EVALUATION OF OUTCOMES OF A SINGLE-SEX EDUCATIONAL PROGRAM AT AN ELEMENTARY SCHOOL

by

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ABSTRACT

The purpose of this research was to evaluate outcomes of a single-sex program at an elementary school in Portsmouth, Virginia. Evaluation criteria were (1) girls' and boys' feelings about being grouped into single-sex education and coeducational classes, (2) teaching behaviors, (3) student achievement, (4) student attendance, and (5) student misbehavior.

There were four measures of feelings in this study: feelings about the teacher, feelings about relationships with classmates, feelings about schoolwork, and feelings about the classroom climate. Four one-way ANOVAs with Scheffe's post-hoc comparisons were conducted. Results of the post-hoc analyses revealed that the single-sex male class had more positive feelings about the classroom climate than the single-sex female class.

Teaching behaviors were evaluated through the use of the Hopkins Observation Report Form. Teaching behaviors in two single-sex classrooms and two coeducational classrooms were observed and reported using one-way ANOVAs in three areas: interaction, influence, and non-verbal messages. No differences were found in the frequency of teaching behaviors used in single-sex and coeducational classes in any of the areas.

Student achievement was evaluated using pre- and post-test scores from the Tests for Higher Standards by Flanagan & Mott (1999). The single-sex female, single-sex male, & coed A classes had higher science scores than students in the coed B class. Students in the single-sex male and single-sex female classes had higher social studies scores than the students in the coed B and coed A classes. No differences were found in the performance of the three class types on the math achievement test.

A one-way analysis of variance was conducted to identify differences in absences among the four class groups. Results of Scheffe's post-hoc comparisons showed a difference in absences between the coed A class and the single-sex female class, the single-sex male class, and the coed B class. In all cases the coed A class had more absences per student.

Student misbehavior was reported in four categories: (1) opposition to authority, (2) disrespect, (3) disturbance to the class and peers, and (4) altercation. More misconduct referrals were reported from the two coeducational classes when their data were combined.

DEDICATION

This dissertation study is dedicated to the late Dr. J. Jasper Freeman who saw potential in me and inspired me in my early childhood years to be all that I could be.

and to

The Reverend Dr. Peter M. Wherry who in recent years encouraged and supported me in my endeavor to earn my doctoral degree.

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CHAPTER 1

THE PROBLEM

The context of the study and the theoretical framework are presented in this chapter. Major research findings on the topic of single-sex education during the period of 1972 through 1999 are integrated into the theory. Variables are defined.

Context of the Study

The need for school reform programs is addressed in various reports. The National Educational Research Policy and Priorities Board (1999) reported that America's students fall short of academic achievement levels believed to be necessary to prepare them to be productive citizens for the twenty-first century. The National Research Council (1989) reported that men significantly outnumbered women in mathematics-based careers. According to the council, the under representation was not related to differences in ability, effort, or interest. Differences noted were reportedly due to sex-role experiences at home, in school, and in society (p. 22). Slavin, Madden, and Wasik (1996) identified the first goal of reform as the ability to ensure that every child achieves success starting in the early grades.

The practice of single-sex education dates back to the first public elementary schools in 1860. These schools were established during this period in prosperous areas of New England and the Middle Atlantic States. These schools were known as "common schools." Students attending common schools received instruction in morality, citizenship, and leadership (Riordan, 1985).

In its infancy, single-sex education was available in Catholic schools. According to Kolesnik (1969), Catholic schools were structured specifically for single-sex education. By the early 1800's, two-thirds of the non-public high schools and three-fourths of the non-public elementary schools in the United States were affiliated with the Roman Catholic Church. In 1850, a decree was issued by Pope Pius XI for the Sacred Council of Religious Churches to study the concept of separating students by sex for instruction in response to economic concerns. The Council noted that maintaining separate educational facilities for males and females was a costly procedure. At the conclusion of this study, the Catholic Church voted to adopt the concept of co-institutional high Schools (Kolesnik, 1969).

The purpose of co-institutional schools was to allow boys and girls to attend school in the same building, but assign them to separate classes in different parts of the building (Kolesnik, 1969). The creation of coeducational schools caused public concern. The initial concern was that coeducational schooling exposed upper and middle class children to poor immigrant children. State superintendents and other high officials expressed concern that the curriculum used for coeducation instruction was not differentiated enough to prepare girls to be caretakers of families. School board members were concerned about the methods of punishment used for boys and girls in the coeducational setting. Other proponents of single-sex education believed that girls would be subjected to rude assaults from boys in a coeducational setting (Tyack & Hansot, 1990).

Studies comparing single-sex schools and coeducational schools date back to 1906 (Lee & Bryk, 1986; Lee & Marks, 1990). Many single-sex schools were situated in Australia, Great Britain, and Canada (Shmurak, 1998). Some studies of single-sex education were motivated by goals to equalize the representation of male and female students in mathematics, science, and technology. Perry (1996) reported that girls traditionally fall behind boys in mathematics and science. Research by Marsh, Owens, Myers, and Smith (1989) showed that single-sex education had positive effects on student achievement and that girls performed better than boys in reading and verbal activities.

Opponents of coeducation questioned gender practices. The question of gender practices was whether children were being taught outside of their sex sphere. The theory of sex sphere was defined as students being taught skills that pertained to their gender type. Parents did not want their daughters trained to be legislators, engineers, navigators, and merchants. They proposed that high school studies be organized by gender to prepare pupils for their future destinations (Tyack & Hansot, 1990).

Proponents of single-sex education believed that girls achieved better scholastically without distractions from boys (Morgan, 1986). Others felt that single-sex education helped girls develop spatial and mathematical abilities without having to compete with boys in the classroom. With less competition, researchers hoped that more girls would choose careers in science and technology (Carpenter & Hayden, 1987).

The American Association of University Women (1992) reported widespread gender bias in public schools during the twentieth century. This group contended that gender bias was damaging to the psychological development and academic achievement of students. It recommended alternative instructional methods for female students in regular coeducational settings. The AAUW's support for coeducational schooling was to ensure equitable funding and instruction for girls. These proponents of women's rights advocated that girls be trained to work in a variety of jobs and be able to compete politically and economically with males.

Purpose of the Study

Single-sex education is implemented in public schools to reduce or eliminate achievement gaps between boys and girls. Single-sex education, like any aspect of educational reform, should be planned carefully and evaluated regularly.

The purpose of this study was to evaluate elements of the single-sex program at an elementary school in Portsmouth, Virginia. Evaluation criteria were (1) achievement, (2) student behaviors, (3) teaching behaviors, (4) attendance, and (5) girls' and boys' feelings about being grouped in single-sex and coeducational classes.

Evaluative data on a school-based instructional program are reported to inform decision makers about the outcomes of single-sex classes. These individuals may include building principals, directors of instruction, the assistant superintendent for curriculum and instruction, the director of professional development, and the superintendent of schools. Public awareness may be increased, and these decision makers may be able to plan for improving student achievement using educational resources and program improvement. These results will add to the body of research on single-sex education.

Theoretical Framework

Figure 1 is a model of the effects of single-sex education on such variables as student achievement, student misbehavior, teaching behaviors, attendance, student feelings, and student relationships. Student relationships are not included in this study.

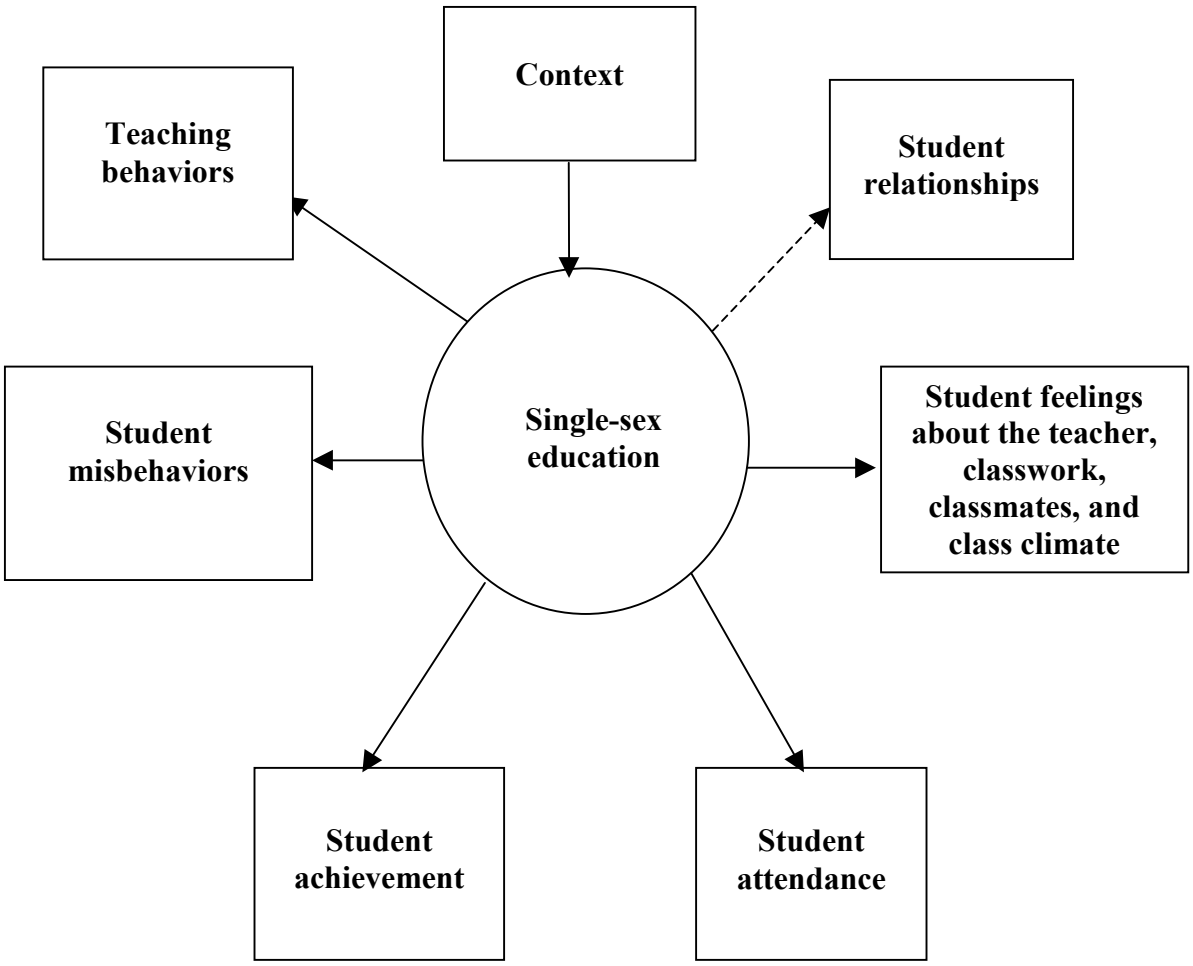

Figure 1. Model of the effects of single-sex education. The broken line to student relationships means that these relationships were not evaluated in this study.

Grouping by Sex and Student Achievement

The grouping of students into single-sex classes is claimed to have a positive effect on student achievement (Lee & Bryk, 1986). The claim is based on the assumption that teachers of single-sex classes will be able to narrow their managerial and instructional focus to the learning needs of students of one gender. Lee and Bryk proposed that certain attitudes and behaviors considered as outcomes are formed early in the secondary school experience. They compared achievement scores for tenth graders and high school seniors from single-sex and coeducational schools. Results showed that girls in single-sex schools demonstrated significantly greater improvement in science and reading between their sophomore and senior years than girls in coeducational schools.

Single-sex schooling is said to be more effective for female students, and coeducational schooling is said to be more effective for male students in improving student performance in mathematics (Price & Rosemier, 1972). These researchers studied cognitive and affective outcomes of classroom groups at the first grade level. The study was conducted to determine if academic achievement in reading, arithmetic, spelling, and word study skills and classroom behavior differed for first grade boys and girls enrolled in single-sex classes as opposed to first grade boys and girls enrolled in coeducational classes. Findings supported that boys in single-sex classes scored better than girls enrolled in single-sex classes in reading and arithmetic.

Jimenez and Lockheed (1989) compared the performance of eighth grade students in single-sex classes and coeducational classes on standardized mathematics tests. The data for this study were extracted from the Second International Mathematics Study. Stratified random samples of classrooms were used in twelve national educational regions in Thailand. The final sample represented data on 3,265 students from 59 coeducational classrooms, 16 all-male classrooms, and 14 all-female classrooms. Male achievement was better in coeducational classes. Female mathematics achievement was better in single-sex classrooms. Females scored higher in mathematics in single-sex classes than females in coeducational classes. Descriptive data on students' performance are in Table 1.

Table 1

Student Performance in Mathematics in Thailand by Sex and Class Type

		Pre-test		Post-test	
Class type	N	M	SD	M	SD
Coeducation	59				
Male		8.83	7.57	12.65	9.05
Female		9.01	7.62	12.19	8.82
Single-Sex					
Male	16	8.18	7.29	10.50	8.46
Female	14	11.33	8.95	14.94	10.62

Note. Data taken from "Enhancing Girls' Learning Through Single-Sex Education: Evidence and a Policy Conundrum" by E. Jimenez and M.. Lockheed, 1989, Educational Evaluation and Policy Analysis, 11, pp. 117-142.

Lee and Bryk (1986) predicted the effects of single-sex and coeducational schooling on academic achievement by performing an ordinary least squares regression analysis. Students were randomly selected from 75 Catholic high schools that were a part of the High Schools and Beyond Survey (HS & B). The random sample included 1,807 students: 452 coeducational girls, 382 coeducational boys, 474 single-sex girls, and 499 single-sex boys. Girls in single-sex schools gained more in reading achievement and science achievement than girls in coeducational schools. No achievement differences were reported for boys in single-sex and coeducational Catholic schools. These data are in Table 2.

Price and Rosemier (1972) examined cognitive outcomes of classroom grouping by gender for first-grade children over a two-year period. Students were randomly selected for experimental and control groups. Five hundred twenty-five students were randomly assigned to groups by sex. Achievement was measured each year using scores obtained from the Stanford Achievement Test. Adjusted mean scores were reported for students on the Stanford Achievement Test in arithmetic, word meaning, and total reading for experimental and control groups. In reading and word meaning single-sex grouping seemed to be advantageous for boys in the first grade. These data are in Table 3.

Research supports that grouping students by sex results in achievement gains in reading (Lee & Bryk, 1986; Price & Rosemier, 1972) mathematics, and science. The findings do not support that girls in single-sex groups always perform better than boys in single-sex groups. Academic gains have been reported for boys and girls in single-sex groups.

Table 2

Estimated Effects of Attending a Single-Sex School on Student Achievement

	Girls			Boys		
Achievement variable	Effect size	Regression coefficient	S.E.	Effect size	Regression coefficient	S.E.
Reading						
Sophomore	.11	.410	.255	.20*	.735	.280
Senior	.21*	.777	.259	.18	.692	.294
Gain	.14*	.494	.190	.05	.196	.227
Mathematics						
Sophomore	-.04	-.261	.455	.26**	1.801	.511
Senior	.01	.047	.502	.18**	1.351	.545
Gain	.04	.268	.321	.00	.014	.394
Science						
Sophomore	-.05	-.139	.228	.01	.107	.243
Senior	.17	.543	.222	.01	.033	.237
Gain	.20**	.630	.172	.01	.024	.201
Writing						
Sophomore	.01	.030	.212	.24*	.830	.263
Senior	.08	.205	.175	.08	.255	.249
Gain	.07	.189	.134	-.05	-.165	.213

Note. Data taken from "Effects of Single-Sex Secondary Schools on Student Achievement and Attitudes," by V. Lee and A. Bryk, 1986. Journal of Educational Psychology, 78, p. 381.

Table 3

Stanford Achievement Results for First Grade Children Grouped by Sex

		Arithmetic scores		Word meaning		Total reading	
		Unadj	Adj	Unadj	Adj	Unadj	Adj
Group	N	M	M	M	M	M	M
SS girls	20	2.84	2.71	2.07	1.98	2.42	2.32
SS boys	17	2.69	2.59	2.25	2.34	2.57	2.62
Coed girls	19	2.81	2.83	2.21	2.07	2.55	2.45
Coed boys	21	1.96	2.32	1.79	1.95	1.90	2.09

Note. Data taken from "Some Cognitive and Affective Outcomes of Same-Sex Versus Coeducational Grouping in First Grade," by E. Price and R. Rosemier, 1972. The Journal of Experimental Education, 40, pp. 71-72.

Grouping by Sex and Feelings About the Teacher, Classwork Classmates, and Class Climate

Pupils learning in single-sex educational settings are reputed to have positive feelings about the experience. Students in these classes may receive more nurturing and may have more positive feelings about school than students in coeducational classes. Lee and Marks (1990) collected and analyzed data to determine the effects of the single-sex school experience on students' attitudes, behavior, and values. Data were collected through the National Study of Gender Grouping in Independent Secondary Schools. Data sources were survey questionnaires, school records, interviews, classroom observations, and documents. Data collected from questionnaires were analyzed through a multivariate analysis. The independent variables were (1) demographics and personal characteristics of students, (2) personal characteristics of families, (3) academic characteristics of students as they enter high school, and (4) students' personal reasons for choosing their high schools.

Boys in Catholic schools were more likely to choose single-sex schools. Girls chose single-sex schools because of family characteristics such as parents and siblings attended this type of school. Attending a coeducational elementary school had a stronger negative effect on girls. Lower mathematics ability was associated with girls choosing single-sex schooling.

Schneider and Coutts (1982) measured students' values and perceptions of their high school environments. Value climate is composed of the behaviors students exemplify in the high school setting. Students completed a questionnaire to rank order six value statements about wealth, appearance, personality, academic achievement, athletic ability, and leadership in activities. Students in single-sex schools ranked achievement and leadership higher than their counterparts in coeducational schools. The population for this study was 2,029 students in grades ten and twelve. Results of this study are in Table 4.

Students at single-sex schools felt that their environments placed greater emphasis on academic achievement than other climate items. The increased emphasis on academic achievement in single-sex schools correlates positively with the high performance of students in single-sex groups in comparison with students in coeducational groups.

Table 4

Mean Ranking of Value-Climate Items: Schools Grouped by Sex

Value-climate items	Coeducational schools		Single-sex schools	
	Males n=421	Females n=427	Males n=589	Females n=592
Good personality	1.87	1.39	1.76	1.38
Leader in activities	2.94	2.90	2.85	2.61
Athletic star	2.61	4.05	2.84	3.71
Good looking	4.36	3.21	4.86	4.20
High grades	4.24	4.15	3.50	3.62
Money	5.00	5.31	5.15	5.46

Note. Data taken from "The High School Environment: A Comparison of Coeducational and Single-Sex Schools," by F. Schneider and L. Coutts, 1982. Journal of Educational Psychology,74, pp. 898-905. A low number signifies the item was seen as contributing highly to achieving importance among same-sex peers at school.

Grouping by Sex and Teaching Behaviors

Streitmatter (1997) studied female students' interactions with the teacher in single-sex classrooms. She observed that the teacher maintained continuous dialogue with the girls while helping them solve problems and equations. Her observation revealed that the teacher was able to assist all of the girls with their work. The girls in the single-sex classroom did not have to compete for the teacher's attention.

Blair and Sanford (1999) conducted an observational study on girls and boys in single-sex classrooms. Students in single-sex classes were interviewed about their present and past educational experiences to determine any differences in teaching strategies. Observations were conducted on classroom activities. The language arts curriculum was adapted to include female authors and gender issues for the all-girls classes. The language arts teacher for the single-sex boys classes adapted the curriculum to focus on schoolwork and issues of literacy for boys. Blair and Sanford reported that teachers were able to devote more attention to the business of teaching as opposed to controlling student behaviors.

A videotape captured a teacher engaging students in the learning of mathematics and social studies (Allen, Cantor, Foster, Grady, & Hill, 1994). The goal was to identify patterns of teaching behaviors. Attention was given to how the teacher directed student questions or responses back to the individuals or the class. The role of the teacher in the all-girls class was to encourage peer talk. Results confirmed that the teacher did not function in the traditional role of having to control the class and facilitate all aspects of the instructional process. Instead, the students were involved in the discussions and assumed responsibility for learning without unnecessary competition.

Trickett et al. (1982) surveyed 456 students in eight coeducational schools and seven single-sex female schools in the United States. Students in single-sex female schools reported teacher control in the classroom. They described their school environment to be more orderly and structured than students in the coeducational schools. Jimenez & Lockheed (1989) reported that teachers in coeducational classes spent less time per week maintaining order. Teachers in single-sex schools tend to be younger and have less in-service training than teachers in coeducational schools.

Grouping by Sex and Student Misbehavior

It is claimed that incidents of poor student behavior will decline in single-sex classrooms (Blair & Sanford, 1999). Tyack & Hansot (1990) found boys more aggressive and disruptive in school than girls. These behaviors required teachers to interact more with boys to maintain discipline. Price & Rosemier (1972) used the Schaefer-Aaronson Classroom Behavior Inventory to rate classroom behavior. This inventory contained 60 items. The covariate was classroom behavior scores collected earlier in the school year. The control population consisted of 10 girls and 11 boys who were in single-sex girls and single-sex boys classes the previous year. The experimental population had 20 girls and 17 boys. The data are in Table 5. The teachers described their students' behaviors using a 4-point scale. Responses to the 60 items were converted to 12 factors. An analysis of covariance was computed for each dimension and 12 factors at alpha = .05. The researchers concluded that single-sex grouping had a positive effect on the girls by causing fewer distractions.

Table 5

Adjusted End-of-Year Means for Classroom Behaviors

Twelve factors	Experimental group		Control group	
	Girls	Boys	Girls	Boys
1. Verbal expression	12.57	14.73	15.33	15.12
2. Gregariousness	14.29	13.22	10.18	13.01
3. Social withdrawal	14.49	14.24	15.83	14.14
4. Self-consciousness	12.13	10.57	9.73	9.38
5. Considerateness	14.05	13.40	16.01	14.42
6. Kindness	9.88	11.70	11.91	11.36
7. Resentfulness	13.21	14.42	15.86	15.52
8. Irritability	13.44	13.77	11.65	12.99
9. Perseverance	14.99	15.76	16.10	15.37
10.Concentration	12.48	10.09	8.72	11.11
11.Hyperactivity	12.88	11.66	13.29	12.71
12.Distractibility	7.46	9.22	10.91	9.23

Note. Taken from "Some Cognitive and Affective Outcomes of Same-Sex Versus Coeducational Grouping in First Grade," E. Price & R. Rosemier, The Journal of Experimental Education, 40, 1972, pp. 70-77.

Grouping by Sex and Student Attendance

The problem of poor school attendance has vexed American educators for many years. Teachers and parents expressed concern for school attendance before the passing of compulsory laws. A major cause for concern over student absenteeism is the harmful effect this problem may have on those who attend regularly. Galloway (1985) reported that excessive student absenteeism interrupts teacher-directed activities by requiring the teacher to bring some students up-to-date while assisting other students who had not been absent with the daily scheduled lesson.

Procedures for identifying and following up absentees are important. School personnel must be aware of the influences that determine attitudes of pupils toward school. Absentees should be analyzed to see whether there are any general conclusions to be drawn. Reid (1987) suggested that there might be an undue proportion of absentees for one gender. The effectiveness of single-sex classrooms will affect the attendance rates of students. The school is a key determinant of the nature of the children who leave it. The rise of youth culture in the public schools marks the emergence of attendance problems, and the increased evidence of a spread of truancy and delinquency (Rutter & Giller, 1983).

Mitchell (1993) found that school attendance among students in coeducational classes differed significantly from students in single-gender classes. The setting for this study was a coeducational elementary school with single-sex classes. She concluded that female students attended school more frequently than males, regardless of class organization. Mitchell found that males in coeducational classes were absent more than males in single-sex classes. Attendance of males in single-sex classes was better than attendance of males in coeducational classes by a ratio of eight to one. Females in coeducational classes had better attendance than females in single-sex classes.

Research Questions

This study was guided by the following research questions:

1. How do students in single-sex classes differ from students in coeducational classes on academic achievement in the areas of science, social studies, and mathematics?
2. How do students in single-sex classes differ from students in coeducational classes on student misbehavior in the following areas: opposition, disrespect, disturbed class, and altercation?
3. How do teaching behaviors in single-sex classes differ from teaching behaviors in coeducational classes in the following categories: interaction, influence, and non-verbal messages?
4. How do students in single-sex classes differ from students in coeducational classes in attendance?
5. How do students' feelings about the teacher, classmates, schoolwork, and classroom climate in single-sex classes differ from students' feelings in coeducational classes?

Definitions

Several key words were used throughout the study. Definitions are provided for each term.

Achievement was students' scale scores on Virginia's Tests of Higher Standards (Flanagan, 1999) for mathematics, science, and social studies.

Attendance was the number of days each student was absent for the1999-2000 school year as recorded in the Integrated Data Store 2 Management System.

Feelings were students' perceptions of the educational environment. In this study, feelings are defined in four domains. These domains include (1) feelings about the teacher, (2) feelings about relationships with classmates, (3) feelings about classroom climate, and (4) feelings about schoolwork (academics). A survey was developed by the researcher to measure feelings. The instrument is in Appendix C.

Teaching behaviors were verbal and non-verbal interactions initiated by the teacher in the classroom. Teaching behaviors were coded on the Hopkins Observation Report Form developed by the researcher. This form has four categories: (1) teacher control activities, (2) non-verbal messages, (3) verbal messages, and (4) interactions with students. The form is in Appendix D.

Student misbehaviors were movements and communications that cause disruption while class is in session. Expectations for student behavior were defined by the Portsmouth Public Schools Student Code of Conduct for the 1999-2000 school year. Student misbehavior was reported on written referrals by the teacher when students exhibited the following misbehaviors: opposition, disrespect, class disturbance, and altercation. These data were retrieved from misconduct reports filed in the principal's office.

Single-sex education was the teaching of children in groups based on same gender. All-girl classrooms and all-boy classrooms comprised single-sex education.

Coeducation was the teaching of children in groups that were sexually heterogeneous. Classrooms with girls and boys comprised coeducation.

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CHAPTER 2

METHODOLOGY

The procedures of the study are described in this chapter. The setting and descriptions of the populations and samples are provided. The research design, data collection methods, and analytical procedures are outlined.

Setting: The School Division and School

The Portsmouth Public School Division is a medium-sized school division located in southeastern Virginia. The division has three high schools, four middle schools, nineteen elementary schools, and three special centers. Total student enrollment for the division was 17,673 for the school year 1999-2000.

Populations and Samples

School C is an elementary school with single-sex classes. School C is an inner-city elementary school in Portsmouth, Virginia. Students attend this school based on a division-wide zoning system. Free transportation is provided to all students zoned to attend School C. Of the school's total population (703 students), forty percent of the students reside in two public housing projects. Ninety-nine percent are African Americans. Ninety-nine percent receive free or reduced-price lunch. Textbooks are provided to all students free of charge.

There are five single-sex classes at School C. At the kindergarten level, there is one male single-sex class and one female single-sex class. At the second-grade level, there is one male single-sex class and one female single-sex class. There is one single-sex female class at the third-grade level.

Sixty-one professional and para-professional staff members are assigned to School C. There are one principal, one assistant principal, one guidance counselor, one social worker, four para-professionals, one librarian, three custodial workers, five food-service workers, one office manager, three clerks, and forty classroom teachers. Eighty-five percent of the professional and general staff members are African American. The gender composition of the teaching staff is 37 females and 3 males.

The program configuration for School C is pre-K through grade 5. School C is organized around departments according to grade levels. A grade- level chair governs the daily logistics for each department. Children requiring special education services attend this school. There are four categories of special education services: self-containment, resource,

mainstream, and inclusion. Teachers assigned to instruct special-needs students are assisted by a para-professional in the classroom.

The curriculum governing instruction is based on a citywide adoption. A variety of programs are offered at School C to complement the pre-K-5 curriculum. These programs include Title 1, Reading Recovery for grade 1, Break Through to Literacy, and computer labs for grades 1-5. Breakfast is served each day to all students. The instructional day begins with a school-based concept called "Ready-to-Read." All students entering the building read one-half hour before the start of the regular school day.

Several after-school programs augment the regular-school-day instructional programs for the boys and girls. These offerings include Tutorial Club, arts and crafts activities, Community Service Club, Foreign Language Club, Chrome Club, boys drill team, Nutrition Club, and the Young Marines.

One single-sex male class, one single-sex female class, and two coeducational classes were included in this study. The grade level for these classes was second. Table 6 describes the makeup of each class included in this study.

Table 6

Description of Groups Included in This Study

Class type	No. of boys	No. of girls	No. of girls	No. of blacks	No. of others
Single-sex male	20	0	0	20	0
Single-sex female	0	22	0	22	0
Coed A	11	12	0	23	0
Coed B	9	11	0	20	0
Totals	40	45	0	85	0

Description of The Single-Sex Program

Single-sex education was implemented at School C in 1995. Grade levels included in the programming model were K, 2, and 4. The goals of the program were: (1) to increase students' average daily attendance, (2) to decrease the number of students referred for misbehavior, (3) to increase students' performance on Standards of Learning tests, and (4) to help students feel positive about school and learning.

In single-sex classes, students are grouped by sex. Student assignment to single-sex classrooms was random. Parents were notified of these random assignments by the principal and were given the option of having their children reassigned to coeducational classrooms. According to the principal, no parents have pursued this option since the program's inception. Single-sex classes were offered for grades K, two, and three during the 1999-2000 school year. There was a single-sex classroom for each gender at each of these grade levels. A male teacher taught one coeducational class for grade two. Females taught the two single-sex classes for boys and girls and the coeducational classes in grades K, two, and three.

Description of the Coeducational Program

Except for the single-sex classes noted, coeducational instruction was provided for all other students attending School C. Coeducation has been provided at School C since its inception in the early 1900s. Grade levels included in coeducation were K through 5. Programming goals for coeducation were the same as those noted for single-sex education. These goals were a part of the school improvement plan. Students were assigned to these classes without regard to sex. This practice is consistent with the citywide K-5 policy.

Data Collection

The researcher collected data based on the theoretical framework shown in Figure 1. Student achievement data were collected from Flanagan pre- and post tests. These tests were administered by classroom teachers during the months of October 1999 and May 2000. Data on student behaviors were collected from misconduct report forms filed in the principal's office. Reporting categories were opposition, disrespect, class disturbance, and altercation. Data on teaching behaviors were collected using the Hopkins Observation Report Form. This form contained 17 nonverbal and verbal teaching behaviors. Teaching behaviors were recorded every five seconds. Each observation session was for twenty minutes. The researcher collected data on student attendance to show the number of days each student was

absent from school in the four classes. This information was retrieved from attendance cards maintained by classroom teachers. A student feelings survey was developed by the researcher to collect data on students' feelings about their teacher, classmates, schoolwork, and classroom climate.

Observation of Teaching Behavior

Teaching behavior was observed using the Hopkins Observation Report Form. This observation instrument was created by the researcher. Its construction and testing are described below.

Construction of the Hopkins Observation Report Form

The Hopkins Observation Report Form was based on the Flanders System of Interaction Analysis (Simon & Boyer, 1974), Boyd's (2000) Non-Verbal Teacher Behavior Observation Form, Mehrabian's (1972) Categories of Non-verbal and Implicit Verbal Behaviors, and the Teacher Expectations and Student Achievement (TESA) (Los Angeles County Office of Education, 1993) program.

Human perception of people is based on many factors besides spoken language. The judgments we make about others are based on perceived emotions, mood, honesty, shyness, gestures, and physical movements (Lewis, 1998). Studies have shown that people convey their feelings in subtle ways. The study of non-verbal communication has focused on several behavioral cues. Mehrabian (1972) researched nonverbal and verbal interactions in categories of immediacy, movements, and facial expressions. Non-verbal teaching behaviors researched by Boyd (2000) are similar to Mehrabian's non-verbal interactions. Boyd's Teacher Behavior Observation System was used to code non-verbal behaviors in seven categories: (1) kinesics, (2) proximity, (3) haptics, (4) oculesics, (5) vocalics, (6) environmental factors, and (7) facial expressions. The researcher used non-verbal and verbal behaviors identified by Boyd (2000) in the categories: proximity, oculesics, and kinesics. Teaching behaviors were modified for the observation report form based on feedback from principals, school psychologists, and curriculum specialists. These individuals were asked to peruse the list of teaching behaviors to identify which were effective and which were not effective. The educators were given the opportunity to recommend additional teaching behaviors based on the categories. The list was adjusted to include two additional behaviors: praises to encourage learning and provides individual help.

The Flanders System of Interaction Analysis (Simon & Boyer, 1974) contains verbal teaching behaviors that have both indirect and direct influence on student participation in the classroom. According to Flanders, teaching behaviors that have indirect influence are (1) accepts feelings, (2) praises or encourages student, (3) accepts or uses ideas of student, and (4) asks questions. Teaching behaviors included in the Flanders System that have direct influence on student participation are (1) lecturing, (2) giving directions, and (3) criticizing or justifying authority.

The Teacher Expectations and Student Achievement Program (TESA) is a research-based program designed to improve student achievement. The goal is to provide students with equitable opportunities to learn. Observation in this program focuses on teacher-student interactions. Participants in the TESA Program are observed in three strands: (1) response opportunities, (2) feedback, and (3) personal regard. Of the three strands, the feedback strand is relevant to this study because it corresponds with the teaching behavior in the Flanders System of Interaction Analysis (Simon & Boyer, 1974) labeled "accepts feelings." The researcher decided to use these behaviors in the observation report form: (1) touches student, (2) stands near student, (3) establishes eye contact, (4) shakes head, (5) gestures with hands, (6) smiles at student, (7) glares at student, (8) frowns at student, (9) provides individual help, (10) asks questions of students, (11) rephrases/gives clues, (12) directs discussion, (13) gives directions, (14) criticizes student, (15) affirms student response, (16) praises to encourage learning, and (17) lectures. Table 7 is a summary of non-verbal and verbal behaviors used in this study. Each behavior is listed by category and source.

Table 7

Categories of Non-Verbal and Verbal Behaviors Used in This Study by Source

Category	Non-verbal or verbal behavior	Source
Immediacy	Touches student (Tb1)	Mehrabian (1972)
Proximity	Stands near student (Tb2)	Boyd (2000)
Oculisics	Establishes eye contact (Tb3)	Boyd (2000)
Movements	Shakes head (Tb4)	Mehrabian (1972)
Kinesics	Gestures with hands (Tb5)	Boyd (2000)
Facial expressions	Smiles at student (Tb6)	Boyd (2000)
	Glares at student (Tb7)	Boyd (2000)
	Frowns at student (Tb8)	Boyd (2000)
Direct influence	Provides individual help (Tb9)	Mehrabian (1972)
Indirect influence	Asks questions of students (Tb10)	Flanders (Simon & Boyer, 1974)
	Rephrases/gives clues (Tb11)	Flanders (Simon & Boyer, 1974)
Direct influence	Lectures (Tb 17)	Flanders (Simon & Boyer, 1974)
	Directs discussion (Tb12)	Flanders (Simon & Boyer, 1974)
Direct influence	Gives directions (Tb13)	Flanders (Simon & Boyer, 1974)
	Criticizes student (Tb14)	Flanders (Simon & Boyer, 1974)
Indirect influence	Affirms student response (Tb 15)	Flanders (Simon & Boyer, 1974)
Feedback	Praises to encourage learning (Tb 16)	TESA (Los Angeles County Office of Education, 1993)

Note. Tb stands for teaching behavior. The number beside each Tb notation represents the position of the item in the observation report form.

Like the Flanders system, the observer coded teaching behaviors while sitting in the classroom. The number of subjects observed during a sitting was one teacher. Subjects in the study were assured of confidentiality. The researcher maintained a non-participant role while investigating these behaviors.

Testing the Hopkins Observation Report Form

A pilot study was conducted to authenticate the researcher as an observer prior to beginning the field study. A pilot school was selected based on a recommendation by the Supervisor of Research and Program Evaluation for the Portsmouth City School Division. The Supervisor of Research and Program Evaluation was asked to identify an elementary school that had at least a ninety-seven percent black student population and a high percentage of students on free or reduced-price lunch. These conditions matched those of the school that would be studied. Douglass Park Elementary School was selected.

About the pilot school. Douglass Park Elementary School is a Pre-K-5 school located in Portsmouth, Virginia. The student population is ninety-nine percent black and one percent white. Ninety-five percent of the students receive free or reduced-price lunch. This school hosts a Universal Breakfast Program that serves more than 600 students daily. The professional staff is described in Table 8. Instructional programs at Douglass Park Elementary School are augmented by a number of special programs that extend and enhance regular classroom instruction. These programs include Accelerated Reader, Breakthrough to Literacy, Jostens Lab, Reading Recovery, CHROME, First Steps to Engineering, Parents as Teachers, IBM Write to Read Lab, and Young Scientists. The instructional staff receives help in accomplishing school improvement goals through several partners. These partners contribute funds, volunteer services, and work with school personnel in cooperative educational projects. The partners are Yale University, Elizabeth City State University, Hampton University, Norfolk State University, Old Dominion University, Bell Atlantic, and The Virginian-Pilot newspaper.

Table 8

Professional and Classified Staff at Douglass Park Elementary School

Professional staff	N	Classified staff	N
Principal	1	Teaching assistants	15
Assistant principals	2	Clerks and secretaries	2
Kindergarten teachers	5	Cafeteria workers	8
First grade teachers	5	Custodial workers	5
Second grade teachers	6		
Third grade teachers	6		
Fourth grade teachers	4		
Fifth grade teachers	4		
Pre-K teachers	3		
Early childhood special education teacher	1		
Special education resource teachers	5		
Art teacher	1		
Music teacher	1		
Physical education teacher	1		
Librarian	1		
School nurse	1		
Reading-resource teachers	1.5		
Reading recovery teachers	4		
Gifted and talented teacher	1		
Guidance counselors	1.5		

Authentication of the observer. The researcher was authenticated as an observer through a series of observations. An instructional supervisor trained to evaluate teachers used the Hopkins Observation Report Form simultaneously with the researcher to observe teaching behaviors in a classroom. Inter-rater reliability was based on the agreement between the observations of the researcher and the expert observer. The Hopkins Observation Report Form is in Appendix D.

The researcher used time-unit coding. Simon & Boyer (1974) explained that time-unit coding requires the observer to record all codable behaviors during a defined period. A behavior was recorded as observed during a specified period. Notations were made every five seconds.

The researcher and supervisor were trained on the use of the observation instrument beginning October 11, 1999. During the first training session, the researcher described each item on the observation form and demonstrated how to record responses on the timeline matrix. A timeline matrix is a coding form used by the observer in this study. Time was blocked into five-second intervals. When lines were added to the matrix, a behavior-by-time grid was produced. This form is Appendix D. Teaching behaviors were observed for 20 minutes.

Observations were completed until an inter-rater reliability coefficient of .80 or greater was achieved on each behavior. The researcher experienced increased accuracy in using the Hopkins Observation Report Form over four practice sessions.

Results of the Hopkins Observation Report Form test for inter-rater reliability. Initial observations in the Pilot School began on October 29, 1999. The supervisor who was considered to be an expert observer and the researcher visited a second-grade class for 20 minutes. Twenty-two students were enrolled in this particular class. Thirteen students were female, and nine students were males. A teaching behavior was coded every five seconds. A teacher observed giving direction to students five times would be calculated as 25 seconds. Levels of agreement between the researcher and the supervisor were calculated for the first observation period. During the first observation, the researcher and supervisor noted several teaching behaviors that were not listed on the observation form. Recommendations were given to amend the observation form to include: (1) facilitates discussion, (2) calls student by name, (3) sits near student, (4)

responds negatively to student, (5) responds to questions, and (6) monitors student's work. Percentages were calculated based on 20 minutes of observation time. Table 9 contains these results. Subsequent observations were conducted at the pilot school on November 3, 5, and December 10, 1999. The researcher and expert observer practiced timing techniques and coding teaching behaviors. Table 10 contains results of the fourth observation for 1,200 seconds. The researcher and expert observer agreed 100 percent on nine teaching behaviors observed. The researcher and observer agreed on all other behaviors except "praises to encourage learning" at or about 80% agreement criteria. These results demonstrate that the researcher was able to code teaching behaviors every five seconds with accuracy except for "praises to encourage learning." The Hopkins Observation Report Form is Appendix D.

Table 9

Percentage of Agreement Between the Researcher and the Supervisor by Teaching Behavior, First Observation

Teaching behavior	Supervisor	Researcher	% of agreement
Touches student	0	0	100.0
Stands near student	1200	1200	100.0
Establishes eye contact	10	0	00.0
Shakes head	0	0	100.0
Gestures	1200	1200	100.0
Smiles	0	0	100.0
Frowns	0	15	00.0
Glares	0	0	100.0
Provides individual help	10	0	00.0
Asks questions	120	65	54.2
Rephrases/gives clues	35	45	78.0
Directs discussion	120	80	66.7
Gives directions	35	40	87.5
Criticizes student	0	0	100.0
Affirms student response	45	30	66.7
Praises to encourage learning	15	25	60.0
Lectures	800	800	100.0

Note. Total observation time was 20 minutes. These numbers are observation times in seconds.

Table 10

Percentage of Agreement Between the Researcher and the Supervisor by Teaching Behavior, Fourth Observation

Teaching behavior	Expert observer	Researcher	% of agreement
Touches students	5	5	100.0
Stands near student	1135	1130	99.6
Establishes eye contact	5	5	100.0
Shakes head	5	5	100.0
Gestures	45	55	81.8
Smiles	50	40	80.0
Frowns	0	0	100.0
Glares	0	0	100.0
Provides individual help	165	170	97.1
Asks questions	165	185	89.2
Rephrases/gives clues	35	35	100.0
Directs discussion	820	820	100.0
Gives directions	260	245	94.2
Criticizes student	0	0	100.0
Affirms student response	125	110	88.0
Praises to encourage learning	10	5	50.0
Lectures	0	0	100.0

Note. Total observation time was 20 minutes. The numbers shown are the observation times in seconds.

Hopkins Feelings Survey

A survey was administered to measure how second grade students feel about being in single-sex classrooms and coeducational classrooms. This instrument was constructed by the researcher.

Construction and Structure

The survey was developed to determine student feelings in grade two single-sex classes and coeducational classes. Four domains of feelings were used. These domains were: (1) feelings about the teacher, (2) feelings about relationships with classmates, (3) feelings about schoolwork (academics), and (4) feelings about classroom climate. Students responded to items on a three-point scale: 3=always, 2=sometimes, and 1=never. Eight survey items were in domain one, nine items were in domain two, three items were in domain three, and four items were in domain four. Faces were included for each item to facilitate student understanding and response (see Appendix C).

Content Validation

Fifteen members of a graduate seminar on dissertation research were asked to review this instrument for content on September 29, 1999. Respondents reviewed the content of each item and selected the domain best suited for the item, rated the item for strength of association with the selected domain, and rated the item for clarity. The rating of survey items on association with the domains was required to identify possible strengths. Item association response categories were (1) very weak, (2) weak, (3) strong, and (4) very strong. Clarity ratings were (1) not clear at all, delete; (2) somewhat clear, revise; and (3) clear, leave as is. Items with very weak or weak associations were revised or deleted. Items rated not clear were revised or deleted. Tables 11-13 contain responses from the first validation study. The instrument used in the first validation study is in Appendix A.

The first validation study showed that members of the dissertation research seminar disagreed on the domain placement for eight survey items. Less than 80% of the respondents placed these items in the expected domain. Members of this group did not agree consistently on the strength of association of the items with domains. The seminar participants made several suggestions about the revision of the Hopkins Feelings Survey. These suggestions were: (1) drop the phrase “I feel that” from all statements in the survey, (2) avoid using

vague words such as “enough,” (3) specify what the teacher helps the student with, (4) avoid abstract words such as “learn” and “work,” and (5) define the phrase “pick on me.”

Table 11

Domain Placement: Hopkins Feelings Survey, First Content Validation Study, (N=15)

Item	Expected domain	Domain[a] 1 n	1 %	2 n	2 %	3 n	3 %	4 n	4 %
2	**1**			**11**	**73.3**	**1**	**6.7**	**3**	**20.0**
3	**1**			**11**	**73.3**	**3**	**20.0**	**1**	**6.7**
4	4							15	100.0
5	4							15	100.0
6	4							15	100.0
7	4							15	100.0
8	3	15	100.0						
9	1	15	100.0						
10	1	13	86.7			2	13.3		
11	1	14	93.3			1	6.7		
12	**1**	**6**	**40.0**			**9**	**60.0**		
13	2			13	86.7	2	13.3		
14	3					15	100.0		
15	1					15	100.0		
16	2			12	80.0	2	13.3	1	6.7
17	4			13	86.7	2	13.3		
18	1	14	93.3			1	6.7		
19	2			14	93.3	1	6.7		
20	**4**			**8**	**53.3**	**3**	**20.0**	**4**	**26.7**
21	**3**	**10**	**66.7**			**3**	**20.0**	**2**	**13.3**
22	**1**	**11**	**73.3**			**4**	**26.7**		
23	2			14	93.3			1	6.7
24	**1**	**10**	**66.7**			**5**	**33.3**		

Note. The items are in Appendix A. [a]Domains are 1 = feelings about the teacher, 2 = feelings about relationships with classmates, 3 = feelings about schoolwork (academics), 4 = feelings about classroom climate.

Table 12

Strength of Association of Items With Domains: Hopkins Feelings Survey, First Content Validation Study, (N=15)

		Domain[b]											
	Expected	1			2			3			4		
Items	domain	n	M[a]	SD	n	M[a]	SD	n	M[a]	SD	n	M[a]	SD
1	2				15	3.40	.83						
2	1				11	3.60	.67	1	3.00	.00	3	3.67	.58
3	1				11	3.45	.69	3	3.00	.00	1	3.00	.00
4	4										15	3.93	.26
5	4										15	3.93	.26
6	4										15	3.93	.26
7	4										15	3.73	.59
8	3	15	3.40	.63									
9	1	15	3.80	.41									
10	1	13	3.54	.52				2	3.50	.71			
11	1	14	3.64	.63				1	4.00	.00			
12	1	6	3.33	1.21				9	2.78	.67			
13	2				13	3.77	.44	2	3.00	.00			
14	3							15	3.40	.83			
15	1							15	3.40	.83			
16	2				12	3.17	1.03	2	2.50	.71	1	4.00	.00
17	4				13	3.46	.97	2	3.50	.71			
18	1	14	3.50	.76				1	3.00	.00			
19	2				14	3.14	1.17	1	4.00	.00			
20	4				8	2.88	1.13	3	3.00	.00	4	4.00	.00
21	3	10	3.40	.70				3	3.67	.58	2	1.50	.71
22	1	11	3.66	.92				4	3.50	1.00			
23	2				14	3.36	.74				1	3.00	.00
24	1	10	3.10	.88				5	3.60	.89			

Note: The content of the items is in Appendix A. [a]The scale was 1 = very weak, 2 = weak, 3 = strong, and 4 = very strong. [b]Domains are 1 = feelings about the teacher, 2 = feelings about relationships with classmates, 3 = feelings about school work (academics), and 4 = feelings about classroom climate.

Table 13

Clarity of Items: Hopkins Feelings Survey, First Content Validation Study, (N=15)

Item	Clarity				
	N	M	SD	Min	Max
1	15	3.00	00	3	3
2	15	2.80	.41	2	3
3	15	2.60	.51	2	3
4	15	3.00	.00	3	3
5	15	2.93	.26	2	3
6	15	2.93	.26	2	3
7	15	2.80	.41	2	3
8	15	2.53	.52	2	3
9	15	2.87	.35	2	3
10	15	2.53	.52	2	3
11	15	2.73	.46	2	3
12	15	2.27	.59	1	3
13	15	2.80	.41	2	3
14	15	2.73	.46	2	3
15	15	2.67	.49	2	3
16	15	2.53	.64	1	3
17	15	2.53	.64	1	3
18	15	2.53	.52	2	3
19	15	2.40	.74	1	3
20	15	2.27	.70	1	3
21	15	2.33	.72	1	3
22	15	2.80	.56	1	3
23	15	2.47	.64	1	3
24	15	2.73	.59	1	3

Note. The items are in Appendix A. The scale was 1 = not clear at all, delete; 2 = somewhat clear, revise; 3 = clear, leave as stated.

A criterion of 80% agreement among respondents was set as acceptable for placement of items within domains. Eighty-percent or more of the respondents agreed on domain placements for 17 items. Less than 80% of the respondents agreed on domain placements for seven items. These items were: (2) I feel my teacher helps me to learn, (3) I feel my teacher enjoys working with the class, (12) I feel that boys and girls should be in this class, (20) I feel I am praised enough when I do good work, (21) I feel I get to work with my classmates enough, (22) I feel that only girls should be in this class, and (24) I feel that only boys should be in this class. The researcher reworded these seven items. Twelve other items were not clear and needed revision. Standard deviations for these items ranged from .52 to .74. The standard deviation measured the dispersion or variability around the mean response for above .51 were revised.

The researcher had an elementary school psychologist evaluate the survey items for validity on October 20, 1999. This individual recommended that the researcher re-define classroom climate to avoid subjective terms that are difficult to measure and to use more direct statements to improve clarity.

The researcher conducted a second validation study on the Hopkins Feelings Survey. A group of secondary educators participated in this study. The revised survey used in the second validation study is in Appendix B. Results from the second validation study are reported in Tables 14, 15, and 16. At least 80% of the respondents agreed on the domain placements of 23 items. Item 15 was in the correct domain in the first validation study; therefore, it was kept in the survey. All items received a standard deviation from .25 to .34 for clarity. These standard deviations were less than .51, thus the items had acceptable clarity.

Table 14

Domain Placement of Items: Hopkins Feelings Survey, Second Content Validation Study, (N=16)

Item	Expected domain	Domain[a] 1 n	1 %	2 n	2 %	3 n	3 %	4 n	4 %
1	2			16	100.0				
2	1	16	100.0						
3	1	15	93.8			1	6.3		
4	4							16	100.0
5	4							16	100.0
6	4							16	100.0
7	4					1	6.3	15	93.8
8	3					16	100.0		
9	1	16	100.0						
10	1	16	100.0						
11	1	16	100.0						
12	1	14	87.5			2	12.5		
13	2			16	100.0				
14	3					16	100.0		
15	**1**	**7**	**43.8**			**9**	**56.3**		
16	2			15	93.8			1	6.3
17	4					3	18.8	13	81.3
18	1	16	100.0						
19	2			16	100.0				
20	4							16	100.0
21	3					16	100.0		
22	1	16	100.0						
23	2			14	87.5			2	12.5
24	1	16	100.0						

Note. The items are in Appendix C. [a] Domains are 1 = feelings about the teacher, 2 = feelings about relationships with classmates, 3 = feelings about school work (academics), 4 = feelings about classroom climate.

Table 15

Strength of Association of Items With Domains: Hopkins Feelings Survey, Second Content Validation Study, (N=16)

Items	Expected domain	Domain[a] 1 n	1 M[b]	1 SD	2 n	2 M[b]	2 SD	3 n	3 M[b]	3 SD	4 n	4 M[b]	4 SD
1	2				16	3.69	.60						
2	1	16	3.81	.40									
3	1	15	3.73	.46				1	4.00	.00			
4	4										16	4.00	.00
5	4										16	3.81	.54
6	4										16	3.81	.54
7	4							1	4.00	.00	15	3.87	.35
8	3							16	3.81	.40			
9	1	16	3.88	.34									
10	1	16	3.50	.52									
11	1	16	3.94	.25									
12	1	14	3.64	.50				2	3.50	.71			
13	2				16	3.94	.25						
14	3							16	3.69	.48			
15	1	7	2.86	.90				9	3.56	.53			
16	2				15	3.93	.26				1	3.00	.00
17	4							3	3.00	.00	13	3.38	.51
18	1	16	3.88	.34									
19	2				16	3.75	.45						
20	4										16	3.94	.25
21	3							16	3.94	.25			
22	1	16	3.63	.50									
23	2				14	3.86	.36				2	3.50	.71
24	1	16	3.63	.50									

Note. The items are in Appendix C. [a] Domains are 1 = feelings about the teacher, 2 = feelings about relationships with classmates, 3 = feelings about school work (academics), and 4 = feelings about classroom climate. [b] The scale was 1 = very weak, 2 = weak, 3 = strong, and 4 = very strong.

Table 16

Clarity of Items: Hopkins Feelings Survey, Second Content Validation Study, (N = 16)

	Clarity				
Item	N	M	SD	Min	Max
1	16	2.94	.25	2	3
2	16	3.00	.00	3	3
3	16	3.00	.00	3	3
4	16	3.00	.00	3	3
5	16	3.00	.00	3	3
6	16	3.00	.00	3	3
7	16	3.00	.00	3	3
8	16	3.00	.00	3	3
9	16	3.00	.00	3	3
10	16	2.94	.25	2	3
11	16	3.00	.00	3	3
12	16	2.94	.25	2	3
13	16	3.00	.00	3	3
14	16	2.88	.34	2	3
15	16	3.00	.00	3	3
16	16	2.94	.25	2	3
17	16	2.94	.25	2	3
18	16	3.00	.00	3	3
19	16	3.00	.00	3	3
20	16	3.00	.00	3	3
21	16	3.00	.00	3	3
22	16	3.00	.00	3	3
23	16	3.00	.00	3	3
24	16	2.94	.25	2	3

Note. The items are in Appendix C. Clarity ratings are 1 = not clear at all, delete; 2 = somewhat clear, revise; and 3 = clear, leave as is.

Scoring the Hopkins Feelings Survey

The Hopkins Feelings Survey was scored based on a three-point scale. Three was the most positive response for all survey items. The number of items in each domain is in Table 37, Chapter 3. Students responding to feelings about the teacher could score a maximum of 24 points because there were eight survey items in this domain. The maximum score for class climate items was 12 because there were only four survey items in this domain.

Achievement Measures

The measurement of student growth is a necessary component of educational evaluative studies. Student academic achievement in this study was measured in three areas – mathematics, science, and social studies – using the Tests for Higher Standards (Flanagan & Mott, 1999).

Construction and Structure of the Tests for Higher Standards

The Tests for Higher Standards were developed under the leadership of Dr. Stuart Flanagan, Professor Emeritus of the College of William and Mary. Dr. Flanagan and colleagues modeled the Tests for Higher Standards after the popular Literacy Passport Test and the Virginia Standards of Learning. These tests are criterion referenced and diagnostic in nature. Test items are formatted as multiple-choice. Results are presented in matrixes so that educators can track student weaknesses and plan for instruction.

Testing the Tests for Validity and Reliability

The Tests for Higher Standards have been rated for validity and reliability through field testing in the state of Virginia. Beginning in 1998, some school districts used the Tests for Higher Standards, Grade-Level Tests, in draft form. The tests have been critiqued and edited by teachers and educational supervisors in the King and Queen, Loudoun, Lancaster, Newport News, Petersburg, and Hopewell school divisions. Criteria for review and field-testing were (1) content matched with Virginia Standards of Learning, (2) readability for a particular grade level, (3) difficulty of content, and (4) format. Test authors made revisions and adjusted items based on the recommendations of reviewers.

Uses of the Tests

The Tests for Higher Standards are used for grade-level testing and pre- and post-testing in the four core areas: science, social studies, language arts, and mathematics. These tests are used primarily to provide students with simulated experiences for taking the

Virginia Standards of Learning Tests. Classroom teachers are able to collect pre- and post-data on individual student strengths and weaknesses, as well as the academic performance of whole classes. The results of the Tests for Higher Standards are used to plan and provide instruction. Teachers may elect to use the tests for mid-year testing, end-of-unit testing, or end-of-year testing. Pre-testing is not required.

Scoring of the Tests for Higher Standards

The Tests for Higher Standards may be hand scored on individual response sheets. The scoring procedure is designed to report the number of correct responses. These scores represent raw scores.

Student Behavior Measures

Data on student behavior were collected from misconduct records submitted by the teachers and guidance counselors. These data were retrieved from student files in the assistant principal's office. Categories of student misbehavior were (1) opposition to authority, (2) disrespect, (3) disturbance to the class and peers, and (4) altercation.

Attendance Measures

Attendance was measured as the number of days absent based on a school calendar of 180 days. The data were collected from copies of student report cards filed in the guidance department of the school. Attendance was for the 1999-2000 school year.

Data Analysis

The outcomes of single-sex classrooms at School C were measured relative to academic achievement, attendance, student misbehavior, teaching behaviors, and student feelings. Statistical analyses focused on one independent variable and twelve dependent variables. The independent variable was membership in a single-sex classroom or a co-educational classroom. Dependent variables were attendance, student misbehavior, student feelings, teaching behaviors, mathematics achievement, science achievement, and social studies achievement.

Academic Performance and Student Grouping by Sex

The researcher retrieved student scale-scores from the Flanagan test in the school division's Office of Research and Evaluation. Pre-test scores were available for September 1999. Post-test scores were collected after the May 2000 testing cycle.

The academic achievement was examined using three ANOVAs, with post-test scores as the dependent variable and pre-test scores as the covariate. Adjusted means and unadjusted means are provided on the dependent variables—the post-test scores—for math, science, and social studies.

Student Misbehavior and Student Grouping by Sex

The researcher collected data from misconduct reports submitted to the principal's office during the school year. Data on student misbehavior was reported as: opposition, disrespect, class disturbance, or altercation. Descriptive statistics are reported to show the numbers, means, and standard deviations for each conduct type.

Teaching Behaviors and Student Grouping by Sex

Teaching behaviors in two single-sex classrooms and two coeducational classrooms were observed and tallied according to 17 activities included on the Hopkins Observation Report Form. Descriptive statistics were reported for each teaching behavior group as means and standard deviations. A one-way analysis of variance (ANOVA) was conducted on each category of teaching behaviors. These categories were: influence, interaction, and non-verbal messages. A total of three ANOVAs were used to report these data.

Attendance and Student Grouping by Sex

The researcher collected attendance data reported by teachers on students' attendance cards. Attendance cards were submitted daily to an attendance clerk in the main office.

Descriptive statistics (means, standard deviations, and percentages) were calculated for the dependent variable attendance for four class types (single-sex male, single-sex female, coeducation A, and coeducation B). An analysis of variance was conducted on attendance results for the four class memberships to determine whether the mean attendance was significantly different.

Student Feelings and Student Grouping by Sex

There were four measures of feelings. They were feelings about the teacher, feelings about classmates, feelings about schoolwork, and feelings about the classroom climate. Each of these was a dependent variable. The independent variable was class type: single-sex-male, single-sex female, coeducation A, and coeducation B. Means and standard deviations were calculated for each dependent variable across the levels of the independent variable. Four

ANOVAS with Scheffe's post-hoc comparisons were run to determine if differences in feelings were present across the four class types.

CHAPTER 3

RESULTS

The data are reported and analyzed in this chapter. Research questions and results for academic achievement (math, science, and social studies), student misbehavior, teaching behavior, attendance, and students' feelings are presented.

Research Questions

The five research questions were:

1. How do students in single-sex classes differ from students in coeducational classes on academic achievement in the areas of science, social studies, and mathematics?
2. How do students in single-sex classes differ from students in coeducational classes on student misbehavior in the following areas: opposition, disrespect, class disturbance, and altercation?
3. How do teaching behaviors in single-sex classes differ from teaching behaviors in coeducational classes in the following categories: influence, interaction, and non-verbal messages?
4. How do students in single-sex classes differ from students in coeducational classes in attendance?
5. How do students in single-sex classes differ from students in coeducational classes on feelings about the teacher, feelings about relationships with classmates, feelings about schoolwork, and feelings about the classroom climate?

Grouping by Sex and Academic Achievement

Analysis of covariance was used to investigate differences in academic achievement as measured by the Tests for Higher Standards (Flanagan & Mott, 1999). Pre-test scores were used to control for initial differences in achievement among the four classes: single-sex male, single-sex female, coeducation A, and coeducation B. The pre-test scores were tested for differences prior to applying the test for covariance, and there were no differences among the groups. Achievement was measured in science, social studies, and math. The results of these tests are in Table 17

Table 17

Tests for Pretest Differences in Science, Social Studies, and Math Among the Four Classes of Students

Subject	Classes of students												F	p
	Single-sex male			Single-sex female			Coed A			Coed B				
	N	M	SD	N	M	SD	N	M	SD	N	M	SD		
Science	18	15.94	3.90	15	14.93	3.45	13	13.31	4.48	17	15.29	3.62	1.23	.31
Social studies	18	19.89	2.45	15	19.73	4.13	16	19.31	4.50	17	21.53	6.28	.76	.52
Math	17	24.82	6.97	12	24.00	4.77	15	26.07	6.43	17	23.35	8.17	.45	.72

Note. The tests were the Flanagan tests of science, social studies, and math.

The unadjusted and adjusted means and standard deviations for the four class organizations for the post-test in science achievement are in Table 18. An analysis of covariance was conducted on the scores to identify differences among the groups. The results of this ANCOVA are in Table 19. Differences were found among the means, and Scheffe's post-hoc comparisons were conducted to locate the differences. The results are in Table 20. Significant differences were found between the Coed B class and each of the other classes. The students in the coed B class performed significantly lower on the science post-test than the single-sex male class, single-sex female class, and coed A class.

Table 18

Unadjusted Means and Adjusted Means for the Four Classes of Students on the Flanagan Science Test With Science Pretest as the Covariate

		Unadjusted		Adjusted	
Class	N	M	SD	M	SD
Single-sex male	16	26. 69	5.67	26.39	1.27
Single-sex female	15	25.80	5.03	25.76	1.29
Coed A	13	25.54	5.75	25.96	1.41
Coed B	15	15.33	3.75	15.31	1.29

Table 19

Analysis of Covariance for Science Achievement

Source	SS	df	MS	F	p
Covariate (science pretest scores)	66.28	1	66.28	2.62	.11
Class type	1291.58	3	430.53	17.04	.00
Within	1364.12	54	25.26		
Total	34816.00	59			

Note. The test was the Flanagan science achievement test.

Table 20

Scheffe's Post-Hoc Comparisons for Post-Test Science Scores

Class type	Class type	Mean differences[a]	p
Coed B	Single-sex male	-11.35	.00
	Single-sex female	-10.47	.00
	Coed A	- 9.43	.00

[a]Coed B minus the other class types.

The unadjusted and adjusted means and standard deviations for the four class organizations in social studies are reported in Table 21. An analysis of covariance on social studies achievement scores was used to identify differences among the classes. These results are in Table 22. A significant difference was found among the classes. Scheffe's post-hoc comparisons were conducted to investigate the differences among the social studies post-test scores. These results are in Table 23. The mean post-test social studies score for the coed B class was significantly different from that of the single-sex male class and the single-sex female class. Students in the coed B class scored lower than the single-sex male and single-sex female classes on the social studies posttest. Students in the coed B class scored the same as students in the coed A class on the social studies posttest.

The unadjusted and adjusted means and standard deviations for the four class organizations in math are in Table 24. An analysis of covariance was conducted on math achievement scores to identify differences among the classes. Results of this ANCOVA are in Table 25. There were no significant differences among the classes. All four classes performed the same in math.

Table 21

Unadjusted Means and Adjusted Means for the Four Classes of Students on the Flanagan Social Studies Test With Social Studies Pretest as the Covariate

		Unadjusted		Adjusted	
Class	N	M	SD	M	SD
Single-sex male	12	35.92	14.53	36.05	3.27
Single-sex female	15	30.47	9.35	30.58	2.92
Coed A	13	28.54	12.69	28.83	3.15
Coed B	17	18.41	9.06	17.98	2.78

Table 22

Analysis of Covariance for Social Studies Achievement

Source	SS	df	MS	F	p
Covariate (social studies pretest scores)	110.53	1	110.53	.86	.36
Class type	2506.14	3	835.38	6.50	.00
Within	6679.47	52	128.45		
Total	52544.00	57			

Note. The social studies achievement test was from the Flanagan Tests for Higher Standards.

Table 23

Scheffe's Post-Hoc Comparisons for Post-Test Social Studies Scores

Class type	Class type	Mean differences[a]	p
Coed B	Single-sex male	-17.50	.00
	Single-sex female	-12.05	.04
	Coed A	-10.13	.13

[a]Coed B minus the other class types.

Table 24

Unadjusted Means and Adjusted Means for the Four Classes of Students on the Flanagan Math Test With Math Pretest as the Covariate

		Unadjusted		Adjusted	
Class	N	M	SD	M	SD
Single-sex male	14	38.86	8.80	38.62	2.68
Single-sex female	12	40.58	9.46	40.76	2.89
Coed A	15	39.27	9.92	38.96	2.60
Coed B	17	32.71	11.47	33.03	2.44

Table 25

Analysis of Covariance for Math Achievement

Source	SS	df	MS	F	p
Covariate (math pretest)	135.95	1	135.95	1.35	.25
Class type	510.90	3	170.30	1.70	.18
Within	5323.15	53	100.44		
Total	87674.00	58			

Note. The test was the Flanagan test in mathematics.

Grouping by Sex and Student Misbehavior

The researcher investigated the impact of class organization on student misbehavior. Categories for student misbehavior were defined by the Portsmouth School Division as opposition, disrespect, class disturbance, and altercation. Forty-four behavior referrals were submitted for the four groups of classes (single-sex male, single-sex female, coed A, and coed B). Descriptive statistics for student misbehavior are in Table 26. Seventy-nine and one-half percent of all misconduct referrals reported were submitted from the two coeducational classes. Sixty-four percent of the total misbehavior reported was from the coed B class. There were more incidents of altercations than opposition, class disturbance, and disrespect. There were few reports of student misbehavior for the single-sex female class.

Grouping by Sex and Teaching Behaviors

The researcher wanted to see if class organization had any bearing on teaching behavior during instruction. Seventeen non-verbal and verbal teaching behaviors were selected from research by Mehrabian (1972), Boyd (2000), Flanders (Simon & Boyd, 1974), and TESA (Los Angeles County Office of Education, 1993). These behaviors were aggregated into three categories-- teacher influence, interaction, and non-verbal messages-- for reporting purposes. These categories are in Table 27. The 17 teaching behaviors were included on the Hopkins' Observation Report Form. Observations were conducted for twenty minutes. Each class group (single-sex male, single-sex female, coed A, and coed B) was observed three times.

Descriptive statistics are reported as means and standard deviations for total interactive teaching behaviors across teachers in the four groups (see Table 28). The number of interactive behaviors exhibited by the four teachers in the single-sex male class, single-sex female class, coed A class, and the coed B class ranged from a high of 126.66 (SD=31.08) to a low 56.33 (SD=14.50). A one-way analysis of variance (ANOVA) was conducted to determine if the number of interactive behaviors differed across class types. The results are in Table 29. No significant differences were found among the groups.

Descriptive statistics are reported as means and standard deviations for influence teaching behaviors across teachers in the four class types. These data are in Table 30.

Table 26

Descriptive Statistics for Student Misbehavior

	Single-sex male		Single-sex female		Coeducation			
Misbehavior referrals	N[a]	%	N[a]	%	N[a]	%	N[a]	%
Opposition	2	15.4	0	0	2	15.4	9	69.2
Disrespect	1	20.0	0	0	2	40.0	2	40.0
Disturbed Class	2	25.0	1	12	3	37.0	2	25.0
Altercation	2	11.0	1	5	0	0.00	15	83.0
Totals	7	15.9	2	4.5	7	15.9	28	63.6

Note. The percentages were calculated based on the total referrals reported for each category across class types. [a] N is the number of referrals.

Table 27

Hopkins Teacher Observation Behaviors by Category

Teacher influence	Interaction	Non-verbal messages
Lectures (Tb17)	Praises (Tb16)	Frowns (Tb8)
Criticizes student (Tb14)	Affirms response (Tb15)	Glares (Tb7)
Gives direction (Tb13)	Rephrases/gives clues (Tb11)	Smiles (Tb6)
Directs discussion (Tb12)	Provides individual help (Tb 9)	Gestures (Tb5)
Asks questions (Tb10)	Touches student (Tb1)	Shakes head (Tb4)
		Nods head (Tb3)
		Stands near student (Tb2)

Note. Tb stands for teaching behavior. The number with each Tb notation represents the position of the item in the Hopkins Observation Report Form in Appendix D.

Table 28

Descriptive Statistics for Observed Interactive Teaching Behaviors by Class Type

Class type	N[a]	M	SD
Single-sex males	3	126.66	31.08
Single-sex females	3	89.00	13.52
Coed A	3	95.33	56.03
Coed B	3	56.33	14.50

Note. The mean represents the average number of times per observation that teachers interacted with students in their classrooms over the three observations. [a]N is the number of observations conducted in each classroom.

Table 29

Analysis of Variance for Observed Interactive Teaching Behaviors by Class Type

Source	df	SS	MS	F	p
Between class types	3	7481.67	2493.89	2.22	.16
Within	8	9000.00	1125.00		
Total	12	117682.00			

Note. The class types were single-sex male, single-sex female, coed A, and coed B.

Table 30

Descriptive Statistics for Observed Influence Teaching Behaviors by Class Type

Class type	N	M	SD
Single-sex males	3	97.33	40.67
Single-sex females	3	103.00	32.41
Coed A	3	77.33	60.43
Coed B	3	137.66	42.15

According to the descriptive statistics, the number of times teacher influence behaviors were observed across class types differed by as many as 60.33 incidents per observation. A one-way analysis of variance was conducted to identify group differences in teacher influence behaviors (see Table 31). No significant differences were found in observed influence teaching behaviors across the class types.

Table 31

Analysis of Variance for Observed Influence Teaching Behaviors by Class Type

Source	df	SS	MS	F	p
Between class types	3	5669.67	1889.89	.93	.47
Within	8	16270.00	2033.75		
Total	12	151316.00			

Note. The class types were single-sex male, single-sex female, coed A, and coed B.

Descriptive statistics are reported as means and standard deviations for non-verbal teaching behaviors across teachers in the four class types (see Table 32). The average number of non-verbal teaching behaviors observed per observation across the four class types (single-sex male, single-sex female, coed A, and coed B) ranged from a low of 23.00 (SD=15.71) to a high of 72.00 (SD=11.78). An analysis of variance was conducted to identify group differences in non-verbal teaching behaviors. These data are in Table 33. No significant differences in non-verbal teaching behaviors were found across the class types.

Grouping by Sex and Attendance (Absences)

Descriptive statistics on absences for the class types are reported as means and standard deviations in Table 34. Students averaged 7.91 days absent from school during the 1999-2000 school year. Of all absences reported for the class types, 45 days were from the coed A class. A one-way analysis of variance was conducted to identify differences in absences among the class types (see Table 35). Differences were found across the class types. Scheffe's post hoc test for multiple comparisons was used to find where the differences were across the four types: single-sex male, single-sex female, coed A, and coed B classes (see Table 36). Differences in absences existed between the coed A class and the single-sex male class, the single-sex female class, and the coed B class. In all cases, the coed A class had more absences.

Grouping by Sex and Students' Feelings

The researcher administered a feelings survey to the students in the four classes. The feelings survey had 24 items aggregated into four domains. The number of items in the four domains is in Table 37. Respondents were asked to report their feelings using a three-point scale: 1= never, 2= sometimes, and 3=always.

Table 32

Descriptive Statistics for Nonverbal Teaching Behaviors by Class Type

Class type	N	M	SD
Single-sex male	3	63.66	56.72
Single-sex female	3	72.00	11.78
Coed A	3	23.00	15.71
Coed B	3	50.66	36.74

Note. The mean is the average number of times non-verbal message behaviors were coded per observation session. [a]N is the number of observations conducted.

Table 33

Analysis of Variance for Nonverbal Teaching Behaviors by Class Type

Source	df	SS	MS	F	p
Between class types	3	4135.33	1378.44	1.11	.40
Within	8	9907.33	1238.42		
Total	12	46908.00			

Note. The class types were single-sex male, single-sex female, coed A, and coed B.

Table 34

Descriptive Statistics for Absences Across Class Types

Class type	N	M[a]	SD	Min	Max
Single-sex male	15	4.47	5.64	0	21
Single-sex female	17	4.29	4.38	0	17
Coed A	20	14.95	12.42	0	45
Coed B	14	5.93	4.51	0	12
Totals	66	7.91	9.11	0	95

[a]The mean is the average number of days absent per student.

Table 35

Analysis of Variance for Differences in Absences Among the Four Class Types

Source	df	SS	MS	F	p
Between class types	3	14046.37	482.10	7.57	.00
Within	62	3947.14	63.66		
Total	65	5393.46			

Note. The class types were single-sex male, single-sex female, coed A, and coed B.

Table 36

Scheffe's Post-Hoc Comparisons for Differences in Student Absences Across Class Types

Class type	Class type	Mean differences[a]	p
Coed A	Single-sex male	10.48	.00
	Single-sex female	10.66	.00
	Coed B	9.02	.02

[a]Coed A minus the other class types.

Table 37

Number of Items in Each Domain of the Feelings Survey

Domain	No. of items
Feelings about the teacher	8
Feelings about classmates	9
Feelings about schoolwork	3
Feelings about class climate	4

Descriptive statistics on students' feelings about the teacher are reported as means and standard deviations in Table 38 by class types. There were only small differences across the four groups. An analysis of variance on students' feelings about the teacher was conducted to check for differences across class types (see Table 39) No significant differences were found.

Descriptive statistics on students' feelings about their classmates are reported as means and standard deviations in Table 40 by class types. There were only small differences among the four groups. An analysis of variance on feelings about classmates was conducted to check for significant differences across class types. There were no significant differences among the means (see Table 41).

Descriptive statistics on students' feelings about schoolwork are reported as means and standard deviations across the four class types in Table 42. Only small differences were observed across the four groups.

An analysis of variance was conducted to identify group differences in students' feelings about schoolwork. There were no significant differences among the class types (see Table 43).

Descriptive statistics on students' feelings about classroom climate are reported as means and standard deviations for the four groups (see Table 44). A one-way analysis of variance was conducted on students' feelings about classroom climate (see Table 45). Significant differences across the class types were found. Scheffe's test for post-hoc comparisons was performed to identify where the differences were among the groups (see Table 46). A significant difference between the mean response of the single-sex female class and the single-sex male class was found. The single-sex male class had more positive feelings about classroom climate than the single-sex female class. No other significant differences were found among the class groups.

Table 38

Descriptive Statistics for Students' Feelings About the Teacher

Class	N	M[a]	SD	Min	Max
Single-sex male	17	18.17	2.85	13.00	22.00
Single-sex female	15	19.13	2.23	15.00	22.00
Coed A	16	18.06	2.40	13.00	22.00
Coed B	16	17.62	2.02	15.00	21.00

[a]The mean is the average number of points per student for the eight items in the domain.

Table 39

Analysis of Variance for Differences in Students' Feelings About the Teacher Across the Four Class Types

Source	df	SS	MS	F	p
Between class types	3	18.59	6.20	1.07	.37
Within	60	348.891	5.82		
Total	63	367.48			

Note. The class types were single-sex male, single-sex female, coed A, and coed B.

Table 40

Descriptive Statistics for Students' Feelings About Their Classmates

Class	N	M[a]	SD	Min	Max
Single-sex male	17	21.17	2.00	17.00	25.00
Single-sex female	15	21.06	2.08	18.00	25.00
Coed A	16	21.37	1.82	19.00	24.00
Coed B	16	20.50	2.80	15.00	25.00

[a]The mean is the average number of points per student for the nine survey items in the domain.

Table 41

Analysis of Variance for Differences in Students' Feelings about Their Classmates Across the Four Class Types

Source	df	SS	MS	F	p
Between groups (class types)	3	6.78	2.26	.46	.71
Within	60	293.15	4.89		
Total	63	299.94			

Note. The class types were single-sex male, single-sex female, coed A, and coed B.

Table 42

Descriptive Statistics for Students' Feelings About Schoolwork

Class	N	M[a]	SD	Min	Max
Single-sex male	17	7.11	1.31	5.00	9.00
Single-sex female	15	7.46	1.18	6.00	9.00
Coed A	16	7.00	1.21	3.00	9.00
Coed B	16	6.93	1.76	3.00	9.00

[a]The mean is the average number of points per student for the three survey items in the domain.

Table 43

Analysis of Variance for Differences in Students' Feelings About Schoolwork Across the Four Class Types

Source	df	SS	MS	F	p
Between groups (class types)	3	2.56	.86	.44	.73
Within	60	116.44	1.94		
Total	63	119.00			

Note. The class types were single-sex male, single-sex female, coed A, and Coed B.

Table 44

Descriptive Statistics for Students' Feelings About Classroom Climate

Class	N	M	SD	Min	Max
Single-sex male	17	9.70	1.21	7.00	11.00
Single-sex female	15	8.06	1.70	6.00	11.00
Coed A	16	8.56	2.12	4.00	12.00
Coed B	16	9.25	1.12	7.00	12.00

Note. The mean is the average number of points per student for the four survey items in the classroom climate domain.

Table 45

Analysis of Variance for Differences in Students' Feelings About Classroom Climate Among the Four Class Types

Source	df	SS	MS	F	p
Between groups (class types)	3	25.21	8.40	3.33	.03
Within	60	151.40	2.52		
Total	63	176.61			

Note. The class types were single-sex male, single-sex female, coed A, coed B.

Table 46

Scheffe's Post-Hoc Comparisons for Differences in Feelings Between Groups in Feelings About Classroom Climate

Class type	Class type	Mean difference[a]	p
Single-sex male	Single-sex female	1.63	.05
	Coed A	1.14	.25
	Coed B	.46	.88

[a]Single-sex male class minus the other class types.

Summary of Findings

The grouping of students by sex produced mixed results according to measurements in this study. Analyses were conducted on student achievement, student misbehavior, teaching behavior, absences, and students' feelings about the teacher, about classmates, about schoolwork, and about classroom climate. Students in single-sex female, single-sex male, and coed A classes had higher scores on the science test than students in the coed B class. Students in the single-sex male and single-sex female classes had higher social studies scores than students in the coed B class. There was no difference in social studies scores for the coed B and coed A classes. The three class types did not differ in performance on the math achievement test. Students in the coeducational classes had more combined incidents of misconduct than students in the single-sex classes. No differences were found in teaching behaviors across the four class types. More absences were found in the coed A class than in the coed B, single-sex male, and single-sex female classes. There were no differences in how the students in the class types felt about the teacher, classmates, or schoolwork. Students in the single-sex male class had more positive feelings about classroom climate than students in the single-sex female class. There were no other differences in feelings about classroom climate among the groups.

CHAPTER 4

CONCLUSIONS, DISCUSSION, AND RECOMMENDATIONS FOR PRACTICE AND FUTURE RESEARCH

This section contains conclusions related to the five research questions; a discussion of the methods, findings, and conclusions; and recommendations for school administrators and policy makers who may be interested in single-sex classes; and some ideas about needed research on single-sex classes.

Conclusions

The researcher examined outcomes of single-sex classrooms at an elementary school in the areas of student academic achievement, student behavior, teaching behaviors, student attendance, and students' feelings about the teacher, classmates, schoolwork, and classroom climate. This section contains conclusions on each outcome measured.

Grouping by Sex and Student Achievement in Science, Social Studies, and Math

The Virginia Tests for Higher Learning (Flanagan & Mott, 1999) were used to measure academic achievement in science, social studies, and math. Students in single-sex female, single-sex male, and coed A classes had higher science scores than students in the coed B class. Students in the coed B class had lower social studies scores than students in the single-sex male and single-sex female classes. There was no difference in social studies scores for the coed B and coed A classes. There were no differences in the performance of the three class types on the math achievement test.

Grouping by Sex and Student Behavior

Overall, single-sex classes have fewer incidents of reported misbehavior than coeducational classes. The single-sex female class had fewer misconduct referrals than all other classes. Students in the single-sex male class had the same number of misconduct referrals as the students in the coed A class. The coed B class had an abnormally high number of misconduct referrals. These may have been due to such conditions in the class as gender conflicts and the teacher's management style.

Grouping by Sex and Teaching Behaviors

The teaching behavior categories observed were teacher influence (control) activities, non-verbal messages, and interaction with students. The researcher found no differences in

the frequency of teaching behaviors used in single-sex and coed classes in any areas observed.

Grouping by Sex and Student Attendance

Single-sex classes may not have better attendance than coed classes. Both single-sex classes had better attendance than one of the two coed classes (coed A). The highest absentee rate was for the coed A class. Attendance records were re-examined, and the researcher found that this high absentee rate was due to one student in the coed A class who was absent more than twenty days.

Grouping by Sex and Student Feelings

Single-sex classes and coed classes did not differ on students' feelings about the teacher, relationships with classmates, feelings about schoolwork, or feelings about classroom climate. There was a difference in how the students in the single-sex male class and single-sex female class felt about their classroom climate. Males in their single-sex class felt better about their classroom climate than females in their single-sex class.

Discussion

The results of academic achievement in this study are different from results reported in earlier studies. Price and Rosemier (1972) and Lee and Bryk (1986) found that single-sex schooling had positive effects on achievement for girls in reading and science courses. Price and Rosemier concluded that boys in a single-sex first grade class performed better than boys in a coeducational class in arithmetic and reading. Marsh, Owens, Myers, and Smith (1989) found that boys and girls in single-sex Catholic schools had higher reading achievement than students in coeducational schools. The boys in the Marsh et al. study had higher achievement in mathematics, science, and vocabulary than students in single-sex girls' classes and coeducational classes. In Harvey's (1985) study, the girls in single-sex classes in a coeducational school scored better in physics than girls in coeducational classes.

With respect to student misbehavior, the researcher found that students in the single-sex female class and the single-sex male class had better behavior than students in the coed A class and the coed B class combined. These findings are consistent with the hypothesis that incidents of student misbehavior decline in single-sex classrooms.

Price and Rosemier (1972) found that single-sex grouping caused fewer distractions for girls. Woods (1990) found that classes segregated by sex had fewer serious discipline

problems. A survey of 104 teachers at single-sex high schools and coeducational high schools resulted in 69% of the respondents recommending single-sex classes for control and the prevention of student misbehavior in grades 7-12. Sixty-seven percent of the respondents recommended single-sex grouping for maintaining classroom control and preventing student misbehavior in grades 10-12. The American Association of University Women (AAUW) (1996) reported that the time students interact during school hours had negative implications for girls. This organization concluded that students interact negatively by engaging in name-calling, joking, teasing, and non-consensual touching.

The AAUW's findings are consistent with findings on student misbehavior in this study. Misconduct referrals from the two coeducational classes represented 79% of all referrals reported. Eighty-three percent of the misbehavior referrals from the coed B class were for altercations. These altercations were reported because of negative student interactions.

Differences in teaching behaviors in single-sex classes and coeducational classes were not statistically significant. Teachers in this study were observed using influence (control) activities, interacting with students, and using non-verbal messages in the four classes about the same number of times. The interactive teaching behaviors measured in this study mirror results of a study by Allen, Cantor, Foster, Grady, and Hill (1994). Findings from this study supported that teachers of single-sex girls' classes did not try to control the learning experience; they shared the teaching role by empowering the students to interact through questions and discussions.

The teachers in this study appeared to behave alike instructionally. According to the data collected, there was no variation in their instructional procedures. However, there were differences in the characteristics of the teachers. Of the four teacher participants, the teacher of the coed B class was the only male. This teacher was in the third year of his career. Prior to this year, he had taught the fourth grade for two years. The teachers of the single-sex female class, single-sex male class, and coed A class were either in the sixth or seventh years of their careers. The teacher of the coed B class was not only a novice; he was teaching the second grade for the first time in his career. The other teacher participants had taught the second grade for a minimum of five years. The teachers of the single-sex female class, the

single-sex male class, and the coed A class preferred to teach students in the second grade. The teacher of the coed B class admittedly preferred to teach students in the fourth grade.

Regarding student absences and single-sex classes, the researcher found that the highest absentee rate was found in a coeducational class. These results match findings by Mitchell (1993), who found that attendance for male students was better in single-sex male classes than for males in coeducational classes.

Much support for this study came from the central office administrative staff in the research department as well as from the Assistant Superintendent for Curriculum and Instruction. During the data collection process, the researcher could not locate all of the pre-test scores. The classroom teachers were uncertain of the location of these data and seemingly had not developed scoring matrixes to guide the instruction of students in the areas of need identified through the pre-tests. The researcher was able to consult with the school principal and guidance counselor to locate most of these data. Curriculum and instructional supervisors were contacted regarding the remaining missing data. Following the completion of the post-tests, the researcher discovered that many of the test sheets were not machine scored. This happened because the top portion of many test sheets was not coded completely with the students' numbers and room numbers. The researcher appealed to the Assistant Superintendent for Curriculum and Instruction and received permission to have all test sheets that were previously rejected machine scored again.

Recommendations for Practice

From this experience, the researcher derived the following recommendations: (1) Provide a testing workshop at the building level before each testing cycle. Show the teachers sample documents so that they will understand the importance of coding the demographic information in the proper fields. (2) Assign an individual to check each answer sheet before these materials are delivered to data processing. (3) Have classroom teachers format teacher-made tests using multiple-choice items prior to standardized testing. This will give young children the opportunity to experience shading in answers correctly. (4) Build a make-up date for testing into the instructional calendar. This will enhance the equivalency of groups for pre- and post-testing. (5) Gather more supporting data on validity and reliability for the Flanagan Test. Currently, there is limited data on the validity and reliability of this test. (6) Verify whether Flanagan test results are actually used in matrixes and that teachers are

tracking students' weaknesses and needs for improved academic achievement. This may be evident by notations in students' folders and in lesson plans.

Several additional recommendations are offered for practice. The school division should provide professional staff development opportunities for teachers assigned to single-sex groups. These staff development activities may be in concert with neighboring school divisions such as Norfolk City Public Schools, which has single sex classes in at least two elementary schools. The researcher offers this recommendation because the standards of accreditation require local school divisions to plan staff development activities for each school year. Sharing staff development activities with other school divisions will foster professional collaboration and facilitate the sharing of resources.

A second recommendation is for building-level administrators to review the results of this study on student achievement, attendance, student behavior, and teaching behaviors and consider the implications for school improvement in the goal areas identified by the school division. The goal areas for the school division are achievement in mathematics, English, science, and social studies; school climate; and attendance. This recommendation is made to help administrators decide if there is evidence of success to support continuation of the program. The data collected should address the goal areas for school improvement. If the data do not align with school improvement strategies for monitoring the program goals and objectives, the program should be re-evaluated.

The school division should appropriate funds to cover staff development and instructional materials germane to this grouping concept. The budget will help to facilitate prudent fiscal planning and management. The school staff will be empowered to collaborate and have ownership in this programming concept.

An evaluation of the success of the school-wide goals for single-sex instruction should be completed. School administrators and supervising staff should have a program assessment plan that will measure results and provide feedback to the teaching staff on how to improve instruction in single-sex classrooms.

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Recommendations for Future Research

Several recommendations are offered for future research. More research is needed on single-sex education.

Whereas this study examined teaching behaviors from a management standpoint of influence, non-verbal messages, and interaction, future research should be conducted to examine effective practices in categories that lend to optimum academic success for students. The effective practices may mirror those recommended by the Governor's Best Practice Centers. They are: (1) provide recognition of students' achievements, (2) develop and implement incentive programs, (3) utilize data to identify students' needs, (4) respond to individual students' needs, (5) provide additional instructional time, (6) use test banks to construct tests, and (7) communicate test scores to parents (Virginia Department of Education, 2000). Other categories to be included may be hands-on-teaching activities, directed instruction, seat-work activities, and computer-assisted instruction (Portsmouth City Public School District, 2000).

The evaluation of the achievement component of the single-sex program at school C did not result in conclusive data to support that students in single-sex female and single-sex male classes performed better than students in the coeducational classes on the posttests. A recommendation for future research is to study the achievement of students grouped by sex over time. To accomplish this recommendation, a researcher may examine outcomes for students who started their educational experiences in single-sex classrooms in 1995. These students may now be in middle school or high school. Their performance over the years in English, science, math, and social studies should be evaluated.

A final recommendation is offered for future researchers to examine policies and instructional practices for single-sex schools in the Virginia Association of Independent Schools. These schools should include Independent schools such as St. Catherine's School in Richmond, Virginia; St. Christopher's School in Richmond, Virginia; The Blue Ridge School in St. George, Virginia; The Madeira School in McLean, Virginia; and the Lower School for Norfolk Collegiate in Norfolk, Virginia.

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APPENDIX A

INSTRUMENT FOR THE

FIRST VALIDATION STUDY OF THE HOPKINS SURVEY:

STUDENTS' FEELINGS IN CLASSROOMS

STUDENTS' FEELINGS IN CLASSROOMS

Directions: Circle the number of the appropriate response.

Domains: (1) Feelings about relationships with classmates
(2) Feelings about the teacher
(3) Feelings about classroom climate
(4) Feelings about school work (academics)

Association Ratings: 1 = very weak
2 = weak
3 = strong
4 = very strong

Clarity Ratings: 1 = not clear at all, delete
2 = somewhat clear, revise
3 = clear, leave as stated

Please use the back of the sheet to list recommendations for items rated 1 or 2.

Item	Domain	Association	Clarity
1. I feel my teacher likes me.	1 2 3 4	1 2 3 4	1 2 3
2. I feel my teacher helps me to learn.	1 2 3 4	1 2 3 4	1 2 3
3. I feel my teacher enjoys working with the class.	1 2 3 4	1 2 3 4	1 2 3
4. I feel that math is fun.	1 2 3 4	1 2 3 4	1 2 3
5. I feel that science is fun.	1 2 3 4	1 2 3 4	1 2 3
6. I feel that social studies is fun.	1 2 3 4	1 2 3 4	1 2 3

Item	Domain	Association	Clarity
7. I feel that language arts is fun.	1 2 3 4	1 2 3 4	1 2 3
8. I feel that I get to help my classmates.	1 2 3 4	1 2 3 4	1 2 3
9. I feel that my classmates like me.	1 2 3 4	1 2 3 4	1 2 3
10. I feel that other students do not pick on me.	1 2 3 4	1 2 3 4	1 2 3
11. I feel that I like my classmates.	1 2 3 4	1 2 3 4	1 2 3
12. I feel that boys and girls should be in this class.	1 2 3 4	1 2 3 4	1 2 3
13. I feel that my teacher answers me when I raise my hand.	1 2 3 4	1 2 3 4	1 2 3
14. I feel happy in this class.	1 2 3 4	1 2 3 4	1 2 3
15. I feel sad in this class.	1 2 3 4	1 2 3 4	1 2 3
16. I feel that the teacher tells me when I do a good job.	1 2 3 4	1 2 3 4	1 2 3
17. I feel my teacher listens to me when I speak.	1 2 3 4	1 2 3 4	1 2 3
18. I feel that my classmates help me to learn.	1 2 3 4	1 2 3 4	1 2 3
19. I feel that my teacher talks to me.	1 2 3 4	1 2 3 4	1 2 3
20. I feel I am praised enough when I do good work.	1 2 3 4	1 2 3 4	1 2 3
21. I feel I get to work with my classmates enough.	1 2 3 4	1 2 3 4	1 2 3
22. I feel that only girls should be in this class.	1 2 3 4	1 2 3 4	1 2 3
23. I feel that the teacher helps me enough.	1 2 3 4	1 2 3 4	1 2 3
24. I feel that only boys should be in this class.	1 2 3 4	1 2 3 4	1 2 3

APPENDIX B

INSTRUMENT FOR THE
SECOND VALIDATION STUDY OF THE HOPKINS SURVEY:
STUDENTS' FEELINGS IN CLASSROOMS

STUDENTS' FEELINGS IN CLASSROOMS

Directions: Circle the number of the appropriate response.

Domains: (1) Feelings about relationships with classmates
(2) Feelings about the teacher
(3) Feelings about classroom climate
(4) Feelings about school work (academics)

Association Ratings: 1 = very weak
2 = weak
3 = strong
4 = very strong

Clarity Ratings: 1 = not clear at all, delete
2 = somewhat clear, revise
3 = clear, leave as stated

Please use the back of the sheet to list recommendations for items rated 1 or 2.

Item	Domain	Association	Clarity
1. My teacher likes me.	1 2 3 4	1 2 3 4	1 2 3
2. I have friends in this class.	1 2 3 4	1 2 3 4	1 2 3
3. I talk to my friends in class.	1 2 3 4	1 2 3 4	1 2 3
4. I like math.	1 2 3 4	1 2 3 4	1 2 3
5. Science is fun.	1 2 3 4	1 2 3 4	1 2 3
6. Social studies is fun.	1 2 3 4	1 2 3 4	1 2 3

Item	Domain	Association	Clarity
7. Spelling is fun.	1 2 3 4	1 2 3 4	1 2 3
8. Being in this class is fun.	1 2 3 4	1 2 3 4	1 2 3
9. My classmates like me.	1 2 3 4	1 2 3 4	1 2 3
10. I am popular in this class.	1 2 3 4	1 2 3 4	1 2 3
11. I like my classmates.	1 2 3 4	1 2 3 4	1 2 3
12. This class would be better with boys.	1 2 3 4	1 2 3 4	1 2 3
13. The teacher answers me when I raise my hand.	1 2 3 4	1 2 3 4	1 2 3
14. I am happy in this class.	1 2 3 4	1 2 3 4	1 2 3
15. My feelings are hurt in class.	1 2 3 4	1 2 3 4	1 2 3
16. My teacher tells me when I do well.	1 2 3 4	1 2 3 4	1 2 3
17. I ask questions in class when I am confused.	1 2 3 4	1 2 3 4	1 2 3
18. My classmates help me when I don't understand.	1 2 3 4	1 2 3 4	1 2 3
19. My teacher talks to me when I am upset.	1 2 3 4	1 2 3 4	1 2 3
20. Reading is fun.	1 2 3 4	1 2 3 4	1 2 3
21. I can laugh in this class.	1 2 3 4	1 2 3 4	1 2 3
22. This class would be better without boys.	1 2 3 4	1 2 3 4	1 2 3
23. My teacher helps me when I don't know the answer.	1 2 3 4	1 2 3 4	1 2 3
24. This class would be better without girls.	1 2 3 4	1 2 3 4	1 2 3

APPENDIX C

THE HOPKINS FEELINGS SURVEY

The Hopkins Feelings Survey

Directions: This survey will allow you to tell how you feel about being in this class. Your teacher will read each statement to you. After hearing each statement, circle the number or face to express how you feel.

1. I have friends in this class.	 3 Always	 2 sometimes	 1 never
2. I talk to my friends in class.	 3 Always	 2 sometimes	 1 never
3. My classmates like me.	 3 Always	 2 sometimes	 1 never
4. I am popular in this class.	 3 Always	 2 sometimes	 1 never
5. I like my classmates.	 3 Always	 2 sometimes	 1 never
6. This class would be better with boys.	 3 Always	 2 sometimes	 1 never
7. My classmates help me when I don't understand.	 3 Always	 2 sometimes	 1 never
8. This class would be better without boys.	 3 Always	 2 sometimes	 1 never

9. This class would be better without girls.	 3 Always	 2 sometimes	 1 never
10. My teacher likes me.	 3 Always	 2 sometimes	 1 never
11. The teacher answers me when I raise my hand.	 3 Always	 2 sometimes	 1 never
12. My teacher tells me when I do well.	 3 Always	 2 sometimes	 1 never
13. My teacher talks to me when I am upset.	 3 Always	 2 sometimes	 1 never
14. My teacher helps me when I don't know the answer.	 3 Always	 2 sometimes	 1 never
15. Being in this class is fun.	 3 Always	 2 sometimes	 1 never
16. I am happy in this class.	 3 Always	 2 sometimes	 1 never
17. My feelings are hurt in this class.	 3 Always	 2 sometimes	 1 never

18. I can laugh in this class	 3 Always	 2 sometimes	 1 never
19. I like math.	 3 Always	 2 sometimes	 1 never
20. Science is fun.	 3 Always	 2 sometimes	 1 never
21. Social Studies is fun.	 3 Always	 2 sometimes	 1 never
22. Spelling is fun.	 3 Always	 2 sometimes	 1 never
23. I ask questions when I am confused.	 3 Always	 2 sometimes	 1 never
24. Reading is fun.	 3 Always	 2 sometimes	 1 never

APPENDIX D

THE HOPKINS OBSERVATION REPORT FORM

THE HOPKINS OBSERVATION REPORT FORM[a]

Teaching Behaviors																							
1. Touches student																							
2. Stands near student																							
3. Establishes eye contact																							
4. Shakes head																							
5. Gestures with hands																							
6. Smiles at student																							
7. Glares at student																							
8. Frowns at student																							
9. Provides individual help																							
10. Asks questions of students																							
11. Rephrases/gives clues																							
12. Directs discussion																							
13. Gives direction																							
14. Criticizes student																							
15. Affirms student response																							
16. Praises to encourage learning																							
17. Lectures																							

[a]Each column represents five seconds.

VITA
for
Angelina W. Hopkins

Educational Background

1999	Educational; Specialist Certificate (Ed.S.) Educational Leadership and Policy Studies Virginia Polytechnic Institute and State University, Blacksburg, Virginia
1989	Masters of Education (MA.Ed.) Norfolk State University, Norfolk, Virginia
1977	Bachelor of Arts, Business Education Norfolk State University Norfolk, Virginia
1973	High School Diploma Lake Taylor High School, Norfolk, Virginia

Professional Experiences

1991-Present	Secondary Assistant Principal Portsmouth City Public Schools
2000-Present	Evening School Principal (Part-time) Cradock Career and Technical Center Portsmouth City Public Schools
1990-1991	Counselor Advocate Portsmouth Alternative School
1988-1990	Vocational Resource Teacher Woodrow Wilson High School Portsmouth, Virginia
1984-1988	Business Education Teacher Churchland High School Portsmouth, Virginia

Personal Data

Spouse	Johnie E. Hopkins, Sr.
Children	Johnette A. Hopkins, Almarie Hopkins, and Johnie E. Hopkins, Jr.