2009

Achievement of boys and girls in single-gender kindergarten classrooms at one elementary school in western Michigan

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ACHIEVEMENT OF BOYS AND GIRLS IN SINGLE-GENDER

KINDERGARTEN CLASSROOMS

AT ONE ELEMENTARY SCHOOL IN WESTERN MICHIGAN

by

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Dissertation

Submitted to the Department of Leadership and Counseling

Eastern Michigan University

In partial fulfillment of the requirements for the degree of

DOCTOR OF EDUCATION

Dr. Ronald Williamson, Chair

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Dr. Lisabeth Margulus, Committee Member

Dr. Nelson Maylone, Committee Member

October 28, 2009

Ypsilanti, Michigan

DEDICATION

This research work is dedicated to my family, whose love supported me in this endeavor.

My brother, John Diehm, whose wit produced laughter,

My sister, Jessica Diehm, whose sensitivity provided insight,

My mother, Carole Diehm, whose loyalty inspired perseverance, and

My father, Richard Diehm, whose devotion instilled confidence.

ACKNOWLEDGEMENTS

With deep gratitude and respect, I thank my dissertation Chair, Dr. Ronald Williamson, for his time, patience, support, and endlessly positive perspective. Committee members, Drs. Nelson Maylone and Ella Burton from Eastern Michigan University, and Dr. Lisabeth Margulus from Grand Valley State University, provided mentorship, insight, and feedback throughout the process, and I gratefully express my appreciation for their efforts. I wish to thank Dr. Phyllis Curtiss for her assistance with the statistical analysis for this project. Finally, Dr. Norma Ross has generously shared her optimism and expertise, and I am indebted to her for her editorial skill.

ABSTRACT

The impact of single gender classrooms on kindergarten students' acquisition of literacy skills was investigated in this research project. A sample of 144 kindergarten students in one public school district in western Michigan participated in this quasi-experimental, quantitative study during the 2008-09 school year.

The development of reading skills is important for a child's success throughout his or her educational career and is influenced by many factors. This study explored the impact of the variables of age, developmental readiness, socioeconomic status, family structure, and teacher experience on the acquisition of literacy skills among children in different classroom compositions including all-girls, all-boys, and mixed gender classes.

Literacy skills were measured by subtests of the Dynamic Indicators of Basic Early Literacy Skills (DIBELS). Those tests included Letter Naming Fluency, Initial Sound Fluency, Phoneme Segmentation Fluency, and Nonsense Word Fluency. Analyses of covariance (ANCOVA) were used to measure the students' mean change in each of the tests.

Findings revealed that several factors, including classroom composition, significantly affected students' literacy scores. Classroom composition was shown to be statistically significant on the test of Initial Sound Fluency; children in both of the single-gender classrooms (all-boys and all-girls) showed higher mean change in scores than children in the mixed gender classes. Further, one interaction effect between classroom composition and age was significant for females. Girls in one of two age groups, the youngest and the oldest, and in the girls' single gender class, had a higher mean change in Phoneme Segmentation Fluency scores than five-year-old females in the all-girls class. These results show that classroom composition affects some academic outcomes and that some students may benefit from a single-gender environment.

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CHAPTER ONE

Introduction

Early education is the foundation for a child's acquisition of societal, behavioral, academic, and ethical skills. In *Early Childhood Learning Standards: Tools for Promoting Social and Academic Success in Kindergarten*, Logue (2007) wrote, "Children learn much about fairness, justice, and problem solving through play. Most of them grow in social competence through negotiation, taking turns and internalizing rules, and making friends" (p. 35). Some of these skills are learned through family interaction, some are learned in a preschool setting, and some are acquired when children attend kindergarten. All of these competencies are important; yet, at the early grades, the ability to communicate is one of the most vital.

Communication – through reading and speaking – is at the core of a child's early learning. Parents who talk with their children and read stories to them help to promote positive interaction among family and peers. Speaking and listening help children learn to understand words, enjoy stories, express ideas, and convey their feelings. These are important preschool activities, and they help to prepare children for school experiences. Elementary teachers, too, understand that early literacy is crucial to both social and academic success. Neuman (2006) supported this notion in the article *Building Vocabulary to Build Literacy* when she wrote, *"*Children who acquire a substantial vocabulary are often able to think more deeply, express themselves better, and actually learn new things more quickly" (p. 1). Reading is a pivotal skill for all children (Entwistle, 2007).

Early literacy skills are a significant factor in all children's educational progress, but gender differences in literacy acquisition are not considered fully enough in many classrooms across the nation. In *Boy Problems*, Hulbert (2005) explained, "On the front end, boys appear to

be later verbal bloomers than girls, which sets them up for early encounters with academic failure…," and that "…boys perform consistently below girls on most tests of reading and verbal skills and lag in college enrollment and degree attainment" (p. 1). Girls, on the other hand, tend to show strong tendencies to appreciate communication and enjoy literacy activities from an early age. Mothers share more information with their daughters, discuss books more frequently, and have more conversations about books with their daughters than do the mothers of boys (Entwistle, 2007). Differences between genders have not been fully explored in terms of the best classroom environment for boys and girls to achieve a strong literacy foundation.

The environment in which children learn and practice literacy skills crystallizes around the idea of the make-up of the classroom. In *Boys Adrift*: *The Five Factors Driving the Growing Epidemic of Unmotivated Boys and Underachieving Young Men,* Sax (2007) tackled subjects as diverse as environmental factors that affect boys' biological and physical condition, to the ways in which kindergarten curricular expectations have changed over the last three decades from more "play" oriented learning to an academic focus on reading and writing. Sax recommended single-gender classrooms that focus on the specific needs of boys. Although the gender make-up of a classroom is one approach to meeting the differing needs of males and females, educator and family therapist Gurian (2001) in *Boys and Girls Learn Differently: A Guide for Teachers and Parents* took a slightly different approach. Gurian's ideas focused on the general tendencies and preferences of boys and girls, pointing out, for example, that boys need space and movement to aid their learning, whereas girls have a greater need for opportunities to speak and plan in a cooperative environment. These observations, then, lead to further questions regarding the best strategies educators should use to reach males and females in a classroom setting, and whether grouping students by gender could impact students' language acquisition.

Kindergarten is the first formal schooling experience for many students. As a child enters school on the first day, he or she begins an educational journey with a unique set of biological, social, and experiential factors. These include basic attributes such as student gender; age and developmental readiness attributes related to motor, verbal, social, and listening skills; socio-economic status; and family structure. Further, each child is placed in a classroom with a teacher who has a particular number of years of experience, and the student begins immediate classroom interactions with peers who are all boys, all girls, or of mixed gender. All of these features of a child's persona and experience affect his or her school performance.

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

Gender, and how it may influence specific learning inclinations, is not often taken into consideration to any significant degree when a child enters school for the first time. Gurian (2001) brought attention to the idea of gender preferences. He addressed the alternate needs of males and females. Gurian pointed out that boys and girls develop differently, have differing preferences, and behave in dramatically different ways. He asserted that, logically, this leads to the need for educators to offer methods and strategies for learning that appeal to each gender. According to the author, the optimum classroom for boys includes "making everything experiential" (p. 120). He further explained that boys need many manipulatives, short verbal instructions, and activities that harness a boy's high energy level.

Many girls need a different approach. Again, Gurian (2001) suggested strategies such as group work that puts girls in leadership roles and activities that require perceptual skills. Girls, he asserted, desire verbal praise and seek situations where they can utilize verbal skills. In short, males and females bring very different preferences and needs to an educational setting.

Medical doctors have also written about the topic of gender preferences and how

approaches to learning might be improved by attention to this factor. Sax (2007) argued that school has changed and kindergarten, in particular, has changed. The original model of learning through play has been replaced by a more academic purpose for 5-year-olds. Girls seem to have weathered these changing expectations better than boys have. Boys find activities such as sitting, listening, reading, and writing to be stressful and uninteresting, because boys develop physically, emotionally, and psychologically more slowly than girls. In some cases, this leads to less attentiveness and more disruptive behavior by boys. Critics pointed out that this scenario is positive for neither girls nor boys and diminishes the learning opportunities for both groups of students.

<div align="center">Age and Developmental Readiness</div>

Another variable in the success of a child's early learning is his or her age and developmental readiness. Children's chronological age is one determinant of whether they may enroll in kindergarten. Often, schools will use a cut-off date as a method of deciding which children may begin school. The date varies, but typically, a child must be five years old no later than a fall or early winter date such as December 1st. Whether age is a valid measure of a child's readiness is debatable. In *Predicting School Readiness: The Validity of Developmental Age*, Wood, Powell, and Knight (1984) asserted that "…The chronological age of children entering kindergarten within the range of 4 to 6 years is unrelated to eventual success or failure" (p. 11). The authors conceded, however, that chronological age is a very different measure than developmental age, and that "... The less developmentally mature the child, the more likely that child will be to have serious difficulties in kindergarten" (p. 11). Thus, for the purpose of this study, chronological age was one variable used in determining each child's literacy progress over the course of the year. In addition, however, because age can only define a child's physical

development as defined by a continuum of time, each child was assigned another scored variable that placed him or her on a scale that indicated *developmental readiness.*

Because age is not necessarily a comprehensive indicator of a child's ability to function well in school, the concept of developmental readiness is often used to further define a child's abilities. Developmental readiness, by one definition, "…looks at cognitive functioning and potential. In addition, it takes into account the child's physical, social, emotional, and general language development" (Wood et al., 1984, p. 8). An even more complete approach to readiness is explained by Pianta & La Paro (2003).

> Children are ready for school when, for a period of several years, they have been
> exposed to consistent, stable adults who are emotionally invested in them; to a
> physical environment that is safe and predictable; to regular routines and rhythms of
> activity; to competent peers; and to materials that stimulate their exploration and
> enjoyment of the world…. (p. 24)

Translated into the world of the classroom, these definitions take a most concrete form for kindergarten teachers. Instructors want children who are able to follow directions, who have at least a beginner's academic ability, and who can interact with peers in an appropriate manner. Thus, school readiness screenings have become a part of the experience of many children when they enroll in school for the first time. The school in this study screened nearly all children entering kindergarten. Therefore, the majority of kindergarten students in all sections (all-boy, all-girl, and mixed gender) received a composite score that indicated *developmental readiness.* The developmental readiness score used by the district consisted of a battery of tests that included the ability to respond to a series of open-ended questions (language ability), the ability to draw and cut out shapes (motor skills), the ability to follow directions and listen to a story

(social and language ability), the ability to identify letters and numbers (academic ability), and the ability to be separated from parents and interact with another adult (emotional ability).

Some children who enter kindergarten do not have a developmental readiness score. In this study, the students who did not have a developmental readiness score were those who had completed a *Young-5's* pre-kindergarten program. They met all-day, every other day, throughout one full school year and had been exposed to many kindergarten pre-requisite skills, including literacy skills, social skills interactions, and school routines. This study noted students who attended *Young-5's* because they possessed experiential growth and had attained a certain degree of developmental readiness as a result of this pre-school experience.

Socioeconomic Factors

Another important factor that must be considered when children begin their early educational experience is the link between poverty and poor school performance. The correlation is well established: Children from impoverished environments often lack skills needed for school. Wright, Diener, and Kay (2000) noted, "Some might suggest that these children lack intelligence…However, these children not only live in economic poverty but also live in environments deprived in ways beyond the lack of economic resources. These children do not have the early experiences that we take for granted as prerequisites for formal school" (p. 100).

Children in impoverished settings grow up with adults who are less likely to talk and read with their children; and school, not home, is viewed by many parents as the place where learning begins. Among all poor children, boys may be most at risk: "…Early reading skills of boys who are receiving meal subsidies – those who are disadvantaged – are lower than those of girls" (Entwistle, 2007, p. 127). Socioeconomic status influences a child's readiness for school and his

or her long-term educational attainment.

Because school readiness and educational progress is influenced by socioeconomic status, this study accounted for this factor by indicating a family's application for meal assistance. The district provided both breakfast and lunch options for all students during the 2008-09 school year. Meal assistance was provided to students based on a family's income, with the most impoverished receiving both free breakfast and lunch. Kindergarten children were noted as receiving no meal assistance, reduced cost meals, or free meals.

Family Structure

Family structure and educational attainment impact a child's school performance. Family structure can influence a child socially, emotionally, and economically. Garasky (1995), citing others, pointed out, "Socialization theory perceives educational attainment as a consequence of parental ability to provide children with motivation and skills necessary for school achievement" (p. 2). Children who live in single parent households are more likely to be poor, may have less supervision, have internalized fewer parental values, and thus, may be at a disadvantage in institutions that are "fundamentally hierarchical such as education" (p. 2). Garasky's own study concluded, "As one might expect, the combination of possibilities that leads to the highest likelihood of becoming a high school graduate is to grow up with both parents, have a mother graduated from high school, and not to have lived in poverty" (p. 6). For the period of this study, family structure was coded according to the child's primary household living situation; the child resided with (1) two biological parents, (2) biological mother and step-father or boyfriend, (3) biological father and step-mother or girlfriend, (4) grandparent (s), and (5) other.

Teacher Experience

A teacher's years of educational experience may influence a child's academic performance. Nye, Konstantopoulos, and Hedges (2004) defined *teacher effects* as years of experience and teacher education. They found that "neither teacher experience nor teacher education explained much variance in teacher effects (never more than 5%)," but that teacher experience did positively impact reading scores in all cases, however small (p. 249). For the purposes of this study, the number of years of experience of each kindergarten teacher was noted, so that this variable could be examined in relation to student reading acquisition.

Single-Sex Classrooms

The opportunity to incorporate gender-specific classrooms into educational philosophy came in 2006 when the United States Department of Education changed regulations to allow single-gender classrooms in public schools and permitted more districts to offer options for parents and their children in terms of class composition. In an Associated Press article, Leonard Sax, Director of the National Association for Single Sex Public Education, explained that the number of gender-specific classrooms in 1998 was a mere four, but that by 2006, "At least 223 public schools across the country already offer some single-sex classrooms…" (More schools, p. 2).

While several instances of popular literature in bookstores and news outlets have encouraged the idea of same-sex classrooms, research-based literature is less prevalent. Because the changes in federal law allowing single-gender classes are fairly recent, studies on the topic are limited. Two studies (Whitmore, 2005; DePape, 2006) supported the notion that the gender make-up for classrooms may be beneficial to academic achievement. The study by Whitmore (2005) examined the effects of both class size and composition on academic performance. The

sample included early elementary students in kindergarten through 3rd grades. In this case, the classrooms were not solely boys or girls, but by virtue of the small class size, some classes were predominantly girls, whereas the ratio in other classes favored boys. The results of the classes with predominantly girls were not consistent over all grades; 1st grade students' academic achievement was not found to be significantly increased. However, girls in kindergarten, second, and third grades who interacted with peers in classes composed of a high ratio of other girls were found to have significantly higher achievement. Boys, too, showed greater achievement when they were educated in classes primarily composed of girls. This pattern changed in third grade, where boys scored lower than girls in classes with either composition. This study, then, implied that the overall gender composition of a classroom may affect academic performance.

The second study, conducted in a private, Roman Catholic school in Saskatchewan through the *McDowell Foundation for Research into Teaching*, reached similar conclusions. In this study of seventh and eighth grade students, the classrooms, unlike the Whitmore (2005) research, controlled for gender by assigning students to specific all-girl or all-boy sections. Measuring academic performance, represented by average grades in their classes, DePape (2006) concluded that "The percentage of students who increased their average marks in a gender specific classroom was generally greater than the percentage of students who decreased their average marks or experienced no change" (p. 11). Thus, this study also supported the idea that gender specific classrooms deserve further consideration, because they have the potential to positively influence academic performance.

In conclusion, federal law, popular literature, and increased public awareness of the social, biological, psychological, and emotional differences between male and female students has created a prime setting for research in gender differences in a classroom setting. A study that

examines the interaction of student gender, age (birth date), developmental readiness, socioeconomic status, family structure, teacher experience, and classroom composition (single-sex or mixed-gender) of students will enhance the field of multicultural research by providing information for educational organizations to consider as they continue to improve the field of instruction and performance.

Research Questions

The study will seek answers to the following research questions:

- Does a child's gender impact his or her academic growth, as measured by four subtests of the assessment entitled Dynamic Indicators of Basic Early Literacy Skills (DIBELS)? If so, to what degree?

- Does a child's age (birth date) influence his or her academic growth, as measured by four subtests of the assessment entitled Dynamic Indicators of Basic Early Literacy Skills? If so, to what degree?

- Does a child's developmental readiness, as measured by the district's screening tool or the child's exposure to a *Young-5's* (pre-kindergarten) influence his or her academic growth, as measured by four subtests of the assessment entitled Dynamic Indicators of Basic Early Literacy Skills? If so, in what ways?

- Does the socio-economic status of a child's primary household influence his or her academic progress, as measured by four subtests of the assessment entitled Dynamic Indicators of Basic Early Literacy Skills? If so, in what ways?

- Does a child's family structure influence his or her academic growth, as measured by four subtests of the assessment entitled Dynamic Indicators of Basic Early Literacy Skills? If so, to what degree?

- Does the number of years that a child's teacher has taught elementary age children influence the child's academic growth, as measured by four subtests of the assessment entitled Dynamic Indicators of Basic Early Literacy Skills? If so, in what ways?

- Does the gender composition of a kindergarten classroom impact the academic growth of male or female students, as measured by four subtests of the assessment entitled Dynamic Indicators of Basic Early Literacy Skills? If so, in what ways?

- Is there an interaction affect between the gender composition of a child's classroom and any of the following phenomena: gender, age (birth date), developmental readiness, socio-economic status, family structure, or teacher years of experience? If so, what is the relationship?

Purpose of the Study

The purpose of this study was to examine the academic impact of grouping kindergarten students by gender – a plan that one elementary school in a district in Western Michigan implemented during the 2008-09 school year. Specifically, the study will examine the achievement of one section of only male students, a second section of only female students, and five sections of the more traditional, mixed-gender classes. The district maintained the same location, daily schedule, core curriculum, and special programs (art, music, physical education) for all kindergarten students; however, the class composition consisted of a single gender variable.

The impact of the gender-specific classrooms would be determined by comparing the students' scores in four subtests of the Dynamic Indicators of Basic Early Literacy Skills (DIBELS). This assessment tool is "a set of standardized, individually administered measures of

early literacy development. They are designed to be short (one minute) fluency measures used to regularly monitor the development of pre-reading and early reading skills" (DIBELS, 2008). The subtests include Letter Naming Fluency, Initial Sound Fluency, Phonemic Segmentation Fluency, and Nonsense Word Fluency. Letter naming fluency consists of children identifying upper and lower case letters on sight. A child's ability to distinguish the first sound in a word is tested in the Initial Sound Fluency subtest by showing students a picture (such as a dog) and asking the child to say the initial sound of the word indicated by the picture. The ability to articulate the first, middle, and end phoneme of a word when the word is spoken by an assessor is measured by asking the child to *segment* the word (as in cat: k -- a -- t). Finally, in the last semester of kindergarten, children are tested on their ability to segment a *nonsense word* by saying aloud the sounds of letters that he or she sees (as in k -- i -- p). Scores on the DIBELS assessment will be compared for all students to determine how several factors influence language acquisition, including student gender, age (birth date), developmental readiness, socio-economic status, family structure, teacher experience, and the composition of the kindergarten classroom (all-boy, all-girl, mixed).

<center>Definitions</center>

Family: Merriam-Webster online dictionary defined family as "a group of individuals living under one roof and usually under one head; the basic unit in society traditionally consisting of two parents rearing their children; any of various social units differing from but regarded as equivalent to the traditional family."

Family structure: Family structure is coded as one of the following: two biological parents; one biological parent and one step-parent, or one biological parent and one other person of the opposite sex who lives with the family, such as a boyfriend or girlfriend of the biological

parent; or other, such as foster parents, grandparents or other living arrangment.

Gender: Merriam-Webster online dictionary defined gender as "the behavioral, cultural, or psychological traits typically associated with one sex."

Gender-specific: For the purpose of this study, gender-specific referred to a group consisting of children of one sex exclusively; a method or strategy conceptualized as being preferential to either males or females.

Mixed gender: For the purpose of this study, mixed gender referred to a group consisting of children of both sexes.

Single gender: For the purpose of this study, single gender referred to a group consisting children of only one sex.

School readiness: For the purpose of this study, school readiness refers to preparedness for school as measured by a child's perceived ability to listen, speak, or perform certain gross and fine motor skills such as writing letters or cutting paper.

Socioeconomic: Merriam-Webster online dictionary defines the term socioeconomic as "relating to or involving a combination of social and economic factors."

Socioeconomic status: For the purpose of this study, children were identified belonging to one of three groups: (1) No meal assistance (the most economically advantaged group, (2) Reduced cost meal assistance (intermediate group), (3) Free meals, breakfast and lunch (the most economically disadvantaged group).

Research Design

Stake (1995) described the purpose of research in the social sciences. "The design of all research requires conceptual organization, ideas to express needed understanding, conceptual bridges from what is already known, cognitive structures to guide data gathering, and outlines for

presenting interpretations to others" (p. 15). However, qualitative and quantitative designs dominate most research endeavors.

A qualitative approach seeks to observe, record, and interpret information by "…starting where you are," gathering data, asking questions, "developing the analysis" and using a process of "writing a report that has a logic and social psychology of its own" (Lofland & Lofland, 1984, p. 2). This approach often focuses on a relatively small number of subjects.

Quantitative design, which seeks information about a larger population, is more empirical in nature and concerns itself with "…knowledge based on observation and experimentation" (Sirkin, 1995, p. 5). A quantitative design was most appropriate, as this study explored the relationships between seven variables: (1) student gender, (2) age (birthdate), (3) developmental "readiness," (4) socio-economic status, (5) family structure, (6) teacher experience, and (7) the composition of the kindergarten classroom (all-boy, all-girl, mixed) on the acquisition of literacy skills as measured by subtests of DIBELS.

Procedures of the Study

Students in this school's mixed-gender and single-gender kindergarten classes received the standard core curriculum; specifically, all students received instruction for units in writing aligned with the Katie Wood Ray (2004) writing workshop method entitled *About the Authors.* All students also participated in a uniform curriculum for reading from the Houghton Mifflin Reading (2001) materials for kindergarten. All teachers of the kindergarten students, regardless of class composition, followed this series, which includes the *AlphaFriends* methodology for letter acquisition. Although classroom strategies varied due to the differences from teacher to teacher, one consistent variable among all classes was the core language arts curriculum. Likewise, class size was consistent among the kindergarten classes studied.

The classes differed in composition, however. One class comprised eighteen boys; their placement was based on parent choice. One class comprised twenty-two girls, also placed by parent request. The remaining five sections of kindergarten comprised both boys and girls.

The following information was collected for each student: gender, age (birth date), socio-economic status, family structure, "developmental readiness," teacher experience and classroom composition.

For the purpose of assessing literacy acquisition, the district used the DIBELS assessment recommendations – students were tested by their classroom teachers three times per year in September, January, and May. Secretarial staff entered the data into the online, web-based system. Data could then be compared between buildings in the same district, among districts in the county, and among districts nationwide that use the system.

The information for the elementary school in this study was transferred to the SPSS system. An analysis of covariance (ANCOVA) model was conducted to understand the relationships among the variables noted above and the impact of each on the child's acquisition of literacy skills measured by subtests of the DIBELS.

Limitations and Delimitations

This study measured kindergarten students' scores on the DIBELS test to ascertain the degree to which gender, age (birth date), socio-economic status, family structure, teacher experience, and classroom composition influenced acquisition of literacy skills. This study had several limiting factors. First, the study's scope was limited to one elementary school in a district in Western Michigan. Because this district does not represent all schools in Michigan, generalization was limited to other rural districts of a similar size (approximately 3000 students) and similar demographics. In addition, the study was limited to the kindergarten population in

one school that offers both mixed-gender and single-gender composition. Although single-gender classrooms are becoming more prevalent, this particular classroom composition is not representative of most schools, as single-gender classrooms at the kindergarten level are few.

Another important delimitation was that the students who composed the single-gender and mixed gender classes did not represent a truly random sample. In this district, precedent dictated that parents had input into the classroom assignment of their children. In some cases, parents requested a specific teacher or wrote explanations of the characteristics of the teacher with whom they wished their child to be placed. Another complicating factor in this particular study was that parents were given a choice of either the single-gender or mixed gender classroom, leading to the possibility that parents who were more attentive to their children's needs may have been more likely to choose one type of class over another.

A further consideration was that, according to district personnel, parents did not seem to have much information regarding mixed- and single-gender classrooms prior to the district's offer of this option during the district's kindergarten registration period in the early spring of 2008. District staff offered the mixed, all-girls, and all-boys options as part of registration materials but reported fielding many questions from parents regarding this option.

Significance of the Study

This highly relevant research extends the long-standing relationship of early childhood education and children's acquisition of literacy skills into new territory by adding the important dimension of single gender classrooms into the array of factors that influence the academic achievement of kindergarten students. Schools and districts will have the opportunity to use the results of this study as a springboard for discussion about equity, learning, and choice. This consideration of educational alternatives may optimize the learning environment for students by

providing the youngest attendees of public schools a unique learning atmosphere.

Conclusion

This study, which examined the relationships between a kindergarten child's literacy acquisition as measured by the DIBELS assessment tool and seven variables, was introduced in Chapter One. Topics also included the research questions; purpose of the study; pertinent definitions; scope, assumptions, and procedures; limitations and delimitations; and the significance of the study. A comprehensive review of literature will be presented in Chapter Two, followed by methodology in Chapter Three and a report of findings in Chapter Four. Chapter Five will be devoted to conclusions and future research recommendations.

CHAPTER TWO

Introduction

Chapter Two comprises relevant research related to the importance of early childhood

literacy and variables of literacy acquisition among kindergarten students; including student

gender, age (birth date), developmental readiness, socioeconomic status, family structure, teacher

experience and classroom composition (all-boy, all-girl, mixed). Using a thematic approach for

searching the literature, the researcher will link each of these facets of a child's biological and

environmental background with pre-literacy skill attainment.

Early Literacy

Children interpret much of their world through communication – listening, speaking,

reading, and writing – and early literacy skills are viewed by parents, teachers, and policy-

makers as key elements of a child's success in school and in life. Dodd and Carr (2003) wrote,

"Literacy is a key to learning in schools. It allows children to access the curriculum. Those

children who find reading and writing difficult in the early stages of education often perform

poorly on academic measures" (p. 128). Whereas historically, the purpose of kindergarten has

been seen as a time for children to learn about sharing, routines, group interaction, and social

rules, this grade has metamorphosed. The expectations for early childhood learning have

changed dramatically: "Children are now expected to come with the prerequisite skills for early

literacy and math and the social maturity to comply with school routines. Some children enter

kindergarten with all of these skills and the disposition to use them. Others do not" (Logue,

2006, p. 37).

Whether children enter kindergarten possessing or lacking these preferred skills, teachers,

early childhood specialists, and other professionals have created an environment that promotes, teaches, and reinforces literacy skills. Gail Connelly (2008), Executive Director of the National Association of Elementary School Principals, wrote in a recent column, "Young children are ready and eager to explore and examine their world through hands-on science, number games, and the wonderful world of books" (p. 72). Noting No Child Left Behind (No Child Left Behind [NCLB], 2001), accountability demands that require public schools to meet required levels of competence on academic assessments, she further stated, "We know we cannot wait until grade 3...to get students up to speed. Instead, we realize that it takes a continuum of high-quality education...to help children reach their highest potential by grade 3 and beyond" (p. 72). Individuals of various professional backgrounds have joined in the promotion of literacy. One example is the *Reach Out and Read* program, a joint effort between early childhood educators and pediatricians who supply books to young children in their medical practice offices. The doctors and their office personnel, who are trained in early childhood literacy strategies, "...counsel parents on the importance of reading aloud to their children by reminding them that early literacy is linked to later academic success" (Rust, 2005, p. 65).

Children begin kindergarten on an uneven educational footing for many reasons, but regardless of their entry status, "The language problems of students who enter school with poor or limited vocabularies only worsen over time" (Stone & Urquhart, 2008, p. 5). Children who have many literacy experiences – parents who talk with them, people who value books and read with them, or preschool teachers who have reinforced print concepts – have an advantage: "Students who enter school rich in literacy skills early in their development are more likely to access the general curriculum effectively than those who are poor in literacy. Once children are on a normal developmental trajectory for reading, they enjoy many opportunities to engage with

reading success, gain general knowledge, and access a rich vocabulary" (Foster & Miller, 2007, p. 174). In contrast, those who fall behind in the beginning tend to remain behind both in general knowledge and in vocabulary, This, in turn, can lead to a downward spiral and "...typically translates into low vocabulary knowledge throughout schooling" (Stone & Urquhart, 2008, p. 5). The authors also linked poor early literacy with later limits on adult accomplishments such as "earning potential." They explained, "Students' lack of everyday and academic vocabulary ultimately translates into shallow interaction with print and the spoken word, fewer job opportunities, and less income" (p. 5).

Thus, pre-literacy skills are important not only for success in kindergarten but also for continued progress throughout a child's elementary and secondary education and on into adult life.

Gender and Literacy Acquisition

A pattern of gender differences exists in children's acquisition of literacy skills both nationally and internationally. Ma (2008) summarized the worldwide trend when she wrote, "The PISA data reveal consistent gender differences in favor of females in reading performance in almost all countries, with a few countries demonstrating from moderate to large gender gaps" (p. 452). Girls also show a multi-decade history of better reading skills than their male counterparts in the United States, as shown by information collected by the National Center for Education Statistics (NCES). Tyre (2008) wrote that from 1973 to 2004 "...the NCES data on reading, the linchpin skill for academic success, shows boys lagging far behind" (p. 26). While the disparity is narrower in fourth grade, with boys scoring five points below girls, the gap continues to widen, and by twelfth grade they score 14 points lower (p. 26). Further, girls tend to have an early advantage with communication skills in general, and in reading, more specifically.

Gurian (2001) relied on United States Department of Education data, noting that "Girls are approximately one and a half years ahead of boys in reading and writing competency..." (p. 56).

Whether girls are significantly or only slightly better than boys in reading skills may depend on the specific skill being assessed. Seventy percent of girls know their letters at school entry while only sixty-two percent of boys have this same skill (Zill & West, 2001). Likewise, thirty-two percent of girls versus twenty-six percent of boys associate beginning and ending letters of words with their respective sounds. The gender discrepancy is much smaller for sight words, with three percent of girls and two percent of boys knowing words at the beginning of kindergarten (p. 15).

The difference in reading skills of boys and girls has caused some educators and writers to claim that a crisis exists for boys. A column in entitled *Boys and Books* (2008) in Reading Today began, "*Boy Trouble*, *Struggling School-Age Boys*, *The Boy Crisis*. These are the titles of three recent articles in the latest flurry of attention to the gender gap – the stark reality that, on average, boys in the United States read less often and less well than girls" (p. 1). Not all experts agree that a serious problem exists, however. Barnett (2007) asserted that there are more differences within a gender than between boys and girls. She wrote, "In 2005, University of Wisconsin psychologist Janet Hyde synthesized data from 165 studies on verbal ability and gender. They revealed a female superiority so slight as to be meaningless" (p. 3). Whether highly significant or not, reading skills of early elementary age children vary, and the explanation for the differences reaches into the discipline of biology.

Girls mature more quickly than boys, and this may be the most plausible explanation for the differences in verbal skills among early elementary students. In one study that examined the advantages that girls possess in kindergarten literacy learning, the authors described a nationwide

trend among kindergarten students: "Not only did girls enter kindergarten with somewhat stronger literacy skills, they learned slightly more during kindergarten (boys gained an average of 9.6 points, girls gained an average of 10.3 points)" (Ready, LoGerfo, Burkam, & Lee, 2005, p. 28). Citing information from a study published in 2006 by the National Institute of Mental Health, Sax (2007) emphasized that specific parts of the brain develop more quickly in females than in males (p. 17). With regard to brain areas that control verbal skills and reading ability, Sax asserted, "It now appears that the language areas of the brain in many five-year-old boys look like the language areas of the brain of the average three-and-a-half-year-old girl. Have you ever tried to teach a three-and-a-half-year-old girl to read?" (p. 18). Gurian (2001) also relied upon evidence of brain development in his explanation of gender differences, and noted that "Girls, for instance, can acquire their complex verbal skills as much as a year earlier than boys. Thus, quite often a preschool girl reads faster and with a larger vocabulary than a peer boy does, and she speaks with better grammar. In general, female brains develop quicker than male brains" (pp. 26-27). Brain development may largely explain why girls begin and continue along a path of strong communication skills that influences their reading attainment because "When we look neurologically at girls dominance in certain aspects of reading and writing...,we find that male and female brain structure is a direct causal factor" (p. 59).

Not only do boys and girls mature at different rates and have different brain structures, they also seem to have learning preferences that vary by gender. Girls tend to be more sedentary and to work in a quieter manner (Gurian, 2001). They also have a greater ability to see things from an adult perspective and a greater desire to please the teacher. Boys, in general, like movement and competition and hands-on experiences (Sax, 2007). A classroom that provides both of these types of learning nuances may fit both boys and girls equally well; however, Sax

(2007) cautioned, "If your school's kindergarten is like most kindergartens today, with an accelerated curriculum focused on reading and math skills, you should seriously consider not enrolling your son until he is six" (p. 186). Why? The answer is that the school described likely places a great emphasis on learning traits that are most prevalent in girls. In their study, Ready et al. (2005) defined learning approaches as "attentiveness, task persistence, eagerness to learn, learning independence, flexibility and organization" (p. 26), and concluded that those children who were "at the extreme 'poor' end of each behavioral category," including approaches to learning, were boys (p. 29). Further, they asserted that girls had stronger literacy skills at the beginning of kindergarten and at the end of kindergarten than boys, and that differences in boys' and girls' learning approaches explained 70% of the gap (p. 33).

Gender differences among boys' and girls' early performance in literacy skills are exacerbated by changing institutional goals. School has changed, because expectations about what children should know, when they should know it, and how they should be able to demonstrate it has altered the educational landscape. The federal law commonly referred to as "No Child Left Behind" (NCLB, 2001) set many standards for all public schools. One expectation is that all students will read at grade level by the year 2014. Schools, under pressure to meet performance standards, have gradually increased the literacy skills that each child must achieve at each grade.

In the world of the elementary classroom, the practical implication of these new standards has been the requirement that children will read at an earlier age. Tyre (2008) summarized these rigorous elementary expectations: "The drumbeat for early academics gets even louder when [children] enter 'real' school. Veteran teachers will tell you that first graders are...expected to master a curriculum that, only 15 years ago, would have been considered appropriate for second,

even third graders" (p. 1). The theme of more academics in kindergarten is acknowledged by many who are trying to explain the gender gap in literacy achievement among the young. Parents recognize the change partly by pure observation; they see that the days of their kindergarten in which they sang, painted, played, and learned basics such as colors, shapes, and letters has changed. Teachers understand these same changes through the dramatically different curriculum they teach and the increasing number and kinds of assessments they must administer. Sax (2007) bemoaned that play has been replaced by rigor, and "Traditional kindergarten activities such as finger painting and duck-duck-goose have been largely eliminated, replaced by a relentless focus on learning to read and write" (p. 16).

Of course, reading is a noble goal because strong communication can, as noted earlier in this section, lead to better jobs and greater pecuniary success in adulthood. The emphasis on reading can be a hardship, however, for young boys who enter kindergarten with less academic finesse, and less development in brain areas that support language skills than their girl counterparts. Tyre (2008) explained, "Our expectations for our children have been ramped up but the psychological and physical development of our children has remained about the same" (p. 1). Referencing a report by the National Center for Health Statistics, Tyre continued, "...and what this government study now shows – is that the ones who can't handle it [changing academic expectations] are disproportionately boys" (p. 1).

Educational institutions and the staff who help children learning to read have begun to acknowledge the gender gap in literacy and the need to find ways to help all children, especially boys, read better. No one would argue that better literacy instruction for all children is a positive goal. Communication is a vital component of educational success. "This said, because boys are so far behind in reading and writing right now, the most substantial pressure at all levels (local

and federal) ought to expand...to improvement in boys reading scores... We are damaging a generation as we neglect the tragic reading and writing gap" (Gurian, 2001, p. 59).

<center>Age, Developmental Readiness, and Literacy Acquisition</center>

The emphasis on literacy in kindergarten classrooms in the United States has focused the attention of educational institutions on a child's readiness for formal schooling. "Many schools now screen age-eligible children to determine school readiness, even though educators disagree about what determines a child's chances of success in school. One reason for this trend is that escalating standards in the early grades have altered curriculum, causing more children to be at risk of failure" (Hills, 1987, p. 2).   Most schools use age as a determinant of whether a child can enroll in kindergarten, but many schools also screen students to determine their suitability for a classroom setting.

Marshall (2003), citing the National Association of the Education of Young Children, noted that the organization promotes age as the "only legally and ethically defensible criterion of determining school entry" (p. 85). Admission to school in the chronological sense, however, is a different parameter than admitting those who are most likely to find academic success in their first school experience. Work by Wood et al. (1984) concluded that the chronological age of children between four and six years of age when they begin kindergarten does not predict "eventual success or failure" (p. 11), thus downplaying age as a beneficial criterion. Likewise, Marshall (2003) wrote: "The classic review of the literature by Shepard and Smith (1986) indicates that although the oldest children in a class on average are more successful than their younger peers in the first few grades...these differences are of little practical significance and usually disappear by grade three" (p. 89). Seemingly relevant differences when a child is age four or five affect kindergarten academic success, but may have no long term relevance.

Others disagree, however, and suggested that the opposite is true: "Giving children an extra year, whether through delayed entry or retention, makes sense in view of the ample research suggesting that the youngest children tend to lag behind their classmates" (Holloway, 2003, p. 89). Similarly, Oshima and Domaleski (2006) found age to be a significant predictive variable. Their study looked at data from over 6000 kindergarten students in *The Early Longitudinal Study of the Kindergarten Class of 1998-1999* (ECLS-K), and examined their academic performance over the course of kindergarten and beyond. While the difference between the younger and older students declined as they progressed through eighth grade, for kindergarten students, a moderately significant higher achievement score existed for older children by the end of the kindergarten school year (p. 213).

More recent research also supported the idea that age is a defining factor in academic success. Cascio (2008) considered several explanations for an apparent achievement gap that surfaces when children enter school at a young age, do not perform academically as well as their peers, and then fail to catch up as they continue through the upper elementary grades (a phenomenon called by some an entry-age achievement gap). One explanation for the difference in ability asserts that younger kindergarteners do not gain as much over the course of the year because they are smaller and less cognitively developed than their larger classmates, so in relation to their peers, they do not gain as much academically. The second explanation is that a student's age when he or she begins school affects achievement, with older students having had more time to develop, thereby being *better equipped* to succeed in school. The third theory is that older children have had more time to live life outside of school, and this experiential advantage gives them an edge because they are more prepared for existence in general and school more specifically. Cascio concluded that the differences in achievement between older

and younger students is "largely an artifact of natural differences" due to age (p. 3).

Further, Crosser (1991) concluded that age and gender both need to be considered because boys, in particular, were "advantaged academically by postponing kindergarten entrance one year" so that they started school when they were older (p. 145). Crosser found that advantage for boys to be greatest in the area of reading. Girls in Crosser's study did not see the same advantage by delaying their school start.

Defining readiness is a challenge. The National Institute for Early Education Research (NIEER, 2009) has attempted to synthesize information about what skills pre-kindergarten children should possess, but noted that among states "...the character, scope, and level of detail provided in standards often vary significantly among states and subject area" (p. 1). They further explained that "...no consensus is clear regarding what form standards should take or how they should be used" (p. 1). A similar sentiment is expressed by Wood et al. (1984) regarding research related to readiness. "The research, like the practice, also suffers for want of an agreed-on definition of readiness" (p. 8). Nevertheless, in an attempt to describe a pre-kindergarten student, the State of Michigan defined seven domains — Language/Literacy, Math, Science, Social/Emotional, Cognitive Development, Health and Physical Development, Social Studies — that detail the characteristics of a child who is ready for school (NIEER, 2009, p. 1).

What criteria, then, along with age, should schools use to determine if children are ready to begin school? Most educators and researchers agree that readiness is some ideal level of development in language, motor, social, emotional, and cognitive skill areas. The idea of readiness encompasses cognitive functioning and "in addition, it takes into account the child's physical, social, emotional, and general language development" (Wood et al., 1984, p. 8).

Defining readiness leads logically to what a screening tool should measure when

assessing students. Teachers tend to emphasize the need for academic skill, with some indicating that children need to know the alphabet, some wanting students to be able to write letters, and others expressing recognition of numbers (Wright, Deiner, & Kay, 2000). Many teachers in this same study wanted children to be able to express themselves by speaking (p. 103). This emphasis on language mastery is supported by research that has shown that "The strongest predicator, on its own, of reading readiness skills is letter identification..." (Hadaway, 2005, p. 15). Yet others see a need to assess motor development in addition to communication skills because academic skills depend on an interaction with visual motor skills (Son & Meisels, 2006, p. 773). Equally significant in determining a child's ability to have a positive school experience is his or her social and emotional competence. Traditionally, social skills were emphasized in kindergarten; children learned how to make friends, share, negotiate, and talk. Today, that old kindergarten has evolved and, with the emphasis on more academic goals in early elementary grades, students are expected to demonstrate greater self-regulation and social competence right from the beginning of school.

Readiness is a measure of whether, when all of a child's facets are taken into account, he or she is likely to be successful in kindergarten. Ideally, readiness must be assessed for children beginning school so that school personnel can plan instruction to meet varying student needs: "...assessment is performed to understand the individual children's strengths and weaknesses, to promote improved, individualized instruction, and to evaluate programming" (Denham, 2006, p. 57). Underlying a school's goal of tailoring a child's education, however, is also the notion that a student who will disrupt, is unable to perform academic tasks, or who is immature socially, is unlikely to learn literacy skills. Hills (1987) described the purpose of readiness screening: "Readiness tests yield information about the extent to which a child has acquired the knowledge

and skills considered to be important entry criteria for a particular program" (p. 2). That readiness score, in turn, is utilized by schools as a predictor of a child's likelihood of achieving academically, learning letters, speaking sounds, and learning to read.

Socioeconomic Status and Literacy Acquisition

Socioeconomic status (SES) is strongly correlated with educational achievement in the United States. Factors associated with low socioeconomic status, including low birth rate, inadequate medical care, basic nutritional needs, environmental pollutants, family relations, and neighborhood characteristics, all influence a child's physical, social, and psychological well-being (Berliner, 2009). Diminished well-being, in turn, means that children arrive at school with characteristics "ranging from neurological damage and attention disorders to excessive absenteeism, linguistic underdevelopment, and oppositional behavior" (p. 1). Berliner asserted that "Poverty limits student potential; inputs to schools affect outputs from them" (p. 1).

Socioeconomic status influences reading acquisition with children from disadvantaged households performing more poorly than their more advantaged peers. This assertion was confirmed when the U. S. Department of Education undertook a major study of 19,000 kindergarteners from 940 public and private schools entitled the *Early Childhood Longitudinal Study Kindergarten Class of 1998*-99 (ECLS-K). That study described disadvantage as children with risk factors such as living in single-parent homes, living in poverty, having a mother with low education, or living in a household in which members do not speak English (Zill & West, 2001, p. 17). Traditional measures of socioeconomic status, such as parent income, education, and employment status, are clearly linked to achievement (Matuszek & Haskin, 1978). These researchers further noted that "Income information in particular is often available in application for free lunch programs and other school services" (p. 7). Consequently, the connection between

poverty and income is obvious, but other factors such as having one parent in the household or having a parent with low education are likely to contribute to the overall low economic condition of the family as well. In 2000, forty-six percent of children entering kindergarten came from backgrounds with at least one of these risk factors (Zill & West, 2001).

The issue of socioeconomic status and literacy acquisition thus becomes more interconnected, as low income households may also be less able to meet children's early literacy needs. The children in these households not only live in poverty but also "live in environments deprived in ways beyond the lack of economic resources" (Wright, et al., 2000, p. 99). Researchers of 11 inner city schools in Salt Lake City explained that children in impoverished environments "do not have the early experiences that we take for granted as prerequisites for formal school. They grow up in families who don't understand the importance of talking and reading to preschool children" (p. 100). This leads to a disadvantage in reading acquisition because children from these backgrounds are not only likely to have less support but also "to know fewer letter names and letter-to-sound associations. From their first literacy lesson, they are disadvantaged" (Dodd & Carr, 2003, p. 135). Children from poverty also know fewer words than their peers from a higher socioeconomic tier. By age three, children of welfare families knew 525 vocabulary words; children in working class families used 749 words, but children of professional families utilized 1,116 vocabulary words (Berliner, 2009). Berliner, citing others, concluded: "This restricted experience with language early in development seems to be causally related to academic achievement later in life. Right from the start, at entrance to kindergarten, higher SES children were found to have cognitive scores about 60% higher than did children from lower SES families" (p. 28).

The interrelatedness of socioeconomic status and reading acquisition is compelling. "The

complex social and economic correlates of SES – including home environment and early education factors – likely directly influence cognitive skills important in the development of reading" (Noble, Farah & McCandliss, 2006, p. 363). The ECLS-K report on the nation's kindergarten students supported this correlation as well. Those results showed that thirty-three percent of the children in the lowest quartile of the reading skill distribution had one risk factor. Children with two or more risk factors were even more likely to fall in the bottom quartile in reading: Forty-seven percent of the multiple risk students were in this lowest range (Zill & West, 2001, p. 20).

While family income level can stand alone as an indicator of the likelihood of student achievement, related risk factors of a child's background such as home environment paint a more accurate picture. The stages of reading acquisition proceed from emergent literacy to phonics and then to fluency and comprehension (Foster & Miller, 2007). Emergent literacy skills include abilities such as identifying the front of a book, naming animals in a story, understanding a character's emotion, or telling the beginning and ending of a story (Wright et al., 2000). Children who have little support in their homes — those who have less exposure to books, those with parents who are not involved in school, or those whose parents fail to read to them — have less chance of acquiring emergent literacy skills: "Each of these family climate indicators has been cited as a factor underlying disparities in early literacy and language outcomes" (Aikens & Barbarin, 2008, p. 236). Alternately, families with a higher socioeconomic status tended to participate in more family literacy activities, and this was linked to the children's reading skills (Son & Strasser, 2002).

When children are not exposed to literacy activities, they are deprived of specific emerging literacy skills. Wright et al. (2000) described a study of the kindergarten population in

eleven inner-city schools in Salt Lake City, which revealed that sixty-eight percent of the children did not know where to start or the direction in which to read, fifty-eight percent had difficulty knowing a rhyming word or knowing which words began with the same sound, and thirty-seven percent could not recognize even one letter of the alphabet. A majority of the parents in this same study responded that they rarely read to their children (p. 113). The authors concluded, "Our data support previous research regarding the negative effects of poverty on literacy development. Children coming from families who are better able to support literacy development...are more likely to enter kindergarten with literacy skills that propel them on a positive developmental trajectory" (p. 179).   Like other emergent literacy skills, phonemic awareness, which requires children to associate letters with sounds, has been found to be correlated with socioeconomic status (Noble et al., 2006). The authors of this study of 150 first graders in nine New York public schools representing a range of socioeconomic backgrounds attribute this effect to a child's decreased access to resources due to living environment.

Attentiveness by a child's mother is another aspect of home environment that influences budding literacy. Roberts, Jurgens, and Burchinal (2005), studied 72 African American children from primarily low income families. They concluded that the factors of maternal sensitivity and book reading strategies were positively correlated with reading, such that "Mothers who used more book reading strategies had children with higher vocabulary scores over time between 3 year and entry to kindergarten" (p. 354). Additionally, they utilized a more general assessment instrument called Home Observation for Measurement of the Environment Inventory, and found that "The measure of the overall quality and responsiveness of the home environment...was the most consistent and strongest predictor of children's language and literacy skills. In the longitudinal analyses and the individual correlation analyses, ...the home environment was

related to both children's language and early literacy skills" (p. 356).

The research of Aikens and Barbarin (2008) supported the premise that family context influences reading. Using ECLS-K data, their results suggested that "The relation between SES and children's initial reading competence is mediated by home literacy environment, number of books available within the home to the children, parental involvement in the school, parental role strain and warmth, and provision of center-based care prior to kindergarten" (p. 248). Their work also drew connections between the socioeconomic status of the larger setting of the children's life, such as neighborhood and school. In fact, they conclude that once a child enters school, the "Qualities of school and community are associated with differences in reading development to a greater extent than is family life" (p. 248). Children's literacy, then, is greatly influenced by home factors until they enter kindergarten. Once a child begins school, the effects of poverty continue to be reflected in the home, but influences of the neighborhood and school settings have a significant and possibly greater impact so that the child's literacy is still negatively affected. The influence of poverty on reading acquisition is profound, and low socioeconomic status affects short and long term educational success.

<center>Family Structure and Literacy Acquisition</center>

Family structure impacts a child's early years in economic and environmental ways that, in turn, are shown to affect achievement. Over the last few decades, the family unit has changed, and many children are no longer raised in traditional, two-parent households. Although "family" can be defined as a married couple, the term also includes a single individual as the head of household, co-habiting couples, families with step-parents, and children being raised by grandparents. In 2006, 66.8% of children aged five to seventeen were in two-parent households, 23.2% were in mother-only households, and 4.7% resided with only their fathers (Planty, Hussar,

Snyder, Provasnik, Kena, Dinkes, KesalRamani, and Kemp, 2008, p. 88). Zill and West (2001)

explained that certain family backgrounds are correlated with poor educational outcomes,

including children from a low-income or welfare-dependent family, or those living in a single-

parent family (p. 16).   For young children, these environments cause stress and, consequently,

academic deficiencies. Gurian (2001) noted, "All preschool and kindergarten teachers know that

their most problematic children generally come from homes or family situations where

attachment is lax, dysfunctional, or dangerous" (p. 76). These dysfunctional situations involve

both male and female children, but those most at risk for these poor outcomes may be boys. Tyre

(2008) wrote, "Boys are isolated at home, too. More and more boys are growing up with no men

in their lives. According to the U. S. Census Bureau, about thirty percent of boys don't live with

their biological fathers" (p. 243).

Adding to the climate of at-risk households is that more and more children transition

through not only one, but several, family structures during their youth. Between 1965 and 1974,

only 11% of marriages were preceded by two adults living together; however, in the years from

1980 to 1984, that percent rose to 44% (Bumpass & Sweet, 1989). Further, in a study using data

from the 1987-1988 National Survey of Families and Households with a sample of more than

13,000 individuals, Brown and Booth (1996) concluded that co-habitation is "most prevalent

among those with low levels of education," and that those who live together outside of marriage

report less quality in their relationships than do married couples (p. 674).

Instability of relationships in a household has a profound impact on children in those

homes. Unmarried mothers who are not living with their child's father are particularly at risk of

many transitions, with 25-30% of the women having three or more partnership changes by their

child's third birthday (Osborne & McLanahan, 2007). In addition, the researchers found that

partnership instability manifests itself in the children as aggressive, anxious, or depressive behavior due to "maternal stress and poor mothering behaviors" (p. 10). Thus, social behavior, positive or poor, often mirrors a child's environment: "Social learning is acquired developmentally and happens in the context of relationships when children feel safe and valued as individuals. Given the diversity of families from which children come, and the genetic heritage they bring, social learning...occurs at different rates for different children" (Logue, 2007, p. 38).

Poor emotional and behavioral outcomes are not the only result of high risk structures. A child's economic situation is closely tied to the family unit. One study, a sample of African American families with kindergarten students, examined processes such as family cohesion, family beliefs, and family structure. Among factors measured were togetherness, decision making, and communication among family members. The authors concluded that although family structure, cohesion, and beliefs were influential, "None of the family process variables added a unique contribution to the influence upon achievement for these kindergarten children beyond the role of parental education and income" (Smith, Prinz, Dumas & Laughlin, 2001, p. 967).

Family structure, then, can influence achievement in that the make-up of certain households is more prone to social, emotional, and economic stresses, and the adults in those households have less time, attention, and resources to devote to their children. Berliner (2008) contended, "These data reveal clearly that the form of verbal interaction expected from adults and received by the children of professional families is quite different than that expected and received by children from poorer families. Compared to lower SES children, these differences in expectations and experiences with particular kinds of linguistic forms will no doubt serve the

higher SES children better..." (pp. 28-29).

The concept of concerted cultivation may explain the connection between resources and achievement, specifically reading skills of the very young. Extending the work of Lareau, Cheadle (2008) examined the relationship between concerted cultivation behaviors and kindergarten students' reading scores. Concerted cultivation behaviors are those activities in which parents participate, such as attending a school open house, or volunteering at the school, as well as student activities promoted by parents, such as taking dance or music lessons or participating in athletics. These behaviors are believed to be connected to socioeconomic status and social class standing with more affluent parents investing more time and money for their children to participate in these activities. Using ECLS-K 1998-1999 data, Cheadle concluded that "When the full covariate list is used, concerted cultivation remains an important predictor of children's reading skills at kindergarten entry" (p. 17). He further concluded that concerted cultivation measures were associated with higher reading scores over the course of the kindergarten year and into the first grade.

A similar connection between income and reading achievement is evident in the work of Shaff, Wolfinger, Kowaleski-Jones, & Smith (2008), who used *National Longitudinal Survey of Youth* 1979 data to track children's reading scores over time beginning with those who were at least five years old in 1986. Their work examined reading scores as a function of the number of family transitions (marriage/remarriage/divorce). Children of continuously married families had higher reading scores than any other group, whereas those who experienced remarriage were neither better nor worse over time. Those children in unmarried households, whether through divorce or non-marriage, had lower reading scores. Ultimately, the authors concluded that parental income, lack of role models, and lack of parental time are factors in this achievement

difference, and that "maternal education and income appear to be attenuating the effects of family structure more for reading than math achievement" (p. 698).

Teacher Experience and Literacy Acquisition

Whether teacher experience influences student academic achievement is a small part of a larger debate about school and teacher performance. The controversy around quality schools first received attention in the paper *Equality of Educational Opportunity*, known as the Coleman Report, which "reported relatively small effects of differences in the measured attributes of schools on student achievement" (Rivkin, Hanushek, & Kain, 2005, p. 418). Over the years, studies about school quality and its many facets have produced mixed results (p. 417), but in spite of this, the more recent affects of federal policy (No Child Left Behind) have continued to focus many states on improving schools. Schools, in turn, grasp at ways to produce higher achieving students by focusing on methods that affect staff, such as increasing teacher qualifications or stemming teacher turnover.

Students learn through a complex system that encompasses home, neighborhood, and school settings. "Under such perspectives, functioning and development are not merely a reflection of children themselves but also of the nature of experiences, resources, and interactions encountered by children across settings" (Aiken & Barbarin, 2008, p, 235). This was the theoretical framework utilized by Aiken and Barbarin to determine socioeconomic differences in reading trajectories of the 10,998 students using data from the Early Childhood Longitudinal Study Kindergarten Cohort of 1998-99. The study examined the influences of family, neighborhood, and school contexts, among them, teacher experience. For the study, teachers completed questionnaires and provided information on students' performance as well as their own teacher background. Teacher experience was measured as a combination of the total

number of years the teacher had taught at the school and the number of years the teacher taught at the grade level. The researchers concluded that the overall results of their study supported the contention that many factors, including home, neighborhood, and school influence early reading acquisition; however, teacher experience was not consistently "related to students' reading outcomes beyond their expected trajectories" (p. 249). Archibald (2006) came to similar conclusions in her study of 7,601 students in Washoe County, Nevada elementary schools. While finding that teacher *performance,* as measured by the district's evaluation tool, indicated a positive and statistically significant relationship in students' reading and math scores, other variables such as whether or not the teacher had a master's degree or an instructor's years of experience were not positively related nor statistically significant in terms of student performance in these subject areas.

In contrast to the above conclusions regarding teaching experience and student achievement, a study of preschool teachers' experience was shown to have more impact. Brown, Molfese, and Molfese (2008) examined specific literacy skill attainment of 138 four-year-old preschool students who were enrolled in preschool programs for low income or developmentally at-risk students in public schools. While a teacher's educational attainment was most closely related to letter identification ability of students when tested in the spring, the study found that the strongest influence on letter identification was teacher education (bachelor degree versus non-bachelor degree preschool teachers); however, teacher experience had a modest influence on these early literacy skills. Likewise, in a study of 103 Colorado school districts, Turner (1988) found that teacher experience influenced reading attainment of fifth and sixth grade reading scores at a level of .31.

Teacher experience as an indicator of student reading achievement remains dubious.

Rivkin et al. (2005) summarized the unclear nature of this variable when they wrote, "Achievement gains are systematically related to observable teacher and school characteristics, but the effects are generally small and concentrated among younger students" (p. 449). While quality may improve over the first few years of a teacher's career, there is little evidence "that improvements continue after the first three years" (p. 449).

<div align="center">Single-gender Education and Literacy Acquisition</div>

Gender specific education is simultaneously newly unique and old school. Generally, until 2006, most people associated with public educational institutions could only talk about how a single-gender classroom might work. Private institutions had, for years, created classes, departments, wings, or entire schools and colleges devoted to either boys or girls, but public schools were limited by issues of equity, fairness, and the law.

In October of 2006, the legal path was paved for such an option. Nevertheless, gender specific classrooms were not prominent in most areas of the United States, and they are still only a fraction of all classrooms in the country. Why, one might ask, do people hold an ambivalent or even negative attitude toward this educational option? The answer is because single-gender classrooms could be considered to discriminate against either boys or girls, or both, simply by virtue of the fact that males and females are separated and one group is denied access to the classroom housing the opposite gender.

The most pressing concern from an ethical and legal perspective centers on the idea of treating students in a just and equitable manner. Most people would feel that when it comes to schools and classrooms, "substantive justice" is a necessity, and that all students must be given access to good teachers, adequate materials, and effective instruction (Beckner, 2004, p. 37). Several courts cases have addressed various aspects of Title IX, the regulation that requires

equitable treatment of males and females. The most important legal action affecting K-12

schools was the case brought by school boards in Connecticut who questioned whether Title IX

was directed at the practices of school districts. The outcome of that case indicated that Title IX

does apply to school systems, its employees, and students (Essex, 2005). For many years, Title

IX restrictions hindered public schools from offering a single-gender classroom option, even

though some evidence existed indicating that students might benefit academically from this

arrangement.

The most important facet of the legal precedent regarding single-gender classrooms came

recently, first through the 2001 reauthorization of the Elementary and Secondary Education Act

(most often called the No Child Left Behind legislation), followed by changes in Title IX

regulations in 2006. Secretary of Education Margaret Spellings "announced the release of final

Title IX single-sex regulations that give communities more flexibility in offering additional

choices to parents in the education of their children" (Secretary, 2006, p. 1). The No Child Left

Behind legislation requires districts to attain prescribed levels of learning for all students for the

purposes of holding educational institutions accountable for student academic improvement. At

the same time, loosening of the Title IX requirements allows school to offer unique options

including single-sex classrooms or academies in an effort to create an environment and

instructional setting where students are more likely to make educational gains. Single gender

classes, it was thought, hold promise for this.

 In her press release, Spellings noted that "Research shows that some students may learn

better in single-sex education environments…These final regulations permit communities to

establish single sex schools and classes as another means of meeting the needs of students"

(Secretary, 2006, p. 1). The new regulations allow for gender-specific classrooms, provided that

students are treated equitably, that parents may choose which classroom environment they desire for their children, and that both boys and girls are afforded a similar single gender opportunity for instruction. "Male and female students must be treated in an 'evenhanded manner,' and a 'substantially equal' coeducational class must always be provided" (Clarke, 2007, p. 2).

According to Spellings' (2006) press release, "Prior to today's announcement, the Title IX regulations generally prohibited single-sex classes and extracurricular activities in public and private coeducational schools…Under the new regulations, public…elementary and secondary schools may offer single-sex classes and activities" (p. 1). This new legislation opened the window of opportunity for districts across the nation to offer a gender-specific classroom composition within the bounds of the legal system for the purpose of improving academic skills. As of February 2009, at least 540 public schools are offering single-sex educational opportunities, most of which are coeducational schools that offer single-sex classrooms (NASSPE, 2009, p. 1).

Reaction to the new legislation and the subsequent formation of single-gender learning environments is polarized. Sax (2007), founder of the National Association for Single Sex Public Education, believes that education needs to be tailored to the learning differences between males and females, and that this can best be done with the genders separated. Girls benefit from this arrangement because they are better able to do the pencil and paper tasks expected of kindergarten students and, therefore, find success in a school setting, whereas boys benefit from Kenntnis, knowledge gained through active participation. Sax pointed out that boys gain significantly from this arrangement because "Single-sex education allows the school to create an alternative culture in which it's cool to study, in which team competition for academics is the most natural format imaginable, and in which restoring Kenntnis to its rightful place is likely to

yield immediate positive results" (p. 187).

Opponents of single-gender education are numerous and high profile. Organizations such as the National Women's Law Center (NWLC) maintain that the new regulations violate the intent of the Title IX law and imply that legal battles will follow for districts that offer gender-specific options (Green, 2006, p. 1). In an only slightly less challenging tone, a 2006 position statement from the National Coalition for Women and Girls in Education (NCWGE, 2009), a group of more than 50 organizations that work to improve educational opportunities for females, stated, "While single-sex programs can be beneficial and lawful in appropriate circumstances, the new regulations abandon long-standing legal safeguards that are designed to ensure that these programs will not result in sex stereotyping or discrimination " (p. 1). The NCWGE also criticized the new regulations as relying on unsubstantiated claims about the benefit of single-sex education. The National Organization for Women (NOW), a member of the NWLC, maintained that dividing students by gender perpetuates stereotyping and has the potential to lead to more gender inequality over the long term. NOW asserted that men and women must learn to work together, and that school is the place to help students learn that this cooperation is a necessity for later life experiences. Likewise, the American Civil Liberties Union (ACLU) believes the new regulations to be unconstitutional, and claims they "will reinforce sex stereotypes and result in an unequal distribution of resources" (McNeil, 2008, p. 2).

Implementation of single-gender classrooms and programs has varied by state. Districts in Flint, Michigan, and Portland, Oregon, have closed all-boys schools while maintaining all-girl options because the programs for females have been more popular (Vaznis, 2009). Some single-gender schools have failed because parents simply are unfamiliar with the concept or are concerned about the social impact of having a child associate primarily with only one gender.

Conversely, South Carolina schools are "at the forefront in implementing such programs statewide" due in large part to a man named David Chadwell, a state education official, whose primary role is to encourage schools to embark on the path to single-gender programs (McNeil, 2008, p. 3). In that state, ninety-seven urban and suburban schools offer gender-specific education to students from a variety of cultural and socioeconomic backgrounds (p. 1).

Whereas enthusiasm for single-gender classes is evident in some areas of the United States, research to determine the efficacy of such classrooms is limited. One of the variables which most clouds the evidence on the quality and generalizability of the outcomes of these classrooms is that the students who participate in the specialized arrangements are participating as a result of choice by their guardians. Thus, the sample population for the research itself is not random, and conclusions cannot be broadly interpreted. In addition, most public school programs have not operated for long periods of time; therefore, results reflect only short term results.

One major report by Datnow, Hubbard, and Woody (2001) focused on six districts in California that were the first to open single gender academies as a result of a pilot program supported by former Governor Pete Wilson. The study's purpose was to "assess the consequences of single gender schooling in the public sector" (p. 5). The study examined the socio-political context of the gender-specific academies in the communities, the organization, and implementation issues associated with each, the policy implications for this schooling choice, and the issues of equity that were woven into each of these facets (p. 5). The authors drew several conclusions about California's single-gender endeavor. Among the twelve major findings were: (1) Administrators saw single-gender schooling not as an "end in itself" but as a way to meet the needs of at-risk students, (2) most of the single-gender academies were not open

to all students, (3) teachers were "less concerned about gender bias" but did allocate resources equally to boys and girls, (4) negative consequences were experienced by many groups directly and indirectly associated with the single-gender academies, including students in the specialized classes, and by those in the coeducational settings, and (5) all but one of the academies closed after no more than three years (pp. 6-8). Whereas this report drew several conclusions about gender-specific education, one variable not reported was whether, and to what degree, single-gender instruction influenced academic achievement.

Another important analysis of single-sex education was conducted by researchers sponsored by the U. S. Department of Education (Mael, Alonso, Gibson, Rogers, and Smith (2005). The researchers began by reviewing studies on the topic of gender-specific education and utilized 88 quantitative studies for their meta-analysis. Many of the studies, however, did not meet the original criteria they established. The researchers noted, "There is a dearth of quality studies...across all outcomes. From the perspective of the What Works Clearinghouse, which requires randomized controlled trials, quasi-experimental designs with matching (QED), or regressions discontinuity...virtually no studies would inform this topic" (p. 87). Nevertheless, they investigated six research questions, two addressing student adaptation and socioemotional development, two addressing school climate that affects performance, and two addressing academic performance. With regard to academic achievement, the researchers asked, (1) Are single-sex schools more or less effective than coeducational schools in terms of concurrent, quantifiable academic accomplishments? and (2) Are single-sex schools more or less effective than coeducational schools in terms of long-term, quantifiable academic accomplishments? (p. 83). Mael et al. concluded that in the short term about one third of all studies found that students in single-sex schools had higher academic achievement than those in coeducational

environments; the other two thirds of the studies were "split between null and mixed results" (p. 83). In the long term, though, the positive effects of single-sex schooling on academic achievement "are not readily apparent" (p. 83). To summarize, Mael et al. wrote: "There is some support for the premise that single-sex schooling can be helpful, especially for certain outcomes related to academic achievement and more positive academic aspirations...There is limited support for the view that single-sex school may be harmful or that coeducational schooling is more beneficial for students" (p. x).

Whether single gender classrooms warrant more attention remains unclear. Gurian indicated that he neither promotes nor discourages single gender education; rather his focus is on the needs of boys, many of whom lack a father figure, have little or no extended family with male models of behavior, and experience social stresses that affect their educational attainment but that they cannot control, such as poverty (Jayson, 2009, p. 7D). He asserted that an educational approach that engages boys can be accomplished through either coeducational or single gender means by "making education relevant to them and bring in more service learning and vocational education" (p. 7D).

Others see gender specific education in a more positive light and are hopeful about its potential. Researchers at Florida's Stetson University tracked students at a local elementary school over three years and found that they performed better on state standardized tests than their counterparts in coeducational classes (Vaznis, 2009, p. 3). When asked whether single-sex classes work, Spielhagen (2008) gave a complex "maybe" (p. 26). He elaborated, "Recent research suggested that these arrangements work for some students, both boys and girls, in some academic areas. They seem to be most effective when their implementation is related to the developmental needs of students. In fact, the younger the student, the more likely that being in

such a classroom will be a positive experience" (p. 26). The Education Testing Service (ETS) (2007) indicated: "Clearly, more research on what happens in single-sex settings is needed – and may be more possible if the new regulations create momentum toward introduction of more single-sex programs" (p. 8). The ETS also asserted that areas of study should include the grade levels or subject areas where the single gender option might have the most impact.

<div align="center">Dynamic Indicators of Basic Early Literacy Skills</div>

Dynamic Indicators of Basic Early Literacy Skills (DIBELS) is a group of related assessments that provide information about individual student's literacy skills for the purpose of informing instruction and evaluating school level outcomes (Good, Kaminski, Smith, Simmons, Kame'enui & Wallin, 2002). According to the DIBELS website (2009), "The DIBELS measures were specifically designed to assess the Big Ideas of early literacy: Phonological Awareness, Alphabetic Principle, Fluency with Connected Text, Vocabulary, and Comprehension" (p. 1). The measures are linked to one another, both psychometrically and theoretically, and have been found to be predictive of later reading proficiency. Combined, the measures form an assessment system of early literacy development that allows educators to determine student progress. In addition, "The measures are intended to be brief and repeatable. There are over 20 alternate forms of each measure, and each measure is designed to take approximately one minute to administer" (Good et al., 2002, p. 2). The assessments for each grade level are administered at regular intervals in Fall, Winter, and Spring, with additional assessments available that may be administered between these "benchmark" intervals so that the progress of students who are not performing at prescribed levels may be monitored more often. All DIBELS tests are intended to show a measure of risk. Students are labeled as "low risk," "some risk," or "at risk" on the basis of their scores.

Beginning in first grade, the main test for reading ability is a test of Oral Reading Fluency (ORF). "Benchmarks" are established for each grade that give targets for the number of words a child should be reading per minute. These benchmarks were based on the performance of participating students in the DIBELS internet-based system as of Spring 2002 and assessed during the 2001-02 academic year (Good, Kaminski, Smith, Simmons, Kame'enui, & Wallin, In Press). Students are assessed by reading passages that reflect a target range for each grade, and their ORF score is the total number of words correctly read in a one minute period. A strength of the DIBELS assessment program is that "a clear focus is created with concrete, realistic, and challenging *goals* for improved child performance on critical basic early literacy skills...validated by large-scale studies" (pp. 2-3)

A test of oral reading ability is not appropriate for most kindergarten students, especially during the first half of their initial year of schooling; thus, the DIBELS assessment system utilizes four other assessments to measure the progress of kindergarten literacy acquisition. Two tests are administered in the fall test window: Letter Naming Fluency (LNF) and Initial Sound Fluency (ISF).

In the test of LNF, students are presented with upper and lower case letters in a random order and are prompted to identify as many letters as possible. Students are allowed one minute of response time, and their score is the total number of correctly identified letters. At the beginning of kindergarten, "low risk" students are above the 40th percentile and would name eight or more letters correctly, "some risk" students fall between the 20th and 40th percentile and would name between four and eight letters correctly, while "at risk" students are below the 20th percentile and would name fewer than four letters correctly (Good et al., 2002).

The Initial Sound Fluency (ISF) test is also administered in the fall. The purpose of the

test is to determine the child's skill in recognizing and producing the first sound of a spoken word. A child is shown four pictures and the examiner names each picture. The child is then told to identify the picture that the examiner specifies. For example, the examiner might say, "This is dog, mittens, desk, pencil. Which picture begins with /m ⁄ ? The child's responses are timed and the child's score is determined by the number of correct responses in one minute. In the middle of kindergarten the goal is for 25 on the ISF.

Two additional tests are given during the winter testing window: Phoneme Segmentation Fluency (PSF) and Nonsense Word Fluency (NWF). The PSF test requires students to speak the individual sounds or phonemes in a word. For example, the examiner would say "sat" and the student would be expected to respond "/s/ /a/ /t/" to receive three points. The number of correctly produced phonemes in one minute constitutes the student's score. At the end of kindergarten, the PSF goal is 35. The fourth DIBELS measure administered in kindergarten is the NWF in which students' letter-sound correspondence and ability to blend sounds is measured. For example, a student would be shown a card with a consonant-vowel-consonant nonsense word such as "tuv." The student would respond "/t/ /u/ /v/" or say the nonsense word "tuv" to obtain three points. The child's score is the total number of correct sounds produced in one minute.

Much of the initial research on DIBELS was conducted by researchers associated with the University of Oregon where the instrument was developed. In reviewing the unpublished technical reports found at the official DIBELS website, Rouse and Fantuzzo (2006) found that the authors of the original reports utilized samples of children from one school district over four academic years with sample sizes from 37 to 298. Citing these unpublished reports, they concluded, "Concurrent and predictive validity was also demonstrated with global readiness and reading subtests from the Woodcock-Johnson Psycho-Educational Battery-Revised" thus

establishing some efficacy for the instrument (p. 343). Rouse and Fantuzzo also considered three

research articles published in peer-reviewed journals and drew further conclusions about

DIBELS. One study by the DIBELS authors used a small sample study of 18 Caucasian

kindergarten students and found "Evidence for the criterion-related validity of the DIBELS with

the McCarthy Scales of Children's Abilities, the Metropolitan Readiness Test and the Stanford

Diagnostic Reading Test was provided for kindergarten" (p. 343). A second study of 86

kindergarteners showed evidence of criterion-related validity with the Comprehensive Test of

Phonological Processing. A third study in a Midwestern city of 75 kindergarten students with

33% qualifying for free or reduced lunch indicated: "Statistically significant reliability and

concurrent validity estimates with criterion measures of phonological awareness, standardized

achievement, and teacher ratings were found" (p. 343).

In their own work, Rouse and Fantuzzo sought to determine the validity of the

kindergarten DIBELS LNF, PSF, and NWF tests with two nationally normed tests; the

Developmental Reading Assessment (DRA) and the TerraNova (second edition). They used a

stratified, random sample of 330 kindergarten students including African American, Caucasian,

Hispanic, and Asian, 31% of whom qualified for free and reduced lunch. They concluded that

"significant predictive relationships" (p. 349) were found between literacy skills measured by

DIBELS and first grade performance on DRA (.67). They also concluded that letter naming is

the most significant predictor of first grade reading, vocabulary, and language, and the Phoneme

Segmentation Fluency test was the second most significant indicator. To summarize, they stated,

This is the first study...to demonstrate predictive validity for each subtest with

individual assessments of unique literacy constructs...The significant longitudinal

relationships found between alphabetic principles and phonemic awareness and these

first-grade constructs emphasize the importance of early skill development. (p. 352)

Criticism of the DIBELS assessment tool tends to focus on the weaknesses in the Oral Reading Fluency test. The ORF test is a series of three, one-minutes tests administered to students. Student performance is a measure of the number of words read correctly with the median score from the three passages selected as the oral reading fluency rate. Researchers such as Shelton, Altwerger, and Jordan (2009) questioned the validity of using a one-minute test which utilizes "reading accuracy and speed as the means of identifying a reader's level of reading 'risk'" (p. 138). Their study asked whether DIBELS ORF predicts the rate and accuracy of reading of authentic books, and whether DIBELS ORF measures comprehension of the same by examining the performance of 14 second grade students. Their results showed that a large variation existed between rates of a student's reading of DIBELS passages versus authentic texts. For example, based on the DIBELS passages, 10 out of 14 readers were "low risk." Yet, when the same criteria were applied to an authentic text, 10 out of the 14 students would fall into the "some" or "high" risk categories. The authors acknowledged that the students were likely to be responding to differing expectations, one being to read quickly (the DIBELS passage), the other being to read for comprehension (the authentic texts). They concluded that: "Our finding suggest that the fluency (speed and accuracy) of reading varies with both the demands of the task, as well as the nature of the interaction between a reader and specific texts, even of comparable difficulty levels" (p. 143-144). Thus, although the DIBELS assessment is a valuable tool for determining some skills such as fluency, the ORF segment of the test may not accurately reflect the nature and purpose of other reading tasks and may not be a complete reflection of a student's reading ability.

Another review of DIBELS points out both positive and negative aspects of the tool.

Elliot, Huai, and Roach (2007) indicated that the DIBELS test provides a way to assess early literacy skills at a time when young children's academic ability is limited (most are unable to read), and it provides information that allows predication of future literacy development. At the same time, they caution that correlational studies that link DIBELS measures with later reading development do not provide the entire picture — measures of sensitivity and specificity indices are needed for this. As stated earlier, DIBELS places students in risk categories. Elliot et al., citing others, indicated that DIBELS is effective in identifying students who are at risk; however, the instrument has low specificity and may also identify many false positives — students who fall into a category based on a cut score, but who are not really at risk. This misidentification, they concluded, may mean that some students will receive intervention that is unnecessary, thus allocating resources to those who are not in great need.

In conclusion, the DIBELS assessment program has reliability and validity as a tool for determining whether students are acquiring specific early literacy skills that will lead them to be successful readers. These strengths are especially notable in the kindergarten tests of Letter Naming Fluency and Phoneme Segmentation Fluency, which are good predictors of students' reading trajectories. DIBELS has efficacy for students who are the top and bottom of the spectrum, but may over-identify students in the middle of the group, labeling them as having a moderate amount of risk when they, in fact, have average ability. Further, research indicated that the ORF portion of the test may not give a complete picture of students' ability when it is used in isolation, as fluency is only one indicator of many skills that mesh for successful readers. In comparing DIBELS and another assessment, the Observation Survey of Early Literacy (OSESA), Li and Zhang (2008) pointed out that there may not be a "best" assessment tool, but that "The important concern relates to the relevancy of a particular approach given the

assessment situation and teachers' understanding of the strengths and limits of the chosen assessment tool" (p. 49). The DIBELS components that constitute the kindergarten indicators for early literacy skills provide valuable predictive information about a student's ability and can be used effectively by teachers to provide interventions to improve a child's reading skills.

Conclusion

The purpose of this chapter has been to give an overview of early childhood literacy and to investigate the variables that affect children's ability to acquire language skills during the first year of their school experience. Many environmental, behavioral, and biological factors affect children's learning, making student learning complex and, therefore, making measurement of that learning equally complex. This review of pertinent literature has linked several of these factors with the notion of single-gender classrooms, a new variable in the public school realm. The purpose of Chapter Three will be to review the methodology used in this study, Chapter Four will be dedicated to reporting the results, and Chapter Five will be devoted to findings and conclusions.

CHAPTER THREE

Introduction

An overview of the research project and an introduction of the research questions related to variables associated with kindergarten children's acquisition of literacy skills were presented in Chapter One. A review of pertinent literature in Chapter Two revealed that several factors, including student gender, age, developmental readiness, socioeconomic status, family structure, and teacher experience have all been studied extensively with regard to early literacy. Few studies, however, have been conducted about single gender classrooms in public schools, and there is a significant lack of studies on kindergarten literacy and gender-specific classrooms. Topics in this chapter on methodology include research questions, research design, participant population, instrumentation, validity, data analysis, and limitations/delimitations.

Research Questions

The following research questions examine the impact upon academic growth of the variables of gender, age, developmental readiness, socio-economic status, family structure, teacher's years of experience, and classroom composition. Further, the study explores whether there is an interaction affect between the gender composition of a child's classroom and any of the following phenomena: gender, age (birth date), developmental readiness, socio-economic status, family structure, or teacher years of experience.

- Does a child's gender impact his or her academic growth, as measured by four subtests of the assessment entitled Dynamic Indicators of Basic Early Literacy Skills (DIBELS)? If so, to what degree?

- Does a child's age (birth date) influence his or her academic growth, as measured by four subtests of the assessment entitled DIBELS? If so, to what degree?

- Does a child's developmental readiness, as measured by the district's screening tool or the child's exposure to a *Young-5's* (pre-kindergarten) program influence his or her academic growth, as measured by four subtests of the assessment entitled DIBELS? If so, in what ways?

- Does the socio-economic status of a child's primary household influence his or her academic progress, as measured by four subtests of the assessment entitled DIBELS? If so, in what ways?

- Does a child's family structure influence his or her academic growth, as measured by four subtests of the assessment entitled DIBELS? If so, to what degree?

- Do the teacher's years of experience teaching elementary age children influence a child's academic growth, as measured by four subtests of the assessment entitled DIBELS? If so, in what ways?

- Does the gender composition of a kindergarten classroom impact the academic growth of male or female students, as measured by four subtests of the assessment entitled DIBELS? If so, in what ways?

- Is there an interaction affect between the gender composition of a child's classroom and any of the following phenomena: gender, age (birth date), developmental readiness, socio-economic status, family structure, or teacher years of experience? If so, what is the relationship?

Research Design

This study utilized a quantitative research design. Creswell (2003) explained that "A quantitative approach is one in which the investigator primarily uses postpositivist claims for

developing knowledge…employs strategies of inquiry such as experiment and surveys, and collects data on predetermined instruments that yield statistical data" (p. 18). This study used a quasi-experimental design to explore the impact of seven independent variables (student gender, age, developmental readiness, socioeconomic status, family structure, teacher experience, and classroom composition) on the dependent variable, acquisition of literacy skills. A quasi-experimental design was used for two reasons: (1) Few public schools offer single-gender kindergarten classes, and (2) the nature of single-gender classes does not permit a random sample of participants.

The dependent variable outcome measure was the amount of change in Letter Naming Fluency (LNF), Initial Sound Fluency (ISF), Phoneme Segmentation Fluency (PSF) and Nonsense Word Fluency (NWF) between periodic tests, which were part of the Dynamic Indicators of Basic Early Literacy Skills (DIBELS) assessment. These data were collected during two-week windows in September 2008 and January and May 2009. This assessment schedule was determined by the county in which the district is located. All districts using the DIBELS assessment administered the tests during these same windows of time.

With regard to the dependent variable, each student's classroom teacher administered all four subtests of the DIBELS assessment (Letter Naming Fluency, Initial Sound Fluency, Phoneme Segmentation Fluency, Nonsense Word Fluency) to each kindergarten student in this study. In several studies of kindergarten students, these DIBELS measurement instruments were found to have good predictive ability for later reading performance, as well as significant reliability and criterion related validity with other tests such as the McCarthy Scales of Children's Abilities, the Metropolitan Readiness Test and the Stanford Diagnostic Reading Test (Rouse & Fantuzzo, 2006).

The participants in this study were nonrandomly selected; that is, they were chosen because they represented all of the kindergarten students in one school that offered gender specific kindergarten classes. This convenience sample consisted of five classrooms of students of both genders, one classroom of only boys, and one classroom of only girls (Creswell, 2003).

Research Sample

This study drew information from one elementary school in a rural district in western Michigan. The district was composed of approximately 3000 students in grades pre-kindergarten through twelve and consisted of one high school, one middle school, and four elementary schools. Within this district, one of the elementary schools, a pre-school through second grade building, offered three options for each child's kindergarten year: a mixed gender classroom, an all-boys classroom, or an all-girls classroom.

The sample for this study consisted of all 144 kindergarten students in this building. Of these students, eighteen composed the all-boys classroom, 22 composed the all-girls classroom, and 104 were enrolled in the five mixed-gender classrooms. Sixty-eight of the students (47%) were boys; seventy-six of the students (53%) were girls. Regarding socioeconomic status, which was based on a family's meal assistance, fifty-eight students (40%) received free lunch, and fourteen (10%) received reduced cost meals. Seventy-two students (50%) received no meal assistance.

The students' living environment was described on the basis of the structure of the household. Sixty-two% of the students lived with two biological parents, 5% lived with one biological parent and one step-parent, 18% lived only with their mother, and 15% lived in some other household structure such as children living in a household with only a father, with grandparents, or in a foster care home.

Age, another independent variable, was recorded for each student as years from date of birth at the time of the first day of school. Fourteen percent of students were age four, a majority (64%) were age five, 22% were age six, and one child (less than 1%) was age 7.

Children were also identified in terms of their readiness for formal school. The district in which this study took place screened most children prior to the beginning of their kindergarten school year using an instrument that assessed academic, social, and motor skills. Students could receive a maximum score of 88. A child's readiness was expressed as the total number out of 88 that he or she received during screening. Sixty-nine% of students in this study were screened and thus had a readiness score. Thirty-one% of the students in this study were not screened. Among those without a readiness score were kindergarteners who had attended a year of developmental kindergarten; this accounted for 24% of all children in the study. These participants were designated with a non-numeric label. The remaining 7% of the students who were not screened were enrolled immediately before the start of the school year, or were repeating kindergarten.

The number of years of teaching experience of each teacher varied, and this independent variable was coded for each student. One of the seven teachers had less than four years of experience, and six teachers had four or more years of classroom pedagogy. Therefore, 15% of students were taught by a teacher with less than four years of teaching experience and the remaining 85% of students were taught by a teacher with four or more years of experience.

<div align="center">Participant Safeguards</div>

The superintendent of the district gave written consent for use of the student data used for this research project (see Appendix A). The following safeguards ensured the protection of participants:

- The district maintained control over all of the data.

- The district allowed the investigator access to the data in an anonymous form so that privacy of students and families was maintained.

- The investigator held all information in the strictest confidence.

- A *Request for Human Subjects Approval* was granted by Eastern Michigan University (See Appendix B).

Instrumentation

To measure acquisition of literacy skills, this study utilized several subtests from an instrument called Dynamic Indicators of Basic Early Literacy Skills (DIBELS). According to the DIBELS website (2009), the designers of the assessment sought to measure the most important facets of early literacy:

> DIBELS were developed based on measurement procedures for Curriculum-Based Measurement (CBM), which were created by Deno and colleagues through the Institute for Research and Learning Disabilities at the University of Minnesota in the 1970s-80s… Like CBM, DIBELS were developed to be economical and efficient indicators of a student's progress toward achieving a general outcome. (p. 1)

Within this collection of tests, the test of Oral Reading Fluency (ORF) is most widely used and is the primary test for grades one through six. However, because the majority of kindergarten students cannot yet decode sufficiently to read prose passages, DIBELS offers a series of tests that measure beginning language skills. Of these tests, four were administered in this study. In the fall test window, the Letter Naming Fluency and Initial Sound Fluency were administered.

During the winter time frame, these same two tests were given and two were added, Phoneme Segmentation Fluency and Nonsense Word Fluency.

Each test provided information about a child's acquisition of literacy by measuring a key concept of early reading. The Letter Naming Fluency test, as its name implies, tests a child's knowledge of upper and lower case letters. Initial Sound Fluency measures a child's understanding of the first sound in a picture, and Phoneme Segmentation Fluency shows a child's ability to divide a word into its individual sounds (the examiner would say the word "cat" and the child would respond "/c/ /a/ /t/"). Nonsense Word Fluency requires a child to look at three letters that do not constitute an English word, and then to say the sounds correctly (seeing, for example, "tuv," the child would respond "/t/ /u/ /v/"). Because the tests are each one minute in length, a child's score for each test is a measure of his or her correct number of responses within the time frame. Based on the number of correct responses, a child meets, or fails to meet, the benchmark score.

With regard to DIBELS' efficacy in measuring early childhood reading skills, Rouse and Fantuzzo (2006) concluded that the original studies conducted by researchers at the University of Oregon, and subsequent studies by other researchers, showed evidence of significant reliability and concurrent validity with other tests of language skills for the subtests used at the kindergarten level. They also concluded that the test of Phoneme Segmentation Fluency had predictive ability for first grade reading. Most criticism of the DIBELS assessment has focused on the Oral Reading Fluency Test, which may not accurately reflect all aspects of reading and may over-identify students as being at some degree of risk. This test, however, was not administered at the kindergarten level.

Validity

Threats to internal validity refer to the procedures used by a researcher that could inhibit the ability to draw inferences (Creswell, 2006). In this study, one threat to internal validity was the sample population selection. This study utilized the entire kindergarten population of one school that offered single gender classes during the 2008-09 school year. Students were not, however, randomly placed in each of the classrooms; rather, parents specified whether they wanted their child in a mixed gender classroom or in an all-boys or all-girls classroom.

The nonrandom nature of the placement of students was further underlined by the district's policy for student placement. District policy dictated that administrators place children so that each classroom had approximately equal numbers of boy and girls as well as comparable numbers of high, medium, and low achieving students, and similar numbers of children who are identified as having good or poor behavior. All of these factors threatened the internal validity of the data in this study.

External validity, or the ability of results of a study to be generalized to other populations, must also be considered. Shaffer and Serlin (2004) asserted,

> The assumption underlying sampling is that the results we have observed (the sample) are drawn in an unbiased way from some larger population. The statistical question is whether the characteristics of the sample reflect characteristics that hold in general for the larger population from which our sample was taken. (p. 15)

In this study generalizability of results was limited to other rural populations and comparable sized districts with similar demographics and with similar classroom compositions.

The unique, single-gender nature of a kindergarten classroom is not widely found in districts in the United States, particularly in public schools. Consequently, one major purpose of

this study was to broaden the research base regarding single-gender classrooms and their impact on student achievement. Thus, what might be seen as a threat to external validity was also an opportunity to investigate a little known paradigm in early elementary education settings and to explore a specific aspect of classroom composition in public education. Data gathered would add to the small research base in this area and provide greater generalization for future research.

Data Analysis

Quantitative methods were used in the investigation of the literacy acquisition of students in mixed and single gender classrooms. Statistical Package for the Social Sciences (SPSS) Version 14.0.1 was used for all data analysis. For investigative purposes, students were grouped based on whether they attended kindergarten in a mixed or single gender classroom, and descriptive statistics were used to explain the independent variables. Inferential statistics were then used to determine if children in the gender-specific classrooms showed similar or different levels of achievement in literacy.

Creighton (2007) asserted that "Quite simply, correlation is used to measure and describe a relationship between two (or more) variables" (p. 32). For the purposes of this study, correlation was the best method to determine if a relationship existed between each of the independent variables – student gender, age, developmental readiness, socioeconomic status, family structure, teacher experience, and classroom composition – and a child's reading development.

The initial phase of analysis using correlation was important to determine whether a positive or negative relationship existed, and the strength with which each independent variable correlated with the students' literacy acquisition. Creighton (2007) stated, "…The correlation is extremely important to know – because we can look further to investigate the reasons why" (p.

34). The Pearson correlation coefficient, and a *p* value <.05, appropriate for social science research, were used to establish the significance of the correlations.

For those variables that showed a statistically significant correlation, an analysis of covariance (ANCOVA) was conducted to show the type of relationships among the variables and the relative strength of each. ANCOVA was appropriate because this study examined seven variables related to early reading for the purpose of predicting outcomes, in this case early reading skills. ANCOVA was utilized because two types of variables were coded for the study: nominal (such as the independent variables of gender or SES) and ratio (such as the dependent variables of student scores).

In addition, ANCOVA "allows for the comparison of group means on a dependent variable after the group means have been adjusted on a relevant covariate variable" (Morgan, Reichert & Harrison, 2002, p. 63). For this study, the covariates were the students' initial score on each of the DIBELS tests, as well as the students' risk factor (low risk, some risk or at risk) for each test during the first assessment period. Many factors influence children's reading skills; thus, the correlation coefficient squared (r^2) gave an accurate estimate of the amount of variability for which each variable is responsible (Creighton, 2007). The ANCOVA model enabled conclusions to be drawn regarding which variables influenced reading acquisition among kindergarten students and allowed prediction about the outcome of one variable based on another.

Limitations and Delimitations

This study is confined to one district in western Michigan, a rural district having approximately 3000 students. Further, this research is delimited to one elementary school of

about 400 students within that district. Generalizability of results was delimited to other

elementary schools with similar populations, in this case, a school with only grades pre-school

through second grade.

The focus of this research was to gain insight into single-gender classrooms; thus, the

study is further bounded by the fact that this school offered gender-specific kindergarten classes.

While the variables of gender, age, socio-economic status, family structure, and teacher

experience have been extensively studied, single-gender classrooms are a more recent

phenomenon in public schools.

Additionally, the nature of single-gender classrooms constrains this study in that the

students who composed the single and mixed gender classes were not a truly random sample.

Because parents could choose either a single or mixed gender class for their child's kindergarten

experience, generalizations to other populations would be limited to those with similar classroom

composition options and to similar early childhood grades.

Two major limitations exist for this study. First, this research is purely quantitative in

nature. Therefore the impact of single-gender classrooms on student achievement is measured

solely on the basis of a child's language development. The study does not attempt to measure the

social or emotional impact upon a child of a single-gender classroom environment, nor does it

take into account the individual student's likes or dislikes about his or her classroom composition

or the influence this might have on a child's performance. Second, although language can be

measured in many ways, language acquisition in this study is measured using DIBELS as the

only assessment tool. This quantitative tool measures specific skills such as letter recognition and

phonemic awareness.

Conclusion

Quantitative methodology was employed to investigate single-gender kindergarten classrooms and literacy skills. This research examined the change in Letter Naming Fluency, Initial Sound Fluency, Phoneme Segmentation Fluency, and Nonsense Word Fluency among students for whom seven variables were known. Ultimately, the research used descriptive statistics, correlations, and an ANCOVA model. The purpose of Chapter Four will be to report the results of this study, and Chapter Five will be devoted to findings and conclusions.

CHAPTER FOUR

Introduction

Chapter One established the idea that single gender classrooms, especially at the early

elementary level, are a new phenomenon for public schools in the United States. Gender-specific

classrooms have become more widespread as a result of changes in federal regulations in 2006

that allowed districts to experiment with educational strategies as they sought ways to improve

student achievement under the No Child Left Behind mandate. The review of literature in

Chapter Two indicated that several factors related to early literacy have been studied extensively.

Among those factors are student gender, age, developmental readiness, socioeconomic status,

family structure, and teacher experience. Methodology, including research questions, research

design, sampling, and data analysis were outlined in Chapter Three. The main topic in Chapter

Four will be a report of the results of the study.

Methodology and Research Questions

This study used a quantitative design to determine how the independent variables of

gender, age, developmental readiness, socio-economic status, family structure, teacher's years of

experience, and classroom composition impact kindergarten children's literacy development.

Analysis of covariance was used to determine the strength of the impact of each element, as well

as the strength of the interaction effects.

The following research questions examined the impact upon academic growth of the

independent variables of gender, age, developmental readiness, socio-economic status, family

structure, teacher's years of experience, and classroom composition. Growth, the dependent

variable, was measured by four subtests of the Dynamic Indicator of Basic Early Literacy Skills

(DIBELS) including Letter Naming Fluency (LNF), Initial Sound Fluency (ISF), Phoneme

Segmentation Fluency (PSF), and Nonsense Word Fluency (NWF). In addition, the study

utilized analyses of covariance to explore whether an interaction effect existed between

classroom composition and the variables of gender, age, developmental readiness, socio-

economic status, family structure, and teacher's years of experience.

- Does a child's gender impact his or her academic growth, as measured by four subtests of

  the assessment entitled Dynamic Indicators of Basic Early Literacy Skills (DIBELS)? If so,

  to what degree?

- Does a child's age (birth date) influence his or her academic growth, as measured by four

  subtests of the assessment entitled DIBELS? If so, to what degree?

- Does a child's developmental readiness, as measured by the district's screening tool or

  the child's exposure to a *Young-Fives* (pre-kindergarten) program influence his or her

  academic growth, as measured by four subtests of the assessment entitled DIBELS? If so, in

  what ways?

- Does the socio-economic status of a child's primary household influence his or her

  academic progress, as measured by four subtests of the assessment entitled DIBELS? If so,

  in what ways?

- Does a child's family structure influence his or her academic growth, as measured by four

  subtests of the assessment entitled DIBELS? If so, to what degree?

- Do the teacher's years of experience teaching elementary age children influence a child's

  academic growth, as measured by four subtests of the assessment entitled DIBELS? If so, in

  what ways?

- Does the gender composition of a kindergarten classroom impact the academic growth of

male or female students, as measured by four subtests of the assessment entitled DIBELS? If so, in what ways?

- Is there an interaction affect between the gender composition of a child's classroom and any of the following phenomena: gender, age (birth date), developmental readiness, socio-economic status, family structure, or teacher years of experience? If so, what is the relationship?

Descriptive Statistics for Entire Population

The subjects of this study were 144 kindergarten students enrolled at one elementary school in western Michigan during the 2008-09 school year. Using the Statistical Package for the Social Sciences (SPSS) statistical software, descriptive statistics were determined for this study. Of this population, 76 (52.8%) were female and 68 (47.2 %) were male. When divided by classroom composition, the students in mixed gender classes numbered 104 (72.2%). Twenty-two students (15.3%) were enrolled in the all-girls class, and 18 (12.5%) were enrolled in the all-boys class. With regard to the variable of the number of years of experience that each child's teacher possessed, 123 (85.4%) students were in classes with a teacher with four or more years of teaching experience, while one mixed gender class of 21 students (14.6%) was enrolled with a teacher with three years or fewer of teaching experience.

Family structure, another variable examined, showed that 89 students (61.8%) resided in a household with two biological parents (See Figure 1). Thirty-four students (23.6%) lived with one biological parent. Of those who lived with only one biological parent, the majority lived with their biological mother; more precisely, only three students lived with a biological father alone or a biological father and a stepmother. The remaining 21 students (14.6%) lived with neither parent. This last group of children lived in one of several living arrangements such as in

foster care, with grandparents, or with adoptive parents. When examined in the context of classroom composition, 56.7% of students in mixed gender classes, 72.7% of students in the all-girls class, and 77.8% of students in the all-boys class resided with both biological parents. The following proportions of students lived with one biological parent: 26.9% of mixed gender classroom students, 18.2% of all-girls classroom students, and 11.1% of all-boys classroom students.
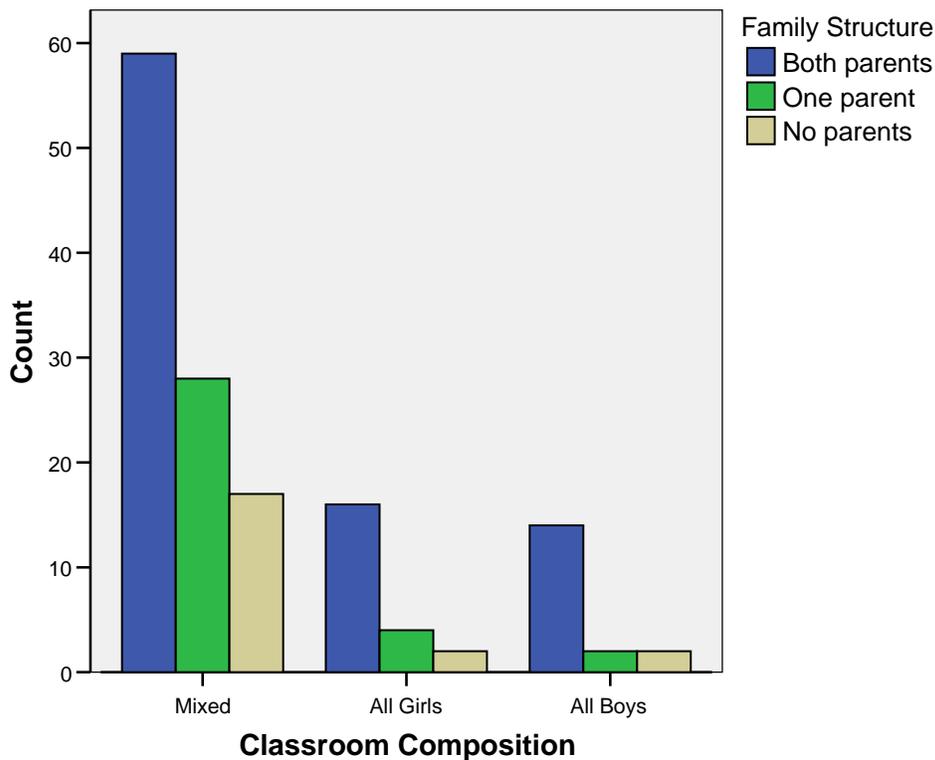
Figure 1. Family structures of students in the sample. This figure illustrates the percentages of students from various household structures in the single and mixed gender classrooms.

For this study, students' socioeconomic status was established as a measure of the family's eligibility for subsidized school meals (See Figure 2). Seventy-two (50%) of the subjects received no meal assistance. Only fourteen students received reduced price meals, so for analysis purposes, these students were combined with the 58 students receiving free lunch. A

total of 72 students (50% of all students) received meal assistance. In the mixed gender classes, 54.8% of students received either free or reduced price lunch. Forty-one percent of children in the all-girls class received free or reduced price lunch, while 33.2% of children in the all-boys class received meal assistance.
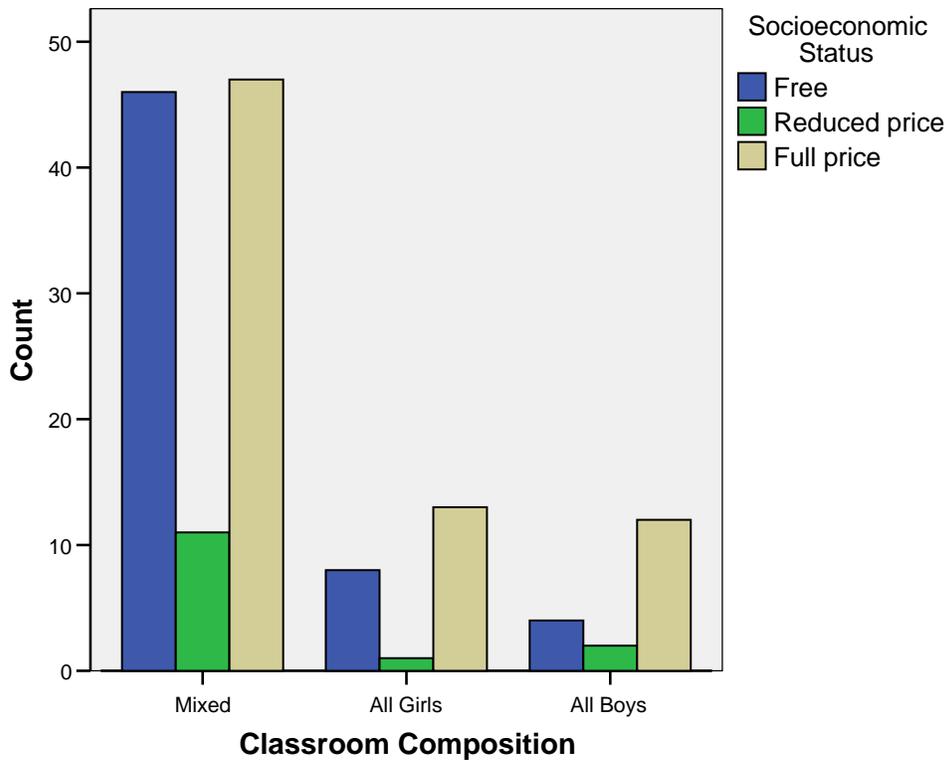
Figure 2. Socioeconomic status of students in each classroom composition. This figure illustrates the percentages of students receiving each type of meal assistance in single and mixed gender classrooms.

Children's school readiness in this district was determined by one of two methods. The majority (89 children, 62%) were administered a screening test with a score range of zero to eighty-eight. Among these students, the mean score was 75.04, and the median score 77, with a standard deviation of 9.667. The low score was 35 and the high was 88. A large number of students (55 students, 38%), however, were not screened because they experienced schooling

prior to kindergarten such as in a young-fives program, or they enrolled close to the beginning of the school year or after the school year began. As will be discussed in more detail later in this chapter, due to the lack of consistency in the school readiness scores, the model was modified in the final data analysis.

Another variable considered was a child's age when entering kindergarten (see Figure 3). The majority of students (92 students, 63.9%) were five years old on the first day of school. Twenty of the children (13.9%) were four years old, and thirty-one (21.5%) were six years old when school began. Only one student (.7%) was seven years old. For analysis purposes, the six- and seven-year-old students were combined into one group. The mean age for all students was 5.09 years and the median age 5.00 years. The standard deviation was .614. The minimum age was four and the maximum age was seven. The mean age in the mixed gender classes was 5.06 years, in the all-girls class, 5.09 years, and in the all-boys class, 5.28 years. The only seven-year-old child was in the all-girls class.
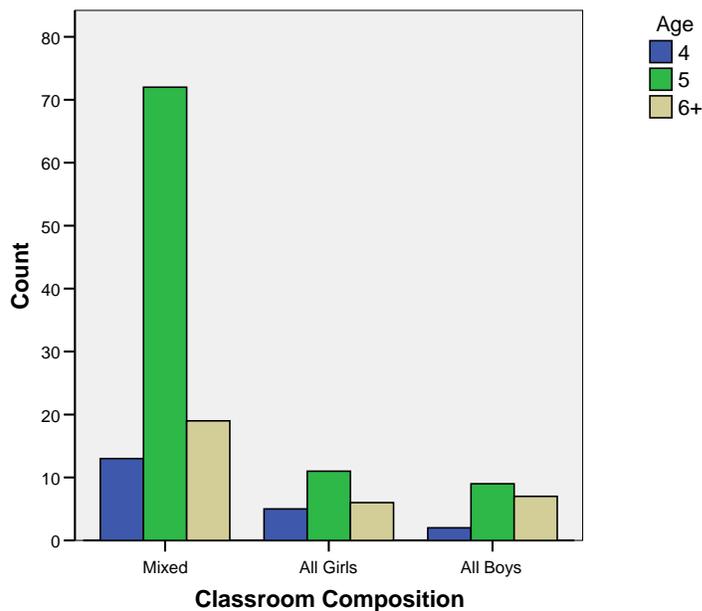
Figure 3. Age of students. This figure illustrates the ages of students in the single and mixed gender classrooms.

Descriptive Statistics for Single-Gender Classes

Twenty-two females were enrolled in the all-girls classroom. Sixteen (72.7%) lived with two biological parents, four (18.2%) lived with one biological parent, and two students (9.1%) had no biological parents living in the household. Eighteen boys were enrolled in the all-boys classroom. Fourteen boys (77.8%) lived with two biological parents, two (11.1%) lived with one biological parent, and two (11.1%) resided with no biological parents. Among both girls and boys, 50% of students began school at age five. More boys (38.9%) than girls (27.2%), however, began school at age six or older. Those who were age four represented 22.7% of the all-girls class, and 11.1% of the all-boys class.

Socioeconomic status as shown by meal cost subsidy varied slightly among the children in single gender classrooms. Thirty-three percent of the all-boys class received free or reduced meals, whereas 40.9% of the all-girls class received meal assistance.

Analysis of Covariance for the Entire Population

SPSS was utilized to perform an analysis of covariance using the following factors: age, family structure, socioeconomic status, teacher experience, school readiness, and classroom composition. Covariates were the initial score for each DIBELS assessment and the school readiness score. The dependent variable was the change in DIBELS scores during the various assessment periods. Separate analyses were run for each of the DIBELS assessments including Letter Naming Fluency (September to May), Initial Sound Fluency (September to January), Phoneme Segmentation Fluency (January to May), and Nonsense Word Fluency (January to May). Throughout the analysis, all interaction effects were included and then dropped if they were not significant.

Correlations were determined to be significant based on p=.05. The strength of the Pearson correlations was determined using the scale developed by deVaus (2002) which he indicated is "Similar to those provided by Davis (1971) and Cohen 1988)" (p. 272). On this scale correlations are labeled as follows: Trivial, .01-.09; Low to Moderate, .10-.29; Moderate to Substantial, .30-.49; Substantial to Very Strong, .50-.69; Very Strong, .70-.89; Near Perfect, .90-.99.

The results of the analysis of covariance model using the change in Letter Naming Fluency from September to May showed that none of the factors was significant (see Table 1). However, the covariate school readiness score (p=.024) and the September Letter Naming Fluency score (p=.002) were significant. The same analysis using the change in Initial Sound Fluency score indicated that while age and family structure were not significant, socioeconomic status (p=.017), teacher years of experience (p<.001), classroom composition (p<.001), and school readiness (p=.023) were all significant (see Table 2). The analysis of covariance with change in Phoneme Segmentation Fluency revealed that age, family structure, teaching experience, and classroom composition were not significant; however, socioeconomic status (p=.020), school readiness (p=.049) and initial January Initial Sound Fluency score (p<.001) were significant (see Table 3).

Table 1.

ANCOVA Significance Values for Change in Letter Naming Fluency Scores.

Variable/Covariate	F	p
Classroom Composition	.290	.749
Age	.533	.589
Family Structure	1.280	.284
SES	1.183	.312
Teaching Experience	.001	.970
Readiness Score	5.323	.024
LNF September Score	9.843	.002

Table 2.

ANCOVA Significance Values for Change in Initial Sound Fluency Scores.

Variable/Covariate	F	p
Classroom Composition	9.316	<.001
Age	.291	.748
Family Structure	.044	.957
SES	4.314	.017
Teaching Experience	51.813	<.001
Readiness Score	5.396	.023
ISF September Score	1.941	.168

Table 3.

ANCOVA Significance Values for Change in Phoneme Segmentation Fluency Scores.

Variable/Covariate	F	p
Classroom Composition	.119	.888
Age	1.768	.178
Family Structure	.741	.480
SES	4.123	.020
Teaching Experience	1.339	.251
Readiness Score	4.001	.049
PSF September Score	40.501	<.001

Thus, while the difference in the results for Letter Naming Fluency (p=.970) and

Phoneme Segmentation Fluency (p=.251) scores showed that number of years of teaching

experience was not a significant factor, the Initial Sound Fluency scores for the one teacher with

three or fewer years of teaching experience was significant (p<.001). This information, in

combination with the fact that this teacher also took leave and did not instruct her students for

over three months, led to the conclusion that years of teaching experience was a confounding

variable and, therefore, the students who were in this teacher's class were eliminated from the

model.   Once the model was modified to drop teacher years of experience, statistical analysis of

school readiness was also found to be a complicating factor in the initial analysis of covariance

model.

School readiness was determined to be significant in two of the four initial DIBELS

assessments. Both the covariates Letter Naming Fluency September score (p=.005) and school

readiness (p=.003) were significant. One interaction, socioeconomic status and age, was also

significant (p=.044). When examining the change in Initial Sound Fluency September to January score, the significant factor was classroom composition (p<.001) and the significant covariate was school readiness (p=.001). In two other models, school readiness was not significant: change in Phoneme Segmentation Fluency January to May (p=.224) and change in Nonsense Word Fluency January to May (p=.126). The covariates, Phoneme Segmentation Fluency January score (p<.001) and Nonsense Word Fluency January score (p=.001), were significant, as was the interaction of family structure and socioeconomic status for change in Phoneme Segmentation Fluency (p=.027). In addition to this information, only five students (28%) in the all-boys class were screened for readiness, while as few as eight students, but as many as seventeen students in the other classes, both all-girls and mixed gender, were assigned readiness scores. Because only 72 students from the sample of 123 were assigned a readiness score, and because the students lacking a readiness score occurred in the all-boys class at a higher ratio than in either the all-girls or mixed gender classes, school readiness was eliminated from the analysis. After school readiness was removed from the analysis, a risk factor - that is, a measure of the child's initial literacy knowledge at the beginning of the year - was added to the model.

Descriptive Statistics with Confounding Variables Removed

Whereas the model for the original study was modified, all of the students in the single gender classrooms, which included eighteen in the all-boys, and twenty-two in the all-girls, remained part of the study. The total sample was reduced to 122 students with the elimination of the class of mixed gender students whose instructor had taught for three or fewer years. This reduced the population of the mixed gender classes to four sections, or 82 students. Descriptive statistics for the revised model, with fewer mixed gender students, were recalculated. Percentages of the number of males and females in the revised mixed gender sample changed

somewhat. Forty of the students (48.2%) were male, and forty-three (51.8%) were female.

Family structure was another variable considered in the analysis. Among the children in mixed gender classes, the percent of students living with two parents was reduced by a little more than 1% to 55.4% with the modification of the sample. Twenty-five students (30.1%) in the mixed gender classes lived with one parent, while twelve children (14.5%) lived with neither biological parent.

With regard to the variable of age, the mean age of the mixed gender classes was 5.07 years. Whereas the majority of mixed gender students were five years old (66.3%), another eleven (13.3%) were four years old at the start of school, and the remaining seventeen (20.5%) were six years old.

Among students in mixed gender classes, 48 (57.8%) received some meal subsidy, either free or reduced price lunch. Thirty-five students (42.2%) received no meal assistance, but paid full price for lunch.

Revised Model: Analysis of Covariance

Two major aspects of the original statistical model were changed. First, only students enrolled with a teacher with four or more years of teaching experience were included. Second, the original measure of school readiness was removed from the statistical model. However, based on the review of literature in Chapter Two, readiness can be an important factor in a child's acquisition of literacy skills. For this reason, the covariate of each child's risk factor was added to the model. For each of the initial DIBELS assessments (Letter Naming Fluency September, Initial Sound Fluency September, Phoneme Segmentation Fluency January, Nonsense Word Fluency January), the child received not only a quantitative number indicating his or her score, but also a categorical indication of risk, either low risk, some risk, or at risk. This categorical

factor, a revised indicator of school readiness, was added to the model along with the original factors of family structure, socioeconomic status, age, and classroom composition. Finally, gender was considered by using analysis of covariance for females only and males only.

For analysis purposes, two additional changes were made to the original model. First, because only three students lived in a home with a biological father as the primary care-giver, students were recoded as living in one of three family structures: two biological parents, one biological parent, or no biological parents. Similarly, because so few students (14 of the total, original sample) received reduced price lunches, students were recoded as either having free or reduced lunch (with the two categories combined) or as having no meal assistance. This prevented conclusions that were based, in some instances, on merely a few occurrences of a factor.

ANCOVA Results

Letter Naming Fluency, one of the four DIBELS assessments, and the only test given three times – in September, January, and May – was one of the measures of literacy acquisition in this study. In the final model, all interactions were dropped. In addition, age, socioeconomic status, family structure, classroom composition, and student risk factor were not significant (see Table 4). While change in Letter Naming Fluency score was not significantly different for classes based on the factor of classroom composition (p=.369), the average mean change in Letter Naming Fluency for children in the all-boys class was 43.218, which was higher than either the all-girls class (37.640) or the mixed gender class (38.062).

Table 4.

ANCOVA Significance Values for Change in Letter Naming Fluency Scores.

Variable/Covariate	F	p
Classroom Composition	1.006	.369
Age	2.957	.056
Family Structure	1.049	.354
SES	.051	.822
LNF September Score	12.961	<.001
LNF Risk Score	.984	.377

All DIBELS tests are one-minute tests, and the goal for students being assessed in Letter Naming Fluency is to name as many upper and lower case letters as possible. The conclusion can be drawn, therefore, that children in this sample who were enrolled in the all-boys class named approximately five more letters than children in either the all-girls or the mixed gender classes. In this model, the difference, however, could have been attributable to chance or error.

The covariate initial Letter Naming Fluency score for September (p<.001) was the only significant variable. The correlation between change in Letter Naming Fluency score and students' initial Letter Naming Fluency score (r =-.309, p =.001) indicates a moderate to substantial inverse relationship. Students who began the year with lower Letter Naming Fluency scores tended to have greater increases in their scores at the end of the school year.

Initial Sound Fluency, the DIBELS assessment given in January and May, was another measure of the change in reading skills of students in this study. Like the Letter Naming Fluency model, all interactions were dropped. In addition, age, socioeconomic status, and family structure were not significant (see Table 5). In this analysis, though, three elements were

significant: the covariates of Initial Sound Fluency score (p<.001), Initial Sound Fluency risk factor (p=.045), and the factor of classroom composition (p<.001). With regard to the Initial Sound Fluency risk factor, students who were at risk during the first assessment had an average change of 19.509, while those in the some-risk category had a mean change of 23.884. Those students who were in the Initial Sound Fluency low-risk classification had a mean change of 29.359. This information shows a significant difference in mean change and indicates that low-risk students had a higher change in Initial Sound Fluency than at-risk students.

Table 5.

ANCOVA Significance Values for Initial Sound Fluency Model.

Variable/Covariate	F	p
Classroom Composition	24.928	<.001
Age	.677	.510
Family Structure	.501	.607
SES	.576	.449
ISF September Score	12.862	<.001
ISF Risk Score	3.175	.045

Classroom composition was shown to be a significant factor (p<.001) as it relates to mean change in Initial Sound Fluency, as well. The average change in mixed gender classes was 12.120, whereas the mean change in the all-girls class was 30.023 and in the all-boys class, 30.569. Although the mean change between the all-boys and all-girls class is not significant, both of the single gender classes showed significantly greater increases in Initial Sound Fluency than students in mixed gender classes.

Classroom composition can be said, therefore, to impact students' acquisition of the skill of Initial Sound Fluency. In a one-minute test, students in both of the single-gender classes were able to tell the initial sound of approximately eighteen more words than children in the mixed gender classes.

Nonsense Word Fluency, the assessment given in January and May, was the third measure of literacy acquisition. Like the Letter Naming Fluency and Initial Sound Fluency models, all interactions were dropped for Nonsense Word Fluency. Age, socioeconomic status, family structure, Nonsense Word Fluency January risk factor, and classroom composition were not significant (See Table 6). The covariate of students' initial score (p<.001) was significant, indicating a very strong (r =-.572, p<.001) relationship: students with lower scores during the initial Nonsense Word Fluency test had greater increases in mean scores by the last test period.

Table 6.

ANCOVA Significance Values for Change in Nonsense Word Fluency Scores.

Variable/Covariate	F	p
Classroom Composition	1.233	.295
Age	1.117	.331
Family Structure	.986	.376
SES	.099	.754
NWF January Score	60.086	<.001
NWF Risk Score	.655	.521

Because discovering the impact of classroom composition was an important purpose of this study, one additional note may be meaningful pertaining to the tests of Nonsense Word

Fluency. The mean change in Nonsense Word Fluency score for the mixed gender class was 10.866, lower than either the all-girls class (14.588) or the all-boys (15.730). While this difference is not significant (p=.295) and, therefore, not generalizable, the scores for this population of kindergarten students show that classroom composition may make a difference in the acquisition of literacy skills as measured by Nonsense Word Fluency, with children in single-gender classes having a higher mean change than their counterparts in mixed-gender classes.

In other words, in the one-minute test of Nonsense Word Fluency, children in the mixed-gender classes pronounced about eleven sounds, while children in the single-gender classes pronounced around fourteen to fifteen sounds. This is not a statistically significant difference, but in this sample, students in the single-gender classrooms had a slightly better score than those in the mixed-gender classes.

Phoneme Segmentation Fluency, the DIBELS assessment administered in January and May, was the only model in which an interaction was significant (See Table 7). For this model, family structure was defined as students living with either two biological parents, or one or no biological parents; students with one or no biological parents were combined because there were so few students in these categories. Among the factors, classroom composition and age were not significant. The covariates of students' initial Phoneme Segmentation Fluency January score (p<.001) and Phoneme Segmentation Fluency risk factor (p=.002) were significant with both low-risk students (mean = 19.650) and some-risk students (mean = 20.070) having a significantly higher mean change in Phoneme Segmentation Fluency score than at-risk students (mean = 1.779).

Table 7.

ANCOVA Significance Values for Change in Phoneme Segmentation Fluency Scores.

Variable/Covariate	F	p
Classroom Composition	1.219	.300
Age	1.016	.365
PSF January Score	74.744	<.001
PSF Risk Score	6.675	.002

Thus, Phoneme Segmentation Fluency, the one-minute test in which students tell the sounds in a word, was significant when related to risk factor. Between January and May, students in the low-risk and some-risk categories increased their scores by about 20 phonemes while the at-risk students pronounced only about two more sounds in May than in January.

One significant interaction was notable for the Phoneme Segmentation Fluency test between family structure and socioeconomic status (p=.043; see Figure 4). Students living with one or no biological parents in the home and receiving no meal assistance had a higher mean change (17.727) than students living with two biological parents and receiving no meal assistance (12.286).
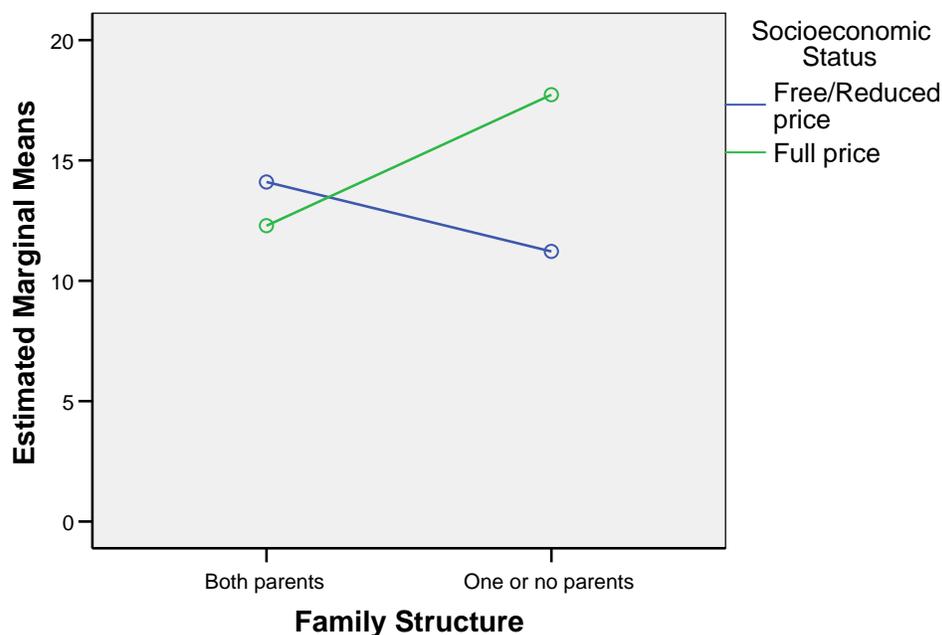
Figure 4. Interaction effect between socioeconomic status and family structure among students in phoneme segmentation fluency model.

The Gender Factor – Females

One research question investigated in this study was how gender, in combination with other variables, affected acquisition of literacy skills. In order to understand the impact of gender, ANCOVA was used for females only; this included all females in the mixed-gender classes as well as students in the all-girls classroom.

All interactions were dropped in the model using Nonsense Word Fluency. Regarding classroom composition, though the mean change in Nonsense Word Fluency score in the all-girls class was higher (15.001) than among the girls in the mixed gender classes (9.581), this difference was not statistically significant (p=.112), and no generalizations can be drawn (see Table 8).

Table 8.

ANCOVA Significance Values for Change in Nonsense Word Fluency Scores.

Variable/Covariate	F	p
Classroom Composition	2.593	.112
Age	.505	.606
Family Structure	.047	.829
SES	.576	.451

To summarize, among girls in this sample taking the Nonsense Word Fluency test, females in the all-girls classroom articulated about fifteen more sounds during the May test period than they had articulated during January testing. Girls in the mixed gender classes increased their scores by only about ten. Although this score is higher for the all-girls class, it is not statistically significant.

Likewise, for the Nonsense Word Fluency test, family structure, socioeconomic status, age, and risk factor were not significant. Initial January Nonsense Word Fluency score was the only significant factor (p<.001).

Similarly, all interactions were dropped in the Letter Naming Fluency representation. Classroom composition was not significant (p=.480), though in this sample, the average Letter Naming Fluency score among girls in the mixed-gender classes was slightly higher (40.038) than that of girls in the all-girls class (37.371; see Table 9). This difference may be due to chance or error. Only age was a significant factor (p=.024), with four-year-olds having a mean average change in Letter Naming Fluency score of 45.846 and those students age six or older having an average change in Letter Naming Fluency score of 30.167.

Table 9.

ANCOVA Significance Values for Change in Letter Naming Fluency Scores.

Variable/Covariate	F	p
Classroom Composition	.505	.480
Age	3.960	.024
Family Structure	.983	.381
SES	.137	.713
LNF September Score	3.708	.059
LNF Risk Score	1.323	.255

Thus, in the test of Letter Naming Fluency, four-year-olds had a significantly higher mean change in score than those children in the oldest group representing six- and seven-year-olds. This means that four-year-olds named approximately 46 more upper and lower case letters in May than they identified in September, while the six- and seven-year-old students named about 30 more letters. Five-year-olds had a mean change of 40.100, which is not significantly different than either of the other age groups.

With change in Initial Sound Fluency as the dependent variable, all interactions were dropped and none of the factors or covariates was significant except classroom composition (p=.001; see Table 10). Girls in the all-girls class showed a mean change in Initial Sound Fluency score of 29.682, while girls in the mixed gender classes showed a mean increase of 16.860. Girls in the mixed gender classroom, therefore, had a significantly lower mean change in ISF than girls in the all-girls classroom. This was the only scenario where the covariate was dropped from the model and classroom composition was significant.

Table 10.

ANCOVA Significance Values for Change in Initial Sound Fluency Scores.

Variable/Covariate	F	p
Classroom Composition	11.893	.001
Age	.631	.536
Family Structure	.075	.928
SES	.058	.811
ISF September Score	1.821	.183
ISF Risk Score	.741	.393

Classroom composition was, therefore, important in the Initial Sound Fluency model. In the one-minute DIBELS test in which students show their understanding of the initial sounds of words, females in the all-girls class identified about 29 more sounds in January than they had identified in September. In contrast, girls in the mixed gender classes identified only about seventeen more initial sounds in the January assessment than in their performance during the September test.

Among females, initial Phoneme Segmentation Fluency January scores (p=.007) were shown to be significant. Change in mean Phoneme Segmentation Fluency was the only model for females that retained interactions including age and classroom composition (p=.007), classroom composition and Phoneme Segmentation Fluency January risk factor (p=.012), family structure and socioeconomic status (p=.001), socioeconomic status and age (p=.014), and age and Phoneme Segmentation Fluency January risk factor (p=.017).

The interaction between age and classroom composition showed that five-year-old

females in the all-girls class had a significantly lower change in mean Phoneme Segmentation Fluency (2.109) than either four-year-olds females in the all-girls class (23.843), or those females in the six-and-older category in the all-girls class (25.665; see Figure 5). Thus, five-year-olds in the all-girls class showed little improvement in their Phoneme Segmentation Fluency ability, while those younger than five and older than five who were enrolled in the single-gender class for girls exhibited greater improvement.
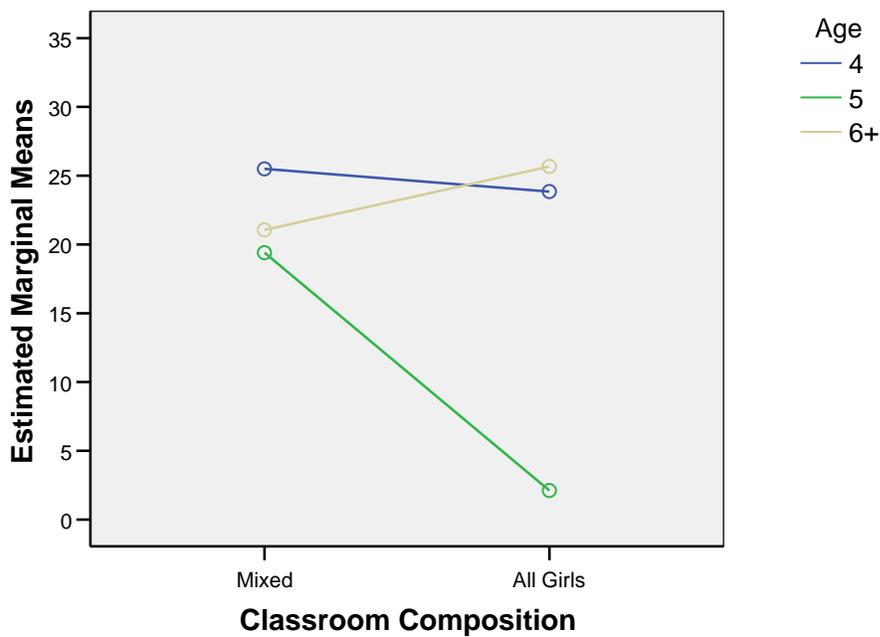
Figure 5. Interaction effect between classroom composition and age among females in phoneme segmentation fluency model.

The interaction between classroom composition and Phoneme Segmentation Fluency January risk factor revealed that females in the mixed gender class who were in the some- or at-risk categories had the highest mean change in Phoneme Segmentation Fluency (31.528) when compared to any other group, increasing their scores by 32 phonemes between the January and May tests (See Figure 6.)
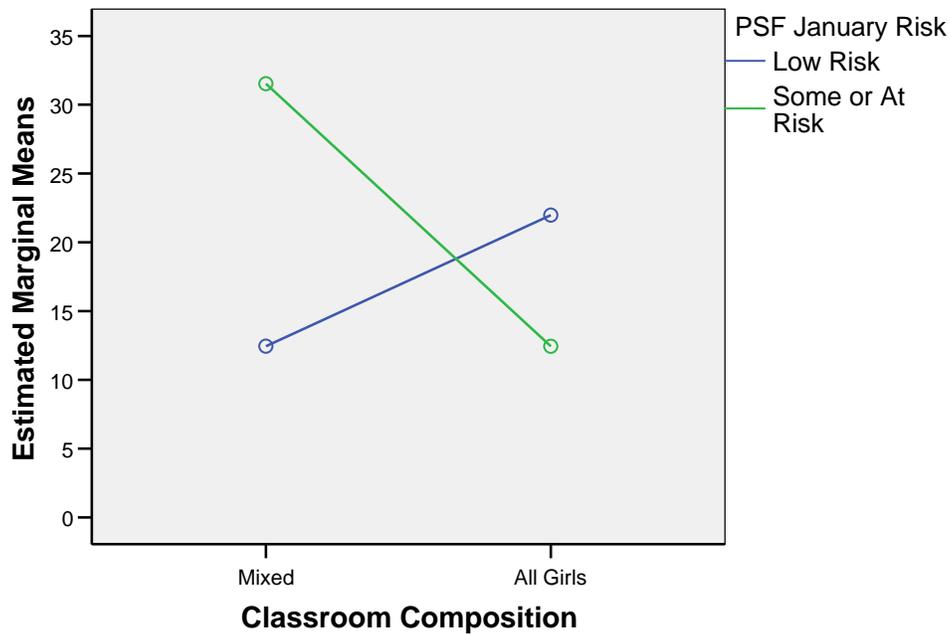
Figure 6. Interaction effect between classroom composition and January risk factor among females for phoneme segmentation fluency model.

Family structure and socioeconomic status interacted in the context of Phoneme Segmentation Fluency to indicate that females in households with two biological parents and receiving no meal assistance had a lower mean Phoneme Segmentation Fluency (12.472) than those females with one or no parents and receiving no mean assistance (26.077; see Figure 7). Among females, children living with one or no biological parents and paying full price for lunch

had improved their ability to phonemically segment a word by 26 phonemes per minute, whereas those females living with two biological parents and paying full price for lunch increased their scores by around 12 phonemes.
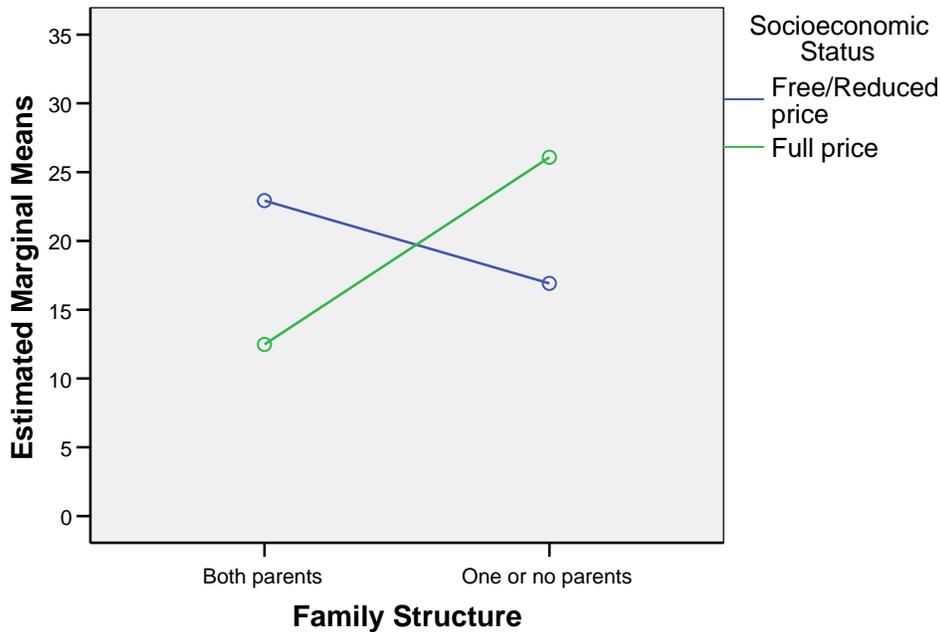
Figure 7. Interaction effect between classroom family structure and socioeconomic status among females for phoneme segmentation fluency model.

The interaction between socioeconomic status and age in the Phoneme Segmentation model showed that females six years old and older and receiving free or reduced price meals had a higher mean change in Phoneme Segmentation Fluency (29.581) than those in the same age category receiving no meal assistance (17.148; see Figure 8). In this case, older students with meal assistance increased their scores by nearly 30 points, while females in the same age category receiving no meal assistance increased their scores by only seventeen points.
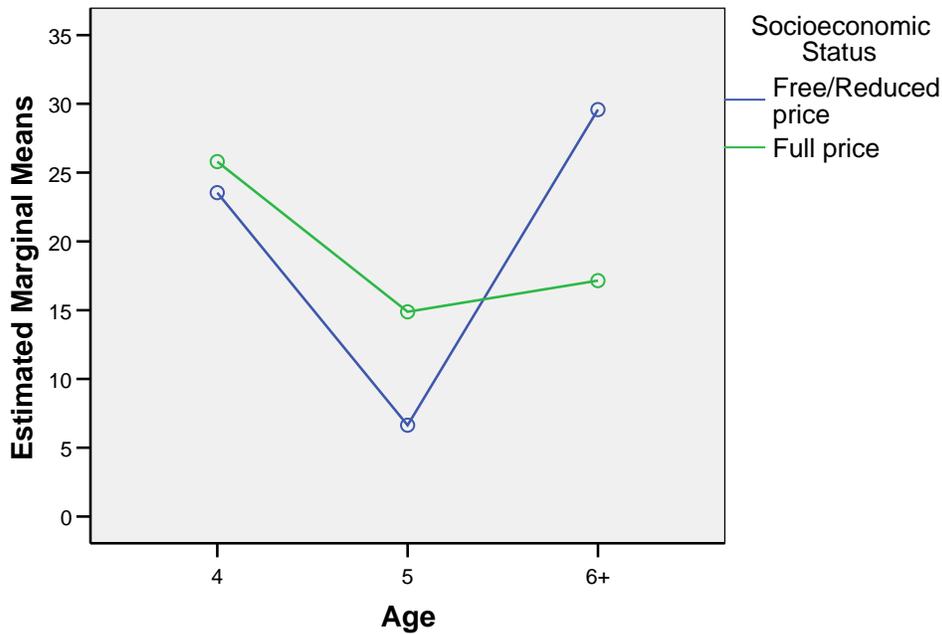
Figure 8. Interaction effect between age and socioeconomic status among females for phoneme segmentation fluency model.

In the interaction between age and Phoneme Segmentation Fluency January risk factor, females in the four-year-old or six and older categories, and in the some- or at-risk classification had a higher change in mean Phoneme Segmentation Fluency (four-year-old = 30.903/six and older = 28.795) than five-year-olds in the some or at risk category who had a low mean Phoneme Segmentation Fluency change of 6.253 (see Figure 9). In this model, students in the youngest and oldest age groups, and simultaneously in the higher risk categories, increased their ability to phonemically segment words by around 30 sounds. Five-year-olds girls in the same risk categories increased their score between January and May by only about six.
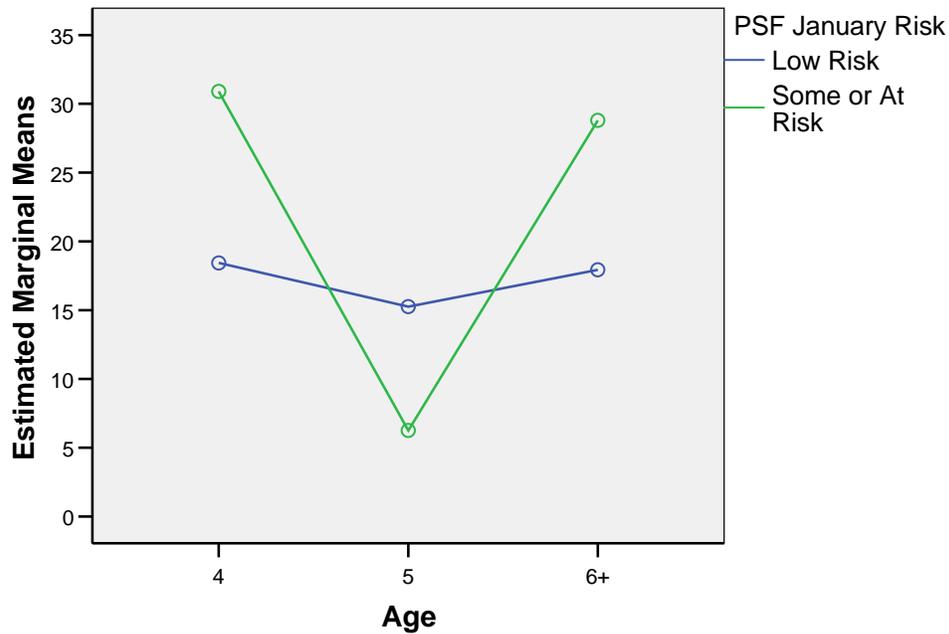
Figure 9. Interaction effect between age and January phoneme segmentation fluency risk factor among females.

The Gender Factor – Males

In order to determine the impact of gender on literacy acquisition, an analysis of covariance was used for only male students. For this phase of the analysis, information for male students in the mixed gender classes, as well as all students in the all-boys class, was utilized.

With change in mean Letter Naming Fluency as the dependent variable, none of the factors was significant when comparing males in the all-boys class with their counterparts in the mixed gender classes except the covariate initial September Letter Naming Fluency score (p=.008; see Table 11). Since classroom composition was an important research question with regard to this study, results for the all-boys class is worth noting, however. While the mean Letter Naming Fluency score was higher among those males in the all-boys class for this sample

(42.72), this was not statistically significant when compared with the average change in Letter Naming Fluency score among boys in the mixed-gender classes (35.00).

Table 11.

ANCOVA Significance Values for Change in Letter Naming Fluency Score.

Variable/Covariate	F	p
Classroom Composition	2.895	.095
Age	2.432	.100
Family Structure	.541	.585
SES	.268	.607
LNF September Score	7.491	.008
LNF Risk Score	.183	.671

In the area of Letter Naming Fluency, males in the all-boys class named approximately 43 more upper and lower case letters in May than they had named in September. This was a greater increase in their ability to name letters than the males in the mixed-gender classes, who recognized about 35 more letters during the same test periods. This difference, while greater for the males in the all-boys class, is not statistically significant.

Similarly, among male students, classroom composition was not significant (p=.226), with average change in Nonsense Word Fluency as the dependent variable. Age was a significant factor (p=.010). Those boys who began school at four years old made significantly higher mean changes (33.456) than either five-year-old boys (12.392) or boys six years or older (8.276). A significant difference did not exist between those boys five years old, and boys six years or older.

Two significant interactions were shown for Nonsense Word Fluency: one between

family structure and January Nonsense Word Fluency risk factor (see Figure 10), and another

between socioeconomic status and January Nonsense Word Fluency risk factor. For these

interactions, family structure was changed to reflect students with two biological parents, or one

or no biological parents. One interaction effect showed that boys living with two parents and in

the some- or at-risk categories had higher mean change in Nonsense Word Fluency scores than

those living with one or no parents and in the some- or at-risk categories. In this interaction,

males living with two parents and in the some- or at-risk categories were able to increase their

nonsense word score by nearly 35 sounds. In contrast, males in the same risk categories living

with one or no biological parents actually decreased their average score by three points. Another

interaction effect indicated that males with either free or reduced cost lunch and in the some- or

at-risk literacy levels had higher mean change in Nonsense Word Fluency scores than males with

no meal assistance who were in the some- or at-risk categories. For this interaction effect, males

with reduced price meals and in the highest risk categories increased their nonsense word scores

by about 40 points while males with no meal assistance in the higher risk categories showed a

decrease in the Nonsense Word Fluency scores.
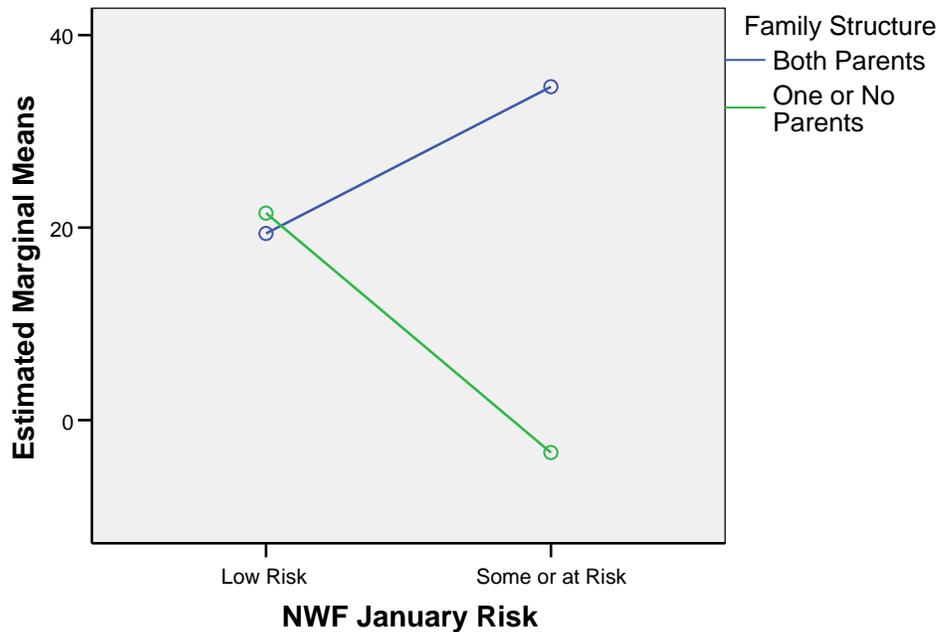
Figure 10. – Interaction effect between family structure and January nonsense word fluency risk factor among males.

Classroom composition (<.001), and Initial Sound Fluency January score (p=.014) were found to be significant with mean change in Initial Sound Fluency as the dependent variable. The mean score reflecting change in Initial Sound Fluency for the all-boys class was 30.772, while the average in the mixed gender class was 7.108. Children in the all-boys class had a significantly higher mean change. Thus, for the skill of Initial Sound Fluency, males in the all-boys class increased the number of sounds that they could identify by an average of nearly 31 between September and January; in contrast, males in the mixed gender classes increased by an average of only seven sounds their ability to distinguish the initial sound of a word.

One interaction (p=.003) was shown to be significant between family structure and socioeconomic status for the Initial Sound Fluency test. For this analysis, family structure was

regrouped so that boys resided with either two biological parents, or one or no biological parents; this change was made due to small numbers of students living with only one biological parent. Students with no meal assistance and living with two biological parents had a significantly higher mean score than students living with one or no biological parents in the same socioeconomic category. Drawing any conclusions from this fact must be tempered, however, as only three students fall into this latter category. A second interaction effect is evident between socioeconomic status and Initial Sound Fluency September risk score (p=.031; see Figure 11). In this interaction, students in the low risk group and receiving free or reduced meals score significantly higher (29.861) than students in the some- or at-risk categories and receiving free or reduced price lunches (19.151). To summarize, students who started the school year at lower risk and received meal assistance increased their ability to identify the initial sounds of words to a greater degree than did students who were more at risk and receiving meal assistance.
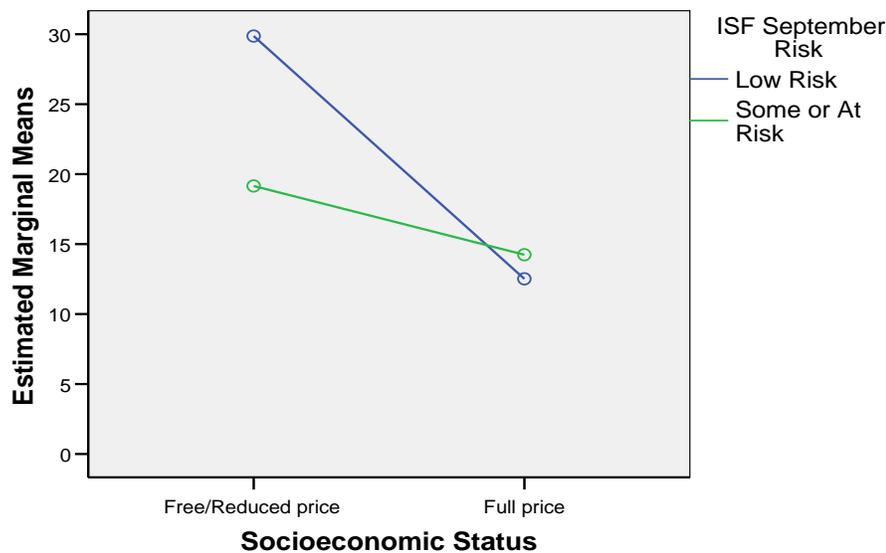
Figure 11. – Interaction effect between socioeconomic status and September initial sound fluency risk factor among males.

Among male students, with change in Phoneme Segmentation Fluency as the dependent variable in the model, two factors were significant: initial January Phoneme Segmentation Fluency score (p<.001) and classroom composition (p=.021). Boys in the mixed gender classes showed a mean change in Phoneme Segmentation Fluency of 10.370, while boys in the all-boys class had a mean change of 16.614. Thus, boys in the all-boys class had a significantly higher change in Phoneme Segmentation Fluency than boys in the mixed-gender classes.

Classroom composition was significant for the Phoneme Segmentation Fluency assessment. All students were given the one minute Phoneme Segmentation Fluency test in January and May. Males in the all-boys class increased their scores by an average of nearly 17 points. In contrast, males in the mixed gender classes increased their scores on the same test by an average of only about 10 points.

One interaction was significant for the Phoneme Segmentation Fluency test, as well: family structure and January Phoneme Segmentation Fluency risk factor (p=.016; see Figure 12). For this analysis, family structure was regrouped so that boys resided with either two biological parents, or one or no biological parents; this change was made due to small numbers of students living with only one biological parent.
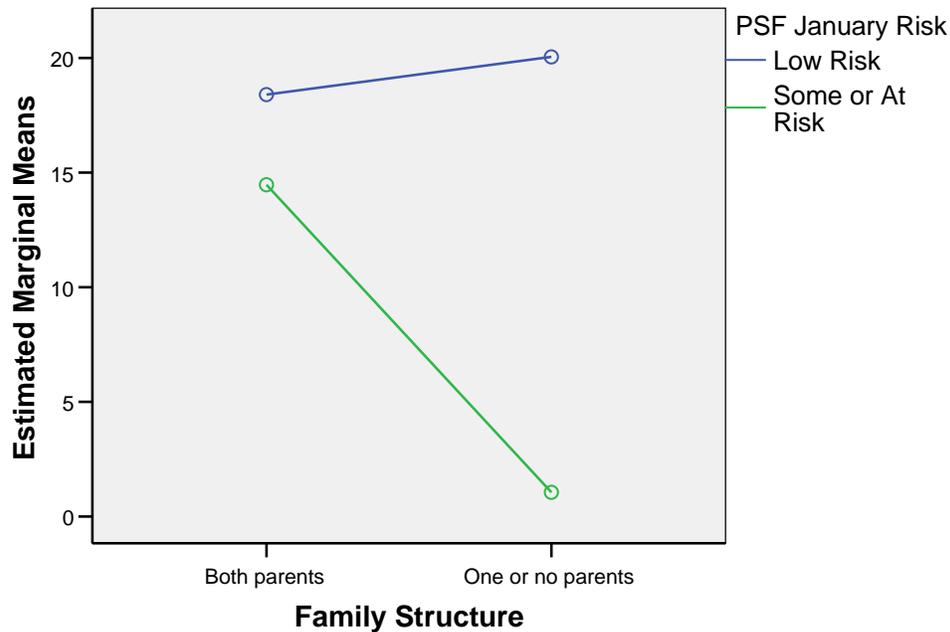
Figure 12. Interaction effect between family structure and January risk factor among males in phoneme segmentation fluency model.

Children at the some- or at-risk levels residing with two biological parents had a mean change in Phoneme Segmentation Fluency of 14.467, but children at these same risk levels living with one or no biological parents had a mean change of merely 1.053. Once again, however, these results should be understood in the context of the sample, as only ten students were at the some- or at-risk levels: six living with two biological parents, and four living with one or no biological parents.

Conclusion

To investigate single-gender kindergarten classrooms and literacy skills, a quantitative design was utilized for this study and the results conveyed in Chapter Four. This research examined the change in Letter Naming Fluency, Initial Sound Fluency, Phoneme Segmentation

Fluency, and Nonsense Word Fluency among students for whom seven variables were known. Descriptive statistics for the entire sample, as well as the mixed and single gender classes, were outlined. Using analyses of covariance, differences in literacy acquisition between students in mixed- and single-gender classes were detailed, as well as differences between males and females in various classroom compositions.   Chapter Five will be devoted to findings and conclusions.

CHAPTER FIVE

Introduction

The purpose of this research project was to investigate the relatively new idea of single-gender classrooms in public education and to explore whether classroom composition, among other variables, impacts children's literacy acquisition during their kindergarten year. The intent of Chapter One was to explain the importance of early education in a child's learning of societal, behavioral, academic, and ethical skills, and to emphasize that recent changes in federal regulations governing public education have given public schools the latitude to offer gender-specific classrooms for the purpose of improving education. In Chapter Two, relevant research was reviewed regarding early literacy acquisition as it relates to the independent variables of interest in this study: student gender, age, developmental readiness, socioeconomic status, family structure, teacher experience, and classroom composition. The methodology of this research, a quasi-experimental, quantitative design, was outlined in Chapter Three. Using analysis of covariance, the study measured literacy acquisition, the dependent variable, using scores from the Dynamic Indicators of Basic Early Literacy Skills. These assessments measured change in Letter Naming Fluency, Initial Sound Fluency, Phoneme Segmentation Fluency, and Nonsense Word Fluency. The goal of Chapter Four was to report the results of the research including descriptive and inferential statistics, focusing on the relevance of single-gender classrooms on literacy acquisition, and reporting interaction effects between classroom composition, other variables, and covariates. This final chapter will be devoted to a review of the research questions and methodology, as well as a summary of findings. Conclusions and recommendations for future research will also be explained.

Research Questions

In order to understand the relationship between literacy attainment and other variables that impact education, including classroom composition, this study began with eight research questions. During the initial phase of data analysis, a teacher's years of experience were found to be a significant factor in a child's literacy acquisition; thus, the children assigned to the only teacher with less than four years of experience were eliminated from the model, and teacher years of experience was not further investigated (See Chapter Four for complete explanation). The following seven research questions were addressed:

- Does a child's gender impact his or her academic growth, as measured by four subtests of the assessment entitled Dynamic Indicators of Basic Early Literacy Skills (DIBELS)? If so, to what degree?

- Does a child's age (birth date) influence his or her academic growth, as measured by four subtests of the assessment entitled DIBELS? If so, to what degree?

- Does a child's developmental readiness, as measured by the district's screening tool or the child's exposure to a *Young-5's* (pre-kindergarten) program influence his or her academic growth, as measured by four subtests of the assessment entitled DIBELS? If so, in what ways?

- Does the socioeconomic status of a child's primary household influence his or her academic progress, as measured by four subtests of the assessment entitled DIBELS? If so, in what ways?

- Does a child's family structure influence his or her academic growth, as measured by four subtests of the assessment entitled DIBELS? If so, to what degree?

- Does the gender composition of a kindergarten classroom impact the academic growth of

male or female students, as measured by four subtests of the assessment entitled DIBELS? If so, in what ways?

- Is there an interaction affect between the gender composition of a child's classroom and any of the following phenomena: gender, age (birth date), developmental readiness, socio-economic status, family structure, or teacher years of experience? If so, what is the relationship?

<p style="text-align:center">Summary of Findings and Conclusions</p>

Each research question in this study focused on a variable that, according to educational literature, influences a child's early reading skills. These factors, along with interactions among them, form the basis for the findings of this investigation.

The Question of Age

Chronological age, one of many considerations in whether a child will be successful when he or she starts school, was investigated in this study. The literature is somewhat divided regarding the relevance of age in determining the ideal point at which a child should begin his or her educational journey. Some studies indicated that children who are older when they start school are more academically successful (Cascio, 2008; Holloway, 2003; Oshima & Domaleski, 2006), but others suggested that there is no long term gain from delaying entry to school (Marshall, 2003). The results of this study indicated that for two of the Dynamic Indicators of Basic Early Literacy Skills (DIBELS) tests including Initial Sound Fluency and Phoneme Segmentation Fluency, age was not a significant variable. With Letter Naming Fluency as the dependent variable, however, age was significant. Among females, age was significant ($p=.024$) with four-year-olds having a higher mean change in average score than the oldest children in the

six- and seven-year-old category. Among boys, with Nonsense Word Fluency as the dependent variable, age was also significant (p=.010), with four-year-olds having a higher average mean change than either five-year-olds or six- and seven-year olds. The fact that in two of the DIBELS tests age was not significant, along with the results of the Letter Naming Fluency and Nonsense Word Fluency tests, which indicate that four-year-old children had greater average gains than those who were five or older, supports the literature that indicated that age alone does not provide a clear indication of a child's school success. The results also show that delaying school solely based on age may not be warranted.

The Question of Readiness

Readiness is another indicator used by schools and parents to determine the most appropriate time for a child to begin school. Most definitions of readiness include not only age but a combination of a child's social, emotional, behavioral, academic, and motor skills. Whereas many schools use a screening tool to measure readiness in an effort to plan for the individual needs of each child (Denham, 2006; Hills, 1987), the readiness scores for the district in this study were incomplete; therefore, the measure of readiness was modified. During the initial test for each of the DIBELS assessments, children received not only a number score but also one of three labels based on that score: at risk, some risk or low risk. For purpose of analysis, this categorical label was used as a measure of each child's level of readiness. In this study, readiness was not significant for two of the DIBELS tests: Letter Naming Fluency or Nonsense Word Fluency. Readiness was significant, however, in the Initial Sound Fluency and Phoneme Segmentation Fluency assessments. In the area of Initial Sound Fluency, readiness was significant (p=.045), with low-risk students having improved, on average, more than at-risk students. Likewise, for the Phoneme Segmentation Fluency test, readiness was significant

(p=.002) with children in the low-risk and some-risk categories showing large average increases in their ability to pronounce phonemes (about 20), while children in the at-risk category improved little (about 2). Thus, in support of previous research on readiness, this study showed that children who possess more ability to understand literacy concepts when they begin school - in other words, indicate greater readiness - also show the greatest gains over the duration of their kindergarten year on at least some measures.

The Question of Gender

To understand the variable of gender, students were separated into two groups, male and female. An analysis of covariance determined whether differences existed between females in the mixed gender classes and their counterparts in the all-girls class. Likewise, the same model was used to determine whether differences were evident among males in the mixed gender classes and the males in the all-boys class.

With regard to gender, results for this study were mixed and varied by the dependent variable measure. Among males, performance on the Letter Naming Fluency and Nonsense Word Fluency measures was about the same whether the boys were in the mixed or single gender classes; there was no statistical difference in scores. In contrast, among males, classroom composition was significant with the Initial Sound Fluency test as the measure. Males in the all-boys class had significantly higher average increases (by an average of 31) in their Initial Sound Fluency scores (p<.001), while males in the mixed-gender classes increased their scores by an average of seven. Likewise, among females, performance on the Letter Naming Fluency and Nonsense Word Fluency tests was about the same for girls regardless of the composition of the class; no statistical difference existed. Like the males, though, for the Initial Sound Fluency assessment, girls in the all-girls class increased their scores significantly more (p=.001) than girls

in the mixed-gender classes. Females in the single-gender class increased their scores by almost 30, while females in the mixed gender classes increased by about 17.

To summarize, students in both the all-boys class and the all-girls class increased their Initial Sound Fluency scores by about 30 sounds. This represents a greater increase than children in the mixed-gender classes. Further, girls in the mixed-gender classes increased their scores by about 17 and boys in the mixed-gender classes increased their scores by about seven. In the single-gender classes, boys and girls performed about the same, but in mixed-gender classes, girls increased their Initial Sound Fluency scores by ten more than did the boys in mixed-gender classes.

In the area of Phoneme Segmentation Fluency, this pre-reading skill was not significantly different for girls, regardless of the composition of the class. In contrast, classroom composition was significant (p=.021) among males. Boys in the mixed-gender class showed an average improvement of 10.370 while boys in the all-boys class had an average change of 16.614. Boys in the all-boys class pronounced about six more phonemes during the one-minute test than did boys in the mixed-gender class.

Previous research on the differences in learning among males and females has shown that gender impacts student learning. Girls tend to mature more quickly than boys, and girls generally master communication skills, such as reading, earlier than boys (Ma, 2008; Tyre, 2008; Gurian, 2001). Results of this study indicated that boys and girls performed about the same over the course of the kindergarten year. In one skill area, Initial Sound Fluency, however, males in the all-boys class and females in the all-girls class outperformed their gender counterparts in the mixed-gender classes. Similarly, on the measure of Phoneme Segmentation Fluency, males in the all-boys class surpassed males in the mixed gender classes by significantly increasing their

average scores.

The Question of Classroom Composition

Research on single-sex classrooms is limited. One review of studies by Mael, Alonso, Gibson, Rogers, and Smith (2005) concluded that some research found that students in single-sex schools had higher achievement, while other studies showed mixed results.

This study of kindergarten students in single and mixed-gender classrooms sought specifically to add to the research base on single-sex classrooms. Results of this study indicated that classroom composition was important and statistically significant ($p<.001$) on one DIBELS assessment, Initial Sound Fluency. On this test, both the all-boys class and the all-girls class had significantly higher average gains (about 30) than students in the mixed gender classes (about 12). Students in the all-boys and all-girls classes identified about eighteen more initial sounds of words than students in mixed-gender classes.

In addition to this finding, other DIBELS measures, including Nonsense Word Fluency and Letter Naming Fluency, showed that classroom composition may have influenced literacy acquisition, at least among this sample. On the test of Nonsense Word Fluency, students in both of the single gender classes showed greater gains than the students in the mixed gender classes, though this was not statistically significant. With regard to Letter Naming Fluency, again, though not statistically significant, males in the all-boys class had greater average gains than students in the mixed-gender classes. Some of these results then, cannot be generalized beyond this particular group of students; however, these results indicate that for some literacy skills, the single-gender classroom composition impacts student achievement and warrants further exploration as an educational option.

Both socioeconomic status and family structure have been shown to impact student achievement in reading. Children in low income households, or with other risk factors, tend to have poorer academic performance (Berliner, 2009; Matuszek & Haskin, 1978; Zill & West, 2001). Often, socioeconomic status is linked to family structure with children in single-family households at greater risk of poverty and other detrimental factors (Noble, Farah & McCandliss, 2006; Zill & West, 2001). The results of this study corroborated the links noted in previous research as demonstrated by several interactions effects.

Socioeconomic status and family structure together were relevant in three interaction effects. The first utilized Phoneme Segmentation Fluency as the dependent variable. Among students in all classes, mixed and single-gender, family structure and socioeconomic status interacted significantly (p=.043) to indicate that students living with one or no biological parents in the home and receiving no meal assistance outperformed students living with both biological parents in the same socioeconomic category. These results would seem to contradict existing research that links poorer performance with family structures in which children are not living with two biological parents, as two-parent homes often have fewer risk factors. Results of another interaction effect (p=.001), this one also involving family structure and socioeconomic status with Phoneme Segmentation Fluency scores as the dependent variable, showed similar results. Among girls, females with two biological parents in the home and receiving no meal assistance had a lower mean change in Phoneme Segmentation Fluency scores than females living with one or no biological parents and receiving no meal assistance. The reasons for the outcomes of these interaction effects is unclear, but one explanation may be that while these students live in a family structure associated with greater risk possibly leading to poorer

academic performance, the family income is higher, as indicated by the fact that the families do not qualify for meal assistance, and therefore the risk is mitigated.

The third interaction effect involving socioeconomic status and family structure (p=.003) was indicated among boys with the Initial Sound Fluency test scores as the measure. These results aligned with research that children in two-parent households often show better school performance. In this study, males living with two biological parents, and whose families paid full price for lunch, showed significantly greater increases in mean score than boys living with one or no biological parents and paying full price for lunch. Any solid conclusions, however, cannot be drawn about this sample because only three students fell into this latter category.

The covariate of readiness combined with other variables in four interaction effects. One interaction effect was significant (p=.012) for classroom composition and readiness as measured by the dependent variable of Phoneme Segmentation Fluency. Girls in the mixed-gender classes who possessed lower readiness scores had a higher mean change in Phoneme Segmentation Fluency than girls in the all-girls class. In both the Nonsense Word Fluency test and the Phoneme Segmentation Fluency test results, family structure interacted with readiness. Boys living with two parents but showing less readiness for school increased their average scores significantly more than boys living with one or no biological parents and showing less readiness for school. These results indicate that among boys whose readiness screening shows them to be less ready to begin school, those living in a household with two biological parents tend to have greater school success. This supports the research that indicated that multiple risk factors such as low readiness ability combined with a non-traditional household structure puts students at greater risk for poor academic progress (Zill & West, 2001). The final interaction effect involved socioeconomic status and readiness with the Nonsense Word Fluency test as the dependent

variable. Among boys whose screening showed them to be less ready for a school experience, those receiving free or reduced lunch had a higher mean change in score than those whose families pay full price for lunch. These results indicated that some male students, who initially seem unready for school, may overcome their deficit and perform adequately given time, resources, and experience.

Age combined with other factors in three interaction effects, all of them with Phoneme Segmentation Fluency as the dependent variable, and all of them among female students. Among girls who were in the lower readiness categories, those who were four years old or in the six- and seven-year-old groups improved their Phoneme Segmentation scores to a significantly greater extent than did those who were five years old (p=.017). Existing research is mixed in terms of the criteria that best identifies students who will be successful in school. This research project did not clarify this dilemma but did indicate that girls who are young and screen as having fewer of the skills needed for school readiness actually may have increased their literacy ability to a greater extent than the typical five-year-old girl whose readiness is not apparent. Age and socioeconomic status also showed a significant interaction effect (p=.014). In this scenario, girls in the oldest age category (six or seven years old) and receiving meal assistance showed greater gains in Phoneme Segmentation Fluency scores than girls of the same age who received no meal assistance. The final interaction between age and classroom composition indicated that girls who were five years old and in the all-girls class had a lower mean change in Phoneme Segmentation Fluency scores than either younger (four years old) or older (six and seven years old) females in the all-girls class. As with the interaction effect noted earlier, this may indicate that students who start school at a younger age have more room to improve and are successful in acquiring literacy skills. These results also supported research by Gurian (2001), Sax (2007),

and Ready et al. (2005) that indicated that girls possess a readiness for school earlier than boys and have a greater ability to succeed at language skills.

<div align="center">Implications for Schools and Educational Leaders</div>

As public school leaders continue to search for ways to improve educational experiences for young children, and, more specifically, to improve students' communication skills, especially in the area of reading proficiency, single-sex classrooms should be seen as a viable option. Leaders in early elementary programs realize that very young children benefit from exposure to an array of literacy activities and strategies. Principals and teachers should proceed with confidence into the arena of single-sex education, knowing that changes in Title IX regulations permit gender-specific education within reasonable guidelines.

Children, even the very youngest, have learning preferences and differences, some of which diverge along gender lines. The current policy climate allows single-gender classrooms to exist alongside traditional mixed gender classes in public schools so that educational leaders can provide various learning environments that suit the needs of children, parents, and families.

While research on the academic benefits of single-gender education in public schools is limited, this study corroborated previous research showing that some students benefit from a gender-specific environment. This study of kindergarten students' acquisition of literacy skills in single- and mixed-gender classrooms indicated no negative academic outcomes for children in single-gender classrooms. Further, the results indicated that on some DIBELS measures, students in the all-girls and all-boys classes had greater average gains than did those in mixed gender classes. Though the overall results were mixed, this study should serve as an incentive for leaders to provide learning options for children to help them become successful readers.

Recommendations for Future Research

Future endeavors should focus on broadening the base of research on single-gender education in four ways: additional research into public school single-gender classrooms, research that attempts an experimental design, research that utilizes a larger sample, and research that incorporates multiple variables.

First, much of the past research on single-gender education has focused on private, rather than public, schools, because prior to 2006, regulations prohibited single-gender education in the public realm. Additional research on gender-specific education with a more diverse population would provide a more generalized understanding of the impact of education when boys and girls learn in separate classrooms.

Second, though it is difficult, if not impossible, to create a study in which the sample is truly random, and in which the research is experimental rather than quasi-experimental as in this study, this should not discourage further research into gender-specific learning environments. Current regulations permit single-gender classrooms as one of many options for educating children, and many parents and guardians have strong preferences regarding their child's learning environment. Researchers should not be discouraged if they are unable to randomly place students in various classroom settings in order to conduct experimental studies. Rather, they should attempt to link research questions to specific outcomes in an attempt to determine if single-sex education can benefit students in certain academic areas.

Third, this study examined only one relatively small district in western Michigan that offered single-gender classrooms at a single grade level, kindergarten. Generalizability could be increased if future studies utilized a larger sample; for example, all kindergarten classrooms in a larger system or geographical area that offers both single and mixed gender classes. Research

into single-gender classrooms at other early elementary grades would also expand the research base.

Finally, as in this study, it is important that future research continue to examine multiple variables along with the single-gender factor. Students' learning is dependent upon many factors including those in their homes, in their communities, and in their schools. For this reason, single-gender schooling may be beneficial for some students but not for others. Some of these variables were incorporated into this study including gender, age, school readiness, socioeconomic status, and family structure. The interactions among these factors and others, including race, should be considered in future research.

Conclusion

This research project explored several research questions related to kindergarten children's acquisition of literacy skills. While investigating the influence of gender, age, readiness, socioeconomic status, and family structure, the study focused on early literacy and single-gender classrooms. Using analyses of covariance, the study measured acquisition of literacy skills using four assessments that are part of the Dynamic Indicators of Basic Early Literacy Skills. The specific skills measured were Letter Naming Fluency, Initial Sound Fluency, Phoneme Segmentation Fluency, and Nonsense Word Fluency.

Findings revealed that several factors including classroom composition significantly affected students' literacy scores. Classroom composition was shown to be statistically significant on the test of Initial Sound Fluency with children in both of the single-gender classrooms (all-boys, and all-girls) showing higher mean change in scores than children in the mixed gender classes. In addition, one interaction effect between classroom composition and age was significant for females. Girls who were in one of two age groups, the youngest and the

oldest, and in the girls' single gender class, had a higher mean change in Phoneme Segmentation Fluency scores than five-year-old females in the all-girls class.

These results show that classroom composition affects some academic outcomes and that some students may benefit from a single-gender environment. While additional research will add to the knowledge base on gender specific education, in the meantime, public school leaders should investigate and consider single-gender classrooms in their quest to improve educational opportunities.

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APPENDICES

Appendix A – Human Subjects Review Board Approval

EASTERN MICHIGAN UNIVERSITY

Education First

January 7, 2009

Celeste Diehm
Department of Leadership and Counseling

Dear Celeste Diehm:

The Human Subjects Institutional Review Board (IRB) of Eastern Michigan University has reviewed and approved as exempt research your proposal titled, "Achievement of Boys and Girls in Single-Gender Kindergarden Classrooms at One Elementary School in Western Michigan." The IRB determined that the rights and welfare of the individual subjects involved in this research are carefully guarded.

Exempt research does not require reporting of continuation one year after approval if the project continues. However, should the sample or procedures change as to have an impact on human subjects, then UHSRC should be notified by using the *Minor Modification to Research Protocol* or the *Request for Human Subjects Approval* form depending upon the scope of the changes (see the forms online).

On behalf of the Human Subjects Committee, I wish you success in conducting your research.

Sincerely,

Deb de Laski-Smith, Ph.D.
Interim Dean
Graduate School
Administrative Co-Chair
University Human Subjects Review Committee

Reference # 081210

University Human Subjects Review Committee · Eastern Michigan University · 200 Boone Hall
Ypsilanti, Michigan 48197
Phone: 734.487.0042 Fax: 734.487.0050
E-mail: human.subjects@emich.edu
www.ord.emich.edu

Appendix B – Research Participant Agreement

Celeste L. Diehm
Eastern Michigan University Doctoral Student
College of Education
Department of Leadership and Counseling
John W. Porter Building, Suite 304
Ypsilanti, MI 48197

December 1, 2008

Dear Mrs. Swan:

Thank you for granting me the opportunity to conduct research about the literacy skills of students who attend Wayland Union Schools. I appreciate your willingness to allow me access to information related to the literacy acquisition of kindergarten students at Baker Elementary School as it relates to mixed and single gender classrooms. I value your help in learning more about the relationship between students' knowledge of pre-literacy skills and classroom composition.

By signing this document, you agree that:

- The Wayland Union Schools District gathers the following data as part of the district's information base –
  - o Student gender
  - o Student age
  - o Student readiness score
  - o Parent educational level
  - o Structure of the family unit (married, divorced, living with other family member
  - o Free/reduced meal status (socioeconomic level)
  - o Teacher year's of experience
  - o Classroom composition (mixed/single gender)
  - o Student scores on the Dynamic Indicators of Basic Early Literacy Skills

- Wayland Union Schools will maintain control over all of the above data.

- Wayland Union Schools will provide the Principal Investigator, Celeste Diehm, access to the data noted above in an anonymous form.

- Wayland Union Schools is providing the Principal Investigator, Celeste Diehm, access to the information noted above and that the district is doing so on a strictly voluntary basis.

- The results of this research may be disseminated; however, all information about the subjects and the district will be removed so that information and results are anonymous.

Further, the Principal Investigator, Celeste Diehm, agrees that any information to which the Wayland Union Schools District provides access will be held in the strictest confidence and that the information will be provided separate from the identifying information so that students' and families' privacy will be maintained. For added protection, all information, both paper and electronic, will be kept in a locked file in the office of the Principal Investigator, Celeste Diehm.

Appendix B Continued

Because this research involves only pre-existing data collected by Wayland Union Schools, there is no foreseeable risk to any of the subjects. At the same time, there is no direct benefit to the subjects; however, district personnel may benefit by reviewing the results of the research and considering those results as they make decisions about the future of single-gender classrooms in the district.

In addition, you, on behalf of Wayland Union Schools, are aware that you may withdraw access to the information and from this research project at any time without prejudice or effect on my standing with Eastern Michigan University. You are also aware that you are free to ask questions about any techniques to be used or procedures to be undertaken.

Your signature below indicates the willingness of Wayland Union Schools to participate in this project.

Sincerely,

Celeste L. Diehm

I understand the nature of this research project, my rights and my responsibilities. My signature below indicates my willingness to allow Celeste Diehm, Principal Investigator, to pursue this research.

Eivor Swan   2-1-08
Name (printed)   Signature   Date

This research protocol and informed consent document has been reviewed and approved by the Eastern Michigan University Human Subjects Review Committee for use from _____ to _____ (date). If you have questions about the approval process, please contact Dr. Deb de Laski-Smith (734.487.0042, Interim Dean of the Graduate School and Administrative Co-chair of UHSRC, human.subjects@emich.edu).