiting and retaining qualified teachers in math, science and special education is particularly difficult, especially for the schools serving disproportionate shares of disadvantaged or low-performing students. North Carolina responded to these challenges in 2001 by introducing an \$1,800 bonus program for certified teachers of math, science and special education in eligible middle and high schools. To be eligible, schools had to meet one of the following criteria: more than 80 percent of its students had to be receiving free or reduced price lunches; or the failure rate on both Algebra 1 and Biology end-of-course tests had to exceed 50 percent. Funding for this program was discontinued in the recent session of the Legislature, so bonuses were not available for 2004-05.

The goal of the program was to use financial incentives to induce teachers of subjects in short supply to teach in schools serving educationally disadvantaged students. That such schools have difficulty recruiting teachers emerges clearly from previous research, from survey responses from principals for this evaluation, as well as from pre-program data on turnover rates in those schools. Though other states have experimented with various types of financial incentives, little is known about the effectiveness of such programs or about how big the financial bonuses need to be to induce the desired outcomes. Hence, a thorough evaluation of the North Carolina Bonus Program could potentially provide useful information for the design of comparable programs in the future.

This report should be viewed as a preliminary evaluation of the North Carolina Bonus Program in that, even in the best of circumstances, its full effects would take a few years to emerge. It takes time for district officials, principals, and affected teachers to learn about the program, to gain confidence that the state will follow through on its commitments, and to change their behavior accordingly. The reader should bear in mind that our quantitative analysis of the effects of the program on teacher retention rates and student achievement is based on only one year of post-program data. Unfortunately, only one additional year of post-program data will ever be available, given that the legislature ended the program in the summer of 2004.

Our evaluation of this program is based on information from the following sources:

- 1) documents related to the legislation and its implementation;
- 2) personal interviews with selected state officials;
- 3) telephone interviews with human resource and finance personnel in 49 of the 65 districts that had eligible schools in the summer of 2004;
- 4) surveys distributed in the spring of 2004 to the principal of every school that was eligible for the program in 2003-04 and to every teacher who received a bonus that year (overall response rate of 73 percent);
- 5) teacher employment records in eligible and comparison schools over a 4-year period;

- 6) student test scores from end-of-grade and end-of-course tests over a four year period.

MAJOR FINDINGS

Program design and implementation.

The program specified two levels of eligibility, one for schools and one for teachers. For schools, eligibility was based on either of two criteria. For teachers, eligibility depended initially on being certified and teaching in a specified subject in an eligible school. Eligibility continued in subsequent years as long as the teacher continued teaching that subject in that school even if the school was no longer eligible. *Largely because of this complexity, the program was neither cleanly implemented nor well understood.*

The program was enacted in September 2001, well after the start of the school year. In its efforts to start the program quickly, the Department of Public Instruction (DPI) made numerous errors in identifying the eligible schools the first year. State audits to determine whether local school districts identified the right set of eligible teachers were not completed until after the school started in the following year.

For incentives to work, the relevant actors must know about them. Our surveys showed that 17 percent of the principals of eligible schools in 2003-04 did not know their school had ever been eligible. Similarly, 13 percent of the teachers receiving the bonus that year did not know they were eligible. Of those teachers who did know they were eligible, almost half did not know why they were receiving the bonus. This finding may reflect the fact that slightly more than half of them learned about the program through unofficial channels.

Perceived effectiveness of the program in recruiting and retaining teachers

Many principals believed that the bonus program has had some effect on teacher recruitment and retention. However, a substantial number of principals thought it was too soon to tell whether the program had had an effect. For schools that had been eligible for only one or two years, there simply has not been enough time for any effects to become evident. In addition, given that some districts did not use the program to recruit new teachers, and that many principals did not know their school was eligible, did not learn about it in a timely manner, or did not learn about it from official channels, it is not surprising that some principals could not evaluate it. *When they did evaluate it, most principals thought it had a positive impact, and most believed that this program was a good use of state resources.*

In general, teachers felt that this bonus program could influence teachers to come to and remain in their school. About two-thirds of the teachers who knew they were eligible said the program had influenced them or would influence them, and even more of them claimed the program would influence others.

Perceptions about the role of money.

Although both principals and teachers claimed that the North Carolina Bonus Program had affected teacher outcomes, *both groups also seemed to believe that \$1,800 was not enough to have a significant impact.*

Impact of the program on teacher retention.

A thorough understanding of the impact of the Bonus Program requires concrete information on measurable outcomes. One such outcome is year-to-year retention rates of teachers in eligible fields in eligible schools.

In the first year in which the program could have influenced retention, we find evidence that retention rates for math and science teachers in eligible schools were higher than they would have been in the absence of the program. In particular we found not only that the retention rate for math and science teachers in eligible schools rose after the program was introduced, but also that this rise could be attributed neither to other factors influencing the eligible schools nor to trends in other comparable schools. *Thus, we conclude that the Bonus Program has had a positive effect on the ability of eligible middle and high schools to retain math and science teachers.*

In contrast, the findings for special education teachers are far less consistent and much less clear, largely because of the much smaller sample sizes. Similarly, small sample sizes kept us from drawing any specific conclusions about the effect of the Bonus Program in ungraded schools.

Impact of the program on student achievement

A similar approach is used to examine the impact of the program on student achievement. In particular, we examine the trends in student test scores in math and science in the eligible schools and compare those to the trends for other subjects in those same schools and in other comparable schools. Here we find essentially no impacts of the program. This finding should not be surprising. The program has simply not been in place long enough for a discernable impact on student outcomes to emerge.

LESSONS FOR STATE POLICY MAKERS

The state's experience with the Bonus Program contains several lessons or cautionary notes for policy makers contemplating similar programs in the future.

Policy Design

Regarding policy design, three lessons emerge.

- First, the complexity of the program design made it difficult for district officials, principals, and teachers to understand and act upon it. A simpler

program may be more effective in influencing teachers' job decisions, but it may not have precisely targeted schools and teachers.

- Second, although a salary bonus is potentially a strong incentive for teachers, the fact that not all teachers within these schools were eligible could have created morale problems.
- Third, because certified teachers, particularly in math, science, and special education, may be in short supply in some poor and/or rural districts, setting full certification as a requirement for receipt of the bonus may place the bar too high to benefit those districts.

Implementation

Four lessons emerge concerning the implementation of the program.

- First, the choice of when to launch a program necessarily involves a tradeoff between doing it as soon possible versus waiting until the most propitious time in the year to influence teacher decisions. Launching the program in the early spring may have been the best time to influence recruitment and retention in the following school year.
- Second, because the mistakes in identifying eligible schools and teachers surely undermined confidence in the program, it would have been worthwhile to spend more time to make sure the lists were correct. Implementing the program later in the school year may have given state and district officials time to do that.
- Third, for any program to succeed, principals, teachers, and potential teachers must know about it and understand it. Thus, greater efforts should be made in advertising the provisions of such programs. This might include a letter sent to every principal in an eligible school to reiterate the program's provisions and to every eligible teacher to emphasize the personal benefit available by virtue of the program.
- Fourth, because the Bonus Program guaranteed future coverage to teachers regardless of whether a school drops out of eligibility, it needed to be applied with unwavering certainty. Some school and district officials were not sure that the program would continue. If actors did not believe the state would follow through on the promises implicit in this statute, it is unlikely that the program influenced behavior. The state's decision to end this program unfortunately proved these doubters right.

**The North Carolina Math/Science/Special Education (MSSE)
\$1,800 Teacher Bonus Program: An Initial Evaluation**

Charles Clotfelter, Elizabeth Glennie, Helen Ladd, and Jacob Vigdor

Duke University

Outline of Report

- I. Previous research
- II. The structure and implementation of the Bonus Program
- III. The views of principals of eligible schools and of eligible teachers.
- IV. Impacts on teacher retention.
- V. Impacts on student achievement
- VI. Recommendations for state policy makers.

Like other states, North Carolina faces the challenge of hiring and retaining high-quality teachers. Finding such teachers is particularly difficult in the areas of math, science, and special education. A report of the Southern Regional Education Board, for example, asserts that "states historically have prepared too few graduates in mathematics, science and special education, forcing up the numbers of under-prepared teachers hired when fully qualified individuals are not available" (Cornett and Gaines 2002, p. 4.). The shortage of qualified teachers in these fields poses special challenges for schools serving large numbers of low-income and low-performing students. Because many teachers tend to view such schools as less attractive places in which to teach than schools serving more advantaged or higher-performing students, such schools are likely to be in a far weaker position than other schools to attract quality teachers in fields in which there are shortages. Some observers have advocated a policy of higher pay as part of the solution to the challenges these schools face.

North Carolina responded to these challenges in 2001 by introducing an \$1,800 bonus program for teachers of math, science and special education in middle and high schools serving low-income or low-performing students (henceforth, either the North Carolina Bonus Program or, simply, the Bonus Program). The goal of the program was to make it easier for such schools to attract and retain qualified teachers in these fields, thereby improving the quality of instruction and increasing student achievement.

This report evaluates the North Carolina Bonus Program, with attention both to implementation issues and its effects on teachers and students. The reader of this initial report should bear in mind that because the program did not begin until the 2001-02 school year, there has not been much time for its effects to emerge. In addition, as we describe below, flaws in how the program was implemented have undoubtedly served to weaken any positive effects that the program may have had. In the following sections we review the scholarly literature related to teacher labor markets, pay and bonuses; describe the North Carolina program; summarize the results from our recent survey of all school principals and teachers affected by the program; and provide an initial evaluation of its

impacts on teacher retention and student achievement. The report ends with recommendations for state policy makers.

I. Previous Research

For the Bonus Program to have an impact on student achievement, it would have to operate through two main mechanisms. First the availability of bonuses in some subjects and selected schools would have to make it easier for those schools to attract and retain teachers in the specified subject areas. Second, the resulting change in the mix of teachers in those schools would have to boost student achievement in those schools. This section reviews the research literature relevant to these two mechanisms.

Research on the labor market for teachers has focuses on these mechanisms. One issue is the nature of the challenges high-poverty and low-performing schools face in recruiting and retaining teachers given the way the teacher labor market operates. Another is the extent to which salaries and salary differentials affect the decisions made by teachers. A final issue is the link between the characteristics of teachers – especially experience and in-field certification – and student outcomes. Thus we divide our summary into the following three research questions: How do school characteristics influence the supply of teachers? How do salaries and salary differentials affect the supply of teachers? How do various teacher characteristics affect student achievement?

How School Characteristics Influence the Supply of Teachers

A central feature of teacher labor markets is the freedom that teachers have to leave one school for another, to move from one district to another, or to quit teaching altogether. Like workers in other occupations, teachers care about their working conditions, and may prefer certain types of schools over others. Thus, current or aspiring teachers tend to seek teaching positions based not only on monetary rewards but also on the working conditions within a school, conditions that are strongly influenced by the characteristics of the school's students. Because most districts pay teachers based on a uniform salary schedule, transfers by teachers within a district tend to be motivated almost exclusively by differences in working conditions rather than by differences in salaries. Even moves across districts with different salary schedules often appear to be motivated primarily by the goal of obtaining a more congenial teaching environment.

Numerous empirical studies of teacher mobility and attrition document a consistent tendency for teachers to seek out schools with smaller classes and more affluent and higher achieving students – as well as higher salaries. This research shows that teachers are more likely to switch schools within a district, move from one district to another, or quit altogether if their original school has a higher percentage of low-achieving, low-income, or non-white students or a high student-teacher ratio (See Becker 1952; New York Public Education Association 1955; Greenburg and McCall 1974; Mont and Rees 1996; Ballou and Podgursky 1997, p. 32; Freeman, Scafidi and Sjoquist 2002, Tables 10-12; Lankford, Loeb and Wyckoff 2002, Tables 10 and 11; Reed and Rueben

2002; Boyd, Lankford, Loeb, and Wyckoff 2003). Patterns within schools are consistent with these patterns across schools and districts. Sieber's (1982, p. 42) study of classroom assignments in a New York City elementary school, for example, reports that teachers normally "viewed as a rewarding and prestigious task" the assignment to classes with advanced students.

Our own research using administrative data from North Carolina confirms these tendencies (Clotfelter, Ladd, and Vigdor 2004). We document, for example, that teachers with stronger qualifications typically work in schools serving higher proportions of advantaged students. In particular, teachers with more experience, degrees from more highly ranked colleges, higher licensure test scores, National Board Certification, or advanced degrees are more likely to be found in schools with higher proportions of students who are white, are not receiving subsidized lunches, have college educated parents and demonstrate higher levels of achievement.

An especially important characteristic of teachers in middle and high schools is whether they are certified to teach in the fields in which they are assigned to teach. Using survey data for schools throughout the nation, Ingersoll (2002) finds that, while most teachers hold basic qualifications, a significant proportion of these qualified teachers – especially in schools serving disadvantaged students – are assigned to teach classes out of their fields. Using the national Schools and Staffing Survey for 1999-2000, Jerald (with Ingersoll, 2002) reports that 24% of secondary-level core academic classes were taught by a teacher without a college major or a minor in the subject. Among high-poverty schools (with half or more students qualifying for the federal free and reduced-price lunch program), the percentage was 34%, compared to 19% for low-poverty schools. For North Carolina, they report a lower overall percentage of classes being taught by out-of-field teachers (19%), but the gap between poor and non-poor schools was larger (34% versus 13%). In a subsequent study, focusing on the problem of underqualified teachers in 7th through 12th grades, Ingersoll (2003) obtains similar findings.

Thus, in the absence of purposeful intervention on the part of administrators or other officials, previous empirical research suggests that teachers with better credentials will tend to gravitate towards schools with more advantaged students and, therefore, away from schools serving disadvantaged students. The resulting patterns provide the basic rationale for some form of public intervention to make it easier for schools serving disadvantaged students to attract quality teachers.

Salaries, Salary Differentiation, and Teacher Supply

Money – in the form of salaries that differ according to credential, years of experience, local district, or other characteristics – is one of the main levers that state policy makers have at their disposal to help schools attract and retain high-quality teachers. Various southern states have experimented with financial policies to attract teachers in hard-to-staff subject areas or schools. In the recent past, a number of states have used extra compensation beyond general salary increases to attract and retain teachers. Some of these programs have targeted teachers in certain subjects, some have

applied only to certain districts or geographical areas, and some only to schools whose high rates of poverty or low achievement make them especially hard to staff with qualified teachers. These supplementary payments have come in the form of housing subsidies, tuition assistance, loan forgiveness, tax credits, and additional salary.

Both Florida and Georgia have offered bonuses in certain subject or geographic areas, and Florida and Louisiana offered bonuses to attract teachers to low-performing schools. In 1998 Mississippi enacted a program to attract teachers to its low-income Delta area, providing scholarships, moving expenses, and housing assistance (Cornett and Gaines 2002, p. 10). Only a few of these programs have targeted low-income or low-performing schools. An example of this orientation is New York City's offer of a 15 percent raise for teachers or other classes of staff to work in schools that were on a state list of troubled schools (Olson 2000; Prince 2002). Massachusetts combined a \$20,000 signing bonus with heavy recruiting and, initially, a special seven-week training program in order to fill positions in high-need urban districts. Teachers hired in that program have had low retention rates after the initial year, however (Fowler 2003).

Considering the important role of prices in most markets, it should not be surprising that teacher salaries have figured prominently in economic models of teacher labor markets, including in studies seeking to determine whether there has been a general decline in teacher quality. Studies such as Murnane (1996), Hanushek and Rivkin (1997), Temin (2002), and Corcoran, Evans and Schwab (2002) argue that average teacher quality has declined nationwide in recent decades because teacher salaries, despite real increases, have not kept pace with salaries available in other fields requiring similar training. Lakdawalla (2001) attributes the decline in quality to technical change in the economy, which has raised the price but not the productivity of skilled teachers, and to the unwillingness of schools to pay the salaries necessary to retain those skilled teachers. Instead, he argues, schools have attempted to compensate for falling quality by raising quantity, increasing the ratio of teachers to students. Murnane et al. (1991), Hanushek, Kain, and Rivkin (1999), and Loeb and Page (2000) model teacher supply as being influenced both by teacher salaries and salaries available in alternative occupations, along with measures of the working conditions in schools. In addition, after holding other factors constant, studies have shown that salaries affect the propensity of teachers to leave teaching.

Research also shows that salary differentials, along with non-pecuniary features of schools, such as the share of students who are poor or low-performing, affect teachers' decisions to move between districts (Figlio 2002). Not all studies, however, have discovered a prominent role for teacher salaries. In their national study, for example, Ballou and Podgursky (1997) found no support for the hypothesis that the rise in teacher salaries during the 1980s increased the quality of new teachers entering the profession.

Previous research has also examined the effect of various programs designed to give teachers incentives based on performance including merit pay and pay for performance. Policies such as these could affect teacher quality either by their success in attracting and retaining better teachers or by making current teachers more effective.

Little research has directly addressed salary differentials by teaching specialty, since this type of policy is not common. A number of research studies, both qualitative and quantitative, have examined the effects on teacher performance of monetary payments that supplement teacher salaries. Among these are studies of bonuses paid to teachers in Kentucky and North Carolina as part of their accountability programs and of Denver's pay for performance pilot program, performance assessment systems in two Midwest districts, and Tennessee's career ladder (King and Mathers 1997, Kelley, Heneman, and Milanowski 2002, Bell et al. 2004, Milanowski and Kimball 2003, and Dee and Keys 2004).

If success is judged in terms of student outcomes, this research yields mixed findings but certainly does not reject the potential effectiveness of monetary incentives. These studies do not provide clear guidance for the current study, however, since these programs make financial awards to teachers based on student outcomes, rather than on the characteristics of students or the subjects taught as in the North Carolina Bonus Program. Indeed, one of the most striking findings to emerge from our survey of the literature is how little is known about the potential effectiveness of programs such as the North Carolina Bonus Program that provide financial supplements to teachers who teach in schools serving large numbers of educationally disadvantaged students.

Teacher Characteristics and Student Achievement

Extensive research exists on whether salary provisions that reward experience and credentials, such as master's degrees or years of experience, affect student achievement because such provisions are common features of teacher salary schedules. In addition, some states – and North Carolina has been a leader in this respect – provide higher salaries for teachers who successfully go through the rigorous process of becoming certified by the National Board of Professional Teaching Standards. In North Carolina, National Board certification increases a teacher's state-paid salary by 12 percent. Most of the relevant research focuses on the extent to which teachers with more experience or with master's degrees are more effective than other teachers. In general the evidence is mixed. The most consistent finding from the literature is that inexperienced teachers are less effective than other teachers. Although one commonly cited meta-analysis of all the studies that examine the issue concludes that teacher experience does not exert a consistent and statistically significant positive impact on student achievement (Hanushek 1997), a closer look suggests a different picture. For example, if one restricts the sample of estimates to those that were derived from conceptually preferable value-added specifications, two-thirds of the study results are positive (Hanushek 1997). Also, Hedges and Greenwald's (1996) analysis of the same set of studies concludes unambiguously that experience of teachers does indeed matter. Recent studies examining the impact of experience in more detail concur in this general conclusion, but note that most of the benefits of experience are established in the first few years of teaching (Hanushek, Kain, and Rivkin 1998 and Darling-Hammond 2000).

Our own recent study based on North Carolina data (Clotfelter, Ladd and Vigdor, 2004) confirms the beneficial effect of the first few years of a teaching experience on

student achievement, or, stated differently, the detrimental effects of having a teacher with little or no experience. We find the positive effect of experience to be quite robust, in that it remains statistically significant even in a model that accounts for a wide array of student characteristics, school effects, prior achievement, and the effects of teacher sorting and teacher shopping, two processes that have the combined effect of placing higher-achieving students with more credentialed teachers. (Teacher sorting is the process by which teachers select districts and schools; teacher shopping is the tendency for parents to request that their children be assigned to certain teachers.) As we emphasize in our study, this matching of teachers and students would otherwise undermine the causal interpretation of estimated effects of teacher characteristics on student achievement. For the typical 5th grade student, we find that the benefit from having an experienced teacher is approximately one-tenth of a standard deviation on reading and math scores (Clotfelter, Ladd, and Vigdor 2004).

This research is relevant to the North Carolina Bonus Program in the following sense. To the extent that the program makes it easier for the eligible schools to retain teachers, it reduces the probability that they will be forced to hire new teachers, many of whom are likely to have little or no experience. As a result, we would expect student achievement to rise.

Another potentially important component of teacher qualifications, especially at the high school level, is the knowledge and training of the teachers in the subjects in which they are teaching. In a detailed survey-based study, Monk (1994) finds that preparation in mathematics and science of secondary school teachers has a positive effect on their students' gains in learning in those subjects. Monk and King (1994) report similar results. In particular, they look at the subjects teachers studied in college and graduate school and find that subject matter preparation is related to student achievement even after controlling for relevant teacher and student background and contextual variables. In a subsequent study, Goldhaber and Brewer (1997) extend the analysis by measuring subject area competence not simply by whether teachers took courses in a particular area but whether they earned a degree in that area. They find that teachers who are certified in mathematics and have BA and MA degrees in mathematics are associated with higher student mathematics test scores. Likewise, teachers with BA degrees in science are associated with higher student science test scores. Goldhaber and Brewer (2000) analyze whether specific state-by-state differences in teacher licensure requirements systematically affect student achievement. In mathematics, the authors find that teachers who have a standard certification have a statistically significant positive impact on student test scores relative to teachers who either hold private school certification or are not certified in their subject area.

Once again, this research is relevant to the current study to the extent that the North Carolina Bonus Program succeeds in generating a set of teachers in the eligible schools that is more highly qualified to teach math, science, or special education than otherwise would have been the case.

II. The Structure and Implementation of the North Carolina Bonus Program

In September 2001, the North Carolina General Assembly passed the bill containing the Bonus Program, and the Governor signed it into law on September 26.¹ The basic idea was for the state to provide an annual bonus of \$1,800 to teachers certified in math, science, and special education who teach those subjects in disadvantaged middle and high schools. Though the basic plan was simple, its details turned out to be too complex for the state to implement without significant error and for many teachers to understand fully. In addition, the timing was unfortunate in that the bill passed after virtually all teachers had been hired for that year. This fact delayed any possible impact on teacher hiring and recruiting until the following year.

Eligibility

To be eligible for the bonus, a teacher had to be certified in one of the three designated fields and teaching in that field in a middle or high school meeting at least one of the following conditions:

- (1) 80% or more of students had to be eligible for free or reduced price lunch, or
- (2) 50% or more of its students had to perform below grade level in *both* Algebra 1 and Biology, as measured by the state's end-of course tests.

The expectation was that the subsidized lunch criterion would apply to middle schools, for which such data are generally available and deemed to be a reasonable proxy for the poverty of the school's students. The second criterion would apply to high schools. Alternative schools serving students in these same grade ranges, which typically are not neatly categorized by the grades they serve, would also be eligible provided they meet either one of the two criteria. According to the law, the bonus would apply only to certified math, science, or special education teachers. Part time teachers in these fields would receive bonuses at a prorated rate.

As the law was written, a teacher in an eligible school at the time the school became eligible would receive the bonus as long as he or she continued to teach math, science or special education at the school, even if the school subsequently became ineligible. A teacher who remained in an eligible school but did not continue to teach in one of these areas would no longer be eligible for the bonus. Thus the program specified two levels of eligibility – at the school level and at the individual teacher level.

[\(www.ncga.state.nc.us/html2001/bills/CurrentVersion/ratified/Senate/Sbill005.full.html\)](http://www.ncga.state.nc.us/html2001/bills/CurrentVersion/ratified/Senate/Sbill005.full.html)

¹ Senate Bill 1005, 2001-2002 Session, signed into law on September 26, 2001. See appendix for a time line of the administrative actions related to the Bonus Program.

Implementation problems

In early October 2001, the Department of Public Instruction (DPI) sent out information about the program to administrators in school districts and posted explanations of the bill's provisions on the Web. (See Appendix A for a time line of the administrative actions related to the bill and official memos.) A week later, DPI sent lists showing which schools would be eligible to school districts affected by the program. The list included 74 schools, three of which would ultimately close within the year. Unfortunately, this original list turned out to be rather dramatically incorrect. Due perhaps to the complexity of the eligibility requirements, DPI's original list of eligible schools contained 44 schools that subsequently were determined not to be eligible for that 2001-02 year. In addition, the original list omitted 20 schools that should in fact have been eligible. Not until May 2002 was the correct list of eligible schools finally confirmed.

Late in the spring, DPI audited teacher databases to determine whether the teachers identified by school districts (LEAs) to be eligible for the bonus were in fact eligible. DPI used data from the school activity reports database to confirm that the teacher was in fact teaching math, science, and special education and data from the licensure and salary database to determine if the teacher was certified in the appropriate field. Due to the availability of payroll records, the results of this audit were communicated to school officials in September 2002, nearly a year after the program was initially implemented.

For the 2002-03 school year, the list of eligible schools was not made available until January 2003, far too late for it to have influenced the recruiting process for that school year. The audit of teacher eligibility was completed by early August 2003. As we discuss further below, personnel officers in some districts were reluctant to use the program to recruit teachers because they were not at all confident that the program would be continued. In fact this lack of confidence in the program was justified. During the summer of 2004, the legislature abolished the program.

Size and scope of program

Table II-1 describes the program in terms of the number of districts, schools and teachers participating each of the years 2001-02, 2002-03, and 2003-04. Of the state's 117 school districts, 65 have paid teachers the bonus in one or more of the past three years; a total of 148 schools have been eligible.

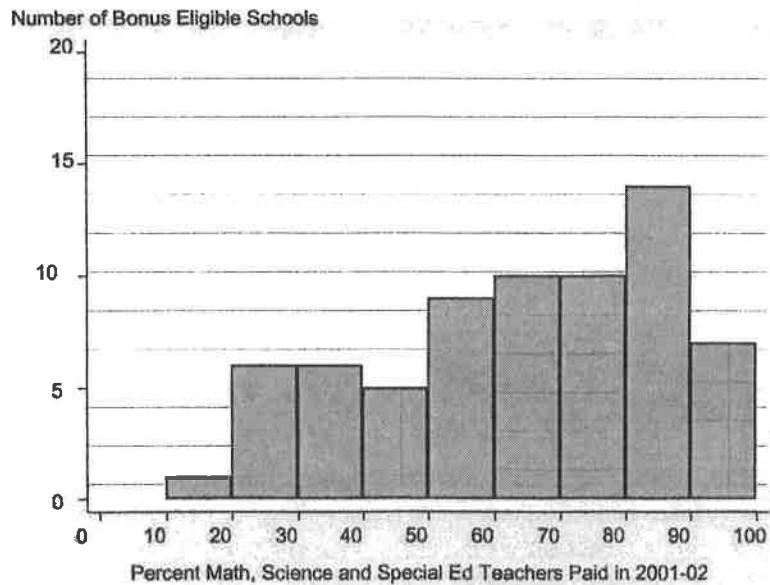
Table II-1: Size of program, over time

Year	No. of districts	No. of schools	No. of teachers
2001-02	40	82	716
2002-03	51	104	993
2003-04	59	135	1507
Total participating	65	146	1992

The program expanded each year, and by 2003-04, 1,509 teachers were receiving bonuses. At some time in the past three years, 1,992 teachers received the bonus.

Within eligible middle and high schools in 2001-02, teachers receiving the bonus represented 26.1 percent of all teachers – or about 1 in 4 – and they represented 65.7 percent of all teachers of math, science, and special education – or about 2 out of 3. Presumably the math, science, and special education teachers who did receive bonuses in the eligible schools were not certified to teach those subjects and hence were not eligible. The proportion of eligible teachers differs across schools. As shown in the following histogram, the percentage ranges from 10 percent to 100 percent with 21 schools having 80 percent or more of their math, science and special education teachers eligible for the program.

Figure II-1: Proportion of Math, Science and Special Education teachers in eligible schools receiving the bonus, 2001-02

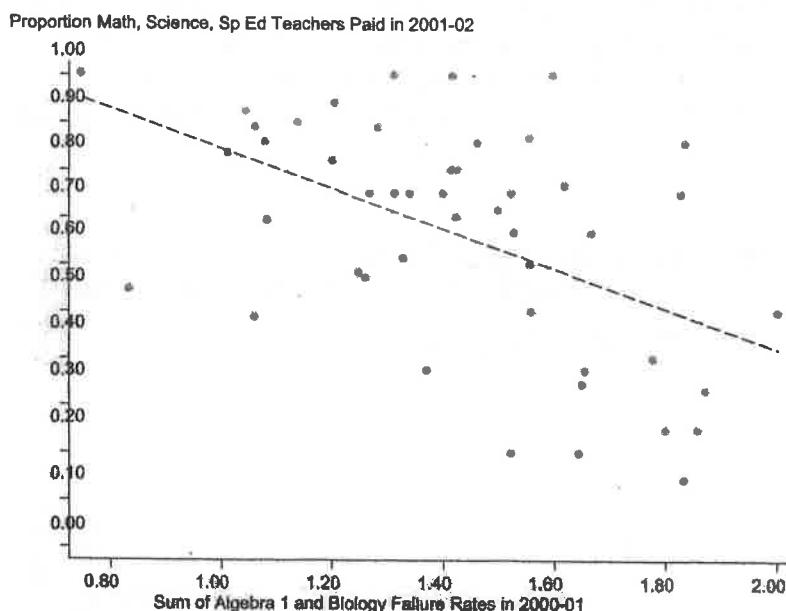


The following plot for high schools illustrates that the proportion of math, science and special education teachers receiving bonuses declines with the educational disadvantage of the school. The horizontal axis measuring educational disadvantage is the sum of the failure rates in Algebra 1 and Biology in the prior year. Thus, for example 1.40 would represent average failure rates of about 70 percent in both subjects.² The downward slope of the fitted line indicates that the higher the total failure rate, the lower the percentage of the math, science and special education teachers who are receiving the bonus. Thus, it appears that the program requirement that teachers be certified in their

² Note that we have excluded from this figure, any school for which the participation rate exceeds 1.

subject area may not benefit the schools which may be having the most difficulty attracting certified teachers.

Figure II-2: Plot of proportion of Math, Science and Special Education teachers receiving the bonus by sum of Algebra 1 and Biology failure rates in eligible high schools, 2001-02



Implementation at the district level

Though the Bonus Program is a state program, human resource departments and finance managers in local school districts are responsible for implementing it. Upon receiving the list of eligible schools from DPI, districts determine which teachers are eligible for the bonus and make sure those teachers receive it. District human resource managers can use the bonuses to help recruit teachers to the district.

In the summer of 2004, we conducted telephone surveys of district human resource officials, such as assistant superintendents and executive directors of human resources. Of the 65 districts with schools that had been eligible for this program, 49 officials responded to our questions about their use and perceptions of it.

Most district officials understood that the eligibility of teachers was determined both by their certification and the subjects they teach. For many districts, the process of determining eligibility required the involvement of personnel in both the human resources and finance offices. Six districts involved the school principals in determining eligibility, and two of those thought that this task was primarily the principal's responsibility. One district waited until the June School Activity Report data were

complete and then determined which subjects the teachers had been teaching in the past year. Presumably, this district paid teachers retroactively. Others paid the bonus as monthly supplements during the year.

Districts differed in their process for telling teachers about the program. Thirteen officials said that someone in the district office contacted teachers to tell them about the bonus through a letter, e-mail, or informally. Seventeen of them said that the district told the principals, who then told teachers. Nine district officers did not know how the teachers found out about their eligibility for the program.

Only about half of the districts used the program to recruit new teachers. These districts promoted the program in different ways, such as disseminating brochures and discussing the program at job fairs and in interviews. One person mentioned that this program was effective when a teacher was comparing vacancies in eligible versus ineligible schools. Another said it helped the district attract a science teacher who had considered taking a job in a different district with no eligible schools.

Among those not using the program to recruit teachers, several mentioned that their unwillingness to use the program reflected concerns about the timing of information flows. They learn too late in the recruiting season which schools are eligible and which teachers will teach the required subjects in the eligible schools. Others said that the program is too small to be effective. For only one or two vacancies, they thought that promotion of the program was not worth the effort.

Only 14 percent of the district personnel we interviewed thought that the program would encourage teachers to transfer from an ineligible school to an eligible one. Most had not seen any evidence that teachers had transferred because of the program. Five of them said that \$1,800 was not enough to motivate teachers to change schools.

However, 60 percent of the officials thought the program did help schools retain teachers. Many of those said that any monetary supplement would help these schools retain teachers. Among those who thought the program did not help schools retain teachers, some indicated that teacher turnover was not a problem in the eligible schools in their particular district.

III. Views of School Principals and Teachers

The central component of our evaluation of the Bonus Program is based on information gleaned from mail surveys (with follow up telephone interviews where necessary) administered in the spring of 2004 to all school principals and teachers affected by the program at that time. The timing of the administration of these surveys was propitious. By 2004, the program had been in place for three years, which means that the initial kinks related to implementation should have been eliminated and that it would be reasonable to assume that the principals of eligible schools would be fully aware of the program. As the survey was conducted at the end of the academic year, principals in schools eligible for the first time and teachers receiving the bonus the first time should

have had sufficient opportunities to learn about the program. Further, as far as we know, there was no specific discussion within the legislature at the time about abolishing the program. Hence, the survey responses of both principals and teachers should represent views of the program that are relatively uncontaminated by implementation errors or by the knowledge that the program would be abolished.

Methodology

During the spring of 2004, we distributed surveys to the principal of every school that was eligible for the program in 2003-04 and to every teacher who was receiving a bonus at that time.³ In all, 1,165 surveys were sent. The overall survey response rate was 73 percent, with 83 percent of principals and 72 percent of teachers voluntarily responding to these questions. Almost every school participated in the survey, and two-thirds of the schools had a response rate of 75 percent or better.

The principal survey addressed questions about the principal's opinions of the school's need for the program, knowledge of the bonus program, perceptions of its influence, and views about the importance of money in attracting qualified teachers. In analyzing the results, we looked not only at the aggregate patterns, but also at cross-tabulations with the following sets of variables.

Years of experience as a principal (1-2, 3-5, 6-10, more than 10 years)

Whether the school is an alternative school (yes, no)

Percentage of students in the school who are ethnic minorities (greater than, less than 66 percent)

Percentage of teachers in the school who received the bonus (greater than, less than 33%)

Number of years the school was eligible (1, 2, 3 years)

Whether the district used the program to recruit teachers (yes, no)

The teacher survey addressed questions about the teacher's knowledge of the bonus program, perceptions of its influence, and views about the importance of money in attracting qualified teachers to that school. As with the principals, we examined aggregate patterns and cross tabulations by subgroups of teachers. For the teachers, we focused on the following subgroups.

³ As of February 2004, when the survey was designed, the following LEAs had not yet paid any eligible teachers their bonus for the 2003-04 school year: Bertie, Asheville City, Chatham, Cumberland, Davidson, Durham, Jackson, Johnston, Mitchell, Rockingham, Rowan-Salisbury, and Yadkin. For these LEAs, we contacted those in schools that were eligible in 2002-2003. Even if those schools were no longer eligible, those teachers would have eventually received the bonus in the 2003-04 school year.

Years of experience as a teacher (1-2, 3-5, 6-10, more than 10 years)

Whether the school is an alternative school (yes, no)

Percentage of students in the school who are ethnic minorities (greater than, less than 66 percent)

Subject taught by the teacher (math or science, special education)

When the teacher started teaching at the school (before the program was implemented, after the program was implemented)

Many differences across subgroups for either principals or teachers are not statistically significant. That is, they are so small that we cannot rule out the possibility that they simply occurred by chance. The only differences across subgroups that we report in the following discussion are those that are statistically significant. Additional tables are available from the authors upon request.

Frequency distributions for all questions and subgroup categories are reported in Appendix B.

Principals' perceived need for program

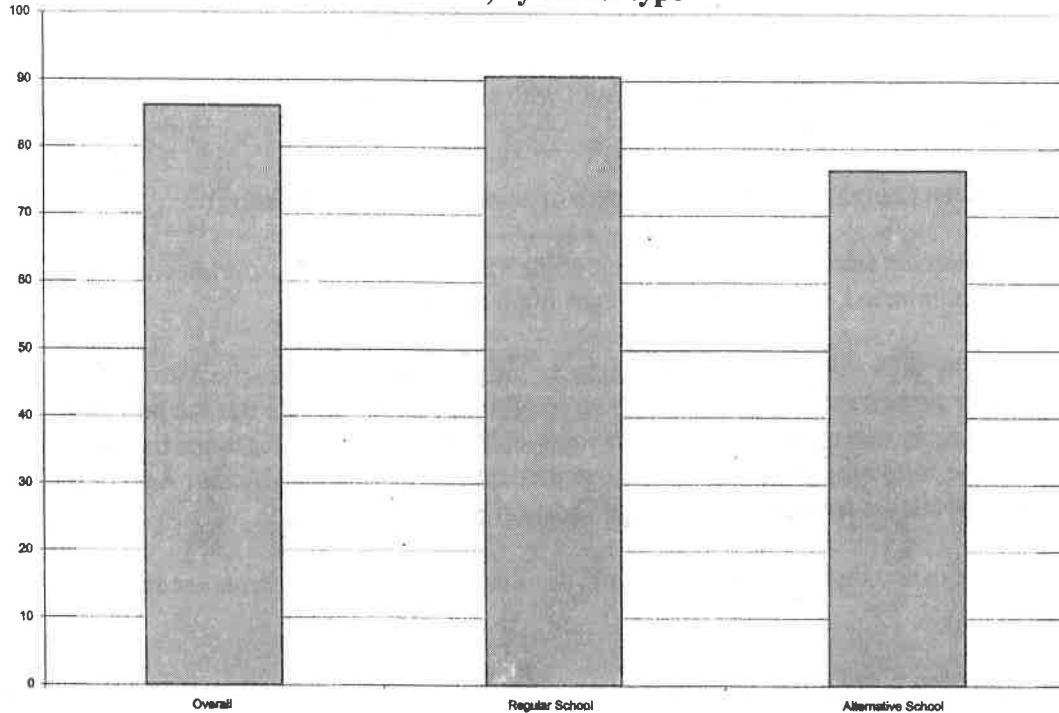
The survey included measures of the principal's perception of the school's difficulty recruiting and retaining teachers. These measures included whether the school had difficulty recruiting and retaining teachers, and whether those difficulties were worse in this school than in others. Principals were also asked their opinions of why the teachers leave that school.

Eighty-six percent of principals reported that before the program was introduced their school had difficulty recruiting qualified teachers. The type of school influenced this perception. In alternative schools, 77 percent of the principals reported difficulty recruiting. In regular schools, the proportion rose to 91 percent. Other subgroups did not differ in their reported difficulty recruiting teachers.

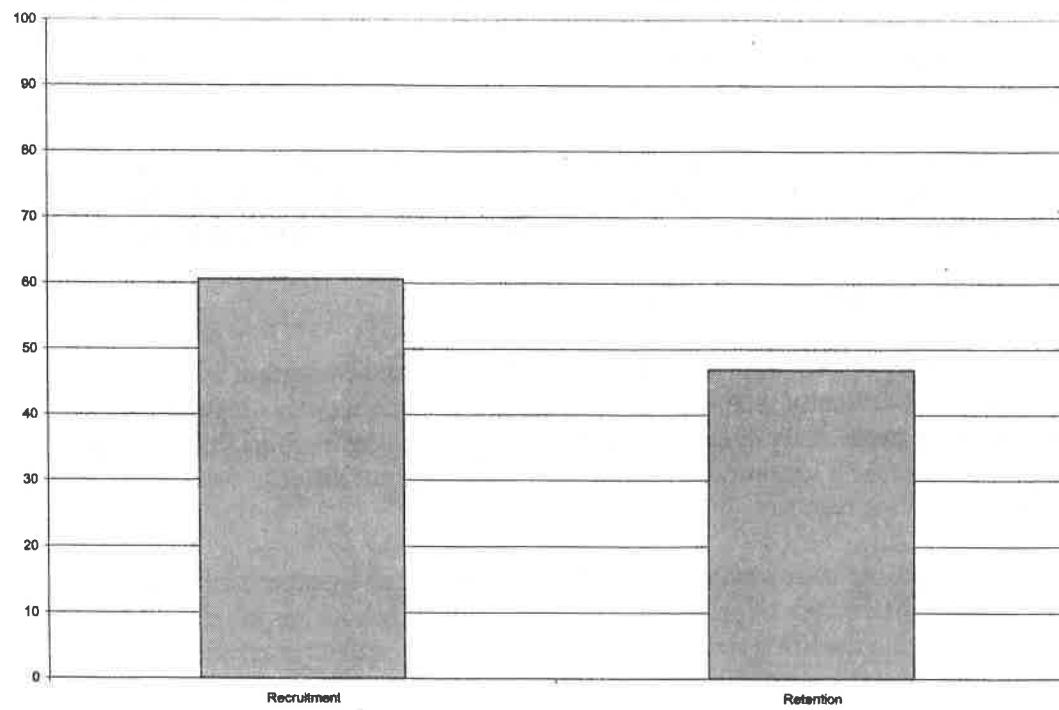
Fifty-nine percent of principals reported that before the program was introduced, their school had difficulty retaining qualified teachers. Schools with only one year of eligibility were more likely to say they had difficulty retaining teachers than schools that had been eligible for a longer period. Other subgroups did not differ in their reported difficulty recruiting teachers.

In comparing their schools' difficulties to those faced by other North Carolina public schools, 61 percent of principals reported that their school has more difficulty than others in recruiting qualified teachers and 47 percent of principals in retaining teachers. Both patterns persist across all subgroups.

**Figure III-1: Principal report of school's recruiting difficulty
Overall, by school type**



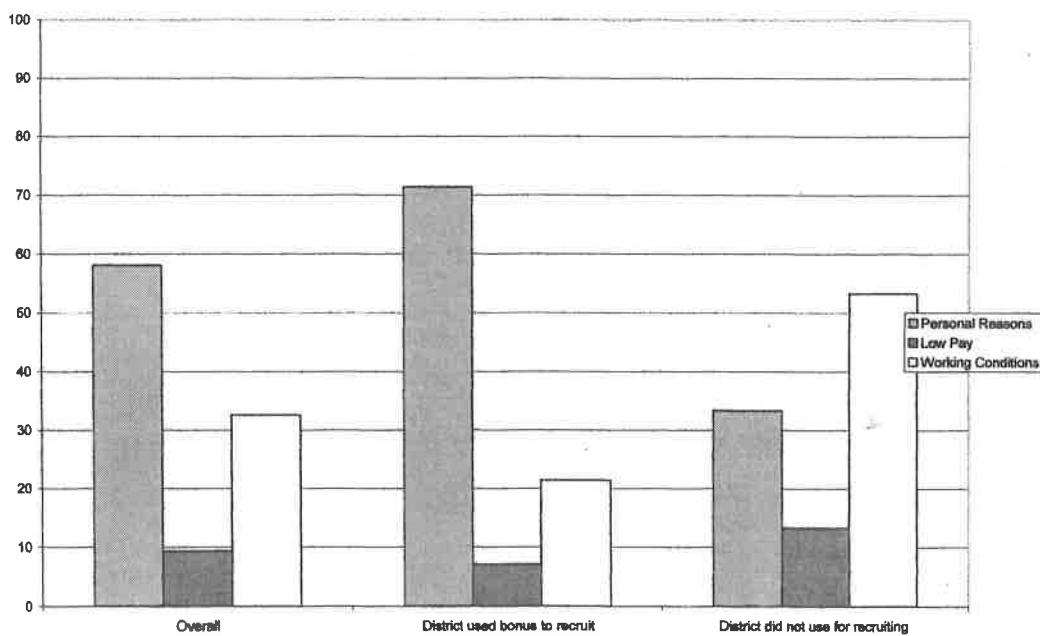
**Figure III-2: Principal report of difficulty recruiting and retaining teachers
relative to other North Carolina public schools**



Principals in schools where teachers have left in the past three years were asked why they thought the teachers left. Options included the following: personal reasons, such as retirement or family obligations; higher salaries; and working conditions, such as a lack of community support, insufficient teaching supplies, or too much paperwork. Fifty-five percent thought teachers left their school for personal reasons having nothing to do with teaching in general or with that particular school. Eleven percent of principals thought teachers left their school to earn more money. Another 34 percent thought that teachers left due to dissatisfaction with working conditions.

District promotion of the bonus program influenced these perceptions. Where districts did not use the program to recruit teachers, principals were more likely to think that teachers left due to pay and poor working conditions. In those districts, 13 percent of the principals thought that teachers left for pay, and 55 percent thought they left due to working conditions. In contrast, where districts used the program, only 7 percent thought teachers left for pay, and 21 percent thought they left because of working conditions. Perhaps in these districts, personnel more actively promote many programs benefiting teachers and principals and so morale is higher. Perceptions of why teachers left do not differ across other subgroups.

**Figure III-3: Principals' perceptions of the reasons teachers left their school
Overall, by whether the district used the program to recruit**



Summary. In general, many principals thought their bonus-eligible school has historically had more difficulty than other North Carolina schools in recruiting and retaining teachers. Principals reported more difficulty recruiting teachers than retaining them. About half of principals thought teachers left their school due to salary concerns or

poor working conditions. It seems that these schools in particular could benefit from programs that help recruit and retain teachers.

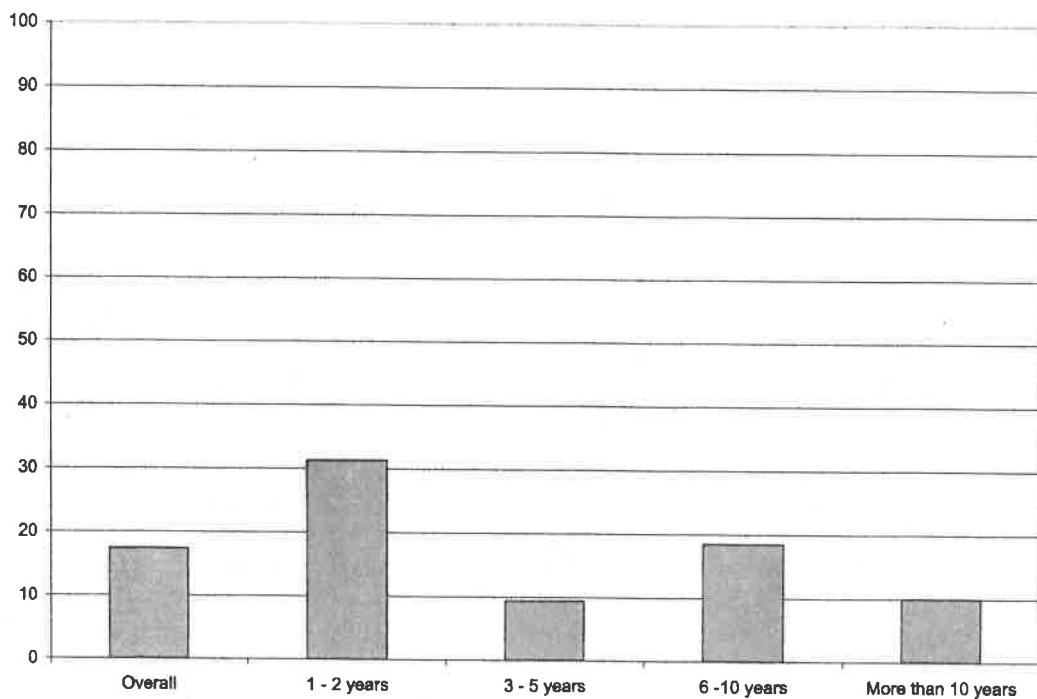
Principals' knowledge of the program

Several survey questions pertain to the principal's knowledge of the program. These include questions about whether the principal knew the school had ever been eligible, when the principal learned about the program, and whether the principal learned about the program from official or unofficial sources. The survey included a question about the principal's own role in promoting the program, specifically whether the principal told teachers about it. The main findings are as follows.

More than one in six principals (17 percent) did not know that their school was eligible for the program. Given that all principals were in schools where teachers were receiving the bonus, this lack of knowledge is quite striking.

In general, principals with the least experience knew less about eligibility than more experienced principals did. Specifically, of those with 1-2 years of experience, 31 percent did not know their schools were eligible. In contrast, among those with more than 10 years of experience, only 10 percent did not know their schools were eligible.

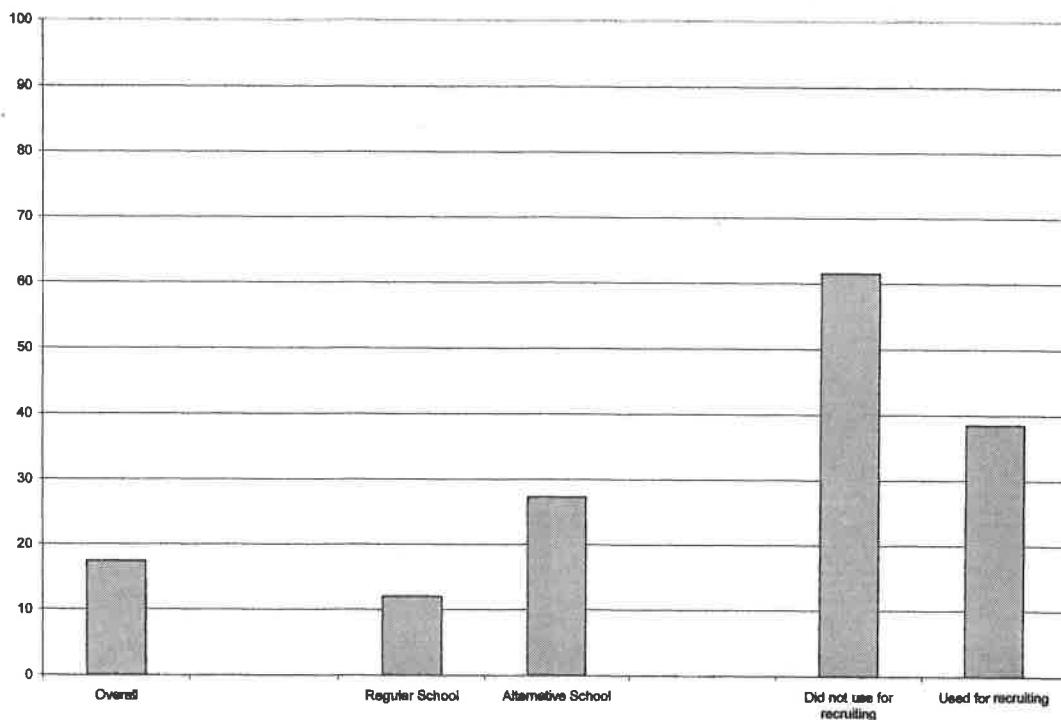
**Figure III-4: Principal did not know the school had ever been eligible
Overall, by years of experience**



The only other statistically significant difference in knowledge emerged with respect to the type of school. The probability that a principal did not know his or her school was eligible was 27 percent if the school was an alternative school in contrast to only 12 percent if the school was a regular public school.

One might expect that a principal's knowledge would be affected by whether that school's district used the program to recruit teachers. In fact, that is the case. Where districts did not promote the program, almost one in three of the principals did not know about their school's eligibility. In contrast, where districts reported using the program to recruit, only 11 percent did not know about it. This pattern makes sense – we would expect to find more awareness of the program among principals in districts that are actively using the program.

**Figure III-5: Principal did not know the school had ever been eligible
Overall, by school type, by whether district used the program to recruit**



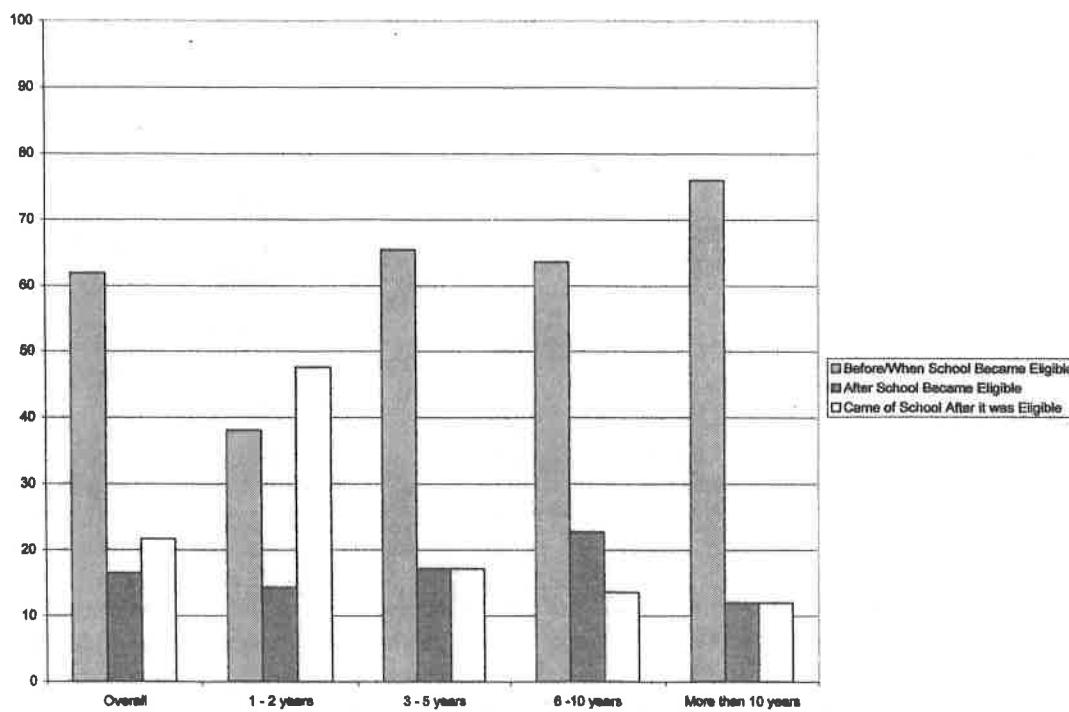
Somewhat surprisingly, the principal's knowledge did not differ by the number of years the school was eligible. One might expect that the longer a school was eligible, the more likely the principal would be to know about it. However, if 2003-04 was the first year the school was eligible, the principal might be more aware of the program than if the school had become eligible two years earlier. In these newly eligible schools, the principals may have recently received new information about it. In schools where the program was ongoing, the principal may not have received new information about it within the past year. . Similarly, a principal who was new to the school might not know about a program that had been implemented before his or her arrival.

It is also surprising that the principal's knowledge did not differ by the percentage of teachers in the school who received the bonus. This finding suggests that opportunities for the principal to learn about the program did not depend on the scale of the program in that school.

The timing of the principals' learning about the program is relevant to their ability to promote it and explain it to teachers. Of the principals who knew their school had been eligible, 62 percent reported learning about the bonus program in a timely manner, either before or when the school became eligible. Sixteen percent said they did not know about it until some time after their school became eligible. Thus, nearly one in six principals was not in a position to help incoming teachers understand it.

More experienced principals were more likely to learn about the program before or when their school became eligible. Seventy-five percent of principals with more than ten years of experience learned about the program in a timely manner, compared with only 38 percent of those with 1-2 years of experience.

**Figure III-6: Principal learned of eligibility in a timely manner
Overall, by years of experience**



Also of interest is how the principals learned about the bonus program. The district office was in the best position to tell principals about when schools were eligible and which teachers would receive the bonus. The district could provide consistent, reliable information about the program. Other, unofficial sources of information, such as

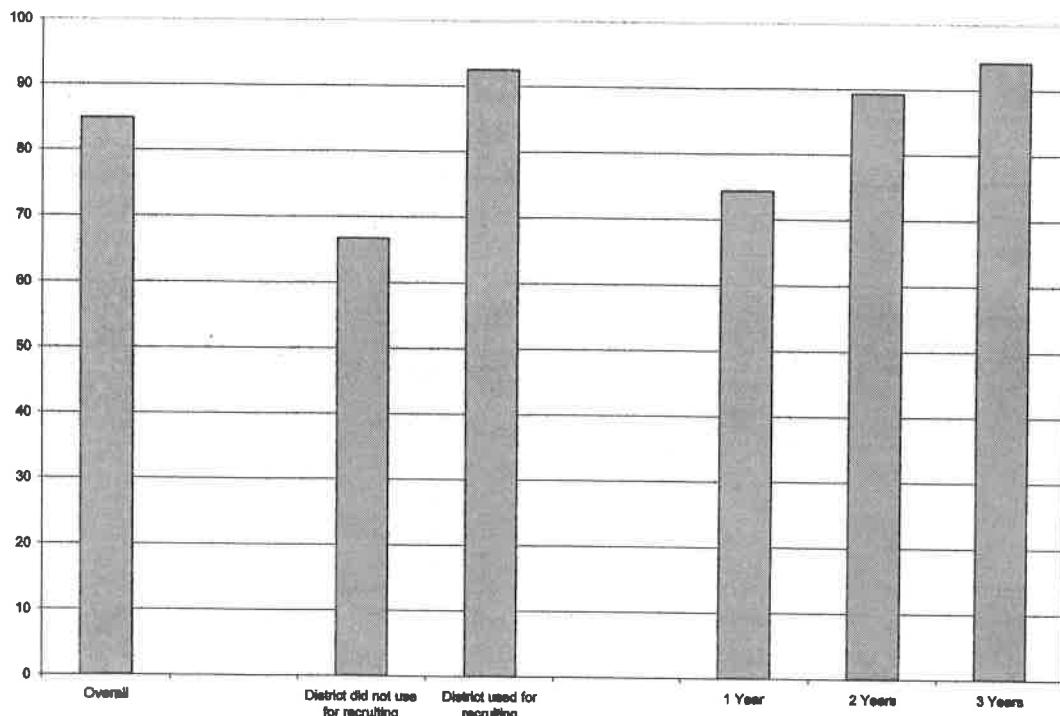
the mass media, may well be less reliable and systematic in explaining the program. Someone learning about the program through an unofficial source may be less likely to have correct information or to feel comfortable promoting the program.

Sixty-eight percent of the principals learned about the program from the district. The other 32 percent learned of the program through other unofficial channels, such as teachers or the mass media. The proportion of principals who learned about the program from the district did not differ in any systematic way across the subgroups.

Many districts did not tell teachers directly about the program, relying instead on principals to do so. Even where districts contacted teachers directly, principals could have discussed the program with teachers. Of the principals who knew their school had been eligible, 85 percent told teachers about it.

One might expect to find better communication about the program where it had been in place longer, and the patterns across schools confirmed this. Again, focusing on principals who knew of their school's eligibility, we find the following results: In schools that had been eligible 1 year, 74 percent of principals told teachers, in schools eligible for 2 years, 89 percent told the teachers, and in schools eligible for 3 years, 94 percent told the teachers.

**Figure III-7: The Principal told teachers about the program
Overall, by whether the district used the program to recruit,
by years school was eligible**

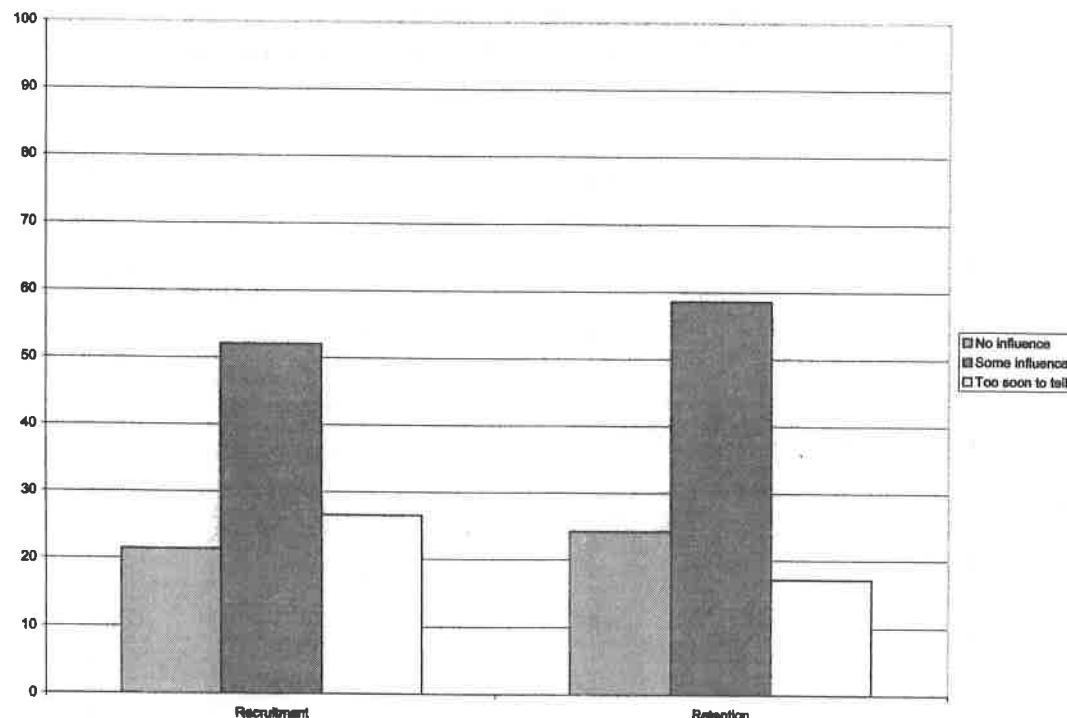


Finally, the promotion of the program by the district influenced whether principals told teachers about it. Where districts used the program to recruit, 89 percent of principals told teachers about it, compared with 69 percent of principals in districts that did not do so.

Summary. Given that we surveyed only principals in eligible schools, and that the survey was conducted at the end of the academic year, the fact that 17 percent of principals did not know their school had ever been eligible indicates a relatively high level of ignorance about the program. This ignorance is particularly striking among the less experienced principals who are also less likely than their more experienced counterparts to have learned about it in a timely manner. Thus, the state and the districts apparently were not very effective in making sure that all affected principals learned about the program. Further evidence of that point emerges from the fact that almost one in three principals learned about the program not through their district but rather through unofficial channels such as the media. However, where districts actively promoted the program, principals were more likely both to know about the program and to tell teachers about it.

Principals' perceptions of program effectiveness

Figure III-8: Principals' perception of the program's effect on recruitment and retention of teachers



The survey included several questions about the principals' perceptions of the bonus program's effectiveness. Only principals who knew about the program were asked these questions, which included whether the bonus had affected the ability of the school

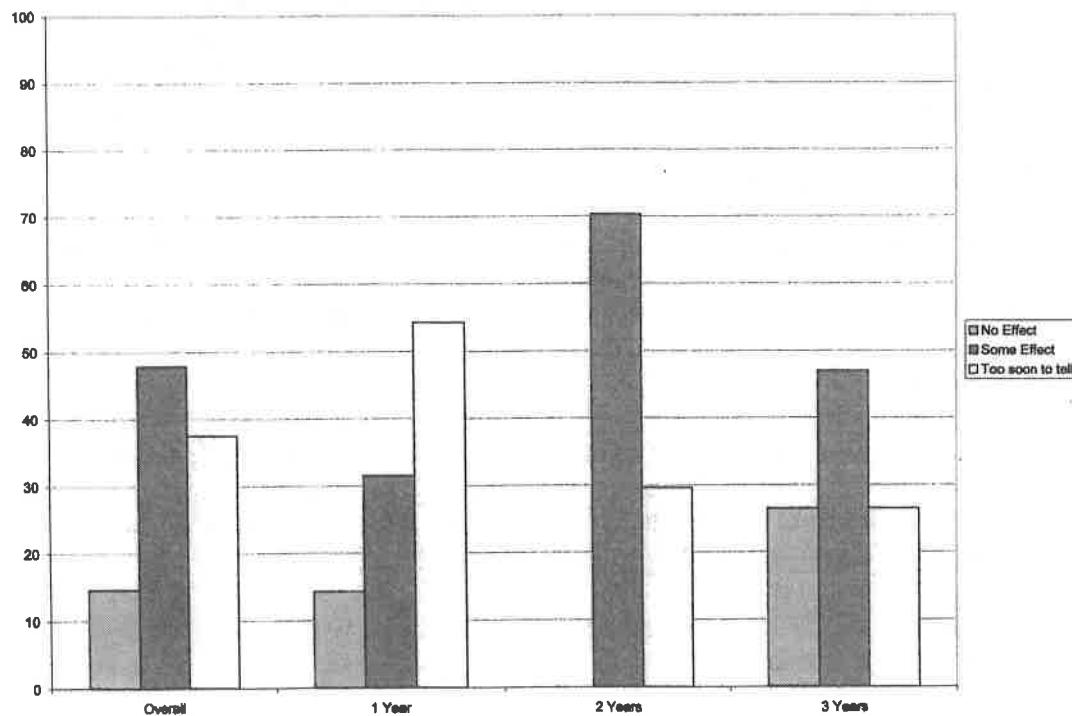
to recruit teachers, to retain teachers, and to improve student achievement. Principals were also asked if they believed the program was a good use of state resources.

About half of the principals (52 percent) thought that the program influenced the school's ability to recruit teachers. Twenty-one percent thought the program did not have an effect, while 27 percent thought it was too soon to tell. This pattern persisted across all subgroups.

A somewhat higher percentage (59 percent) thought that the program influenced the school's ability to retain teachers. Twenty-four percent thought the program did not have an effect, while 17 percent thought it was too soon to tell. This pattern persisted across all subgroups.

Forty-seven percent of principals thought that the program had some impact on student achievement, while 14 percent thought that it did not. Thirty-eight percent thought it was too soon to tell.

**Figure III-9: Principals' perception of the program's effect on student achievement
Overall, by years of school eligibility**



This pattern does not differ across any of the subgroups except for the number of years the school had been eligible. In schools where the program had been in place only one year, 54 percent thought it was too soon to tell whether the program had influenced student achievement, compared with 30 percent of principals in schools eligible two

years and 26 percent of those eligible in three years. This finding is not surprising in that, even in the best of circumstances, one year of a program designed to influence teachers is probably not sufficient to influence student achievement. Where the program was in place longer, the principals felt more able to assess its influence on students.

Eighty percent of principals thought that this program is a good use of state education funds. This finding is robust in that it does not differ in a statistically significant manner across any of the subgroups.

Summary. Many principals believe that this program has had some effect on teacher recruitment, teacher retention, and student achievement. We remind the reader, however, that beliefs about program impact need not correspond to actual program impacts (see sections IV and V below). Nonetheless, they indicate a relatively positive view of the program.

However, in each case, a substantial number of principals thought it was too soon to tell whether the program had had an effect. For schools that have been eligible for only one or two years, there has simply not been enough time for effects to emerge. In addition, given that some LEAs did not use it to recruit, and that many principals did not know about the program, did not learn about it in a timely manner, or did not learn from official channels, it is not surprising that some principals could not evaluate it. Where they did do so, though, most thought it had a positive impact, and most believe that this program is a good use of state resources.

Principals' views on whether money influences teachers

The survey included measures of whether the principal believes that more money would be an effective tool for recruiting and retaining qualified teachers. Principals responded to questions about the minimum size of the bonus necessary to attract teachers to their school. Other questions asked about their opinion of the best way to recruit and retain teachers.

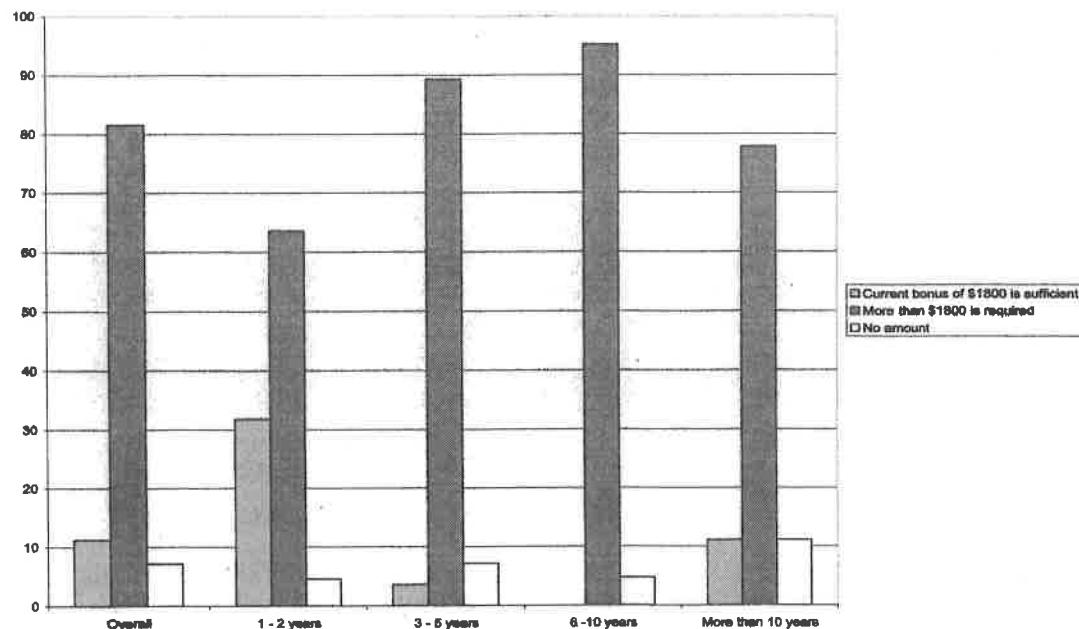
Eighty-two percent of principals thought that the \$1,800 awarded in the bonus program is not enough to make a difference in recruiting teachers. Of the rest, 11 percent thought that \$1,800 would be sufficient and another 7 percent thought that no amount of money would make a difference.

Principals with 1-2 years of experience were less likely to say that \$1,800 is not enough (64 percent), particularly compared to those with 3-5 years (89 percent), or those with 6-10 years of experience (95 percent).

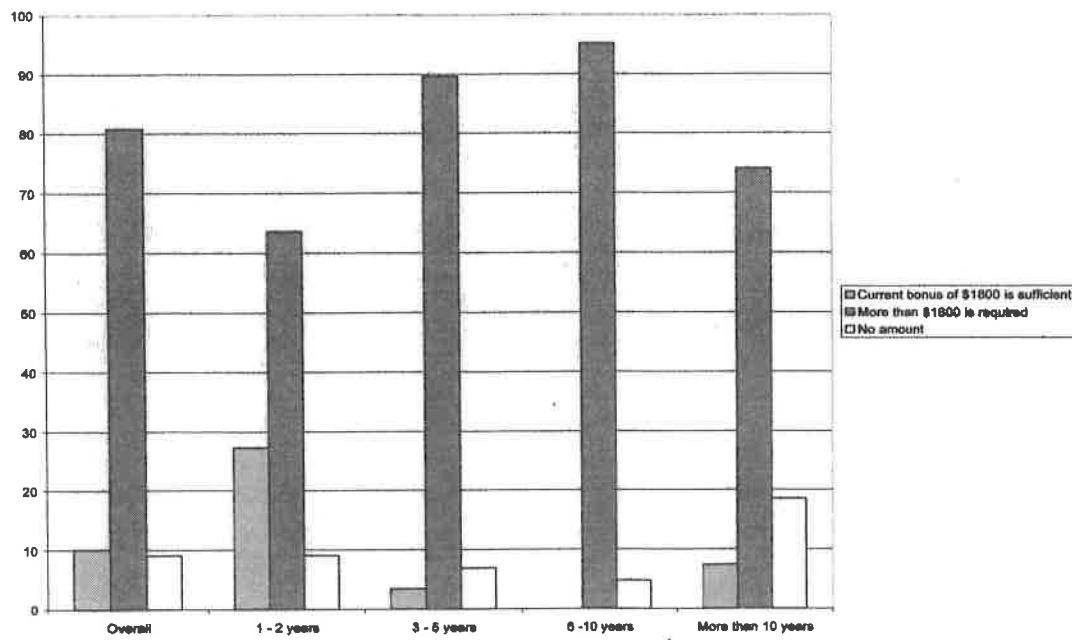
Similarly, most principals (81 percent) think that \$1,800 is not enough to help retain teachers. Only 9 percent thought that the \$1,800 bonus was sufficient and 10 percent thought that no amount of money would make a difference. Once again, the answers differ by the experience of the principals. Among those with 1-2 years of experience, 64 percent thought that \$1,800 would not be sufficient compared to 90

percent of those with 3-5 years of experience and 95 percent of those with 6-10 years of experience.

**Figure III-10: Principals' perception of the minimum amount needed to recruit new teachers
Overall, by years of experience**



**Figure III-11: Principals' perception of the minimum amount needed to retain teachers
Overall, by years of experience**

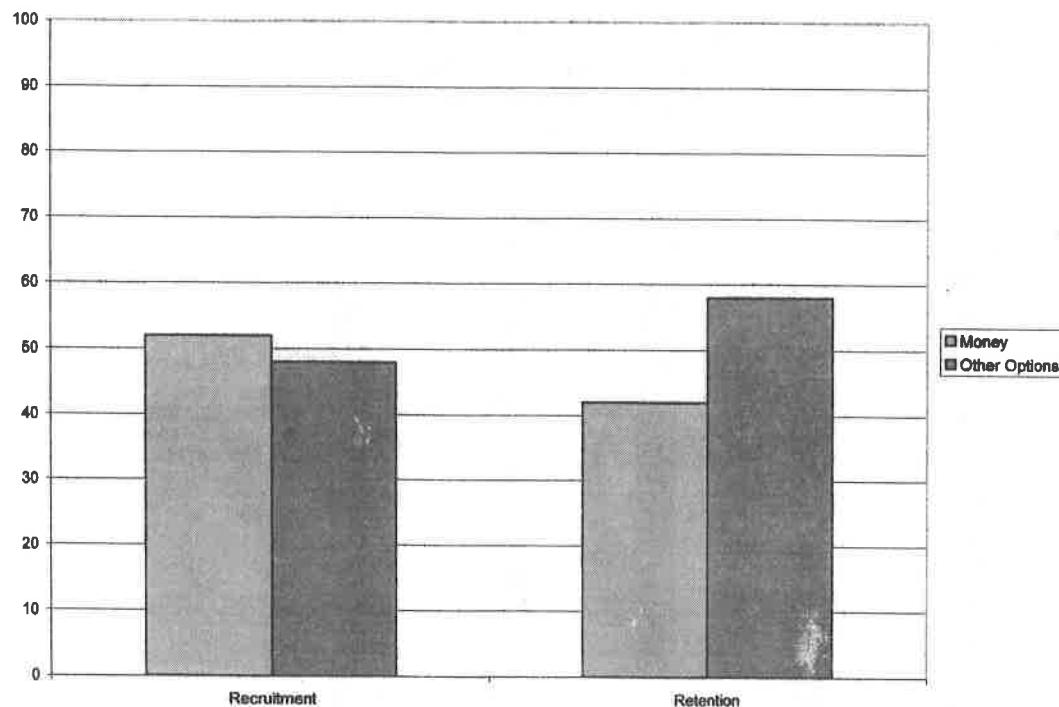


No differences emerge across subgroups for either of these questions. Thus regardless of the type of school, percentage of non-white students in the school, years the school has been eligible, percentage of the teachers receiving the bonus, and whether the district used the bonus to recruit, about 4 out of 5 principals thought that \$1,800 was not enough of a bonus to have much impact on the ability of the schools to recruit and retain teachers.

We note that this finding seems somewhat inconsistent with the earlier results indicating that many principals believed that the bonus program, with its \$1,800 bonus, seemed to be having an impact and was a good use of state funds. Principals may believe that any amount of money would have some effect, but that more money would have a greater impact.

Finally, we asked principals separate open-ended questions about their views on the most effective way either to recruit teachers to their school or to retain teachers. For the purposes of this analysis, we categorized responses as money versus all other options. Other suggestions for recruitment included actively promoting the school and providing a supportive working environment through mentoring and training programs. Other suggestions for retaining teachers included providing more administrative support, improving the school's working conditions, and facilitating teachers' professional development.

Figure III-12: Principals' suggestions for the best way to recruit and retain teachers



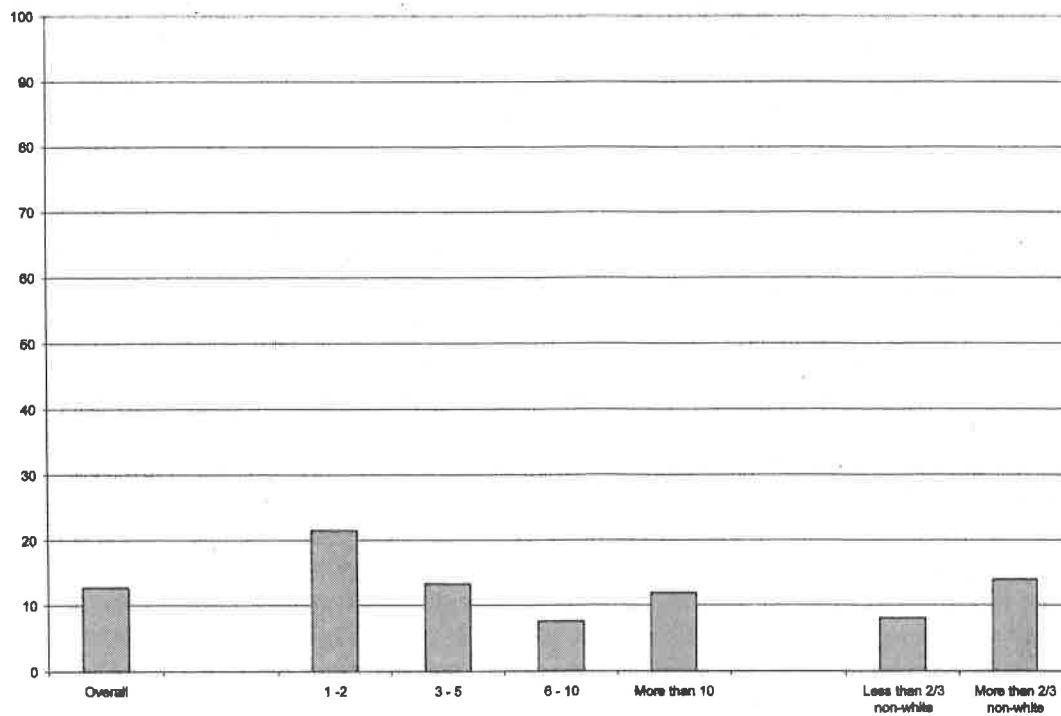
For the recruitment measure, 52 percent said that money was the best way to recruit teachers to the school. Principals in alternative schools were less likely to say that money was the best way to recruit teachers. In those schools, only 39 percent of principals said that money was the best way. No statistically significant differences emerged across other subgroups for this measure.

For the retention measure, less than half the principals (42 percent) thought that money was the best way to retain teachers in that school. This perception did not differ across any of the subgroups.

Summary. Many principals think that money is an effective tool for recruiting and retaining teachers. However, about 80 percent said that the bonus of \$1,800 was not sufficient to influence teachers to come to or remain in their school. Some differences emerged between views about its power to recruit teachers versus to retain teachers. For retention, other strategies are perceived to be more effective than money.

Teachers' knowledge of the program

**Figure III-13: Teacher did not know he or she was eligible
Overall, by years of experience, school ethnic composition**



A bonus program intended to affect teachers' decisions cannot succeed unless they understand it. In this section, we focus on whether the teachers knew they were

eligible, how long they expected to receive the bonus, and how they learned about the program.

According to official records, every teacher included in our survey had received the bonus in the 2003-04 school year; however, thirteen percent of them did not know they were eligible for it.

Teachers' knowledge was influenced by their experience level. Twenty-two percent, or more than one in five, of those with 1-2 years of experience did not know they were eligible, compared with 13 percent of those with 3-5 years of experience, 8 percent of those with 6-10 years, and 12 percent of those with 11 or more years.

The percentage of non-white students in the school also influenced the likelihood that a teacher would know she was eligible. In schools where non-white students predominated, a higher percentage of teachers did not know they were receiving the bonus compared to those in other schools (14 percent vs. 8 percent).

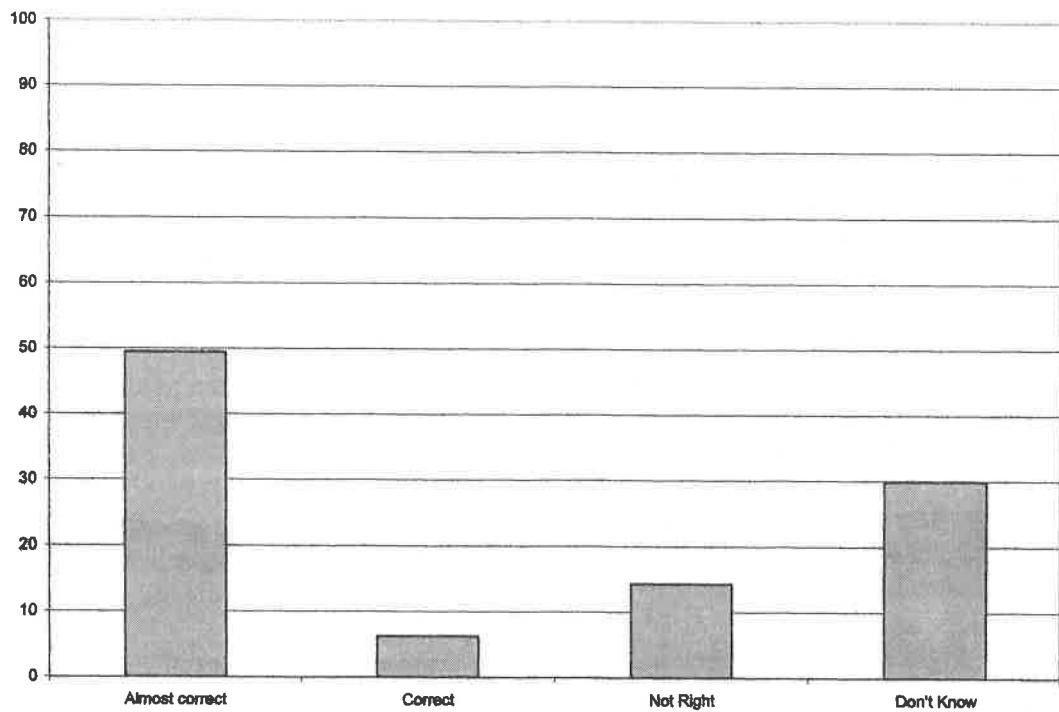
As described in Section II above, the eligibility requirements for individual teachers are confusing. Teachers were given the following options in response to the survey question: How long do you expect to receive this bonus?

- As long as I teach my subject in this school regardless of its eligibility (Correct answer)
- As long I teach my subject in this school and the school is eligible (Almost correct answer)
- As long as I teach any subject in this school; as long as I teach my subject anywhere; or just this year (Incorrect answer)
- Not sure

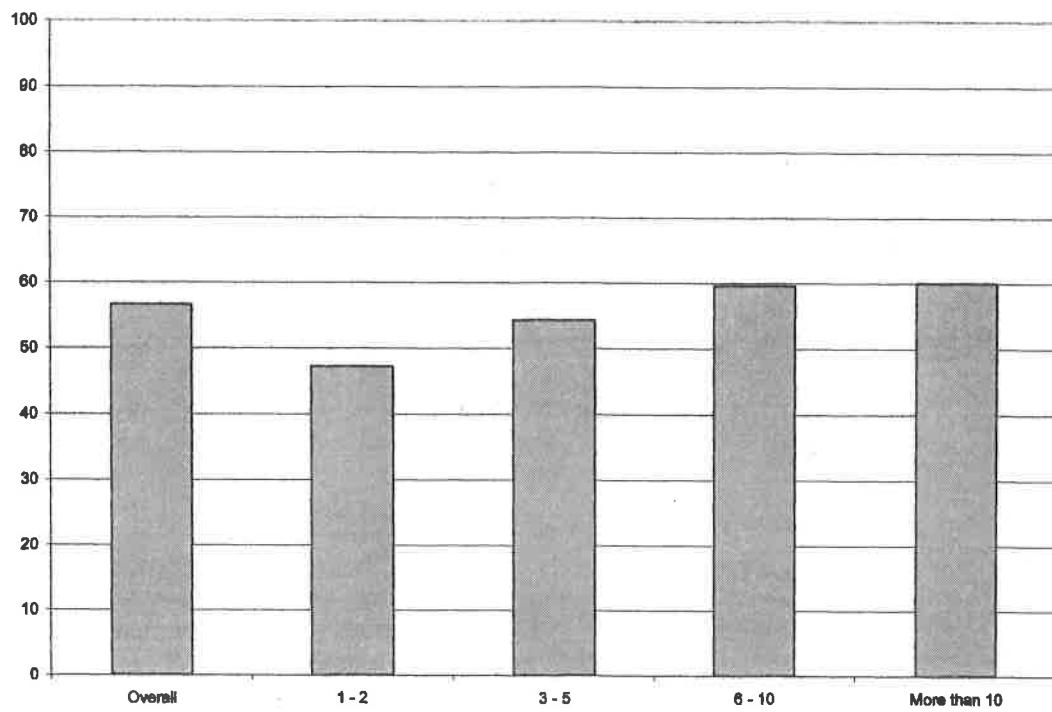
Only those who knew they were receiving the bonus were asked to answer this question. Among this group, only 7 percent selected the correct response. Another 50 percent of teachers had the answer almost correct. They knew that receiving the bonus was tied *both* to their school and to their subject, but they did not understand the requirements related to the school's eligibility. Because the eligibility requirements were complicated, it is not surprising that teachers would understand more about the requirements for their own actions (choice of school and subject) and less about the relevance of school eligibility requirement, which is out of their direct control.

However, another 14 percent of the teachers did not know that the bonus was linked *both* with their school and subject. They thought that they could teach their subject anywhere, that they could teach any subject in their school, or that they would only get the bonus this year. Further, 30 percent of teachers were not sure how long they would get the bonus. In total, 44 percent of teachers did not understand the basic components of this program. An incentive bonus simply cannot influence people's decisions if they do not know whether or why they received it.

Figure III-14: Teacher understood the requirements for eligibility



**Figure III-15: Teacher understood the requirements for eligibility
Overall, by years of experience**



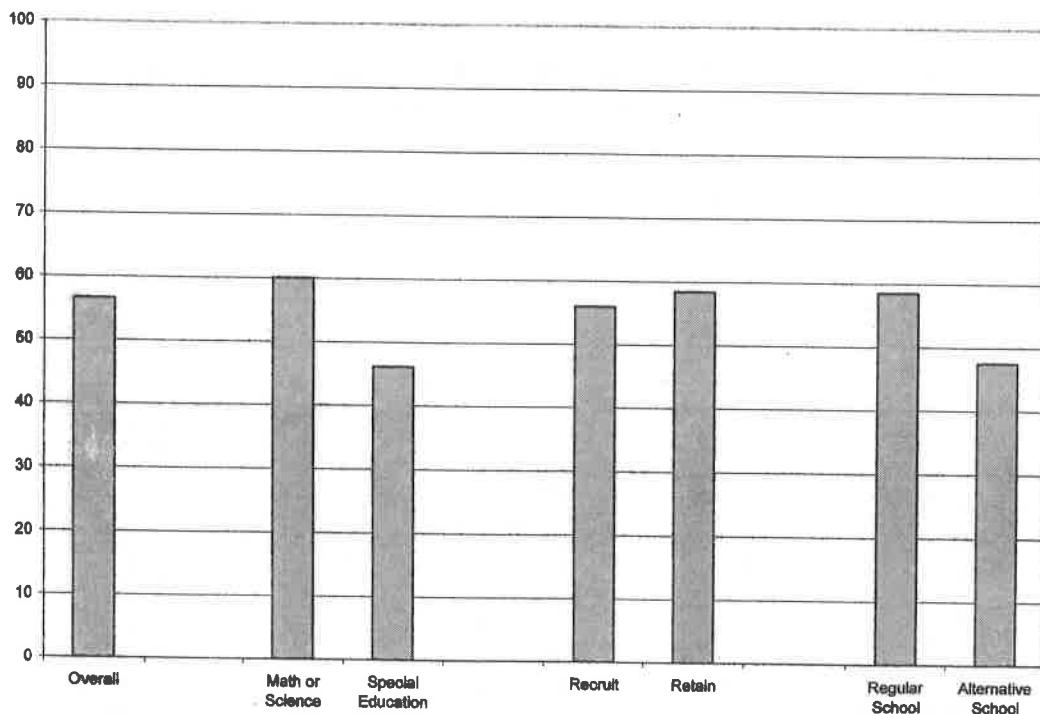
Many subgroups differed in their understanding the program. In the following discussion, those with a basic understanding of the program (correct or almost correct answer) are compared to those with less comprehension.

Teachers with more experience had a better understanding of the program than those with less experience. Of those with 6-10 and more than 10 years of experience, 60 percent understood the basic structure of the program. Of those with 3-5 years of experience, 54 percent understood the program. Among those with 1-2 years of experience, less than half gave the correct or almost correct answer.

Among teaching specializations, those teaching special education were less likely than math or science teachers to understand the program. Only 46 percent of special education teachers knew the basic requirements of the program, compared with 60 percent of math or science teachers.

Teachers in alternative schools were less likely to understand the program than those in regular schools. Forty-eight percent of the teachers in alternative schools had a good understanding of the program in contrast to 59 percent in regular schools.

**Figure III-16: Teacher understood the requirements of eligibility
Overall, by subject, status, and school type**



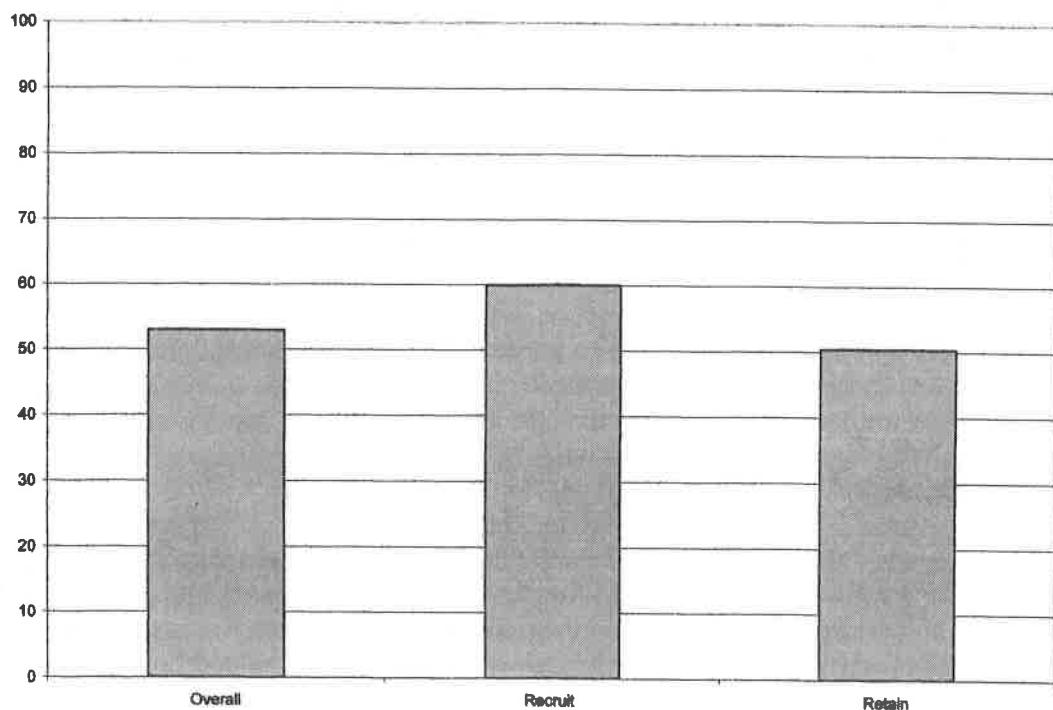
Finally, those working at the school before the program was implemented (*i.e.*, they were initially retained by it) were slightly more likely to understand it (59 percent)

than those who came to the school afterwards (*i.e.*, they may have been recruited with it) (56 percent).⁴

Thus, a significant number of teachers did not know they were eligible for the program, and of those that did, almost half did not understand how it worked.

We turn our attention now to the way teachers learned about it. As with the principals' responses, we categorized teacher responses as learning through official versus unofficial channels. Official channels, such as a job fair, probably presented correct information about the program. The teacher did not have to actively pursue the information, and multiple prospective teachers received the same information at the same time. Unofficial channels, such as another teacher, may not provide the correct information. Learning about the program through unofficial channels may depend on chance factors, such as happening to see a newspaper article on the program, or on teacher initiative, such as deciding to investigate the reason for additional money in a paycheck. In fact, 15 percent of the teachers learned about the bonus when they asked about it after getting the money in their paycheck.

**Figure III-17: Teacher learned about the program through unofficial channels
Overall, by status**



⁴ This difference may reflect differences in experience between those two groups.

Slightly more than half of the teachers learned about the program through unofficial channels.⁵ This pattern did not differ by experience, alternative school, percentage non-white in the school, subject taught, or even whether the principal knew about it.

The only subgroup differences to emerge were for when the teachers came to the school. Among those who came to the school after the school became eligible (*i.e.*, they were potentially recruited with this program), 60 percent learned about it through unofficial channels, compared with 50 percent of those in the school before it was implemented. This finding helps explain the earlier patterns showing that those who came to the school after the program was implemented were less likely to understand it.

Finally, fifty percent of new teachers did not know about the program until after accepting the job. This finding implies that the bonus probably did not influence their decision to accept a job in that school.

Summary. No incentive program can be effective unless people understand how it works. In this case, every teacher surveyed had been paid under this bonus program in the 2003-04 school year. Given that the survey was administered at the end of that year, teachers should have had ample time to learn about it. Yet, about one in eight of them did not realize they were eligible for the bonus. Of those who did know they were eligible, almost half did not understand why they were receiving it. These findings may reflect the fact that slightly more than half of them learned about the program through unofficial channels.

Teachers' views about whether the program influenced their decisions

The survey included several questions about whether teachers thought the bonus program influenced their decision to take a job or to remain at that school. Because some people may feel embarrassed saying that money influenced them, the survey also asked them to speculate about how the program might influence others to come to or remain in that school. We suspect that these results may be a more reliable indicator of the program's influence.

As reported above, 50 percent of those who came to the school after the program was implemented did not know about it when they were hired. Of those who did know about it, 58 percent said that it influenced their decision. This pattern persists across all subgroups: alternative school, percentage non-white in the school, subject taught, and

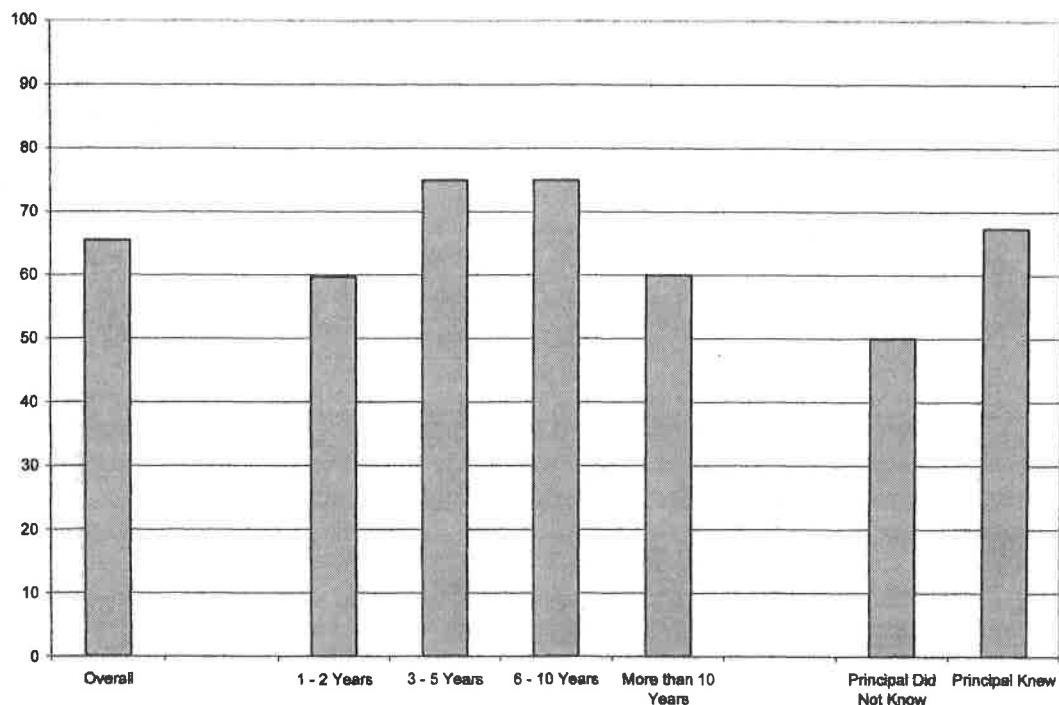
⁵ This finding seems to contradict the result from the principal survey that 15 percent of principals did not tell teachers about the program. However, note that an additional 17 percent of principals did not know about the program themselves. Thus, 32 percent of principals either could not or did not tell teachers about the program. Of those that did, they may not have told every eligible teacher about the program, or the teachers may have learned about the program from another source before the principal told them about it.

principal knowledge. Most of the time, when job candidates knew about the program, it influenced their decision to take a job at that school.

About two-thirds of all the teachers said that the bonus would influence them to stay at their school. The least and most experienced teachers were less likely than others to say that the bonus would influence them. In each group, about 60 percent said it would influence them, compared to about 75 percent of those in the middle-range experience groups.

In schools in which the principals knew about the program, teachers were more likely to say that the program influenced their decision to stay at the school. Two thirds of those teachers said it influenced them, compared to half of the teachers where principals did not know about the program. Thus, having principals understand how the program works appears to be important for the effectiveness of the program for retaining teachers.

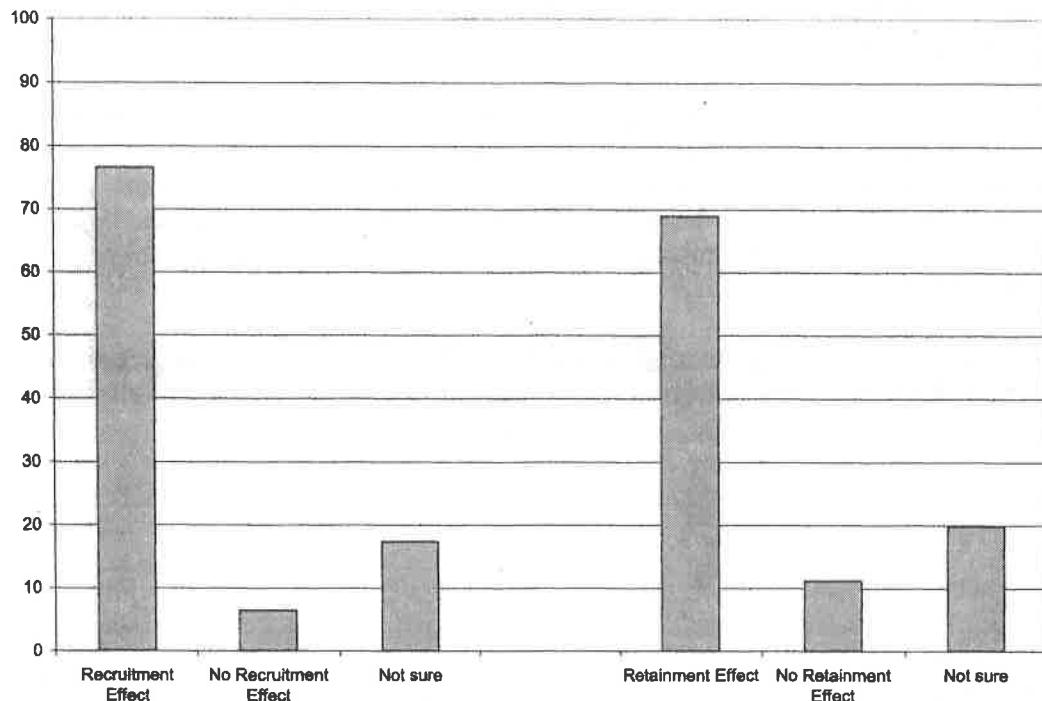
**Figure III-18: Program affected teachers' decision to stay at their school
Overall, by years of experience, principal knowledge that school was eligible**



Most teachers thought that the bonus program would influence new teachers to come to that school. Seventy-six percent of them thought so. Seventeen percent were not sure, but only 6 percent thought the bonus would have no impact on recruitment. This relationship persisted across all subgroups. In every case, about three-fourths of the teachers thought the program would influence recruitment.

Similarly, most teachers thought that the bonus program would influence other teachers to remain in that school. Twenty percent were not sure, and 11 percent did not think the bonus would effect teachers' decisions to stay. Again, this relationship persisted across all subgroups.

Figure III-19: Teachers' perception of the program's influence on other teachers



Summary. In general, teachers felt that this program could influence teachers to come to and remain in their school. About two-thirds of the teachers said the program had influenced or would influence them, and even more of them claimed the program would influence others.

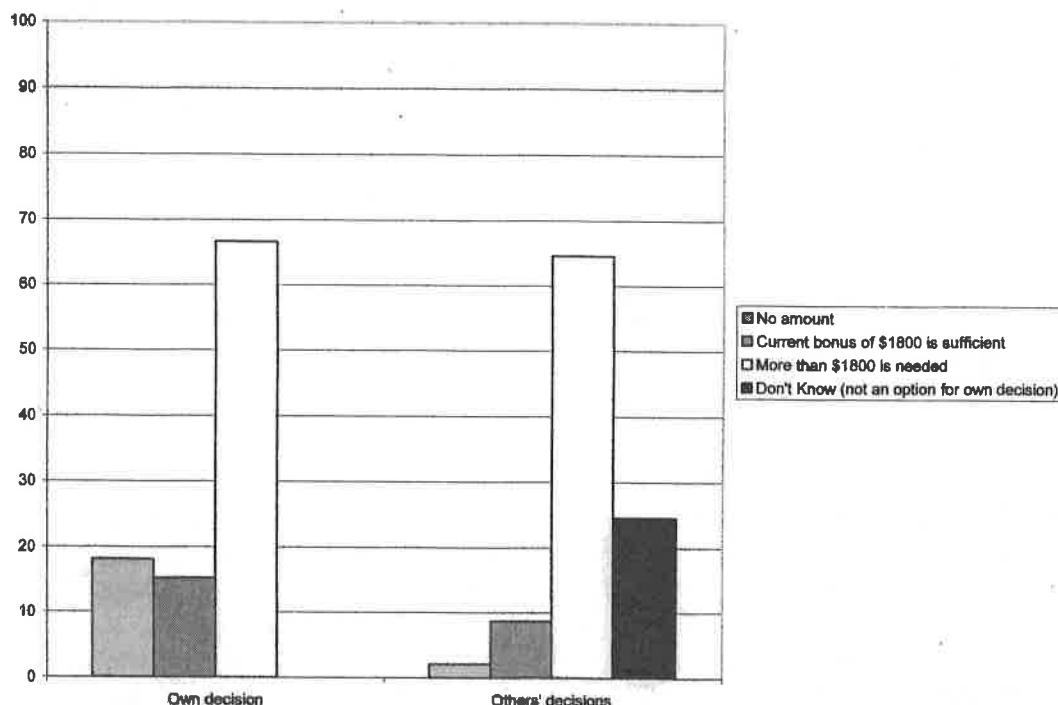
Teachers' perceptions about the role of money

The survey included measures of whether the teacher believed that more money would influence teachers' decisions to come to and remain in that school. These questions include the minimum amount that would help recruit and retain other teachers, and the minimum amount that would influence that particular teacher to stay at this school. Teachers also responded to questions about the best ways to influence recruitment and retention.

Two-thirds of teachers reported that more than \$1,800 would be necessary to influence them to remain in the school. More than one in six stated that no amount of money would influence them to stay in the school and almost one in six said that the \$1,800 was sufficient.

Similarly, most teachers think that more than \$1,800 is necessary to help retain other teachers. Only 9 percent thought that \$1,800 was sufficient, while 65 percent thought that a bonus of between \$1,800 and \$7000 would be needed. Another 1 percent thought that no amount of money would make a difference. The other 24 percent represents those who were not sure what minimum amount would be needed to influence others. This pattern of responses emerged quite consistently across all the subgroups.

Figure III-20: Teachers' perception of the minimum amount needed to influence their own and others' decision to remain at their school

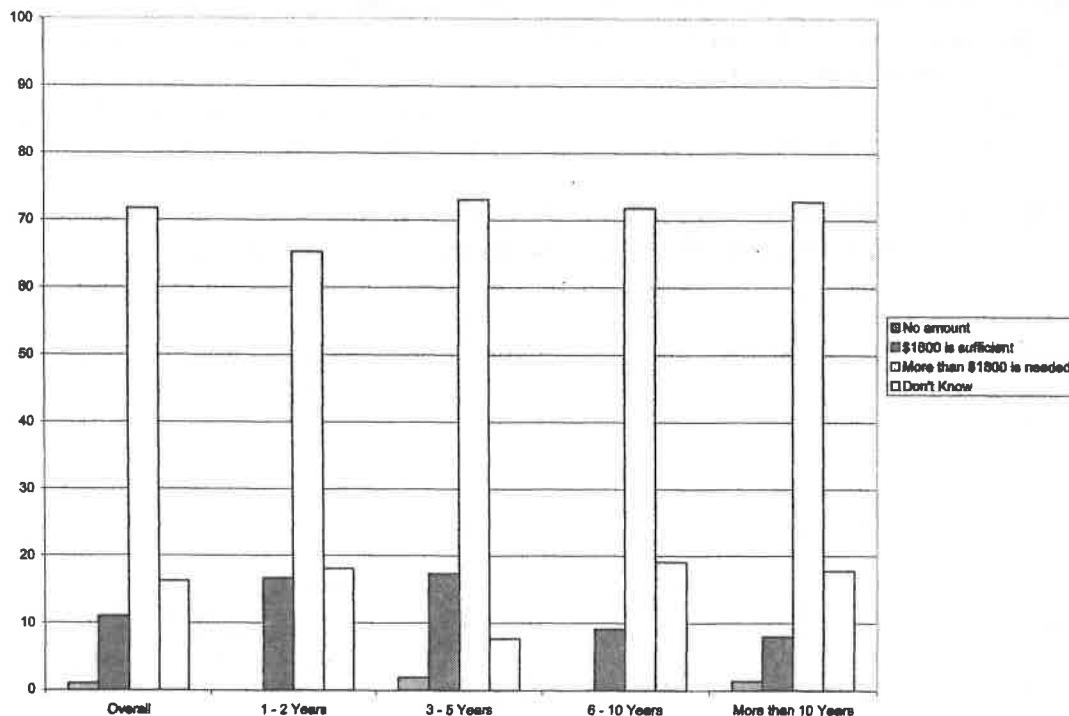


With respect to recruitment, 72 percent of teachers said that \$1,800 awarded in the bonus program is not enough to make a difference. Eleven percent said that the current amount was sufficient, and 1 percent said that no amount of money would influence new teachers. Sixteen percent of teachers were not sure how much money would influence other teachers to come to the school.

Perhaps because of their own lower pay, inexperienced teachers were more likely than more experienced teachers to believe that \$1,800 was enough to influence whether new teachers would come to this school. The \$1,800 bonus is a higher percentage of their current salary. More than 15 percent of those with less than five years of experience thought that \$1,800 would suffice. In contrast, less than 10 percent of those with six or

more years of experience thought so. None of these perceptions differed among other subgroups.

**Figure III-21: Teachers' perception of the minimum amount needed to recruit new teachers
Overall, by years of experience**



Thus, the patterns are clear. Whether teachers were asked about retention or about recruiting, about their own decisions or those of others, about two-thirds of them thought that the \$1,800 bonus was not a sufficient inducement to change behavior. In addition, this finding is quite consistent across all the subgroups of teachers that we examined.

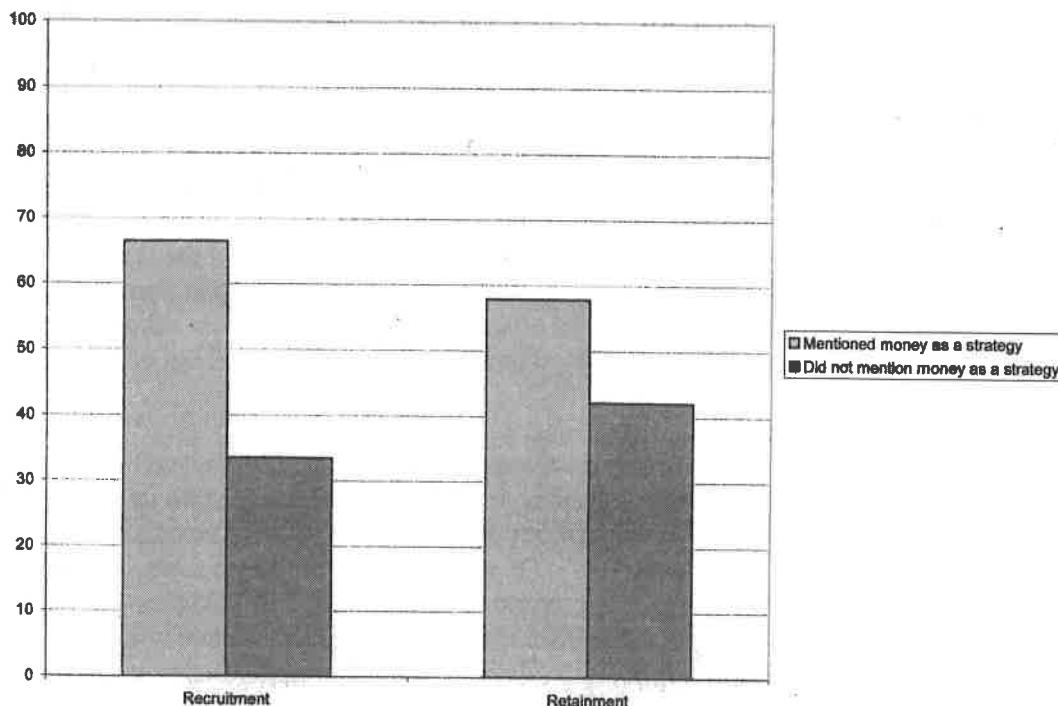
At face value, these findings seem to contradict the previous responses by teachers that the current bonus influenced them and would influence others. Thus, there is a puzzle. How could the Bonus Program have influenced them if \$1,800 is not enough money? One possibility is that the teachers' responses to both questions are biased by their own interest. It could be, for example, that an interest in having the state continue the program could induce them to say it had an impact. Similarly, an interest in obtaining larger bonuses could induce them to assert that the minimum sufficient amount is far higher than \$1,800. Perhaps any bonus amount would help to some extent, but a higher bonus would be even more effective in recruiting and retaining teachers.

Hence, we turn now to a different set of questions that are independent of the specifics of the bonus program. In particular, we asked teachers what they thought was the most effective way to recruit teachers to or to retain teachers in their school. These were open-ended questions. For the purposes of this report, we categorized responses as

money versus anything else. Included in the latter category for recruitment were actively promoting the school to job candidates and providing more administrative support to teachers. Other suggestions for retaining teachers included providing more administrative and community support to teachers and upholding student discipline policies.

The results for these open-ended questions parallel those in the principal survey. For the recruitment measure, 66 percent of teachers said that money was the best way to recruit teachers to the school. For the retention measure, 58 percent said that money was the best way to retain teachers in that school.

Figure III-22: Teachers' suggestions for the best way to recruit and retain teachers



With respect to recruiting, teachers in alternative schools were less likely to say that money was the best way to recruit teachers. Here, only 55 percent of teachers said that money was the best way, compared to 69 percent of those in regular schools. No other subgroups exhibited statistically significant differences in this measure.

With respect to retention, the subject taught influenced this perception. Special education teachers were more likely to say that money was the best way to recruit new teachers. Sixty-five percent of them said so, compared with 55 percent of math and science teachers. No other subgroups differed in these measures.

Summary. Teachers and principals seem to agree that money is an effective tool for recruiting and retaining teachers in the types of middle and high schools eligible for

the Bonus Program. However, about two-thirds of teachers thought that \$1,800 was not enough to influence the decisions of teachers either to come to or to stay in their schools.

IV. Impact on Teacher Retention

Though policy makers can learn much from the perceptions of principals and teachers as elicited through surveys, a thorough understanding of the impact of the Bonus Program requires more concrete information on measurable outcomes. In this section we discuss some initial evidence on the extent to which the Bonus Program has affected the ability of eligible schools to retain teachers. At best, the evidence is preliminary and incomplete in that the relevant data are available at this time for only one post-program year, 2002-03.

To determine whether the Bonus Program has affected the ability of the eligible schools to retain teachers, our strategy is to make use of the fact that the program was instituted at a particular time in only some schools and for only some teachers. That allows us to use comparisons over time, across schools, and among teachers to infer any impact the program may have had. For the purposes of this analysis we define retention on a yearly basis as follows: a retained teacher is one who was teaching in a particular field in a particular school in one year and is teaching in the same field in the same school in the following year. We then ask whether there is any evidence to suggest that retention rates for math and science teachers or special education teachers in eligible schools have risen after the introduction of the Bonus Program relative to what they would otherwise have been.

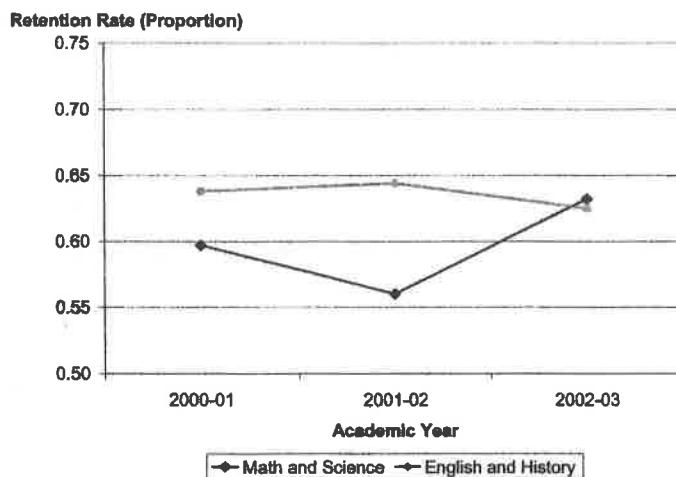
We look separately at the patterns in middle schools, high schools, and ungraded alternative schools and, for each group, identify a school as eligible based on its eligibility for the program in the 2001-02 school year. This approach generates 22 eligible middle schools, 59 eligible high schools, and 7 eligible ungraded schools. With eligibility defined with respect to the first program year alone, the 2002-03 year can be interpreted as the first post-program year. Even if other schools became newly eligible in 2002-03, the timing of their notification virtually rules out any possibility that it would have any effects on the set of teachers in those schools that year. Thus, any program-related changes in retention in 2002-03 are fully attributable to eligibility in the first year. We note as well that teachers in a school that was eligible the first year of the program remain eligible even if the school is no longer eligible in the second or subsequent year. Thus, eligibility in the first year is the crucial defining variable for our analysis of teacher retention.

Math and Science Teachers

We start with the retention results for high schools because of the relatively large set of eligible high schools (59) and the large total number of math and science teachers in those schools (about 600). Large sample sizes are preferred to smaller samples since they typically generate more precise results. Figure IV-1 depicts the trends in retention rates for math and science teachers (combined) and English and history teachers (combined) in

the eligible high schools.⁶ As can be seen, fewer than 60 percent of the math and science teachers were retained during the year before the program and the year it was implemented. The clear rise in the retention rate to 63 percent in the first post-program year provides some initial evidence that the Bonus Program succeeded in its goal of making it easier for the eligible schools to retain math and science teachers.

Figure IV-1: Retention rate trends in bonus-eligible high schools



That rise, however, might conceivably reflect the effects of some more general factor influencing all teachers in the eligible schools rather than the effect of the Bonus Program. The trends for English and history teachers in the same figure allow us to rule out that possibility. Prior to the introduction of the program, the eligible schools were more successful at retaining English and history teachers than math and science teachers, a pattern that helps to justify focusing the program on math and science teachers. After the program was introduced, however, the retention rate for English and history teachers declined somewhat. Thus, the rise during 2002-03 for math and science teachers cannot be attributed to general factors that influenced the eligible schools.

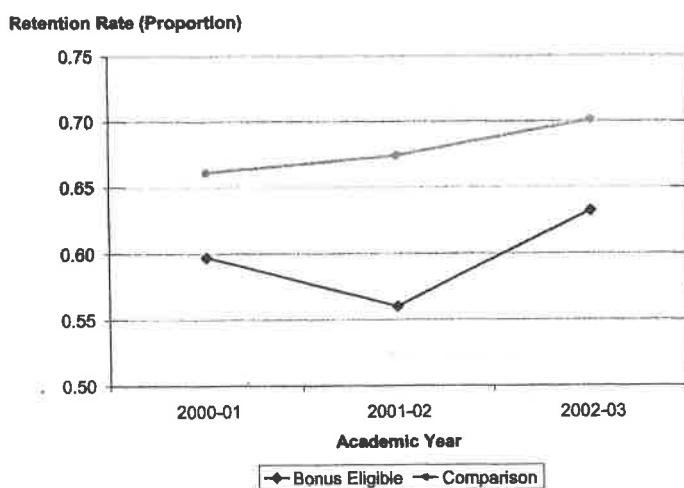
Further evidence that it was the Bonus Program that led to the higher retention rate for math and science teachers in 2002-03 emerges from Figure IV-2 which compares the trends for math and science teachers in the eligible schools to the comparable trend in a group of comparison schools. This comparison group includes the 59 high schools that were most similar to the eligible high schools in terms of the main criterion for their selection, the fraction of students failing both Algebra 1 and Biology.⁷ Because these

⁶ All the retention results discussed in the text are available in tabular form in Appendix C.

⁷ As would be expected, the average of the sum of the failure rates is somewhat higher for the eligible group (144 percent, indicating about a 72 failure rate on each of the tests) than for the comparison group (107 percent.). In addition, the eligible schools are typically smaller (about 445 students) than the

schools are somewhat less educationally disadvantaged than the eligible schools it is not surprising that they tend to be somewhat more successful than are the eligible schools in retaining teachers. The key point is that while these comparison schools experienced an increase in their retention of math and science teachers in 2002-03, that rise was far smaller than that in the eligible schools. Thus, we conclude that much, although probably not all, of the increase in the eligible high schools is attributable to the Bonus Program.

Figure IV-2: Math and science retention rate trends in bonus-eligible and comparison high schools



Figures IV-3 and IV-4 show the comparable patterns for teachers in the 22 eligible middle schools. Figure IV-3 depicts a small increase in the retention rate of math and science teachers in the eligible schools. Though relatively small, it contrasts with a much smaller increase for English and history teachers in those same schools (see top line of Figure IV-3) and a decline in the retention rate for math and science teachers in the comparison group of schools (Figure IV-4). The comparison group of middle schools contains the 22 schools that are most comparable to the eligible group in terms of the percentage of students who are receiving free and reduced price lunches.⁸ Thus once

comparison groups (792 students). We also worked with a second, alternative comparison group of schools. This alternative group contains the 59 schools that were most similar to the eligible schools after the removal of any schools that might confound the results. Removed from the sample were schools that were initially misidentified as being eligible or that were eligible in a subsequent year. The average of the sum of the failure rates for this alternative comparison group is 0.92 and their average size is 927 students. The results based on this alternative comparison group are similar to those reported in Figure R2. See Tables in Appendix C for the full results.

⁸ The mean percentage for the eligible schools is 87 percent; for the control group is 77 percent. In addition, the eligible schools are somewhat smaller, with an average of 354 students in contrast to 470 in the comparison group. In addition, we constructed an alternative comparison group defined to be similar to the eligible group but after the removal of any school that was misidentified as being eligible during the

again, the evidence is consistent with the conclusion that the Bonus Program may well have exerted a small positive impact on the ability of middle schools to retain math and science teachers.

Figure IV-3: Retention rate trends in bonus-eligible middle schools

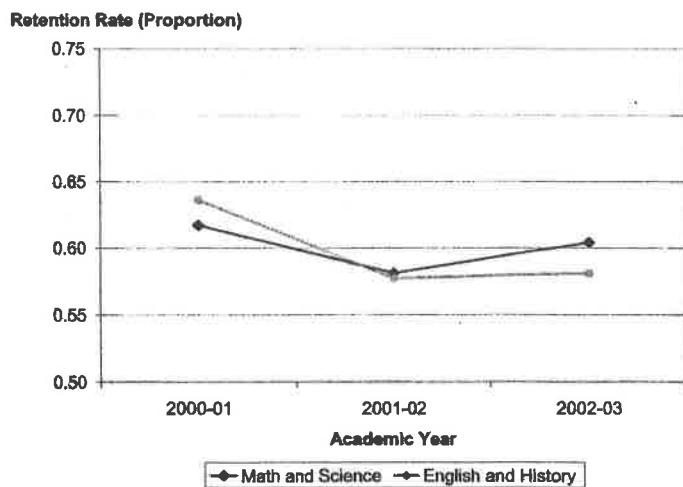
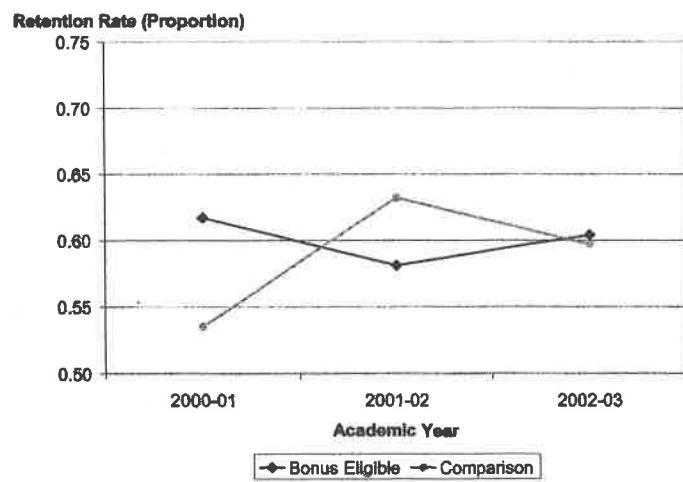


Figure IV-4: Math and science retention rate trends in bonus-eligible and comparison high schools



first year of the program or that was deemed newly eligible in a subsequent year. The mean percentage of students in this alternative comparison group is 76 percent and the average school size is 498 students. As shown in Appendix C, the results based on this comparison group are similar to those for the basic comparison group.

Special Education Teachers

In contrast to the findings for math and science teachers, the findings for special education teachers are far less consistent and much less clear, largely because of the much smaller sample sizes. When the program was implemented, there were only 146 special education teachers in the eligible high schools and only 26 in the eligible middle schools.

Comparisons between the trends in retention rates for special education teachers in eligible high schools and in their comparison group of schools are reported in Figure IV-5 and comparable comparisons for middle schools are reported in Figure IV.6.

Figure IV-5: Special Education retention rate trends in high schools

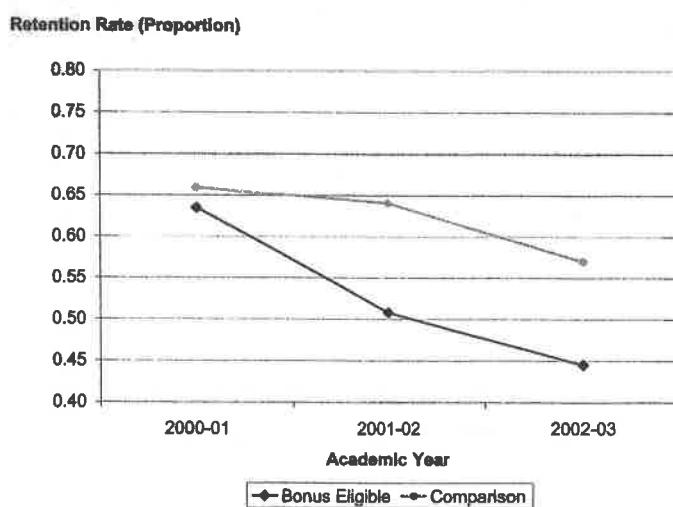
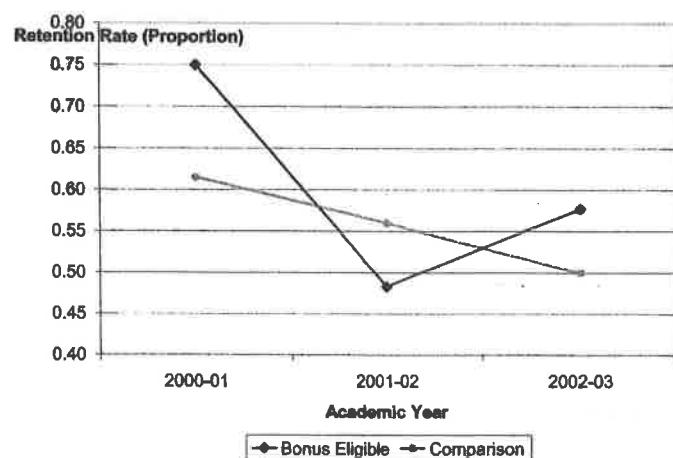


Figure IV-6: Special Education retention rate trends in middle schools

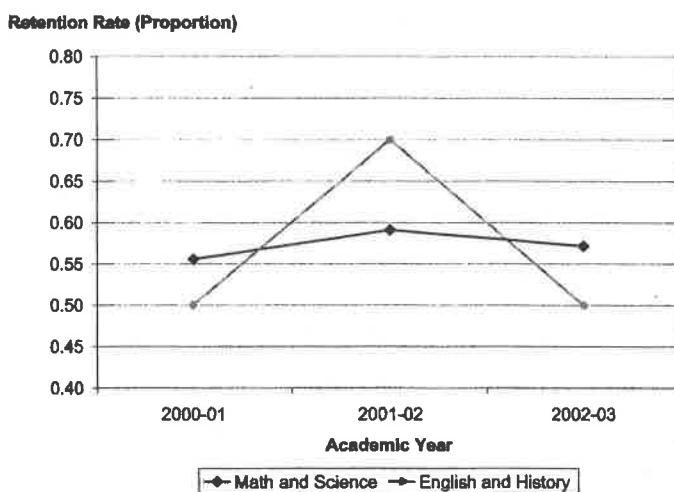


Eligible high schools experienced a fall in the retention rate of special education teachers, a decline that was quite comparable in magnitude to that in the comparison group of high schools. Eligible middle schools, in contrast, experienced a large rise, both absolutely and relative to the comparison schools. Once again small sample sizes reduce the confidence one should have in these findings.

Alternative Schools

According to state reports, 7 of the eligible schools in 2001-02 were alternative ungraded schools.⁹ Figure IV-7 shows a slight decline in the rate at which math and science teachers were retained in those schools in the post-program period. During that same period there was a far greater decline in the retention rate for English and History teachers in those same schools. Though the difference in the trends provides some support for the possibility of a positive impact of the Bonus Program on the retention of math and science teachers in these schools, the small sample size means that the results could have occurred by chance.

Figure IV-7: Retention rate trends for bonus-eligible alternative (ungraded) schools



Conclusion about retention

The outcomes reported here are consistent with the views of principals and teachers that the North Carolina Bonus Program has influenced the decisions of teachers about whether to stay in a particular low-performing middle or high schools. Even though our empirical results are limited to one post-program year, 2002-03, we find that retention rates for math and science teachers are higher in both high schools and middle schools than otherwise would have been the case. The patterns for special education teachers are less consistent and are subject to greater chance variability because of the relatively small sample sizes.

⁹ Only four schools had sufficient data for all years of this analysis.

V. Impact on Student Achievement

The ultimate goal of the N.C. Bonus Program was to improve the quality of math, science, and special education instruction for students in disadvantaged schools. In the previous section, we find some evidence that the program increased retention rates for math and science teachers in eligible schools. By definition, lowering turnover by definition reduces the proportion of highly inexperienced teachers in a school, and previous research indicates that student achievement is lower in classrooms staffed by inexperienced teachers (see, for example, Clotfelter, Ladd and Vigdor 2004). Thus it would be quite reasonable to hypothesize that the reduction in turnover would lead to improvements in student achievement.

Before turning to an analysis of student test score performance, however, it is important to consider the magnitude of the expected effect. In our analysis above we find increases in teacher retention on the order of 3 to 7 percentage points over a single year. If we assume that the replacements for all these departing teachers were highly inexperienced, and that assignment to such a teacher lowers standardized test scores by 10% of a standard deviation (Clotfelter, Ladd and Vigdor 2004), the expected gain to average test scores in a school would be on the order of 0.3% to 0.7% of a standard deviation.¹⁰ Only a very powerful statistical test would be able to identify an effect of this small magnitude. With a sample of 75,000 student test scores, the probability of distinguishing an effect of this magnitude from random statistical noise would be at most 50%.¹¹ The sample sizes of test scores we have available for these analyses are an order of magnitude smaller than this. Thus, our prior belief is that it would be unrealistic to expect statistically significant gains in test scores over such a short time period. More significant changes in test scores might accrue over time, as differences in turnover rates compound, generating wider gaps in experience levels between eligible and comparison schools. The state legislature's cancellation of the bonus program renders such an analysis impossible.

We examine the link between the Bonus Program and instruction quality by examining trends in end-of-grade and end-of-course test scores for students attending schools eligible for the Bonus Program in both 2001-02 and 2002-03. By omitting schools that cycled into or out of eligibility, we avoid complications arising from the

¹⁰ Both of the assumptions made in this statement can easily be criticized. It is theoretically possible that the impact of reduced turnover would be much smaller or much greater than what we hypothesize. The logical exercise outlined in this paragraph should be considered a back-of-the-envelope calculation to gauge our statistical ability to detect impacts on student achievement.

¹¹ This power calculation assumes an effect size of 0.007 standard deviations. In such a scenario, a sample size of 78,400 would lead to a margin of error equal to the effect size (assuming a two-tailed hypothesis test at the 5% significance level). When the margin of error equals the effect size, there is a 50% chance of finding evidence sufficient to reject the null hypothesis that the effect size equals zero. If the effect size were 0.003 standard deviations, the required sample size would increase to 426,844. Note also that these sample size calculations assume perfect knowledge of the population mean test score. Thus, these sample sizes refer exclusively to the number of observations required in *eligible schools*.

possibility that program impacts may take time to evolve, or may begin to reverse once a school loses eligibility.

As in the previous analysis, we employ three strategies to separate the impact of the bonus program from other factors that may have influenced achievement in schools eligible for the program. First, we examine relevant test scores before and after the implementation of the Bonus Program. Second, we take advantage of the fact that the hypothetical impact of the Bonus Program differs across subject areas. We would expect any test score gains associated with this program to be concentrated in math and science. If our analysis shows gains in math and science test scores, but also shows gains of similar magnitudes in reading, English I or U.S. History test scores, the most logical conclusion is that some factor other than the Bonus Program is responsible for raising performance.¹²

Our final strategy is to compare schools that were eligible for the Bonus Program to a set of comparison schools. For this task, we use a slightly different procedure for identifying comparison schools than that employed in the analysis of teacher retention in the previous section. We rank schools by the sum of failure rates on Biology and Algebra I end-of-course tests in 2001 and 2002, and separately by free and reduced price lunch eligibility rates in 2000-01 and 2001-02. We then delete from these rankings schools that were eligible for the bonus program in either 2001-02 or 2002-03. The comparison group consists of the top 30 remaining schools on each list. Because some schools appear on both lists, the total number of schools in the comparison group is 57.

We present data on student achievement for the four years, 2000, 2001, 2002, and 2003, where the specified year refers to the spring in which the tests were administered.¹³ Figure V-1 presents basic information on average Algebra I and Biology test scores for schools deemed eligible for the Bonus Program in both 2001-02 and 2002-03.¹⁴ At first glance, there appears to be a noticeable upward trend in Algebra I test scores in this sample of schools. Closer inspection, however, reveals that these gains occurred before 2002, too early for any retention effects of the bonus program to have kicked in. The implementation of the bonus program is actually associated with a leveling off of what had been a positive trend. Biology test scores show a decline between 2002 and 2003, with 2003 mean test scores slightly below what they had been in 2000 and 2001.

¹² An alternative explanation for such a finding would be that the Bonus Program somehow improved the performance of teachers who were not directly eligible. While it is conceivable that such an effect could occur, for example by raising overall levels of teacher morale, or leading to improvements in student study habits, we would expect such a "spillover" effect to be relatively small in magnitude.

¹³ We have four years of results here rather than the three that we use in our analysis of teacher retention because for the retention analysis we needed to use the data for 1999-2000 to calculate the retention rate for 2000-2001.

¹⁴ From a statistical perspective, a sample selection problem may skew the average test scores in Figure 1. Schools that experienced substantial test score gains between 2001 and 2002 would select themselves out of the sample by losing eligibility for the Bonus Program. Note, however, that this selection problem would not apply to the 2003 test scores. Algebra I and Biology are by far the most commonly administered end-of-course tests in math and science and thus present the largest sample sizes for analysis. Figure V-7 below shows test score trends for Geometry and Chemistry, which although less common do not suffer from the same sample selection concerns.

Figure V-1: Test score trends in bonus-eligible schools

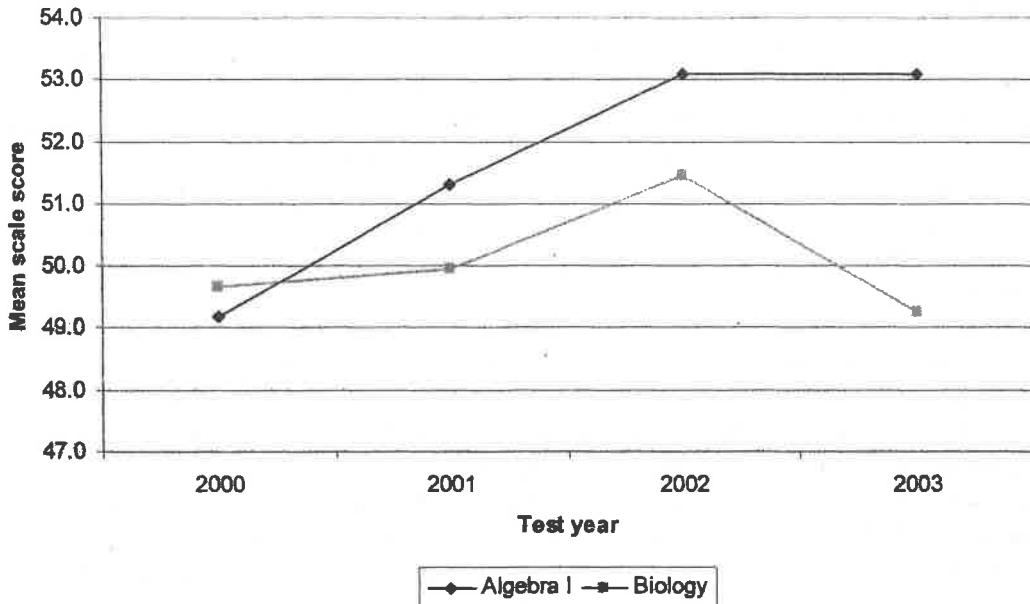
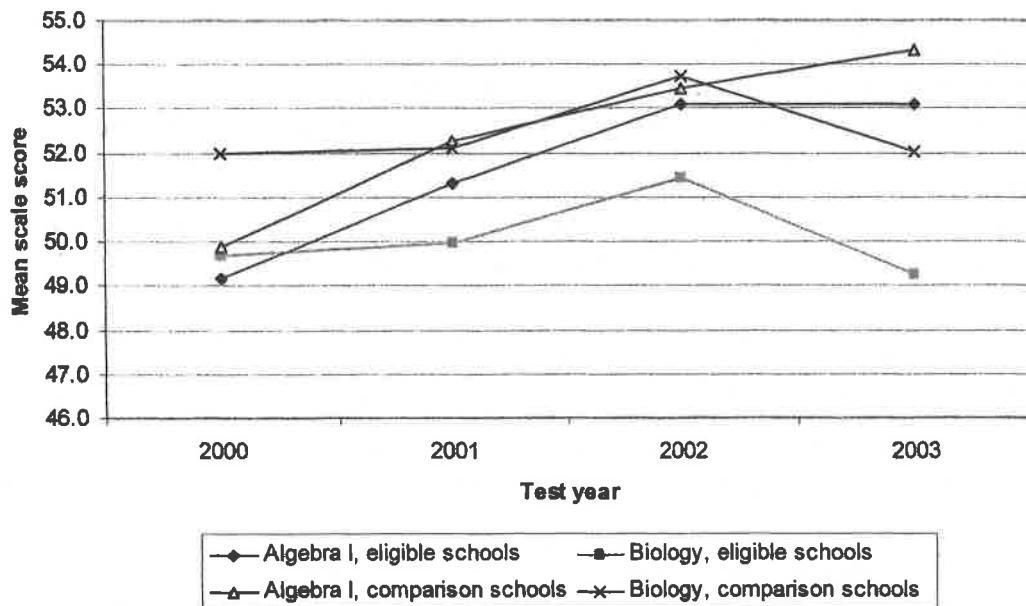


Figure V-2: Test score trends: eligible and comparison schools

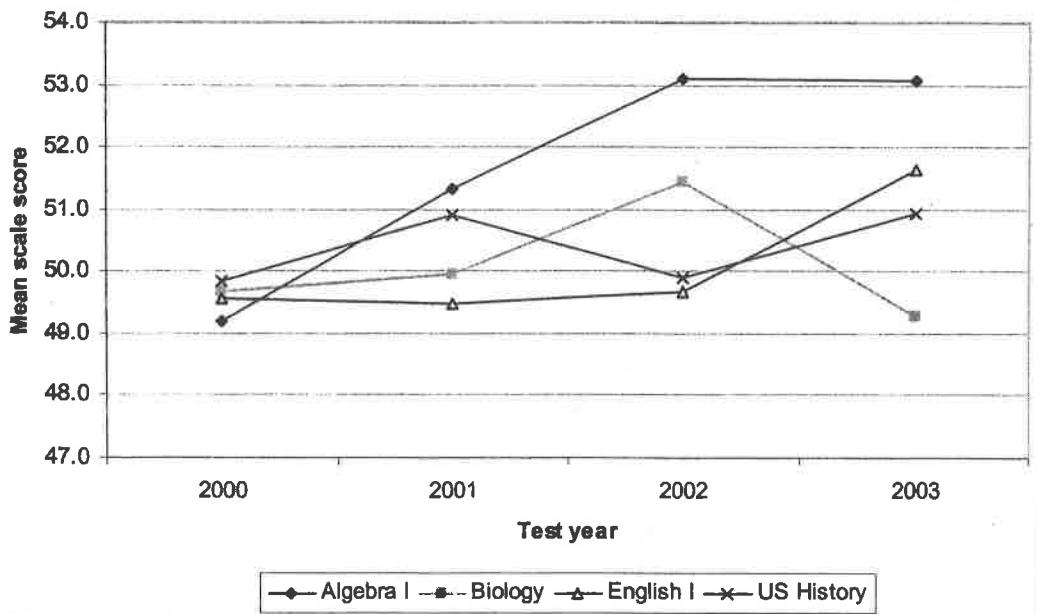


The time trends in Figure V-1 do not directly address the question of what would have happened to math and science scores in eligible schools in the absence of the Bonus Program. Figures V-2 and V-3 follow our two additional strategies for addressing this counterfactual question. Figure V-2 reproduces the two trend lines from Figure V-1, adding to them equivalent trend lines based on mean test scores at comparison group schools. Our comparison schools began this time period with average Algebra I test scores slightly higher than those in eligible schools. Comparison schools match the upward trend observed in eligible schools between 2000 and 2002, and actually continue the upward trend into 2003, widening the gap between the two groups.

Biology test scores in comparison group schools are moderately higher than in eligible schools, but the time trend displayed in the two sets of schools is nearly identical. Thus, eligible schools failed to gain ground relative to comparison group schools while the Bonus Program was in effect.

Figure V-3 replaces the comparison trends in Table V-2 with alternative measures drawn from other end-of-course tests in eligible schools themselves. Initially, average scores on English I and U.S. History EOC tests are virtually identical to Biology test scores in these schools. By 2003, average English I and U.S. History test scores are actually a bit higher than average Biology scores. Comparison of 2002 to 2003 test scores reveals that the implementation of the bonus program was associated with a decline in biology test scores, no change in algebra test scores, and an increase in US

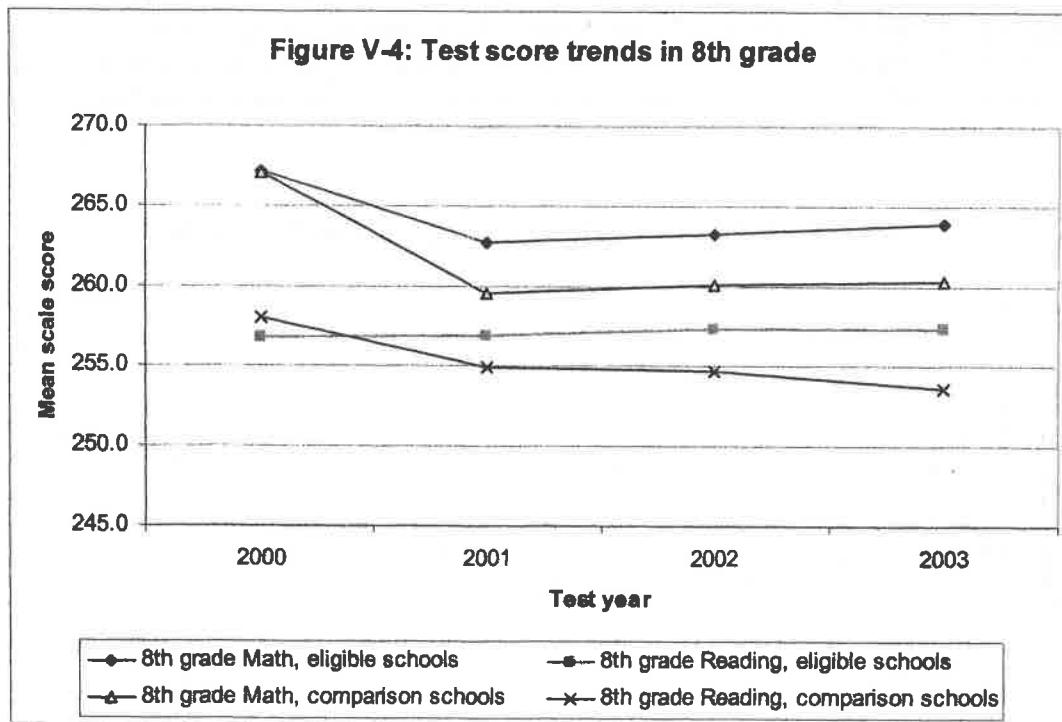
Figure V-3: Test score trends eligible and ineligible subjects



history and English scores. Because these statistics are subject to sampling error, much caution should be used in interpreting differences as slight as these. Nonetheless, it is noteworthy that Biology and Algebra I test scores trended downward between 2002 and 2003, while average English I and U.S. History test scores increased.¹⁵

Based on the evidence presented in Figures V-1 through V-3, the most logical conclusion is that the Bonus Program had little or no impact on student achievement in math and science courses at eligible high schools. Test scores show no absolute increases in the post-implementation period, and similarly show no increases relative to test scores in ineligible subjects or at comparison schools. Bear in mind that our prior belief was that any impact of the bonus program on test scores would be small. For the mean scaled test scores depicted in these figures, the expected impact would be less than one-tenth of a point.¹⁶

Figure V-4 extends the analysis to middle schools by examining trends in 8th grade end-of-grade test scores in math and reading.¹⁷ Similar to the high school case, we expect any effect of the Bonus Program to be evident in math test scores more than reading test scores. We also compare test score trends in eligible and comparison schools in this figure.



¹⁵ Note also that this contrast occurs in the last year of the time frame, which serves as evidence against the sample selection argument made in the preceding footnote.

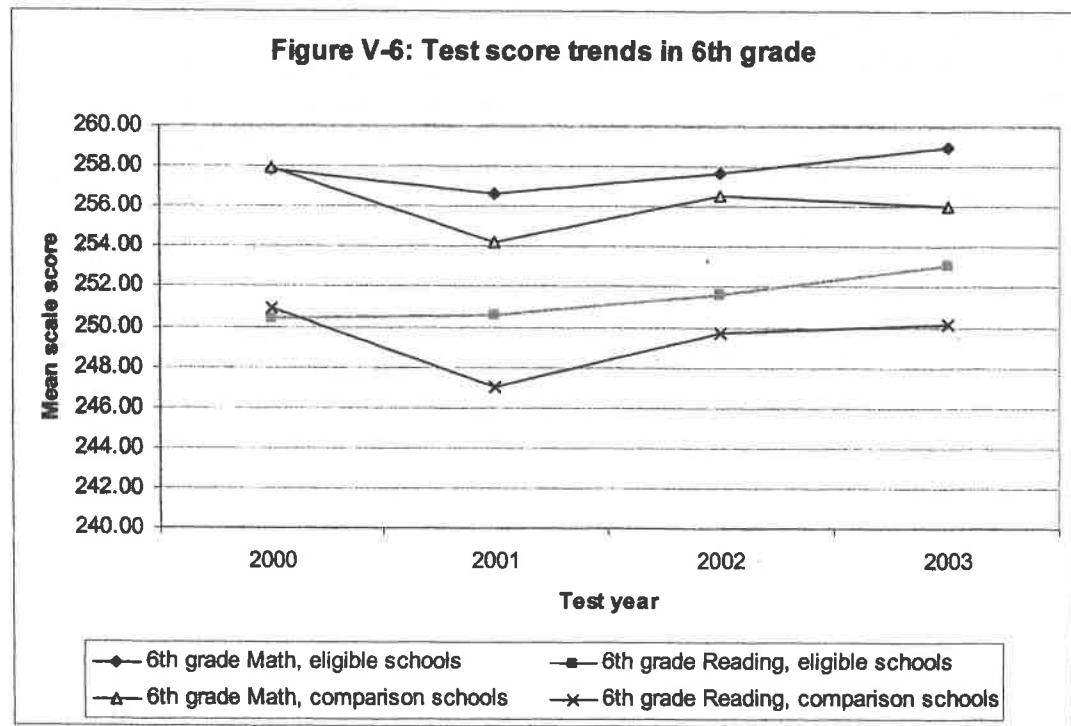
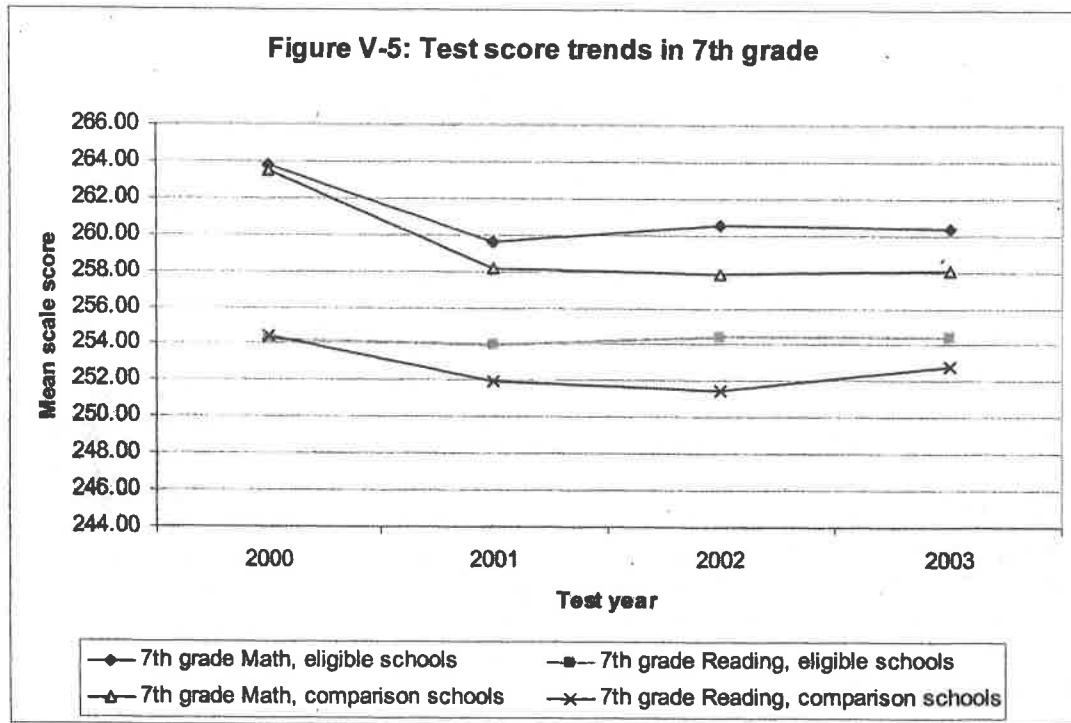
¹⁶ This relates to our earlier assumptions producing an effect size estimate of 0.003-0.007 standard deviations, applied to variables with standard deviations on the order of 10 points.

¹⁷ The scale of Math EOG scores changed after the 1999-2000 school year, and the scale of Reading EOG scores changed after the 2001-02 school year. To make scores comparable, we added 100 points to mean scores recorded before these change dates.

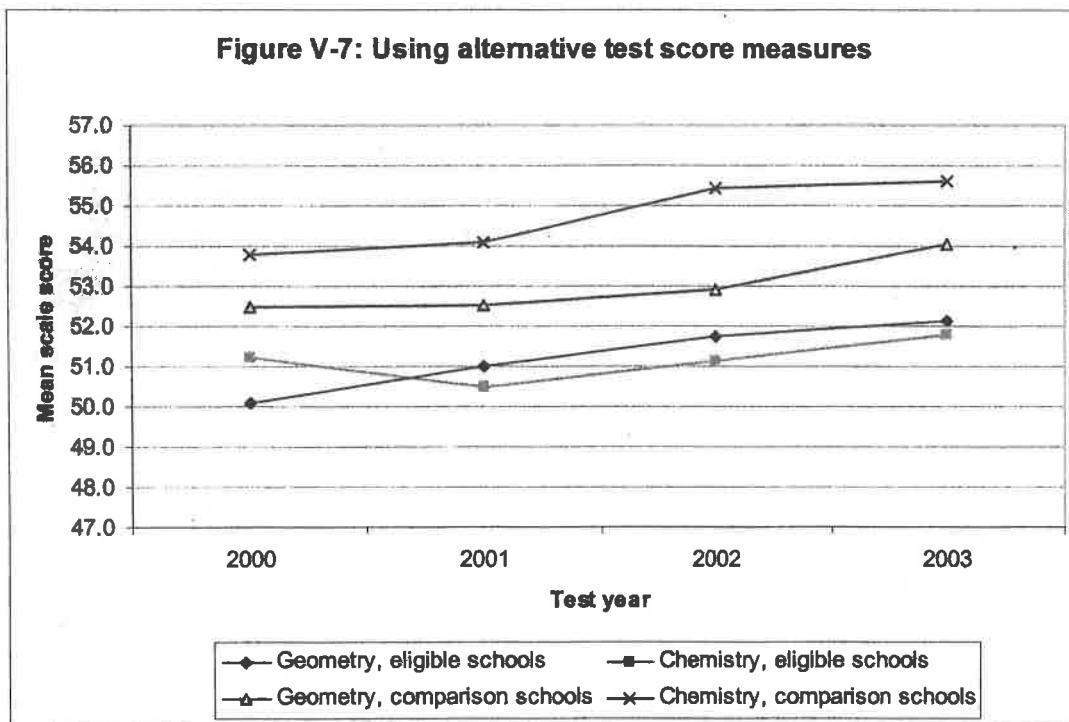
The figure indicates that average Math test scores declined in eligible schools prior to implementation of the Bonus Program. Some portion of the decline may be an artifact of our efforts to make test scores comparable between 1999-2000 and 2000-01, when the point scale used for this test shifted. A similar, though more pronounced, decline is evident in comparison schools. In the two years of program implementation, eligible schools gained ground both in absolute terms and relative to comparison schools.

Turning attention to EOG test scores in reading, the lower two trend lines in Figure V-4, we see a similar pattern. Reading test scores in eligible schools also display slight gains in absolute terms and relative to comparison schools. The most logical conclusion from the 8th grade test score evidence is that factors other than the Bonus Program are most likely responsible for any positive trend in test scores, since Math and Reading scores display nearly identical trends, and only Math teachers were eligible for the Bonus Program. It should be noted, however, that the difference-in-difference point estimate of the Bonus Program's impact, comparing changes in math EOG scores between eligible and comparison schools, is roughly 5% of one standard deviation, an effect size that actually appears large relative to our *a priori* expectations, but not large enough to be statistically significant. The difference-in-difference-in-difference estimate incorporating differential trends in reading test scores produces a negative point estimate of the Bonus Program's impact.

Figures V-5 and V-6 present additional Middle School evidence, examining 7th and 6th grade EOG test scores, respectively. The evidence in these graphs bears a very strong resemblance to that depicted in Figure V-4. In all three grades, math test scores show some improvement in eligible schools relative to comparison schools, but this improvement is evident in reading test scores as well. Moreover, there is not uniform evidence of relative improvement in math scores between 2002 and 2003, when we would expect Bonus Program effects to appear. Such relative improvement appears in 6th and 8th grade math test scores, but not in 7th grade.



A potential concern with the High School analysis above is that the tests used in the analyses were also used to determine eligibility for the Bonus Program. Schools that were eligible in year 1 but experienced rapid increases in test scores would be systematically excluded from our analysis. To address this concern, Figure V-7 presents a similar analysis for scores on math and science end-of-course tests that were not used to determine eligibility: Geometry and Chemistry. Although less commonly administered than Biology and Algebra I exams, these tests were taken by at least 1,000 students in eligible and comparison schools each year.



For both tests, students in comparison schools consistently outperform those in eligible schools in each year. There is some evidence, though, that eligible schools gained some ground relative to comparison schools in geometry: over the four year period, the gap in average test scores shrinks from 2.5 to 2 points, actually reaching a minimum of 1.2 points in 2002. Between 2002 and 2003, though, eligible schools lose ground relative to comparison schools. Moreover, from a statistical perspective, the magnitude of this impact is not large enough to be distinguished from pure sampling error.¹⁸ Trends in Chemistry test scores provide more evidence that eligible schools lost ground relative to comparison schools over this time period. Overall, the use of

¹⁸ The standard error on the mean test scores shown in Figure V-5 are on the order of 0.25. Thus a 95% confidence interval surrounding each mean would extend about 0.5 points on either side. Standard errors on the mean test scores in earlier figures are somewhat smaller, since the underlying samples are larger and the test score distributions have similar standard deviations. Nonetheless, confidence intervals of total width 1 would provide a conservative estimate of the likely magnitude of sampling error in each figure.

alternative test scores points to the same conclusion as earlier analysis: the Bonus Program had no discernible impact on student achievement, as measured by standardized test scores.

Thus we conclude that the Bonus Program has had no discernable impact to date on student achievement in the eligible schools. As discussed above, however, it would be very difficult to identify an effect of the magnitude we hypothesized in a sample of this size. It would have been reasonable to expect the impact of the bonus program on test score performance to grow exponentially over time, due to the compounding effects of changes in turnover rates.

VI. Recommendations for State Policy Makers

Having studied the North Carolina Bonus Program and provided a preliminary evaluation of its effects, we now offer some possible recommendations that may be taken from the state's experience. We offer these with appreciation of the tremendous efforts that have been expended by the state and school districts to implement the program, and with full recognition of the potential shortcomings to which one evaluation such as ours may be subject. The recommendations we see arising from this experience fall into two categories – policy design and implementation.

Policy Design

Trade-offs between simplicity and precision of targeting. In order to target its funds at the teachers in shortest supply in the schools with the most urgent need, the Bonus Program established two levels of eligibility, one at the school level and one at the teacher level. And at each level, further conditions had to be met. In order to identify both high schools and middle schools in need, two different criteria were established to identify schools, one based on the percentage of students eligible for free and reduced price lunch and the other based on failure rates in two end-of-course tests. For a teacher to be eligible, conditions regarding field, certification, and continuity of employment at an eligible school needed to be satisfied. This set of eligibility standards resulted in a program that was not easy to understand, explain, or implement.

In general, a far simpler program may be more effective in influencing teachers' job decisions. However, simplicity should not be viewed as an end in itself. Simpler programs may be less likely to target a specific set of teachers and schools. Thus a tension exists between simplicity and precision of targeting.

Salary differentials as a primary policy tool. A second design aspect of the program was a reliance on salary differentials as the key instrument for effecting a change in teacher behavior. The fact that our survey evidence confirms the relative difficulty that the principals of eligible schools experienced in recruiting teachers to their schools and retaining them prior to the introduction of the program provides a clear rationale for differential salaries for the teachers in such schools. However, the fact that not all teachers within the schools were eligible for the bonus could have created morale

problems. Because we did not survey teachers who were not eligible for the bonus, we can provide no information on the extent to which those teachers felt slighted.

Importantly, our surveys of principals and teachers, administered in the spring of 2004, suggest that the bonuses appeared to have been effective in influencing the decisions of eligible teachers to teach in or to stay in an eligible school. Moreover, our analysis of one year of post-program retention data tend to confirm that the program was successful in helping eligible schools to retain math and science teachers. We await retention data for 2003-04 to confirm these initial findings. Nonetheless, they provide new evidence on the potential for salary differentials to influence teacher decisions about where to teach.

Emphasis on certification. Only teachers fully certified in math, science, and special education were eligible to receive the bonus. In some very poor and/or rural districts, such teachers may be in short supply, both in the teaching corps and in the pool of potential applicants. It is possible, therefore, that setting full certification as a requirement for receipt of the bonus might place the bar too high to be useful for some poor and/or rural districts.

Implementation

Launch date. Assuming the necessary funds are available, the choice of when to begin a program like this involves a tradeoff. On the one hand, it is best to begin as soon as possible since the program depends on establishing and reinforcing incentives for qualified teachers to go to and stay in troubled schools. In that spirit, the Bonus Program was started in the fall of 2001 right after it was enacted, but well after the new teachers had been recruited for that year. On the other hand, it might well have been preferable to launch the program in the early spring so as to have the best chance of influencing the recruitment and retention process for the following year. A spring launch in this case would have provided more time for the Department of Public Instruction to work out the details of the program, to provide accurate and complete information to district and school decision makers, and to be in a position to influence the decisions of applicants receiving job offers as well as established teachers considering whether to stay or leave a school.

Accuracy. The carpenter's rule, "measure twice; cut once," applies to the implementation of any policy that requires administrators to make determinations regarding eligibility. In hindsight, it is relatively easy to conclude that delaying somewhat the dissemination of lists of eligible schools would have been worth avoiding the embarrassment and confusion arising from promulgating a list of eligible schools that would be discovered to contain numerous errors. It is hard to gauge the cost of publishing that incorrect list, but it surely could not have helped the program.

Dissemination. A program such as that being considered here can be no better than the knowledge about it allows it to be. For it to be effective, this program requires that principals, teachers, and potential teachers know about it and understand its

provisions, at least to a first approximation. If principals do not understand it, they cannot use it to recruit new teachers. If teachers do not understand it, they will not take its provisions into account in deciding whether to stay in a school or leave. And if potential teachers do not know about it, they cannot factor the extra salary into their own decisions about jobs to take. Given the importance of dissemination, therefore, we believe greater efforts should be made in advertising the provisions of such programs. This might include a letter sent to every principal in an eligible school to reiterate the program's provisions and to every eligible teacher to emphasize the personal benefit available by virtue of the program.

Certainty. Finally, because of the importance of its provisions guaranteeing future coverage to teachers regardless of whether a school drops out of eligibility, this Bonus Program needed to be applied with unwavering certainty. Some district human resource administrators reported that they did not use the program in recruiting because of their fear that the program would not be continued, in apparent ignorance or skepticism regarding the program's stated provisions. The state's decision to pull the plug on the program has proven these doubters right. If the important actors on whom the program depends to elicit the desired behavior do not believe the state will follow through on the promises implicit in the statute, it is hard to see how it can have much of an impact on behavior. Indeed, the discontinuation of the program may have negative ripple effects on the success of any similar programs the state may try to enact in the future, by creating an environment where educators' faith in the lifespan of such initiatives becomes critically low.

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APPENDIX A: IMPLEMENTATION

Table A-1. Time Line for \$1,800 Bonus

2001

September Legislation debated; ratified and signed by governor 9/26/01
 SB 1005 of 2001 Legislative Session of General Assembly

October 9 All LEAs with eligible schools notified (memo from Jennifer Bennett)

October 16 List sent to LEAs of eligible schools

2002

January 8, 16 Finance officer newsletters 43 and 44 from Hank Hurd (FBS) mention bonus program

May Interim audit [20 were eligible but had not received notice; Alexis Schauss had heard from just one of them by fall 2003; audit by Alexis Schauss determined that 44 should not have gotten notification]

May 22 LEAs notified of error in October list (Letters from Hank Hurd. Notified of schools not eligible and those that should be eligible (Becky McConkey did letters).

September 11 Audit letters to LEAs detailing teachers who should not have received bonus (Attachment A-2)

2003

January LEAs notified of newly eligible schools (Memo to Accompany List 1-15-03.doc; Attachment A-3)

June Guidelines posted on the web:
<http://www.ncpublicschools.org/fbs/SB1005.htm>
<http://www.ncpublicschools.org/fbs/1800policy.html>

August Audit letters to LEAs about ineligible teachers (Attachment A-4)

November 3 Report of FY 2003-04 Eligible Schools released (Attachment A-5)

**Attachment A-2: Sample Audit Letter from DPI to School District,
September 2002**

MEMORANDUM

TO: Finance Officer
Bertie County Schools

FROM: Jennifer S. Bennett, Director
Division of School Business

SUBJECT: \$1,800 Recruitment Retention Bonus

DATE: September 11, 2002

Per Section 29(a) of SB1005, teachers are eligible for an annual \$1,800 bonus if they are certified and teaching in the fields of mathematics, science or special education at a school that was identified as eligible by Department of Public Instruction for fiscal year 2002. These teachers must be teaching students in 6th through 12th grades.

During our audit of the Recruitment Retention Bonus payments, the Division of School Business noted that your LEA paid ineligible teachers out of PRC 094. These teachers were either not licensed appropriately, based on DPI's licensure database, or they were not teaching an appropriate subject, based on the 2002 Student Activity Report.

Our audit noted the following exceptions:

LEA Sch	Last Name	First Name	Amount	Licensed in Teaching in License Appropriate Appropriate			
				Exception	Current	Field	Field
080312	Smith	John	1,800.00	License		No	
080320	Jones	Mary	1,800.00	SAR			No
080312	Price	Michael	1,800.00	License	No	No	

Should these expenditures be the result of a miscoding, a refund for the above amount should be made through the BUD system, by October 8th, 2002. This entry should note that the entry is for the miscoding of PRC 094, in FY 2002. If you have supporting documentation that supports the payment of these bonuses in accordance with Section 29(a) of SB 1005, please submit that documentation for review to the following:

Financial and Business Services
6332 Mail Service Center
Raleigh NC 27699-6332
Fax: 919.807-3723

If you have any questions or require additional details, call Alexis Schauss, Section Chief of Information Analysis and Support, at 919.807.3708.

JSB:AS:dkm

c: Hank Hurd

Attachment A-3. Memo from DPI to School Districts, January 15, 2003

January 15, 2003

MEMORANDUM

TO: Superintendents

Finance Officers

Personnel Administrators

FROM: Philip Price

Becky McConkey, Manager
Office of Budget Management

SUBJECT: \$1,800 Recruitment and Retention Eligible Schools for 2002-03

Attached are the middle and high schools in your LEA that are eligible under Senate Bill 1115, Section 7.22 to provide annual bonuses of \$1,800 in 2002-03 to teachers certified in and teaching in the fields of Mathematics, Science or Special Education in grades 6 through 12. These schools are eligible because 80 percent or more of the students in the schools are eligible for free or reduced lunch **or** 50 percent or more of the students are performing below grade level in Algebra I and Biology.

The bonuses shall be paid monthly with matching benefits. Teachers shall remain eligible for the bonuses so long as they continue to teach in one of these disciplines at a school that was eligible for the bonus program when the teacher first received the bonus. If your school is no longer eligible, any new teacher certified in and hired to teach in the areas of Mathematics, Science and Special Education during 2002-2003 **will** receive the \$1,800 bonus. However, any new teachers hired to teach in 2003-2004 **will not** receive the bonus (unless next fall the school is determined to be qualified). Teachers who do not serve 100 percent in a qualifying position shall receive the bonus on a pro-rata basis.

The bonuses are to be paid from Program Report Code (PRC) 094. No allotment will be made for these bonuses, but expenditures for eligible recipients will be covered as reported through the Uniform Education Reporting System (UERS). If you have any questions, please contact Lydia Prude at lprude@dpi.state.nc.us or Becky McConkey at bmcconke@dpi.state.nc.us.

PWP/BMC/nmr

Attachment

OFBS #03-01

Attachment A-4: Sample Audit Letter from DPI to Districts, August 2003

MEMORANDUM

TO: Earnest Howard, Finance Officer
Bertie County Schools 080

FROM: Paul LeSieur, Director

SUBJECT: \$1,800 Recruitment Retention Bonus

DATE: August 7, 2003

Per Section 29(a) of SB1005, teachers are eligible for an annual \$1,800 bonus if they are certified and teaching in the fields of mathematics, science or special education at a school that has been identified as eligible by Department of Public Instruction for fiscal year 2003. These teachers must be teaching students in 6th through 12th grades.

During our audit of the Recruitment Retention Bonus payments, the Division of School Business noted that your LEA paid ineligible teachers out of PRC 094. These teachers either were not licensed appropriately, based on DPI's licensure database, or they were not teaching an appropriate subject, based on the 2003 Student Activity Report.

Our audit noted the following exceptions:

<u>LEA</u>	<u>Sch</u>	<u>Last Name</u>	<u>First Name</u>	<u>Amount</u>	<u>Exception</u>	<u>License Current</u>	<u>Licensed in Appropriate Field</u>	<u>Teaching in Appropriate Field</u>
080350		Johnson	Sandra	1,800.00	License	Yes		No

Should these expenditures be the result of a miscoding, a refund for the above amount should be made through the BUD system, by August 31, 2003. This entry should note that the entry is for the miscoding of PRC 094, in FY 2003. If you have supporting documentation that supports the payment of these bonuses in accordance with Section 29(a) of SB 1005, please submit that documentation for review to the following:

Division of School Business
Information Analysis and Support
6332 Mail Service Center
Raleigh NC 27699-6332
Fax: (919) 807-3723

If you have any questions or require additional details, call Alexis Schauss, Section Chief of Information Analysis and Support, at (919) 807-3708.

PL:AS:dkm

Attachment A-5: List of Eligible Schools Each Year

Public Schools of North Carolina
North Carolina Department of Public Instruction
FY 2003-04 Schools Eligible for \$1,800 Bonuses

LEA#	LEA Name	SCH#	SCHOOL NAME	ELIGIBLE		
				2002	2003	2004
010	Alamance County	378	SELLARS-GUNN ALTERN	X		X
040	Anson County	305	ANSON CHALLENGE ACAD	X	X	X
070	Beaufort County	306	AURORA MIDDLE			X
070	Beaufort County	310	B C ED TECH CENTER	X	X	
080	Bertie County	310	SOUTHWESTERN MIDDLE		X	X
080	Bertie County	320	C G WHITE MIDDLE	X	X	X
080	Bertie County	350	SERENDIPITY SCHOOL	X	X	X
090	Bladen County	328	EAST ARCADIA ELEM		X	X
090	Bladen County	332	ELIZABETHTOWN MIDDLE			X
100	Brunswick County	308	BRUNSWICK LEARN CTR	X		X
110	Buncombe County	302	BUNCOMBE CMTY SCH-W			X
111	Asheville City	301	ACCELERATED LEARNING	X	X	X
120	Burke County	308	BURKE ALTERNATE			X
140	Caldwell County	306	CALDWELL CO GATEWAY	X	X	X
170	Caswell County	316	BARTLETT YANCEY HIGH			X
181	Hickory City	318	CATAWBA VALLEY HIGH	X	X	X
190	Chatham County	310	SAGE ACADEMY	X	X	X
200	Cherokee County	312	HIWASSEE DAM ELE/MID			X
200	Cherokee County	322	MOUNTAIN YOUTH CTR	X		X
231	Kings Mountain City	330	DAVIDSON SCHOOL	X	X	X
240	Columbus County	330	CHADBURN MIDDLE		X	X
240	Columbus County	336	NAKINA ALTERNATIVE	X	X	X
240	Columbus County	344	EVERGREEN ELEMENTARY			X
240	Columbus County	348	FAIR BLUFF ELEM	X	X	X
240	Columbus County	352	GUIDEWAY ELEMENTARY		X	
241	Whiteville City	312	N WHITEVILLE ACADEMY		X	
260	Cumberland County	346	CUMBERLAND EVENING A	X	X	X
260	Cumberland County	358	LUTHER JERALD MIDDLE	X		X
260	Cumberland County	409	RAMSEY ST HS ALT PGM	X	X	X
260	Cumberland County	413	RAMSEY ST MS ALT PGM		X	X
260	Cumberland County	424	SEVENTY-FIRST HI			X
260	Cumberland County	449	WALKER-SPIVEY	X	X	X
260	Cumberland County	455	WESTOVER HIGH	X		
290	Davidson County	314	DAVIDSON CO EXT DAY	X		X
290	Davidson County	365	SOUTH DAVIDSON HIGH			X
310	Duplin County	396	WARSAW MIDDLE			X

LEA#	LEA Name	SCH#	SCHOOL NAME	ELIGIBLE		
				2002	2003	2004
320	Durham Public	325	HILLSIDE HIGH	X		
320	Durham Public	341	LAKEVIEW SCHOOL		X	X
320	Durham Public	346	LOWE'S GROVE MIDDLE			X
320	Durham Public	366	SHERWOOD GITHENS MID			X
320	Durham Public	368	SOUTHERN HIGH	X		X
330	Edgecombe County	332	PHILLIPS MAGNET	X	X	X
340	Forsyth County	312	ATKINS MIDDLE	X	X	X
340	Forsyth County	396	HILL MIDDLE	X	X	X
340	Forsyth County	452	MINERAL SPRINGS MID			X
340	Forsyth County	478	INDEPENDENCE HIGH	X		X
340	Forsyth County	488	LEAP AT KENNEDY		X	
360	Gaston County	372	WARLICK SCHOOL			X
360	Gaston County	526	YORK CHESTER MIDDLE		X	
380	Graham County	310	ROBBINSVILLE MIDDLE	X		
410	Guilford County	319	T WINGATE ANDREWS HI	X		X
410	Guilford County	355	DUDLEY HIGH	X		X
410	Guilford County	406	HIGH PT CENTRAL HIGH	X		
410	Guilford County	415	JACKSON MIDDLE		X	X
410	Guilford County	533	SCALE SCHOOL	X	X	X
410	Guilford County	544	BEN L SMITH HIGH	X		X
420	Halifax County	312	BRAWLEY MIDDLE	X	X	X
420	Halifax County	324	ENFIELD MIDDLE	X		X
420	Halifax County	346	NORTHWEST HIGH	X		X
420	Halifax County	358	SOUTHEAST HALIFAX HI	X	X	X
420	Halifax County	376	WILLIAM R DAVIE MID	X	X	X
422	Weldon City	318	WELDON MIDDLE		X	X
422	Weldon City	324	WELDON HIGH	X		X
430	Harnett County	345	STAR ACADEMY	X	X	X
440	Haywood County	326	CENTRAL HAYWOOD HIGH	X		X
450	Henderson County	343	TUXEDO EXTENDED DAY	X		X
460	Hertford County	320	HERTFORD COUNTY HIGH	X	X	X
470	Hoke County	342	J W TURLINGTON	X	X	X
490	Iredell County	342	MULBERRY STREET SCH	X		X
500	Jackson County	324	JACKSON CO SC OF ALT	X	X	X
510	Johnston County	380	SOUTH CAMPUS CMTY			X
520	Jones County	324	JONES MIDDLE		X	X
530	Lee County	306	BRAGG STREET ACADEMY	X	X	X
540	Lenoir County	313	KENNEDY HOME			X
540	Lenoir County	318	LEWIS SCHOOL	X	X	X
550	Lincoln County	308	ASBURY SCHOOL	X		X
560	Macon County	332	NANTAHALA SCHOOL			X
580	Martin County	344	ROANOKE HIGH	X		
580	Martin County	350	ROANOKE MIDDLE		X	X
600	Charlotte-Mecklenburg County	360	MARIE G DAVIS MIDDLE			X
600	Charlotte-Mecklenburg County	376	E E WADDELL HIGH			X

LEA#	LEA Name	SCH#	SCHOOL NAME	ELIGIBLE		
				2002	2003	2004
600	Charlotte-Mecklenburg County	381	EASTWAY MIDDLE		X	X
600	Charlotte-Mecklenburg County	386	MIDWOOD HIGH	X	X	X
600	Charlotte-Mecklenburg County	396	GARINGER HIGH	X	X	X
600	Charlotte-Mecklenburg County	426	INDEPENDENCE HIGH			X
600	Charlotte-Mecklenburg County	439	DERITA ALTERNATIVE	X	X	X
600	Charlotte-Mecklenburg County	461	MORGAN SCHOOL	X	X	X
600	Charlotte-Mecklenburg County	490	OLYMPIC HIGH	X		
600	Charlotte-Mecklenburg County	496	PHILLIP BERRY ACAD			X
600	Charlotte-Mecklenburg County	541	SPAUGH MIDDLE			X
600	Charlotte-Mecklenburg County	576	WEST CHARLOTTE HIGH	X	X	X
600	Charlotte-Mecklenburg County	579	WEST MECKLENBURG HI	X	X	
600	Charlotte-Mecklenburg County	592	ZEBULON B VANCE HIGH			X
610	Mitchell County	308	BULADEAN ELEMENTARY	X	X	X
630	Moore County	330	PINCKNEY ACADEMY	X	X	
640	Nash-Rocky Mount	340	W L GREENE ALTERN		X	X
640	Nash-Rocky Mount	361	ROCKY MOUNT HIGH			X
650	New Hanover County	354	LAKESIDE	X	X	X
660	Northhampton County	320	GASTON MIDDLE	X		
660	Northhampton County	324	NORTHAMPTON HI-WEST	X	X	
700	Pasquotank County	310	H L TRIGG COMM	X		X
700	Pasquotank County	317	NORTHEASTERN HIGH			X
710	Pender County	316	BURGAW MIDDLE			X
710	Pender County	325	PENDER CO ALT		X	
710	Pender County	348	WEST PENDER MIDDLE			X
740	Pitt County	402	WELLCOME MIDDLE			X
770	Richmond County	342	LEAK STREET	X	X	X
770	Richmond County	350	ROBERDEL CHILDREN CT	X		
780	Robeson County	324	FAIRGROVE MIDDLE	X	X	X
780	Robeson County	326	FAIRMONT MIDDLE	X	X	X
780	Robeson County	331	ROBESON CO CAREER CT	X		
780	Robeson County	344	MAGNOLIA ELEMENTARY	X	X	X
780	Robeson County	360	PARKTON ELEMENTARY		X	X
780	Robeson County	368	PEMBROKE MIDDLE		X	X
780	Robeson County	391	RED SPRINGS HIGH	X		
780	Robeson County	393	RED SPRINGS MIDDLE	X	X	X
780	Robeson County	396	ROWLAND MIDDLE	X	X	X
780	Robeson County	401	SAINT PAULS HIGH	X		
780	Robeson County	402	SOUTH ROBESON HIGH			X
780	Robeson County	410	TOWNSEND MIDDLE	X	X	X
790	Rockingham County	366	REIDSVILLE HIGH	X		X
790	Rockingham County	392	THE SCORE CENTER	X	X	
800	Rowan-Salisbury County	308	HENDERSON INDEP HIGH	X	X	X
820	Sampson County	370	UNION MIDDLE			X
830	Scotland County	316	EAST LAURINBURG	X	X	X
850	Stokes County	324	MEADOWBROOK SCHOOL	X	X	X

LEA#	LEA Name	SCH#	SCHOOL NAME	ELIGIBLE		
				2002	2003	2004
900	Union County	365	SOUTH PROVIDENCE		X	X
910	Vance County	320	HENDERSON MIDDLE			X
910	Vance County	368	WESTERN VANCE SECOND	X		X
920	Wake County	324	LONGVIEW	X	X	X
920	Wake County	508	MOUNT VERNON		X	
920	Wake County	528	PHILLIPS HIGH	X	X	X
940	Washington County	308	CRESWELL HIGH		X	X
940	Washington County	316	PLYMOUTH HIGH	X		
940	Washington County	328	WASHINGTON CO UNION		X	X
960	Wayne County	310	BELFAST ACADEMY	X	X	
960	Wayne County	312	BROGDEN MIDDLE			X
960	Wayne County	326	DILLARD MIDDLE	X	X	X
960	Wayne County	335	GOLDSBORO HIGH	X		X
960	Wayne County	337	GOLDSBORO MIDDLE	X	X	X
960	Wayne County	378	SOUTHERN ACADEMY	X	X	X
980	Wilson County	306	ADAMS LEARNING CENT			X
980	Wilson County	317	DARDEN MIDDLE			X
990	Yadkin County	340	YADKIN SUCCESS ACAD			X
Total of Eligible Schools				144	88	77 119

APPENDIX B: INFORMATION FROM SURVEYS

Table B-1: Responses to the principal survey¹⁹

Question	Responses	Number	Percent
Is your school currently eligible for the bonus program?	Yes No Not sure	8 93 22	6.5 75.6 17.9
In what year did your school become eligible for the bonus program?	2001-2001 2002-2003 2003-2004 Not sure when eligible Not sure ever eligible	48 15 15 22 21	39.7 12.4 12.4 18.2 17.4
How many teachers in your school received the bonus this year?	0 1-2 3-5 5-10 More than 10 Not sure	7 10 29 25 19 10	7.0 10.0 29.0 25.0 19.0 10.0
How did you learn about the bonus program?	Superintendent District Office Teacher Other	20 42 8 26	20.8 43.8 8.3 27.1
When did you learn about the bonus program?	Before school was eligible When school became eligible After school became eligible I came to this school after it was eligible	18 42 16 21	18.6 43.3 16.5 21.7
Has your school used this program to recruit teachers?	Yes No Not sure	39 51 8	39.8 52.0 8.2
Have you told teachers at your school about the bonus program?	No Yes	15 84	15.2 84.9

¹⁹ Percentages are based on the number that responded to each question. Because some people skipped questions and some questions did not apply to every respondent, the total number of responses changes.

Table B-1: Responses to the principal survey, continued

Question	Responses	Number	Percent
Did you hire any licensed math, science or special education teachers this year?	No Yes	40 59	40.4 59.6
Describe your school's ability to recruit teachers relative to other NC schools.	Similar to others More difficulty Less difficulty	33 60 6	33.3 60.6 6.1
Before the program, did your school have difficulty retaining qualified math, science, special education teachers?	No Yes	39 57	40.6 59.4
Describe your school's ability to retain teachers relative to other NC schools.	Similar to others More difficulty Less difficulty	33 45 18	34.4 46.9 18.8
Did any math, science, or special ed. teachers leave your school in the past three years?	No Yes	18 79	18.6 81.4
<i>For principals who reported teachers left, why did those who left leave your school?</i>	Personal Reasons Low pay Dissatisfied with teaching in general and left the profession Dissatisfied with teaching at this school and left for another school Dissatisfied with this school and left the profession	42 8 4 18 4	55.3 10.5 5.3 23.7 5.3
<i>For principals who reported teachers were dissatisfied, why do you think teachers left your school? (check all that apply)</i>	School not safe Too much paperwork Classes too large Lack of supplies No community support No professional development time Other	2 4 3 2 8 1 23	7.7 15.4 11.5 7.7 30.8 3.8 88.5

Table B-1: Responses to the principal survey, continued

Question	Responses	Number	Percent
<i>For principals who reported teachers were dissatisfied, would those teachers have stayed if the bonus was more than \$1800?</i>	No Yes	14 16	46.7 53.3
What is the minimum amount of money that would affect recruitment?	No amount of money \$1800 is sufficient \$1,800-\$2,999 \$3,000-\$3,999 \$4,000-\$4,999 \$5,000-\$7,000	7 11 34 21 3 22	7.1 11.2 34.7 21.4 3.1 22.5
Has the bonus program affected your school's ability to retain teachers?	No effect Small effect Large effect Too soon to tell	24 34 24 17	24.2 34.3 24.2 17.2
What minimum amount of money would make the bonus more effective in retaining teachers?	No amount of money \$1800 is sufficient \$1,800-\$2,999 \$3,000-\$3,999 \$4,000-\$4,999 \$5,000-\$7,000	10 9 29 24 4 23	10.1 9.1 29.3 24.2 4.0 23.2
What is the effect of the bonus program on student achievement in math and science?	No effect Small effect Large effect Too soon to tell	14 26 20 38	14.3 26.5 20.4 38.8
Is this bonus program a good or poor use of the state's resources?	Good use Poor use No opinion	78 14 6	79.6 14.3 6.1

Table B-2: Responses to the teacher survey

Question	Responses	Number	Percent
What subjects do you teach this year?	Math Science	430 291	64.7 43.7
Do you teach any self-contained Special Education classes this year?	Yes No	166 496	25.08 77.2
Is your teaching position a part time or full time position?	Part time Full time	14 651	2.1 97.9
Are you eligible for the \$1,800 Recruitment/Retention Bonus program?	Yes No I am not sure	578 20 64	87.3 3.0 9.7
Is your school currently eligible for this bonus program?	Yes No I am not sure	539 1 38	93.3 0.2 6.6
In what year did your school become eligible for the Recruitment/Retention Bonus program?	2001-2002 2002-2003 2003-2004 I am not sure	172 104 52 239	30.3 18.3 9.2 42.2
How long do you expect to receive the bonus?	As long as I teach my subject in this school and the school is eligible As long as I teach any subject in this school and this school is eligible As long as I teach my subject in this school regardless of its eligibility As long as I teach my subject in any North Carolina school Just this year I am not sure	286 19 38 51 9 169	50.0 3.3 6.6 8.9 1.6 29.6

Table B-2: Responses to the teacher survey, continued

Question	Responses	Number	Percent
Do you expect to be teaching at this school 2 years from now?	Yes No	446 117	79.2 20.8
How will the bonus of up to \$1800 influence your decision to remain at this school?	Large effect Small effect No effect	187 189 198	32.6 32.9 34.5
What minimum amount of money over your ordinary salary would influence you to stay at this school?	No amount of money \$1800 is sufficient \$1,800-\$2,999 \$3,000-\$3,999 \$4,000-\$4,999 \$5,000-\$7,000	100 84 151 102 40 75	18.1 15.2 27.4 18.5 7.3 13.6
How would the current bonus influence other teachers to stay at this school?	Large effect Small effect No effect Not sure	216 180 64 114	37.6 31.4 11.2 19.9
What minimum amount of money would influence other teachers to stay at this school?	No amount of money \$1800 is sufficient \$1,800-\$2,999 \$3,000-\$3,999 \$4,000-\$4,999 \$5,000-\$7,000 Not sure	12 50 139 118 46 67 141	2.1 8.7 24.3 20.6 8.0 11.7 24.6
How would the \$1,800 bonus influence other teachers to come to teach at this school?	Large effect Small effect No effect Not sure	226 212 37 100	39.3 36.9 6.4 17.4
What minimum amount of money would influence other teachers to come to this school?	No amount of money \$1800 is sufficient \$1,800-\$2,999 \$3,000-\$3,999 \$4,000-\$4,999 \$5,000-\$7,000 Not sure	6 63 142 132 53 84 93	1.1 11.0 24.8 23.0 9.3 14.7 16.2

Table B-2: Responses to the teacher survey, continued

Question	Responses	Number	Percent
Is this program a good or poor use of the state's resources?	Good use Poor use No opinion	531 15 29	92.4 2.6 5.0
Did you teach at this school before the bonus was implemented?	Yes No Not sure	376 150 48	65.5 26.1 8.4
<i>For teachers who came to the school before it was eligible:</i>			
How did you learn about the bonus program?	Administrator Another teacher District office Other	126 89 44 99	35.2 24.9 12.3 27.7
When did you learn about the program?	Before school was eligible When school became eligible After school became eligible	41 218 96	11.6 61.4 27.0
<i>For teachers who came to the school after it was eligible:</i>			
How did you learn about the bonus program?	Administrator Another teacher District office Job fair Other	37 53 21 5 49	22.4 32.1 12.7 3.0 29.7
When did you learn about the program?	Before applied When applied After accepted job	28 12 126	16.9 7.2 75.9
How did knowing about the program influence your decision?	Large effect Small effect No effect Did not know about it	30 19 35 83	18.0 11.4 21.0 49.7

Table B-3: Descriptive statistics of subgroups for principal analyses

Subgroup Categories		Number	Percent
Years of experience as principal	1-2	32	26.0
	3-5	33	26.8
	6-10	28	22.8
	More than 10	30	24.4
School type	Alternative school	45	37.2
	Regular school	76	62.8
School percent non-white	Less than 2/3 non-white	45	37.2
	2/3 non-white or more	76	62.8
School percent of teachers receiving the bonus	Less than 1/3 received it	60	48.8
	1/3 or more received it	63	51.2
Number of years school was eligible	1	45	37.2
	2	36	29.8
	3	40	33.1
District used program to recruit teachers	No	26	36.1
	Yes	46	63.9

Table B-4: Descriptive statistics for subgroups in teacher analyses

Subgroup Category		Number	Percent
Years of experience as teacher	1-2	93	14.0
	3-5	122	18.4
	6-10	120	18.1
	More than 10	330	49.6
School type	Alternative School	114	17.1
	Regular School	551	82.9
School percent non-white	Less than 2/3 Non-white	138	20.8
	2/3 non-white or more	527	79.3
Subject taught	Math or Science	499	75.0
	Special Education	166	25.0
When the teacher started teaching at this school	Came after (Recruited)	150	28.5
	Came before (Retained)	376	71.5
Principal knew about program	No	71	12.8
	Yes	482	87.2

APPENDIX C: RETENTION RATES

Table C-1: Retention rates for teachers in middle schools, over time.

	2000-2001	2001-2002	2002-2003
In eligible middle schools (22 schools)			
Math and science	0.617 (256)	0.581 (236)	0.604 (235)
English and history	0.636 (129)	0.577 (137)	0.581 (148)
Special education	0.750 (16)	0.483 (31)	0.577 (26)
In comparison schools (1) (22 schools)			
Math and science	0.549 (308)	0.647 (278)	0.599 (280)
English and history	0.636 (129)	0.577 (137)	0.581 (148)
Special education	0.615 (26)	0.560 (25)	0.500 (30)
In comparison schools (2) 22 schools			
Math and science	0.535 (312)	0.632 (280)	0.597 (303)
English and history	0.604 (225)	0.643 (235)	0.591 (225)
Special education	0.543 (35)	0.548 (31)	0.600 (35)

Notes. The table entries are the proportion of teachers by category teaching in a school one year who are still teaching the designated subject in that same school the following year. Eligible schools are those that were eligible in the academic year 2001-02. Comparison schools (1) are the 22 schools that are most similar to the eligible schools in terms of the percentage of students who are receiving free or reduced price lunches. Comparison schools (2) are the 22 schools that are most similar after the removal of the schools that were either misidentified as eligible in 2001-02 or that were identified as eligible in a subsequent year.

Source. Calculated by the authors based on data from the North Carolina Department of Public Instruction.

Table C-2: Retention rates for teachers in high schools, over time.

	2000-2001	2001-2002	2002-2003
In eligible high schools (59 schools)			
Math and science	0.597 (623)	0.560 (597)	0.632 (573)
English and history	0.638 (585)	0.644 (576)	0.625 (605)
Special education	0.635 (85)	0.508 (118)	0.445 (146)
In comparison schools (1) (59 schools)			
Math and science	0.661 (936)	0.674 (889)	0.701 (843)
English and history	0.722 (994)	0.670 (976)	0.671 (931)
Special education	0.659 (170)	0.641 (256)	0.570 (302)
In comparison schools (2) (59 schools)			
Math and science	0.707 (1007)	0.713 (1011)	0.718 (964)
English and history	0.762 (1097)	0.711 (1116)	0.711 (1071)
Special education	0.601 (183)	0.634 (238)	0.578 (325)

Notes. The table entries are the proportion of teachers by category teaching in a school one year who are still teaching the designated subject in that same school the following year. Eligible schools are those that were eligible in the academic year 2001-02. Comparison schools (1) are the 59 schools that are most similar to the eligible schools in terms of the sum of the percentages of students who failed Algebra 1 and Biology. Comparison schools (2) are the 59 schools that are most similar after the removal of the schools that were either misidentified as eligible in 2001-02 or that were identified as eligible in a subsequent year.

Source. Calculated by the authors based on data from the North Carolina Department of Public Instruction.

Table C-3: Retention rates for teachers in ungraded alternative schools, over time.

	2000-2001	2001-2002	2002-2003
In eligible ungraded schools (7 schools)			
Math and science	0.556 (18)	0.591 (22)	0.571 (28)
English and history	0.500 (14)	0.700 (10)	0.500 (10)
Special education	0.627 (43)	0.600 (35)	0.586 (29)

