WAKE COUNTY PUBLIC SCHOOL SYSTEM
Research Watch
Evaluation and Research Department

**Report No. 04.16** **June 2004**

# REASSIGNMENT, SCHOOL DIVERSITY, AND STUDENT OUTCOMES

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*Abstract*

The purpose of this study was to ascertain whether reassignment, when used to promote appropriate diversity in the Wake County Public School System (WCPSS), affects academic outcomes. One major finding highlights that most of the students reassigned for diversity purposes in spring of 2002 did not attend the designated schools in 2002-03. Based on the small sample of students who did attend the designated schools, achievement trends favored the reassigned students, but the sample size was too small for the differences to be statistically significant. Measures included student achievement, retention in grade, and participation in special education services. Both the sending and receiving schools' perceptions of the transition were positive. Given the small sample sizes, generalizations from these findings should be avoided.

## BACKGROUND

WCPSS has had a commitment to promote diversity in the student body of its schools ever since the merger of Wake County and Raleigh city school systems in 1976 for desegregation. In addition to voluntary reassignment based on the extensive system of magnet schools, involuntary reassignment of some students is also utilized to accomplish this goal. Beyond the social benefits, this commitment to maintaining a diverse learning environment stems from a large body of research indicating that students learn better in economically heterogeneous school environments rather than in high poverty schools (WCPSS, 1999). With Goal 2003 achievement standards in place,[1] the evidence from

[1] WCPSS Board Goal 2003, adopted in 1998, declared that by 2003, 95 percent of students taking the North Carolina End-of-Grade exams, grades 3 and 8, would be at or above grade level (Flinspach, Banks, Khanna, 2003).

research on the relationship between diversity and achievement, and lower-court decisions regarding race-based student assignment in January 2000, the school system launched a race-neutral assignment policy that takes school socioeconomic status and achievement level into account when making reassignment decisions (Flinspach, Banks, and Khanna, 2003). Two main aspects of the current race-neutral policy that inform this report are 1) no more than 25% of the students at any given school shall be performing below grade level, and 2) no more than 40% of students at any given school should be receiving free or reduced-price lunch (FRL) (WCPSS, Policy 6200, 2003 – Attachment A).[2] These school-level caps were set to reflect the current research findings on the relationship between academic achievement and the concentration of poverty in a school (WCPSS, 1999; Flinspach, Banks, and Khanna, 2003).

## PURPOSE

This study addresses one of the Superintendent's performance goals for 2003-04, set by the Board of Education, which requested more information about the impact of involuntary school change on the academic outcomes of students involved. Before beginning the study, the staff of the Evaluation & Research Department (E&R) solicited input from members of the Board of Education on questions of interest. E&R also met with key staff of the Department of Growth Management about the reassignment process and the number of students reassigned specifically for diversity purposes. Over the last several years, students were reassigned for a number of reasons, including the need to ease over-crowding, to fill new schools, to allow children to attend programs not available at their base school, to address growth and transportation issues, and to maintain diversity within the schools in a school system. In 2002-03, 4,157 students, grades K-12, were reassigned; however, relatively few students were actually reassigned for the purpose of decreasing the percentage of students receiving FRL at some schools. The Department of Growth Management has only begun in recent years to code the reasons why certain areas (nodes) are reassigned. Often the reasons for reassignment fall into more than one distinct category; thus, disentangling the reasons for any given reassignment proves difficult. The 2002-03 school year was chosen for study because the nodes reassigned for diversity could be more easily identified. Approximately 225 elementary students were identified as being reassigned for diversity purposes.

## RESEARCH METHODS

Specific questions of interest and evaluation methods were drafted by E&R after consideration of the board and superintendent input. We convened a panel of evaluation experts from area universities and the Department of Public Instruction. The outside experts recommended using a quasi-experimental approach, in which the progress of the reassigned students would be compared to that of similar students not reassigned—preferably from neighboring nodes. Other suggestions which were incorporated into the evaluation plan were to examine changes in retention in grade and special education placements as well as academic achievement, and to contact school staff of the sending

[2] Exceptions to these maximums are addressed through instructional review and are taken into consideration when designing the assignment plan.

and receiving schools for input on the impact of the changes on overall school climate and student learning. They cautioned that the small sample size would make it unlikely that significant differences in outcomes could be detected.

**Data Sources**

Data came from several sources. To identify and select students for both the reassigned and comparison groups, the following data sources were combined:

- Student Locators for 2002 and 2003
- K-2 Assessment data for 2001-02 and 2002-03
- Master Build End-of-Grade (EOG) Achievement data for 2002-03

**Research Design**

In classical experimental studies, the participants are randomly assigned to the treatment or control groups. In this instance, the WCPSS reassignment plan defined the participants in the reassigned or treatment group. Node selection criteria and matching with random assignment were used to find a comparable control or comparison group. The purpose of this quasi-experimental research is to determine if differences in the outcome variables between these two groups can be explained by the treatment – reassignment to a lower-poverty school.

**The Reassigned Group**

In an effort to address the issue of whether reassignment affects various educational outcomes, the students in the nodes that were reassigned on the basis of diversity in spring of 2002 and who began school at their reassigned location in fall of 2002 were selected for this study. With the assistance of the Department of Growth Management, six nodes[3] were identified as having been reassigned for fall 2002 primarily on the basis of improving socioeconomic diversity. Initially, these six nodes, representing four elementary sending schools, three receiving schools were to be included; however, one of the nodes did not fit the study criteria. Specifically, in five of the nodes, the percentage of students receiving free or reduced-price lunch (FRL – a proxy for low income) was higher in the sending schools than in the receiving schools. In the node in question however, the reverse was true. Therefore, the node in question was omitted from this analysis.

The first step was to examine student enrollment patterns in the reassigned group. The Student Locators for the 2001-02 and 2002-03 school years were utilized to determine students' school assignments in spring of 2002 (before reassignment) as well as the fall and spring of 2002-03 (the reassigned year). Figure 1 tracks the flow of students across schools. There were 218 K-5 students who were slated for reassignment for the 2002-03 school year. All 29 students in grade 5, however, graduated to the 6th grade, leaving 189

[3] Several nodes are tied to a specific school.

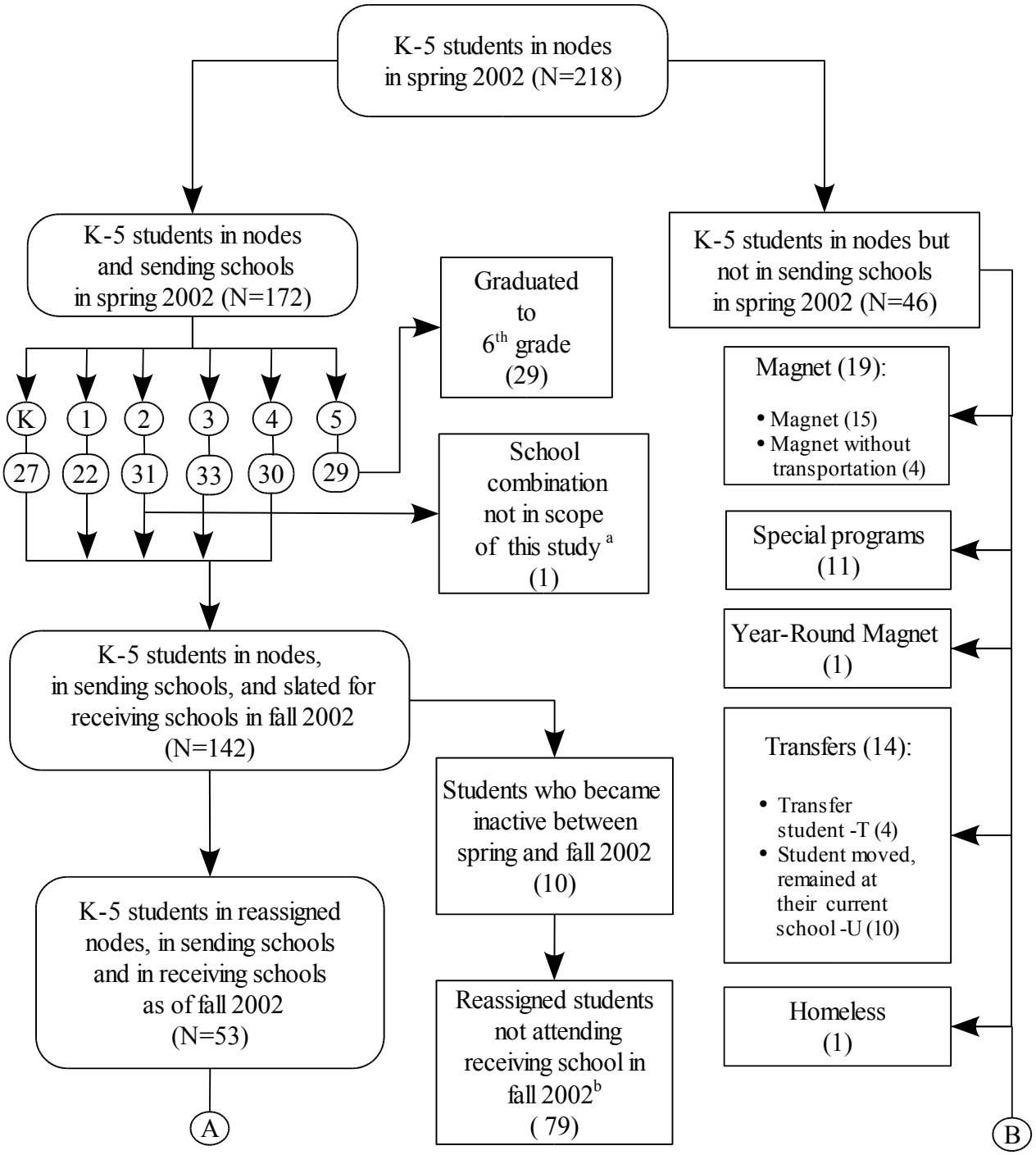
students for whom reassignment was expected to occur. Several factors contributed to students attending schools other than the intended receiving schools. Students may live in one of the reassigned nodes; however, due to choices available to parents with respect to their children's education, not all students living in the identified nodes were actually attending one of the sending schools in spring of 2002. When students not attending one of the sending schools were removed from the analysis, the sample size decreased by 46 students. Of the 143 students attending a sending school, one student's sending and receiving school information did not match the parameters of this study. This reduction left 142 students in the identified nodes, attending a sending school in spring 2002, and slated to attend a receiving school in the fall of 2002.

Over the summer, 10 students became inactive (left the school system) and 79[4] students slated for a receiving school did not attend their newly assigned school in the fall, leaving a sample size of 53. By fall of 2002, two transfer students who were removed from the sample because they were not attending one of the sending schools were added back in as they ultimately ended up attending the receiving school to which they had been reassigned. This addition brought the sample size to 55 students. Finally, three additional students were lost, one each from 3rd, 4th, and 5th grades, due to missing test data, leaving a final sample size of 52 students in the reassigned group.

Figures 1 and 2 illustrate the fluidity of student assignment. Overall, these figures illustrate one of the major findings of this report: namely, *that most of the students who were slated to be reassigned did not, in fact, end up attending the schools to which they had been assigned, but instead took advantage of the many choice options available to WCPSS students.*

[4] Eight of the 79 students took advantage of the "grandfather" clause, opting to remain at the sending school for their 5th grade year. See Figure 2 for the assignment details for students who did not attend their newly assigned schools.

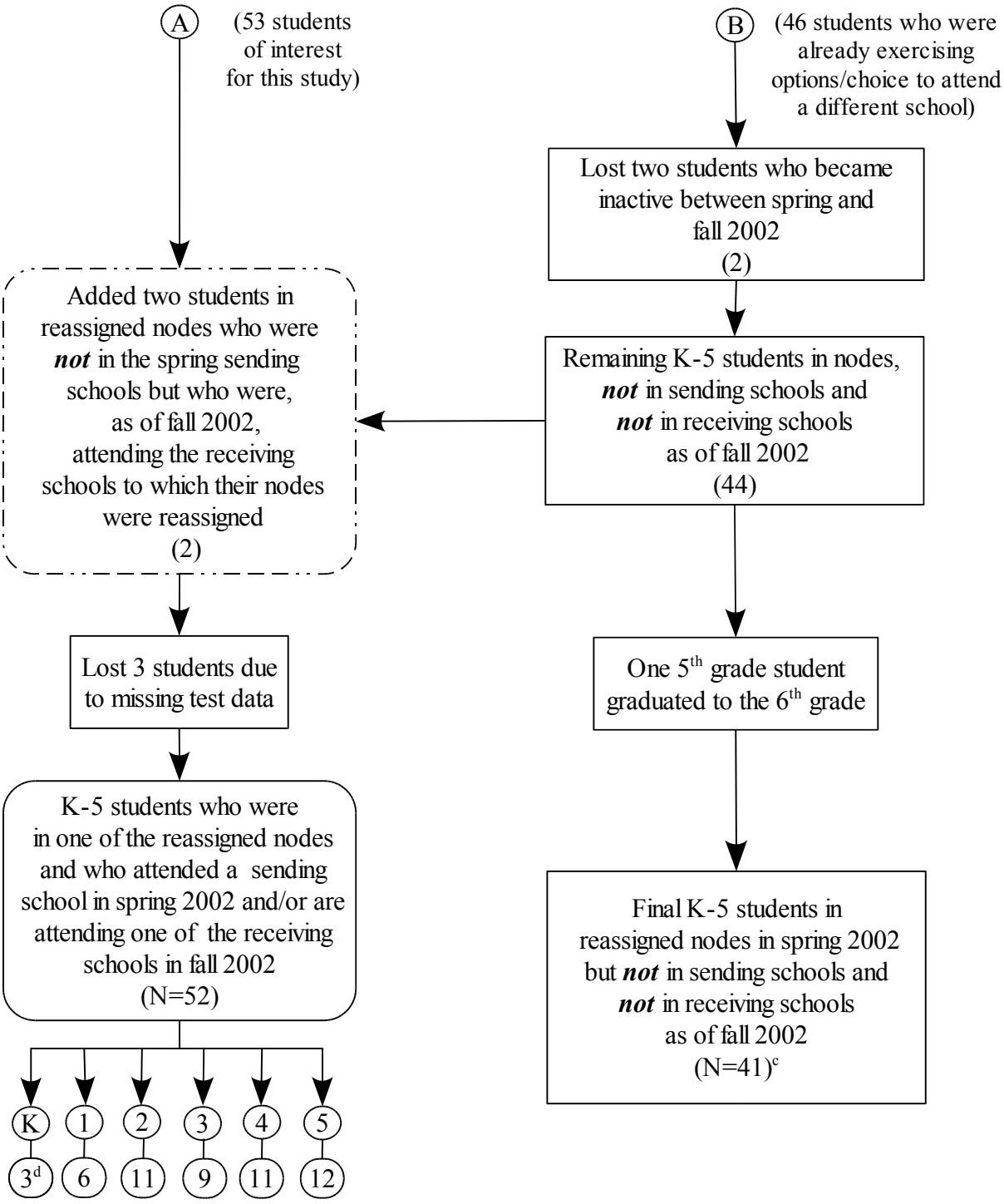
**Figure 1**
**What Happened to Students in Reassigned Nodes?**
**Spring to Fall 2002**




[a] Student's school patterns, according to Student Locator data, were the reverse of expected patterns and data could not be confirmed or explained.

[b] See Figure 2 to determine what happened to these students.

**Figure 1**
**(continued)**
**What Happened to Students in Reassigned Nodes?**
**Spring to Fall 2002**




[c] See Figure 2 for additional details.

[d] These kindergarten students were retained at the end of the 2001-02 school year for the 2002-03 school year.

**Figure 2**
**Where Did Students Go Who Were Not in the Receiving Schools By Fall 2002?**

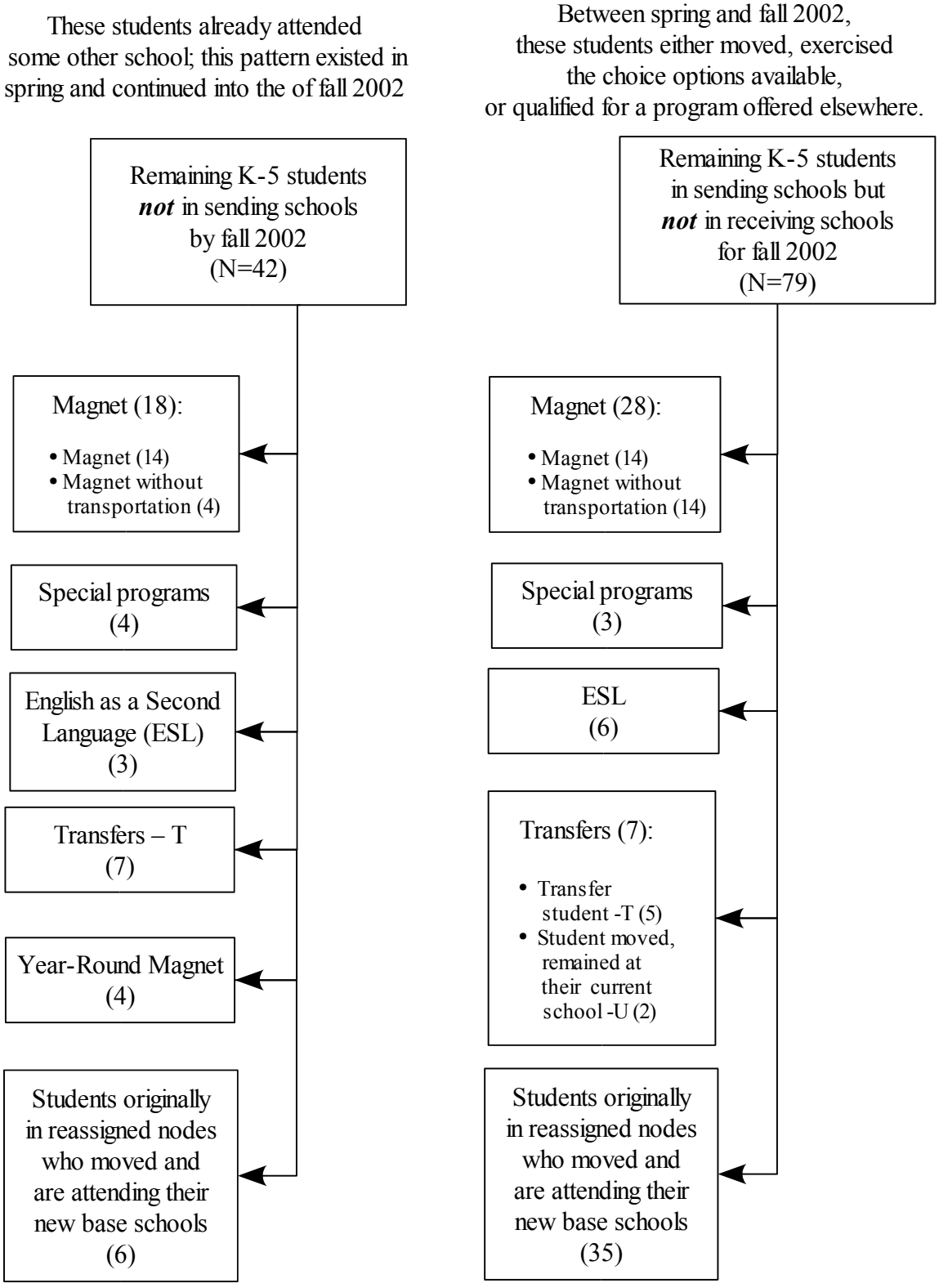
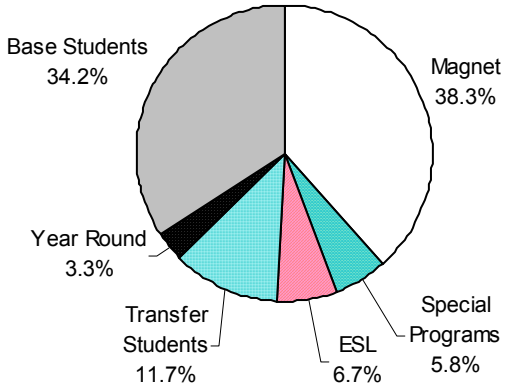


Figure 3 summarizes the assignment status of the 120 students (out of the original 189 of interest) who did not attend one of the intended receiving schools in the fall of 2002. Of the 120 students who did not attend their reassigned school, 41.6% (n=50) were in either program or year-round magnet schools. Another 34.2% (n=41) did not attend the receiving school in fall of 2002 because they held base assignments to the schools they were attending that fall. In each case, between spring and fall 2002, there was a node change, indicating a change of residence.

**Figure 3**
**Assignment Status for Students in a Reassigned Node but Not Attending the Schools to Which They Had Been Reassigned for Fall 2002 (N=120)**

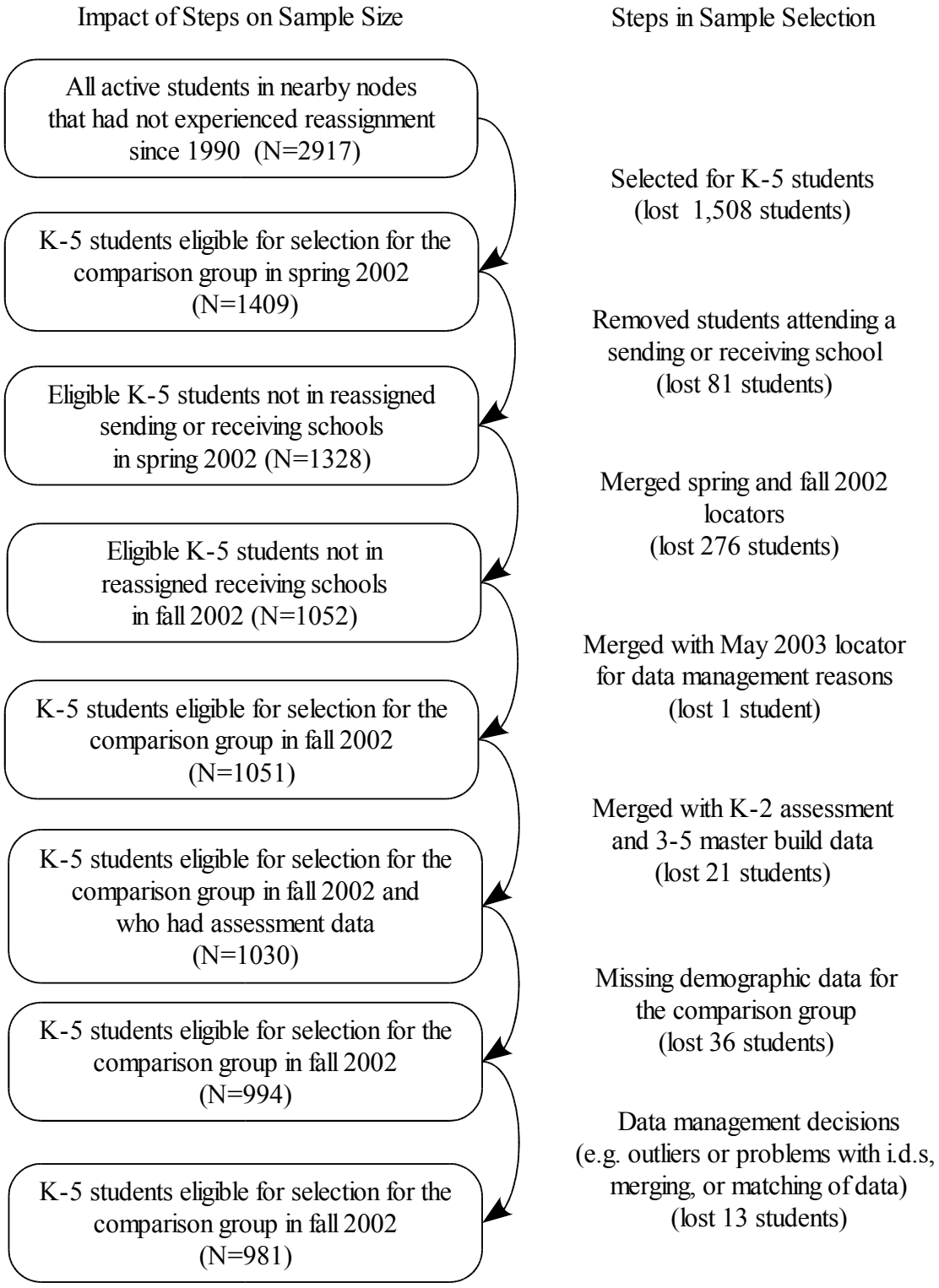



## The Comparison Group

A comparison group, from which the matched group of students was ultimately drawn, was constructed from neighboring nodes that had not been reassigned in the recent past. (See Attachment B for a list of nodes used to generate the comparison group sampling frame). To ensure that none of the students selected had experienced reassignment, nodes that had not been reassigned since 1990 were selected. To be included in the comparison group, a few other criteria had to be met. They had to be active students, in grades 3-5, and none of the students could be attending one of the sending or receiving schools. (See Figure 4 for details on the sample attrition for the comparison group sampling frame).

The comparison group chosen was matched by grade, race, free or reduced-price lunch (FRL) status, prior special education services, and limited English proficient (LEP) status. Initially, pretest scores for math and reading were used to match, as well; however, matching students exactly on pretest scores was not possible, so statistical controls were also included. This research design is not as strong as if the samples were matched perfectly.

**Figure 4**
**Sample Attrition of the Students Eligible for Selection for the Comparison Group Sampling Frame (N=981)**



## Variables

For 1st and 2nd grades, instructional book level for 2002-03 was the outcome variable. At the 1-2 grade levels, students are assessed twice a year to determine their instructional reading level, which ranges from 0 (not yet reading) to 32. WCPSS has set guidelines for the book level students are expected to reach at each grade level: 15-16 at the end of grade 1 and 23-24 at the end of grade 2. There were, however, only six 1st grade and eleven 2nd grade students in the reassigned group. Such small sample sizes are not compatible with the use of inferential statistics; therefore, only univariate descriptive statistics were calculated at these grade levels.

The outcome variables for the analyses of covariance at grades 3-5 are EOG scale scores for reading and math, retention, and special education status for 2002-03. The EOG tests yield both level scores (indicating whether students are scoring at grade level) and scale scores, which increases across grades and are valuable for measuring growth.

In both groups, each student had complete data on the variables used for matching purposes. Students in 3rd, 4th, and 5th grades also had complete data on EOG scale scores for 2001-02 (in other words, they had pretest scores which served as the control variable) in both reading and math.

## Demographic Characteristics of Students in the Analyses

### *Grades 1 and 2*

Seventeen 1st and 2nd grade students who experienced reassignment were in our sample.

- Of these students, 35.3% were in 1st grade and 64.7% were in 2nd grade in 2002-03.
- The students are predominately Black/African American (64.7%), while the remaining students are Hispanic/Latino (23.5%) and Multi-racial (11.8%).
- Of those reassigned, 88.2% were receiving free or reduced-price lunches in 2002-03.
- In 2002-03, 17.7% of 1st and 2nd grade students in the reassigned group were receiving special education services.
- Only 5.9% of the students in the sample were receiving ESL services in 2002-03.

### *Grades 3-5*

Since the comparison group was matched to the reassigned group on various social and school characteristics, the two groups have the same demographic composition for grade, race, FRL status, prior special education services, and LEP status. The combination of these two groups produces a sample size of 64.

- About 28.0% of the students in the sample were in the 3rd grade, 34.4% in the 4th grade, and 37.5% in the 5th grade during the 2002-03 school year.
- The students are predominately Black/African American (84.4%). The remaining students, 15.6%, are Hispanic/Latino.

- In 2002-03, just over 81.0% were receiving free or reduced-price lunches.
- The overwhelming majority of the students, 75.0%, were not receiving special education services in 2002-03.
- None of the students in the sample were receiving LEP services in 2002-03.

## ACHIEVEMENT RESULTS

### Grades 1 and 2

The percentage of students on grade level, as measured by instructional book level was used to describe how the students performed before and after reassignment. Comparisons were made to 1st and 2nd grade students in all WCPSS schools from 2001-02 to 2002-03.

Retention and placement in special education programs were also outcomes of interest in this study. Since none of the reassigned 1st and 2nd grade students had been retained in 2001-02 and none were marked for retention at the end of their first year in their reassigned school, no additional analyses were warranted. The percentage change in students receiving special education services increased 5.9% (from 2 students to 3) between the 2001-02 and 2002-03 school years.

Figure 5 presents the percentage of students on grade level, as measured by instructional book level, before and after the reassignment occurred. In general, a higher percentage of students were on grade level at the end of the first year of reassignment than in the previous year. The WCPSS patterns reveal fairly stable percentages of students scoring at grade level each year. When compared to 1st and 2nd grade students in the system, both sets of students (reassigned and WCPSS students overall) did at least as well as, if not better than, they had the previous school year. The reassigned students show an upward trend, although the small numbers of students included needs to be considered.

We also examined individual book levels across the two academic years. Overall, it appears that students continued to exhibit reasonable growth during this time frame.

**Figure 5**
**Percent of Reassigned Students in 1st and 2nd Grades on Grade Level Compared to WCPSS for 2001-02 and 2002-03**

| | | | 2001-02 | | | | 2002-03 | | |
|---|---|---|---|---|---|---|---|---|---|
| Reassigned Group | 2002 Grade | Book Level | Number of Students | Number on Grade Level | Percent on Grade Level | 2003 Grade | Number of Students | Number on Grade Level | Percent on Grade Level |
| | K | 15-16 | 6 | 4 | 66.7 | 1 | 6 | 5 | 83.3 |
| | 1 | 23-24 | 11 | 8 | 72.7 | 2 | 11 | 11 | 100.0 |
| **Total** | | | **17** | **12** | **70.6** | | **17** | **16** | **94.1** |
| WCPSS Schools | | | | | | | | | |
| | K | 15-16 | 7888 | 6285 | 79.7 | 1 | 8444 | 6734 | 79.7 |
| | 1 | 23-24 | 7597 | 6394 | 84.2 | 2 | 8189 | 6893 | 84.2 |
| **Total** | | | **15485** | **12679** | **81.9** | | **16633** | **13627** | **81.9** |

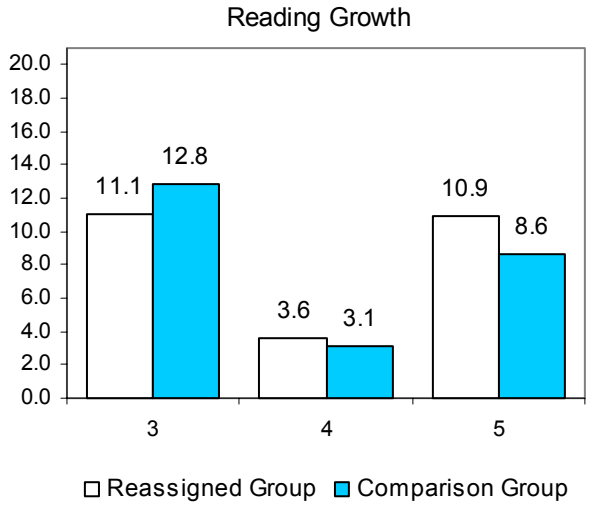
**Grades 3-5**
In order to examine whether being reassigned affected special education status for students in grades 3-5 for the 2002-03 school year, a cross-tabulation analysis using a Fisher's Exact Chi-Square[5] statistic was performed. No retention analysis was performed due to a lack of variation for that outcome.

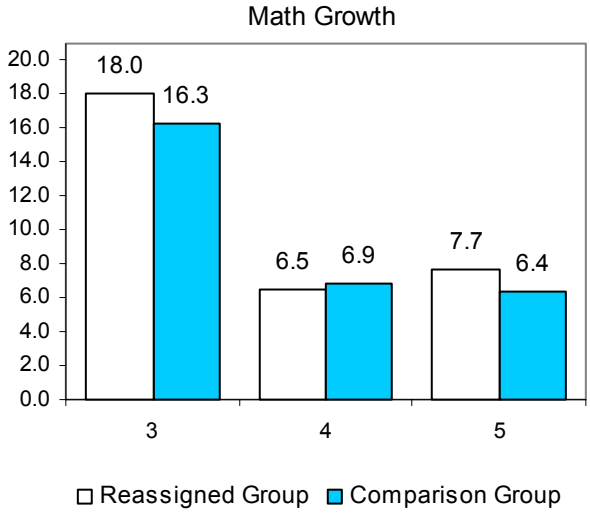
Analysis of covariance for two groups with one control variable was used to examine whether being reassigned affected EOG scale scores for reading and math. These analyses were carried out separately for math and reading by grade. Such separation was necessary due to differences in scale scores and expected growth at each grade level.

**EOG Test Scores:** The analyses of covariance revealed no statistically significant differences between the two groups in scale scores, after accounting for pretest scores. As with the other analyses employed for this research, the extremely small sample sizes are problematic for inferential statistics. In the absence of clear-cut findings, the patterns in the data should be examined. Figure 6 shows the growth (the difference between mean post and pretest scores) for each group in reading and math by grade. The patterns for reading suggest that, overall, the reassigned group experienced higher average growth than the comparison group in two of the three grades; the exception being 3rd grade reading. For math, again, reassigned students appear to be exhibiting higher average growth in all but 4th grade math where the difference in growth is very small.

[5] The Fisher's Exact Chi-square statistic allows for expected frequencies in each cell of the table to fall below five.

**Figure 6**
**Comparisons of Growth between 2001-02 and 2002-03 in Reading and Math for Both Groups**




**Retention:** None of the students in either group was retained.

**Special Education:** There was only a small difference in the distribution of students receiving special education services between the two groups:

- about 25.0% (n=8) of the reassigned group was receiving services in the 2002-03 school year.
- of the comparison group, 21.9 % (n=7) were participating in special education programs in 2002-03.

Figure 7 presents the analysis of the relationship between reassignment and receiving special education services in 2002-03. There appears to be no significant relationship between reassignment status and being in a special education program. There is reason to expect that previous participation in special education services would affect students' current status, therefore, controlling for receiving special education services in 2001-02 is important. There were no differences found after controlling for special education placement for 2001-02. Again, caution must be used when interpreting these results, as the sample sizes are so small that one of the partial tables in the trivariate analysis even violates the requirements of the chi-square test used, which is designed specifically for small sample sizes.

**Figure 7**
**Reassignment and Special Education Services Controlling for Prior Special Education Services for Grades 3-5**

| | | | | Trivariate Relationships | | | |
|---|---|---|---|---|---|---|---|
| Special Education 2002-03 | | Bivariate Relationship | | No Special Education 01-02 | | Special Education 01-02 | |
| | | Reassigned | Comparison | Reassigned | Comparison | Reassigned | Comparison |
| Not in Special Education | | 75.0 | 78.1 | 85.7 | 89.3 | 00.0 | 00.0 |
| | n= | (24) | (25) | (24) | (25) | (0) | (0) |
| In Special Education | | 25.0 | 21.9 | 14.3 | 10.7 | 50.0 | 50.0 |
| | n= | (8) | (7) | (4) | (3) | (4) | (4) |
| Total | | 100.0 | 100.0 | 100.0 | 100.0 | 50.0 | 50.0 |
| | n= | (32) | (32) | (32) | (32) | (4) | (4) |

$X^2$ was not significant for any of the cross-tabulations

[a] Row or Column sum zero. No statistics computed for this table.

**Instructional Climate:** Telephone interviews were conducted with four of the five sending and receiving schools. In general, the sending school principals reported that moving these nodes did help them address the instructional needs of their remaining students better due to a reduction in the number of students with high needs. Other than the typical issues involved with changing schools (i.e., transportation and child care), the receiving schools did not perceive any differences in their climate for instruction and felt they met the needs of their new students.

## CONCLUSION

The purpose of this study was to ascertain whether reassignment, specifically when used to maintain diversity in our schools, affects the academic outcomes of our students. Due to the small sample sizes available, the results of the statistical tests are inconclusive relative to the comparison group; however, the patterns in the raw data appear to suggest that, overall, reassigned students experienced reasonable achievement growth in their first year of reassignment.

## REFERENCES

Flinspach, S.L., Banks, K., & Khanna, R. (2003, Aug./Sept.). Socioeconomic Integration as a Tool for Diversifying Schools: Promise and Practice in Two Large School Systems. Paper presented at the Color Lines Conference, The Civil Rights Project, Harvard University, Cambridge, MA.

Wake County Public School System (WCPSS). Board Policy # 6200: Student Assignment (2003). http://www.wcpss.net/policy-files/series/policies/6200-bp.html.

Wake County Public School System (WCPSS). (1999, March). The Impact of Poverty upon Schools. (Evaluation & Research Report No. 99.20). Raleigh, NC: WCPSS E&R Research Watch Series.

**Attachment A**

6200 STUDENT ASSIGNMENT 6200

The Wake County Public School System believes that maintaining diverse student populations in each school is critical to ensuring academic success for all students, and this belief is supported by research. The school system also must consider such factors as cost effective use of facilities.

Each student enrolled in the Wake County Public School System shall be assigned to the school of his or her grade level serving the attendance area in which that student's parents or court-appointed custodian is domiciled. Exceptions will be made as necessary to limit enrollment of a school due to overcrowding or for special programmatic reasons; e.g., special education, English as a Second Language, or alternative school programs. Each student will have the option of applying for admission to one of the magnet educational programs or year-round programs, which will be offered in designated schools.

All of the following factors, not in priority order, will be used in the development of the annual student assignment plan:

A. Instructional program; e.g., magnet programs, special education, ESL, etc.

B. Adherence to K-5, 6-8, 9-12 grade organization.

C. Facility utilization, including crowding (projected enrollment should be between 85% and 115% of approved campus capacity). New schools may operate with less than 85% of capacity enrolled if some grade levels will not be assigned during the first year or if significant growth is anticipated in the following years.

D. Diversity in student achievement (percentage of students scoring below grade level should be no higher than 25%, averaged across a two-year period). Schools with more than 25% of students below grade level will receive an instructional review to ascertain the reasons for the low achievement; improvement trends will be considered in deciding whether to address this issue in development of the assignment plan.

E. Diversity in socioeconomic status (percentage of students eligible for free or reduced price lunch will be no higher than 40%). Schools with more than 40% of students eligible for free or reduced price lunch will receive an instructional review; improvement trends will be considered in deciding whether to address this issue in development of the assignment plan.

F. Stability (the percentage of students who will remain at the same school).

**Attachment A Continued**



G. Proximity (no student will travel more than the maximum time established by board policy).

Beginning in the fall 2000, the board will review and approve the factors to be considered in developing the student assignment plan and will approve the list of factors and ways to measure those factors by their first meeting in October each year.

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Legal Reference: G.S.115C-366; -367
Cross Reference: Policies 6202 and 6203
Adopted: May 4, 1981
Revised: January 17, 1983
Revised: May 16, 1983
Revised: November 18, 1991
Revised: April 21, 1997
Revised: January 10, 2000
Revised: March 18, 2003

**Attachment B**
**Node Selection Criteria for the Comparison Group Sampling Frame**

| Reassigned nodes solely for diversity purposes for the 2002-03 school year | Surrounding nodes not reassigned at the elementary school level since at least 1990 | Surrounding nodes reassigned within the last 8 years | Surrounding nodes reassigned for the 2003-04 school year. |
|---|---|---|---|
| 036.0 | 034.0 | 039.2 | 245.1 |
| 244.1 | 035.0 | 039.3 | 245.3 |
| 272.2 | 039.1 | | |
| | 040.0 | | |
| Joyner Elementary (456) | 135.1 | | |
| to | 135.2 | | |
| Brassfield Elementary (334) | 243.1 | | |
| | 243.2 | | |
| | 244.3 | | |
| | 244.4 | | |
| | 244.6 | | |
| | 244.7 | | |
| | 245.2 | | |
| | 271.3 | | |
| | 272.1 | | |
| | 272.4 | | |
| | 272.6 | | |
| | 125.0 | | |
| | 091.0 | | |
| 067.0 | 063.0 | 066.2 | 080.0 |
| Farmington Woods Elementary (414) | 065.2 | 155.0 | |
| 144.0 | 066.4 | | |
| Cary Elementary (364) | 074.2 | | |
| to | 084.0 | | |
| Oak Grove Elementary (522) | 145.0 | | |
| | 146.1 | | |
| | 146.2 | | |

Note: All nodes reassigned since 1996 are omitted from sampling frame. This was done to eliminate the chance of selecting a child for the comparison group who had been reassigned.

**Attachment C**
**Reading and Math Pre-test and Post-test Means and Growth for Both Groups for 2001-02 and 2002-03**

| Grade | Sample Size (per group) | Pretest Reassigned Group | Pretest Comparison Group | Grade | Posttest Reassigned Group | Posttest Comparison Group | Growth Reassigned Group | Growth Comparison Group |
|---|---|---|---|---|---|---|---|---|
| | | | **Mean Reading Scores** | | | | **Growth** | |
| 3 | 9 | 231.7 | 231.4 | 3 | 242.8 | 244.2 | 11.1 | 12.8 |
| 4 | 11 | 145.2 | 148.4 | 4 | 148.8 | 151.5 | 3.6 | 3.1 |
| 5 | 12 | 144.7 | 148.0 | 5 | 155.6 | 156.6 | 10.9 | 8.6 |
| | | | **Mean Math Scores** | | | | **Growth** | |
| 3 | 9 | 233.0 | 235.4 | 3 | 251.0 | 251.8 | 18.0 | 16.3 |
| 4 | 11 | 249.7 | 249.4 | 4 | 256.3 | 256.3 | 6.5 | 6.9 |
| 5 | 12 | 250.2 | 252.0 | 5 | 257.8 | 258.4 | 7.7 | 6.4 |

**Attachment D**
**Analysis of Covariance for Grades 3-5 for Reading and Math**

| **Third Grade Reading** | Sums of Squares | Mean Square | F-Value |
|---|---|---|---|
| Full Model | 41.36 | 20.68 | 0.43 |
| | | | |
| Individual Variable Contribution | Type I SS | | |
| Reading Pre-test | 31.25 | | 0.43 |
| Group | 10.11 | | 0.65 |
| $R^2 = 0.0542$ | | | |
| * < .05 ** < .01 *** < .0001 | | | |

| **Third Grade Math** | Sums of Squares | Mean Square | F-Value |
|---|---|---|---|
| Full Model | 92.90 | 46.45 | 3.06 |
| | | | |
| Individual Variable Contribution | Type I SS | | |
| Math Pre-test | 91.54 | | **6.04*** |
| Group | 1.37 | | 0.09 |
| $R^2 = 0.290$ | | | |
| * < .05 ** < .01 *** < .0001 | | | |

**Attachment D**
**(continued)**
**Analysis of Covariance for Grades 3-5 for Reading and Math**

| **Fourth Grade Reading** | Sums of Squares | Mean Square | F-Value |
|---|---|---|---|
| Full Model | 921.71 | 460.86 | **14.57*** ** |
| Individual Variable Contribution | Type I SS | | |
| Reading Pre-test | 921.36 | | **29.13*** ** |
| Group | 0.35 | | 0.01 |
| $R^2$ = **0.605*** ** | | | |
| * < .05 ** < .01 *** < .0001 | | | |

| **Fourth Grade Math** | Sums of Squares | Mean Square | F-Value |
|---|---|---|---|
| Full Model | 284.28 | 142.14 | **5.87** ** |
| Individual Variable Contribution | Type I SS | | |
| Math Pre-test | 284.07 | | **11.73** ** |
| Group | 0.20 | | 0.01 |
| $R^2$ = **0.381** ** | | | |
| * < .05 ** < .01 *** < .0001 | | | |

**Attachment D**
**(continued)**
**Analysis of Covariance for Grades 3-5 for Reading and Math**

| **Fifth Grade Reading** | Sums of Squares | Mean Square | F-Value |
|---|---|---|---|
| Full Model | 36.29 | 18.14 | 1.69 |
| | | | |
| Individual Variable Contribution | Type I SS | | |
| Reading Pre-test | 35.61 | | 3.32 |
| Group | 0.68 | | 0.06 |
| $R^2 = 0.138$ | | | |
| * < .05 ** < .01 *** < .0001 | | | |

| **Fifth Grade Math** | Sums of Squares | Mean Square | F-Value |
|---|---|---|---|
| Full Model | 137.88 | 68.94 | 3.12 |
| | | | |
| Individual Variable Contribution | Type I SS | | |
| Math Pre-test | 136.69 | | **6.18*** |
| Group | 1.20 | | 0.05 |
| $R^2 = 0.229$ | | | |
| * < .05 ** < .01 *** < .0001 | | | |